LilyPond

The music typesetter

Notation Reference

The LilyPond development team

This manual provides a reference for all notation that can be produced with LilyPond version 2.25.3. It assumes that the reader is familiar with the material in the Section "Learning Manual" in *Learning Manual*.

For more information about how this manual fits with the other documentation, or to read this manual in other formats, see Section "Manuals" in *General Information*.

If you are missing any manuals, the complete documentation can be found at `https://lilypond.org/`.

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For LilyPond version 2.25.3

Table of Contents

1 Musical notation 1

1.1 Pitches 1
1.1.1 Writing pitches 1
Absolute octave entry 1
Relative octave entry 2
Accidentals 6
Note names in other languages 8
1.1.2 Changing multiple pitches 10
Octave checks 10
Transpose 11
Inversion 14
Retrograde 14
Modal transformations 15
1.1.3 Displaying pitches 17
Clef 17
Key signature 21
Ottava brackets 24
Instrument transpositions 27
Automatic accidentals 28
Alternate accidental glyphs 36
Ambitus 37
1.1.4 Note heads 40
Special note heads 40
Easy notation note heads 42
Shape note heads 43
Improvisation 47
1.2 Rhythms 48
1.2.1 Writing rhythms 48
Durations 48
Tuplets 51
Scaling durations 56
Ties 58
1.2.2 Writing rests 61
Rests 61
Invisible rests 63
Full measure rests 66
Caesuras 70
1.2.3 Displaying rhythms 72
Time signature 72
Metronome marks 76
Upbeats 80
Unmetered music 81
Polymetric notation 83
Automatic note splitting 87
Showing melody rhythms 88
1.2.4 Beams 91
Automatic beams 91
Setting automatic beam behavior 94

Manual beams . . . 102
Feathered beams . . . 105
1.2.5 Bars . . . 106
Bar lines . . . 106
Automatic bar lines . . . 115
Bar numbers . . . 117
Bar and bar number checks . . . 124
Rehearsal marks . . . 125
Measure counts . . . 127
Section divisions . . . 129
1.2.6 Special rhythmic concerns . . . 130
Grace notes . . . 130
Aligning to cadenzas . . . 135
Time administration . . . 137
1.3 Expressive marks . . . 138
1.3.1 Expressive marks attached to notes . . . 138
Articulations and ornamentations . . . 138
Dynamics . . . 141
New dynamic marks . . . 149
1.3.2 Expressive marks as curves . . . 151
Slurs . . . 151
Phrasing slurs . . . 155
Breath marks . . . 156
Falls and doits . . . 157
1.3.3 Expressive marks as lines . . . 158
Glissando . . . 158
Arpeggio . . . 162
Trills . . . 166
1.4 Repeats . . . 168
1.4.1 Long repeats . . . 169
Written-out repeats . . . 169
Simple repeats . . . 169
Alternative endings . . . 170
Other variation in repeated sections . . . 172
Al-fine repeats . . . 174
Segno repeat structure . . . 175
Segno repeat appearance . . . 178
Manual repeat marks . . . 183
1.4.2 Short repeats . . . 186
Percent repeats . . . 186
Tremolo repeats . . . 189
1.5 Simultaneous notes . . . 191
1.5.1 Single voice . . . 192
Chorded notes . . . 192
Chord repetition . . . 194
Simultaneous expressions . . . 195
Clusters . . . 197
1.5.2 Multiple voices . . . 197
Single-staff polyphony . . . 197
Voice styles . . . 202
Collision resolution . . . 202
Merging rests . . . 207

Automatic part combining 208
Writing music in parallel 213
1.6 Staff notation 216
1.6.1 Displaying staves 216
Instantiating new staves 216
Grouping staves 217
Nested staff groups 221
Separating systems 223
1.6.2 Modifying single staves 224
Staff symbol 224
Ossia staves 227
Hiding staves 231
1.6.3 Writing parts 236
Instrument names 236
Quoting other voices 239
Formatting cue notes 243
Compressing empty measures 248
1.7 Editorial annotations 250
1.7.1 Inside the staff 250
Selecting notation font size 250
Fingering instructions 254
Gliding fingers 256
Hidden notes 259
Coloring objects 260
Staff highlights 262
Parentheses 265
Stems 267
1.7.2 Outside the staff 268
Note names 268
Balloon help 270
Grid lines 271
Analysis brackets 273
1.8 Text 277
1.8.1 Writing text 277
Text objects overview 277
Text scripts 279
Text spanners 280
Section labels 283
Text marks 283
Separate text 287
1.8.2 Formatting text 289
Text markup introduction 289
Selecting font and font size 293
Text alignment 295
Graphic notation inside markup 300
Music notation inside markup 302
1.8.3 Fonts 305
Finding fonts 305
Font families 305
Font features 307
Single entry fonts 308
Entire document fonts 309

Music fonts 311

2 Specialist notation 313

2.1 Vocal music 313
2.1.1 Common notation for vocal music 313
References for vocal music 313
Entering lyrics 314
Aligning lyrics to a melody 315
Automatic syllable durations 317
Manual syllable durations 319
Multiple syllables to one note 321
Multiple notes to one syllable 321
Extenders and hyphens 325
Gradual changes of vowel 325
2.1.2 Techniques specific to lyrics 326
Working with lyrics and variables 326
Placing lyrics vertically 327
Placing syllables horizontally 332
Lyrics and repeats 334
Divisi lyrics 342
Polyphony with shared lyrics 343
2.1.3 Stanzas 345
Adding stanza numbers 345
Adding dynamics marks to stanzas 346
Adding singers' names to stanzas 347
Stanzas with different rhythms 347
Printing stanzas at the end 350
Printing stanzas at the end in multiple columns 351
2.1.4 Songs 353
References for songs 353
Lead sheets 353
2.1.5 Choral 354
References for choral 354
Score layouts for choral 355
2.1.6 Opera and stage musicals 357
References for opera and stage musicals 357
Character names 358
Musical cues 360
Spoken music 363
Dialogue over music 363
2.1.7 Chants psalms and hymns 365
References for chants and psalms 365
Setting a chant 365
Pointing a psalm 371
Phrase bar lines in hymn tunes 374
Partial measures in hymn tunes 375
2.1.8 Ancient vocal music 377
2.2 Keyboard and other multi-staff instruments 377
2.2.1 Common notation for keyboards 378
References for keyboards 378
Changing staff manually 379

Changing staff automatically . . . 381
Staff-change lines . . . 383
2.2.2 Piano . . . 386
Piano pedals . . . 386
2.2.3 Accordion . . . 387
Discant symbols . . . 387
2.2.4 Harp . . . 388
References for harps . . . 388
Harp pedals . . . 389
2.3 Unfretted string instruments . . . 389
2.3.1 Common notation for unfretted strings . . . 390
References for unfretted strings . . . 390
Bowing indications . . . 390
Harmonics . . . 391
Snap (Bartók) pizzicato . . . 392
2.4 Fretted string instruments . . . 392
2.4.1 Common notation for fretted strings . . . 393
References for fretted strings . . . 393
String number indications . . . 394
Default tablatures . . . 395
Custom tablatures . . . 413
Fret diagram markups . . . 416
Predefined fret diagrams . . . 426
Automatic fret diagrams . . . 437
Right-hand fingerings . . . 440
2.4.2 Guitar . . . 441
Indicating position and barring . . . 441
Indicating harmonics and dampened notes . . . 442
Indicating power chords . . . 443
2.4.3 Banjo . . . 444
Banjo tablatures . . . 444
2.4.4 Lute . . . 445
Lute tablatures . . . 445
2.5 Percussion . . . 446
2.5.1 Common notation for percussion . . . 446
References for percussion . . . 446
Basic percussion notation . . . 446
Drum rolls . . . 447
Pitched percussion . . . 448
Percussion staves . . . 448
Custom percussion staves . . . 451
Ghost notes . . . 453
2.6 Wind instruments . . . 453
2.6.1 Common notation for wind instruments . . . 454
References for wind instruments . . . 454
Fingerings . . . 454
2.6.2 Bagpipes . . . 456
Bagpipe definitions . . . 456
Bagpipe example . . . 457
2.6.3 Woodwinds . . . 458
2.6.3.1 Woodwind diagrams . . . 458
2.7 Chord notation . . . 467

2.7.1 Chord mode ... 467
Chord mode overview ... 467
Common chords ... 468
Extended and altered chords ... 469
Chord inversions and specific voicings ... 472
2.7.2 Displaying chords ... 472
Printing chord names ... 472
Customizing chord names ... 475
Chord grids ... 480
2.7.3 Figured bass ... 483
Introduction to figured bass ... 484
Entering figured bass ... 484
Displaying figured bass ... 488
2.8 Contemporary music ... 491
2.8.1 Pitch and harmony in contemporary music ... 491
References for pitch and harmony in contemporary music ... 491
Microtonal notation ... 491
Contemporary key signatures and harmony ... 491
2.8.2 Contemporary approaches to rhythm ... 491
References for contemporary approaches to rhythm ... 491
Tuplets in contemporary music ... 491
Contemporary time signatures ... 491
Extended polymetric notation ... 491
Beams in contemporary music ... 491
Bar lines in contemporary music ... 491
2.8.3 Graphical notation ... 491
2.8.4 Contemporary scoring techniques ... 492
2.8.5 New instrumental techniques ... 492
2.8.6 Further reading and scores of interest ... 492
Books and articles on contemporary musical notation ... 493
Scores and musical examples ... 493
2.9 Ancient notation ... 493
2.9.1 Overview of the supported styles ... 494
2.9.2 Ancient notation – common features ... 495
Predefined contexts ... 495
Ligatures ... 495
Custodes ... 496
2.9.3 Typesetting mensural music ... 497
Mensural contexts ... 497
Mensural clefs ... 497
Mensural time signatures ... 498
Mensural note heads ... 499
Mensural flags ... 500
Mensural rests ... 501
Mensural accidentals and key signatures ... 501
Annotational accidentals (*musica ficta*) ... 502
White mensural ligatures ... 502
2.9.4 Typesetting Gregorian chant ... 503
Gregorian chant contexts ... 504
Gregorian clefs ... 504
Gregorian accidentals and key signatures ... 505
Divisiones ... 505

Gregorian articulation signs ... 506
Augmentum dots (*morae*) ... 507
Gregorian square neume ligatures ... 507
2.9.5 Typesetting Kievan square notation ... 513
Kievan contexts ... 513
Kievan clefs ... 514
Kievan notes ... 514
Kievan accidentals ... 515
Kievan bar lines ... 515
Kievan melismata ... 515
2.9.6 Working with ancient music – scenarios and solutions ... 516
Incipits ... 517
Mensurstriche layout ... 517
Transcribing Gregorian chant ... 518
Ancient and modern from one source ... 521
2.10 World music ... 523
2.10.1 Common notation for non-Western music ... 523
Extending notation and tuning systems ... 523
2.10.2 Arabic music ... 523
References for Arabic music ... 523
Arabic note names ... 524
Arabic key signatures ... 525
Arabic time signatures ... 527
Arabic music example ... 528
Further reading for Arabic music ... 529
2.10.3 Turkish classical music ... 529
References for Turkish classical music ... 529
Turkish note names ... 529
Turkish key signatures ... 530
Further reading for Turkish music ... 531
2.10.4 Persian classical music ... 531
Persian music notation ... 531
Persian tunings ... 532
Persian key signatures ... 532
Further reading on Persian music ... 533

3 General input and output ... 534

3.1 Input modes ... 534
3.2 Input structure ... 535
3.2.1 Structure of a score ... 535
3.2.2 Multiple scores in a book ... 536
3.2.3 Multiple output files from one input file ... 538
3.2.4 Output file names ... 539
3.2.5 File structure ... 539
3.3 Titles and headers ... 541
3.3.1 Creating titles headers and footers ... 542
Titles explained ... 542
Default layout of bookpart and score titles ... 545
Default layout of headers and footers ... 549
3.3.2 Custom titles headers and footers ... 549
Custom text formatting for titles ... 550

Custom layout for titles . . . 550
Custom layout for headers and footers . . . 553
3.3.3 Creating output file metadata . . . 554
3.3.4 Creating footnotes . . . 555
Footnotes in music expressions . . . 555
Footnotes in stand-alone text . . . 561
3.3.5 Reference to page numbers . . . 563
3.3.6 Table of contents . . . 564
3.4 Working with input files . . . 567
3.4.1 Including LilyPond files . . . 567
3.4.2 Different editions from one source . . . 568
Using variables . . . 568
Using tags . . . 570
Using global settings . . . 574
3.4.3 Using music functions . . . 575
3.4.3.1 Substitution function syntax . . . 575
3.4.3.2 Substitution function examples . . . 576
3.4.3.3 How to prevent sharing of music expressions . . . 578
3.4.3.4 Substitution functions and relative octave entry . . . 579
3.4.4 Special characters . . . 580
Text encoding . . . 580
Unicode . . . 581
ASCII aliases . . . 582
3.5 Controlling output . . . 583
3.5.1 Extracting fragments of music . . . 583
3.5.2 Skipping corrected music . . . 583
3.5.3 Alternative output formats . . . 584
SVG Output . . . 584
3.5.4 Replacing the notation font . . . 585
3.6 Creating MIDI output . . . 587
3.6.1 Supported notation for MIDI . . . 587
3.6.2 Unsupported notation for MIDI . . . 588
3.6.3 The MIDI block . . . 588
3.6.4 Controlling MIDI dynamics . . . 589
Dynamic marks in MIDI . . . 589
Setting MIDI volume . . . 589
Setting MIDI block properties . . . 592
3.6.5 Using MIDI instruments . . . 593
3.6.6 Using repeats with MIDI . . . 594
3.6.7 MIDI channel mapping . . . 594
3.6.8 Context properties for MIDI effects . . . 596
3.6.9 Enhancing MIDI output . . . 597
The `articulate` script . . . 598
The `swing` script . . . 598
3.7 Extracting musical information . . . 599
3.7.1 Displaying LilyPond notation . . . 599
3.7.2 Displaying scheme music expressions . . . 600
3.7.3 Saving music events to a file . . . 600

4 Spacing issues ... 601

4.1 Page layout ... 601
4.1.1 The \paper block ... 601
4.1.2 Paper size and automatic scaling ... 602
Setting the paper size ... 602
Automatic scaling to paper size ... 603
4.1.3 Fixed vertical spacing \paper variables ... 603
4.1.4 Flexible vertical spacing \paper variables ... 604
Structure of flexible vertical spacing alists ... 604
List of flexible vertical spacing \paper variables ... 605
4.1.5 Horizontal spacing \paper variables ... 606
\paper variables for widths and margins ... 606
\paper variables for two-sided mode ... 607
\paper variables for shifts and indents ... 608
4.1.6 Other \paper variables ... 608
\paper variables for line breaking ... 609
\paper variables for page breaking ... 609
\paper variables for page numbering ... 610
\paper variables concerning headers and markups ... 611
\paper variables for debugging ... 612
4.2 Score layout ... 612
4.2.1 The \layout block ... 612
4.2.2 Setting the staff size ... 614
4.3 Breaks ... 617
4.3.1 Line breaking ... 617
4.3.2 Page breaking ... 621
Manual page breaking ... 621
Optimal page breaking ... 622
Minimal page breaking ... 622
One-page page breaking ... 623
One-line page breaking ... 623
One-line-auto-height page breaking ... 623
Optimal page turning ... 623
4.4 Vertical spacing ... 624
4.4.1 Flexible vertical spacing within systems ... 624
Within-system spacing properties ... 625
Spacing of ungrouped staves ... 627
Spacing of grouped staves ... 629
Spacing of non-staff lines ... 630
4.4.2 Explicit staff and system positioning ... 631
4.4.3 Vertical collision avoidance ... 639
4.5 Horizontal spacing ... 640
4.5.1 Horizontal spacing overview ... 640
4.5.2 New spacing section ... 642
4.5.3 Changing horizontal spacing globally ... 643
Uniform stretching of tuplets ... 644
Strict note spacing ... 644
4.5.4 Adjusting horizontal spacing for specific layout objects ... 644
4.5.4.1 Overview of object-specific horizontal spacing tweaks ... 645
4.5.4.2 Spacing between adjacent non-musical items ... 645
4.5.4.3 Spacing between adjacent columns ... 646

4.5.5 Line width ... 649
4.5.6 Proportional notation ... 649
4.6 Fitting music onto fewer pages ... 655
4.6.1 Displaying spacing ... 655
4.6.2 Changing spacing ... 656

5 Changing defaults ... 659
5.1 Interpretation contexts ... 659
5.1.1 Contexts explained ... 659
Output definitions – blueprints for contexts ... 659
Score – the master of all contexts ... 660
Top-level contexts – staff containers ... 660
Intermediate-level contexts – staves ... 660
Bottom-level contexts – voices ... 661
5.1.2 Creating and referencing contexts ... 661
5.1.3 Keeping contexts alive ... 664
5.1.4 Modifying context plug-ins ... 667
5.1.5 Changing context default settings ... 668
Changing all contexts of the same type ... 668
Changing just one specific context ... 671
Order of precedence ... 673
5.1.6 Defining new contexts ... 673
Context definition overview ... 673
New contexts in MIDI ... 675
Replacing the `Score` context ... 676
5.1.7 Context layout order ... 676
5.2 Explaining the Internals Reference ... 678
5.2.1 Navigating the program reference ... 678
5.2.2 Layout interfaces ... 679
5.2.3 Determining the grob property ... 680
5.3 Modifying properties ... 681
5.3.1 Overview of modifying properties ... 681
5.3.2 The `\set` command ... 681
5.3.3 The `\override` command ... 683
5.3.4 The `\tweak` command ... 685
5.3.5 `\set` vs. `\override` ... 686
5.3.6 The `\offset` command ... 687
5.3.7 Modifying alists ... 692
5.4 Useful concepts and properties ... 694
5.4.1 Direction and placement ... 694
Articulation direction indicators ... 694
The direction property ... 695
5.4.2 Distances and measurements ... 695
5.4.3 Dimensions ... 696
5.4.4 Spanners ... 696
Modifying broken spanners ... 697
Setting minimum lengths for spanners ... 698
Controlling spanner end points ... 701
5.4.5 Line styles ... 702
5.4.6 Line spanners ... 702
5.4.7 Visibility of objects ... 704

Removing the stencil 705
Making objects transparent 705
Painting objects white 705
Using `break-visibility` 706
Special considerations 708
5.4.8 Rotating objects 711
Rotating layout objects 711
Rotating markup 711
5.4.9 Aligning objects 711
Setting `X-offset` and `Y-offset` directly 712
Using the `side-position-interface` 712
Using the `self-alignment-interface` 713
Using the `break-alignable-interface` 714
5.4.10 Modifying stencils 717
5.4.11 Modifying shapes 717
Modifying ties and slurs 717

Appendix A Notation manual tables 722
A.1 Chord name chart 722
A.2 Common chord modifiers 722
A.3 Predefined string tunings 725
A.4 Predefined fretboard diagrams 726
Diagrams for Guitar 726
Diagrams for Ukulele 728
Diagrams for Mandolin 730
A.5 Predefined paper sizes 731
A.6 MIDI instruments 733
A.7 List of colors 734
A.8 The Emmentaler font 739
Clef glyphs 739
Time Signature glyphs 740
Number glyphs 740
Figured bass symbol glyphs 741
Accidental glyphs 741
Default note head glyphs 742
Special note head glyphs 742
Note head glyphs for shape notes 742
Rest glyphs 744
Flag glyphs 745
Dot glyphs 745
Dynamic glyphs 745
Script glyphs 746
Arrowhead glyphs 747
Bracket-tip glyphs 747
Pedal glyphs 747
Accordion glyphs 748
Tie glyphs 748
Vaticana glyphs 748
Medicaea glyphs 749
Hufnagel glyphs 749
Mensural glyphs 749

Neomensural glyphs 751
Petrucci glyphs 752
Solesmes glyphs 752
Kievan Notation glyphs 753
A.9 Note head styles 753
A.10 Accidental glyph sets 754
A.11 Clef styles 755
Standard clefs 755
Percussion staff clef 756
Tab staff clefs 756
Ancient music clefs 756
Gregorian 756
Mensural 757
Kievan 758
A.12 Text markup commands 758
A.12.1 Font markup 759
A.12.2 Markup for text alignment 770
A.12.3 Graphical markup 785
A.12.4 Markup for music and musical symbols 794
A.12.5 Conditional markup 802
A.12.6 Instrument-specific markup 802
A.12.7 Accordion registers 806
A.12.8 Other markup commands 811
A.13 Text markup list commands 820
A.14 List of special characters 822
A.15 List of articulations 824
Articulation scripts 824
Ornament scripts 824
Fermata scripts 825
Instrument-specific scripts 825
Repeat sign scripts 825
Ancient scripts 826
A.16 List of breath marks 826
A.17 Percussion notes 826
A.18 List of bar lines 829
A.19 Default values for `outside-staff-priority` 833
A.20 Technical glossary 834
alist 834
callback 834
closure 834
glyph 835
grob 835
immutable 835
interface 835
lexer 835
mutable 836
output-def 836
parser 836
parser variable 836
prob 836
smob 837
spanner 837

stencil 837
A.21 Available music functions 837
A.22 Context modification identifiers 850
A.23 Naming conventions 851
A.24 Predefined type predicates 851
R5RS primary predicates 851
R5RS secondary predicates 852
Guile predicates 852
LilyPond scheme predicates 852
LilyPond exported predicates 853

Appendix B Cheat sheet 855

Appendix C GNU Free Documentation License 858

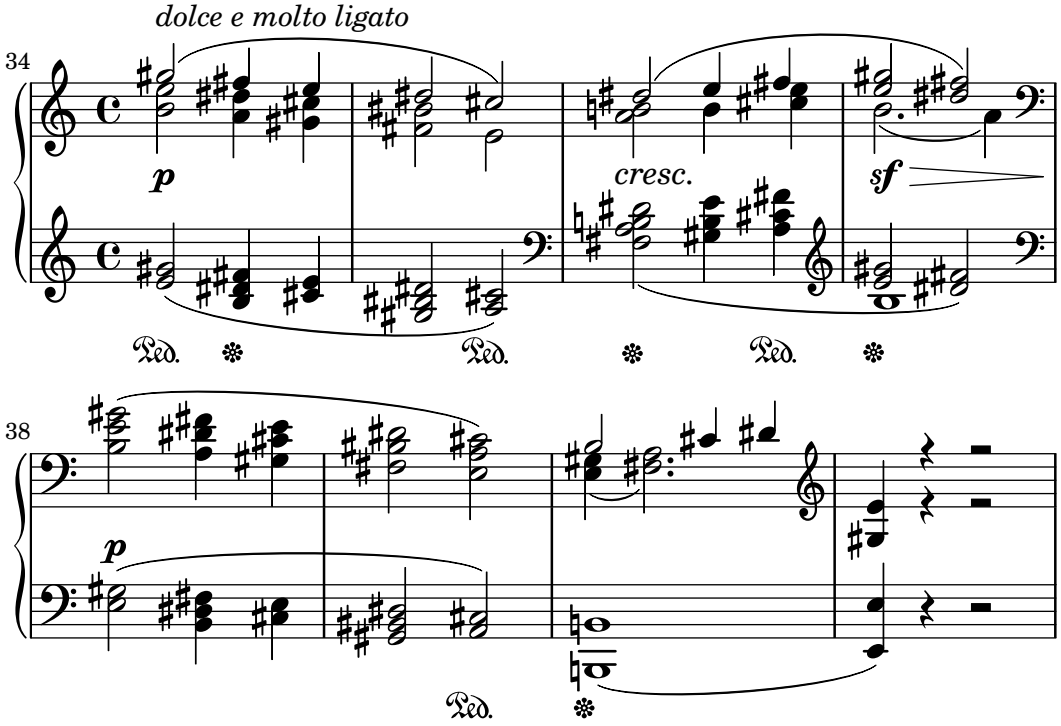
Appendix D LilyPond command index 865

Appendix E LilyPond index 875

1 Musical notation

This chapter explains how to create musical notation.

1.1 Pitches



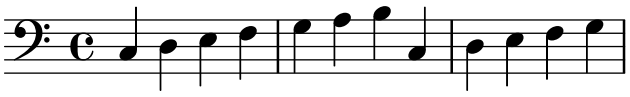
This section discusses how to specify the pitch of notes. There are three steps to this process: input, modification, and output.

1.1.1 Writing pitches

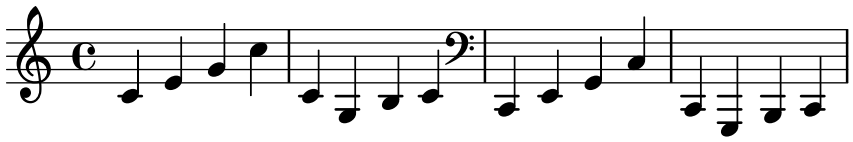
This section discusses how to input pitches. There are two different ways to place notes in octaves: absolute and relative mode. In most cases, relative mode will be more convenient.

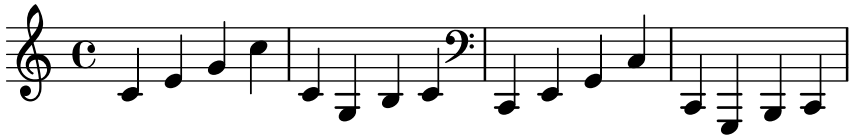
Absolute octave entry

A pitch name is specified using lowercase letters `a` through `g`. The note names `c` to `b` are engraved in the octave below middle C.

```
{
  \clef bass
  c4 d e f
  g4 a b c
  d4 e f g
}
```

Other octaves may be specified with a single quote (`'`) or comma (`,`) character. Each `'` raises the pitch by one octave; each `,` lowers the pitch by an octave.

```
{
  \clef treble
```

```
  c'4 e' g' c''
  c'4 g b c'
  \clef bass
  c,4 e, g, c
  c,4 g,, b,, c,
}
```

Common octave marks can be entered just once on a reference pitch after `\fixed` placed before the music. Pitches inside `\fixed` only need `'` or `,` marks when they are above or below the octave of the reference pitch.

```
{
  \fixed c' {
    \clef treble
    c4 e g c'
    c4 g, b, c
  }
  \clef bass
  \fixed c, {
    c4 e g c'
    c4 g, b, c
  }
}
```

Pitches in the music expression following `\fixed` are unaffected by any enclosing `\relative`, discussed next.

See also

Music Glossary: Section “Pitch names” in *Music Glossary*.

Snippets: Section “Pitches” in *Snippets*.

Relative octave entry

Absolute octave entry requires specifying the octave for every single note. Relative octave entry, in contrast, specifies each octave in relation to the last note: changing one note’s octave will affect all of the following notes.

Relative note mode has to be entered explicitly using the `\relative` command:

`\relative` *`startpitch musicexpr`*

In relative mode, each note is assumed to be as close to the previous note as possible. This means that the octave of each pitch inside *`musicexpr`* is calculated as follows:

- If no octave changing mark is used on a pitch, its octave is calculated so that the interval with the previous note is less than a fifth. This interval is determined without considering accidentals.

- An octave changing mark `'` or `,` can be added to respectively raise or lower a pitch by an extra octave, relative to the pitch calculated without an octave mark.
- Multiple octave changing marks can be used. For example, `''` and `,,` will alter the pitch by two octaves.
- The pitch of the first note is relative to *`startpitch`*. *`startpitch`* is specified in absolute octave mode. Which choices are meaningful?

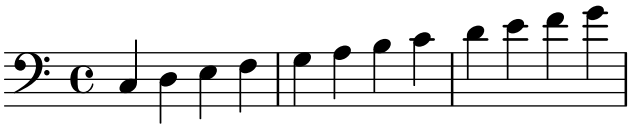
  an octave of `c`
  : Identifying middle C with `c'` is quite basic, so finding octaves of `c` tends to be straightforward. If your music starts with `gis` above `c'''`, you'd write something like `\relative c''' { gis' ... }`

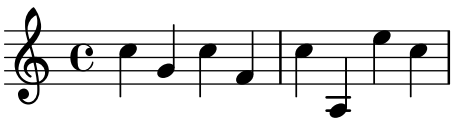
  an octave of the first note inside
  : Writing `\relative gis''' { gis ... }` makes it easy to determine the absolute pitch of the first note inside.

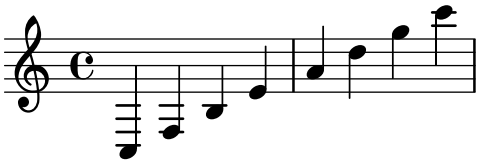
  no explicit starting pitch
  : The form `\relative { gis''' ... }` serves as a compact version of the previous option: the first note inside is written in absolute pitch itself. (This happens to be equivalent to choosing `f` as the reference pitch.)

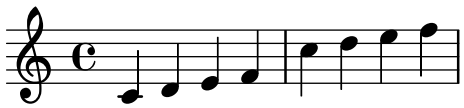
  The documentation will usually employ the last option.

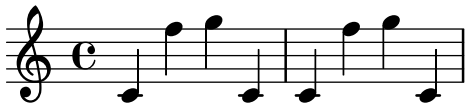
Here is the relative mode shown in action:

```
\relative {
  \clef bass
  c d e f
  g a b c
  d e f g
}
```

Octave changing marks are used for intervals greater than a fourth:

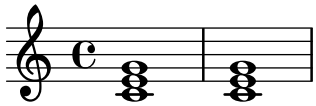
```
\relative {
  c'' g c f,
  c' a, e'' c
}
```

A note sequence without a single octave mark can nevertheless span large intervals:

```
\relative {
  c f b e
  a d g c
}
```

When \relative blocks are nested, the innermost \relative block starts with its own reference pitch independently of the outer \relative.

```
\relative {
  c' d e f
  \relative {
    c'' d e f
  }
}
```

To use absolute mode inside of \relative, put the absolute music inside \fixed c { ... } and the absolute pitches will not affect the octaves of the relative music:

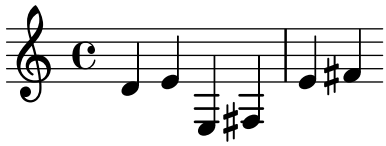
```
\relative {
  c'4 \fixed c { f'' g'' } c |
  c4 \fixed c'' { f g } c
}
```

\relative has no effect on \chordmode blocks.

```
\new Staff {
  \relative c''' {
    \chordmode { c1 }
  }
  \chordmode { c1 }
}
```

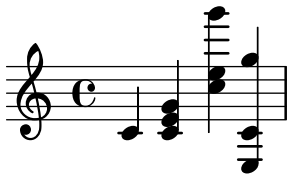


\relative is not allowed inside of \chordmode blocks.

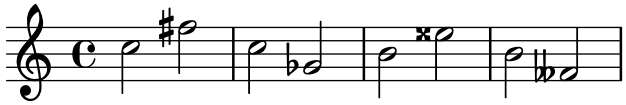
Music inside a \transpose block is absolute unless a \relative is included.

```
\relative {
  d' e
  \transpose f g {
    d e
    \relative {
      d' e
    }
  }
}
```

If the preceding item is a chord, the first note of the chord is used as the reference point for the octave placement of a following note or chord. Inside chords, the next note is always relative to the preceding one. Examine the next example carefully, paying attention to the `c` notes.

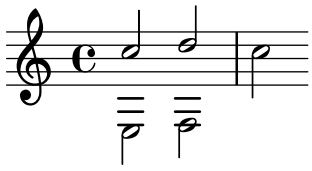
```
\relative {
  c'
  <c e g>
  <c' e g'>
  <c, e, g''>
}
```



As explained above, the octave of pitches is calculated only with the note names, regardless of any alterations. Therefore, an E-double-sharp following a B will be placed higher, while an F-double-flat will be placed lower. In other words, a double-augmented fourth is considered a smaller interval than a double-diminished fifth, regardless of the number of semitones that each interval contains.

```
\relative {
  c''2 fis
  c2 ges
  b2 eisis
  b2 feses
}
```

In complex situations, it is sometimes useful to get back to a certain pitch regardless of what happened before. This can be done using `\resetRelativeOctave`:

```
\relative {
  <<
    { c''2 d }
    \\
    { e,,2 f }
  >>
  \resetRelativeOctave c''
  c2
}
```



See also

Music Glossary: Section “fifth” in *Music Glossary*, Section “interval” in *Music Glossary*, Section “Pitch names” in *Music Glossary*.

Notation Reference: [Octave checks], page 10.

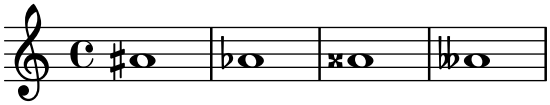
Snippets: Section “Pitches” in *Snippets*.

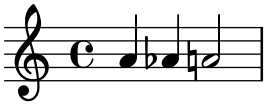
Internals Reference: Section “RelativeOctaveMusic” in *Internals Reference*.

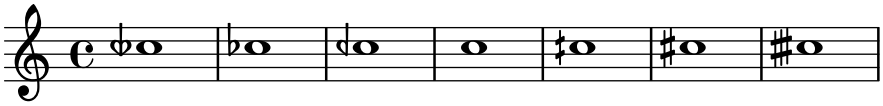
Accidentals

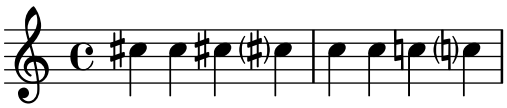
> **Note:** New users are sometimes confused about accidentals and key signatures. In LilyPond, note names specify pitches; key signatures and clefs determine how these pitches are displayed. An unaltered note like `c` means ‘C natural’, regardless of the key signature or clef. For more information, see Section “Pitches and key signatures” in *Learning Manual*.

A *sharp* pitch is made by adding `is` to the note name, and a *flat* pitch by adding `es`. As you might expect, a *double sharp* or *double flat* is made by adding `isis` or `eses`. This syntax is derived from Dutch note naming conventions. To use other names for accidentals, see [Note names in other languages], page 8.

```
\relative c'' { ais1 aes aisis aeses }
```

A natural pitch is entered as a simple note name; no suffix is required. A natural sign will be printed when needed to cancel the effect of an earlier accidental or key signature.

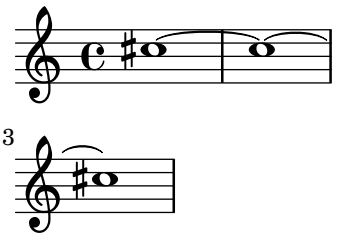
```
\relative c'' { a4 aes a2 }
```

Quarter tones may be added; the following is a series of Cs with increasing pitches:

```
\relative c'' { ceseh1 ces ceh c cih cis cisih }
```

Normally accidentals are printed automatically, but you may also print them manually. A reminder accidental can be forced by adding an exclamation mark `!` after the pitch. A cautionary accidental (i.e., an accidental within parentheses) can be obtained by adding the question mark `?` after the pitch.

```
\relative c'' { cis cis cis! cis? c c c! c? }
```

Accidentals on tied notes are only printed at the beginning of a new system:

```
\relative c'' {
  cis1~ 1~
  \break
```

```
  cis
}
```

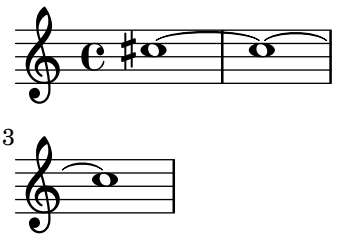


Selected Snippets

Hiding accidentals on tied notes at the start of a new system

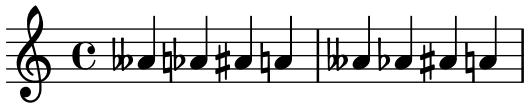
This shows how to hide accidentals on tied notes at the start of a new system.

```
\relative c'' {
  \override Accidental.hide-tied-accidental-after-break = ##t
  cis1~ cis~
  \break
  cis
}
```



Preventing extra naturals from being automatically added

In accordance with traditional typesetting rules, a natural sign is printed before a sharp or flat if a previous double sharp or flat on the same note is canceled. To change this behavior to contemporary practice, set the `extraNatural` property to `f` in the `Staff` context.

```
\relative c'' {
  aeses4 aes ais a
  \set Staff.extraNatural = ##f
  aeses4 aes ais a
}
```

See also

Music Glossary: Section “sharp” in *Music Glossary*, Section “flat” in *Music Glossary*, Section “double sharp” in *Music Glossary*, Section “double flat” in *Music Glossary*, Section “Pitch names” in *Music Glossary*, Section “quarter tone” in *Music Glossary*.

Learning Manual: Section “Pitches and key signatures” in *Learning Manual*.

Notation Reference: [Automatic accidentals], page 28, [Annotational accidentals (*musica ficta*)], page 502, [Note names in other languages], page 8.

Snippets: Section “Pitches” in *Snippets*.

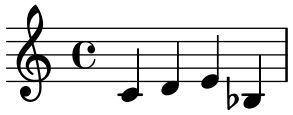
Internals Reference: Section “Accidental_engraver” in *Internals Reference*, Section “Accidental” in *Internals Reference*, Section “AccidentalCautionary” in *Internals Reference*, Section “accidental-interface” in *Internals Reference*.

Known issues and warnings

There are no generally accepted standards for denoting quarter tone accidentals, so LilyPond's symbols do not conform to any standard.

Note names in other languages

There are predefined sets of note and accidental names for various other languages. Selecting the note name language is usually done at the beginning of the file; the following example is written using Italian note names:

```
\language "italiano"

\relative {
  do' re mi sib
}
```

The available languages and the note names they define are:

Language	Note Names
nederlands	c d e f g a bes b
català or catalan	do re mi fa sol la sib si
deutsch	c d e f g a b h
english	c d e f g a bf/b-flat b
español or espanol	do re mi fa sol la sib si
français	do ré/re mi fa sol la sib si
italiano	do re mi fa sol la sib si
norsk	c d e f g a b h
português or portugues	do re mi fa sol la sib si
suomi	c d e f g a b h
svenska	c d e f g a b h
vlaams	do re mi fa sol la sib si

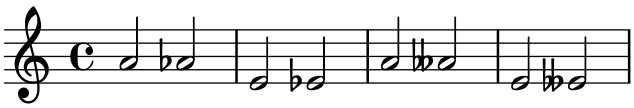
In addition to note names, accidental suffixes may also vary depending on the language:

Language	sharp	flat	double sharp	double flat
nederlands	is	es	isis	eses
català or catalan	d/s	b	dd/ss	bb
deutsch	is	es	isis	eses
english	s/-sharp	f/-flat	ss/x/-sharpsharp	ff/-flatflat
español or espanol	s	b	ss/x	bb
français	d	b	dd/x	bb
italiano	d	b	dd	bb
norsk	iss/is	ess/es	ississ/isis	essess/eses

português or portugues	s	b	ss	bb
suomi	is	es	isis	eses
svenska	iss	ess	ississ	essess
vlaams	k	b	kk	bb

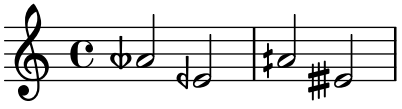
In Dutch, German, Norwegian, and Finnish, `aes` is contracted to `as`; in Dutch and Norwegian, however, both forms are accepted by LilyPond. Exactly the same holds for `es` and `ees`, `aeses` and `ases`, and finally `eeses` and `eses`.

In German and Finnish, LilyPond additionally provides the more frequent form `asas` for `ases`.

```
\relative c'' { a2 as e es a ases e eses }
```

Some music uses microtones whose alterations are fractions of a 'normal' sharp or flat. The following table lists note name suffixes for quarter tone accidentals; here the prefixes *semi-* and *sesqui-* respectively mean 'half' and 'one and a half'.

Language	**semi-sharp**	**semi-flat**	**sesqui-sharp**	**sesqui-flat**
nederlands	ih	eh	isih	eseh
català or catalan	qd/qs	qb	tqd/tqs	tqb
deutsch	ih	eh	isih	eseh
english	qs	qf	tqs	tqf
español or espanol	cs	cb	tcs	tcb
français	sd	sb	dsd	bsb
italiano	sd	sb	dsd	bsb
norsk	ih	eh	issih/isih	esseh/eseh
português or portugues	sqt	bqt	stqt	btqt
suomi	ih	eh	isih	eseh
svenska	ih	eh	issih	esseh
vlaams	hk	hb	khk	bhb

In German, there are similar name contractions for microtones as with normal pitches described above.

```
\language "deutsch"

\relative c'' { asah2 eh aih eisih }
```

Most languages presented here are commonly associated with Western classical music, also referred to as *Common Practice Period*. However, alternate pitches and tuning systems are also supported: see Section 2.10.1 [Common notation for non-Western music], page 523.

See also

Music Glossary: Section “Pitch names” in *Music Glossary*, Section “Common Practice Period” in *Music Glossary*.

Notation Reference: Section 2.10.1 [Common notation for non-Western music], page 523.

Installed Files: `scm/define-note-names.scm`.

Snippets: Section “Pitches” in *Snippets*.

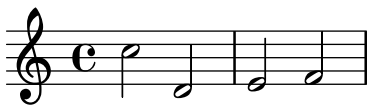
1.1.2 Changing multiple pitches

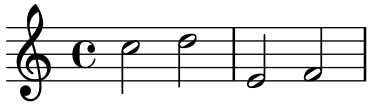
This section discusses how to modify pitches.

Octave checks

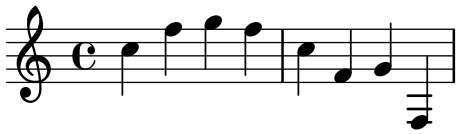
In relative mode, it is easy to forget an octave changing mark. Octave checks make such errors easier to find by displaying a warning and correcting the octave if a note is found in an unexpected octave.

To check the octave of a note, specify the absolute octave after the = symbol. This example will generate a warning (and change the pitch) because the second note is the absolute octave `d''` instead of `d'` as indicated by the octave correction.

```
\relative {
  c''2 d='
  e2 f
}
```

The octave of notes may also be checked with the `\octaveCheck` *`controlpitch`* command. *`controlpitch`* is specified in absolute mode. This checks that the interval between the previous note and the *`controlpitch`* is within a fourth (i.e., the normal calculation of relative mode). If this check fails, a warning is printed. While the previous note itself is not changed, future notes are relative to the corrected value.

```
\relative {
  c''2 d
  \octaveCheck c'
  e2 f
}
```

Compare the two bars below. The first and third `\octaveCheck` checks fail, but the second one does not fail.

```
\relative {
  c''4 f g f

  c4
  \octaveCheck c'
  f
  \octaveCheck c'
  g
```

```
  \octaveCheck c'
  f
}
```

See also

Snippets: Section “Pitches” in *Snippets*.

Internals Reference: Section “RelativeOctaveCheck” in *Internals Reference*.

Transpose

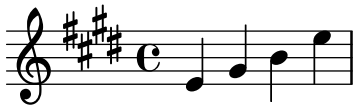
A music expression can be transposed with `\transpose`. The syntax is

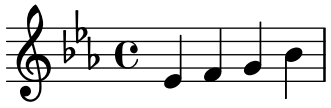
```
\transpose frompitch topitch musicexpr
```

This means that *musicexpr* is transposed by the interval between the pitches *frompitch* and *topitch*: any note with pitch *frompitch* is changed to *topitch* and any other note is transposed by the same interval. Both pitches are entered in absolute mode.

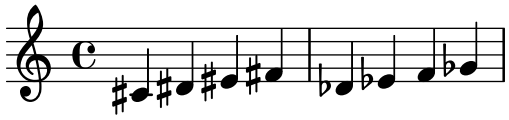
> **Note:** Music inside a `\transpose` block is absolute unless a `\relative` is included in the block.

Consider a piece written in the key of D-major. It can be transposed up to E-major; note that the key signature is automatically transposed as well.

```
\transpose d e {
  \relative {
    \key d \major
    d'4 fis a d
  }
}
```

If a part written in C (normal *concert pitch*) is to be played on the A clarinet (for which an A is notated as a C and thus sounds a minor third lower than notated), the appropriate part will be produced with:

```
\transpose a c' {
  \relative {
    \key c \major
    c'4 d e g
  }
}
```

Note that we specify `\key c \major` explicitly. If we do not specify a key signature, the notes will be transposed but no key signature will be printed.

\transpose distinguishes between enharmonic pitches: both \transpose c cis or \transpose c des will transpose up a semitone. The first version will print sharps and the notes will remain on the same scale step, the second version will print flats on the scale step above.

```
music = \relative { c' d e f }
\new Staff {
  \transpose c cis { \music }
  \transpose c des { \music }
}
```

\transpose may also be used in a different way, to input written notes for a transposing instrument. The previous examples show how to enter pitches in C (or *concert pitch*) and typeset them for a transposing instrument, but the opposite is also possible if you for example have a set of instrumental parts and want to print a conductor's score. For example, when entering music for a B-flat trumpet that begins on a notated E (concert D), one would write:

```
musicInBflat = { e4 ... }
\transpose c bes, \musicInBflat
```

To print this music in F (e.g., rearranging to a French horn) you could wrap the existing music with another \transpose:

```
musicInBflat = { e4 ... }
\transpose f c' { \transpose c bes, \musicInBflat }
```

For more information about transposing instruments, see [Instrument transpositions], page 27.

Selected Snippets

Transposing pitches with minimum accidentals ("Smart" transpose)

This example uses some Scheme code to enforce enharmonic modifications for notes in order to have the minimum number of accidentals. In this case, the following rules apply:

Double accidentals should be removed

B sharp -> C

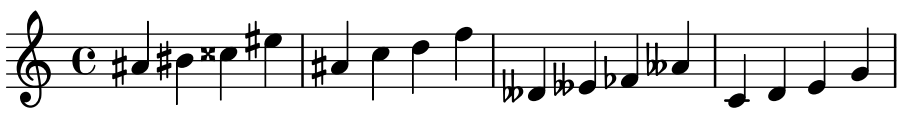
E sharp -> F

C flat -> B

F flat -> E

In this manner, the most natural enharmonic notes are chosen.

```
#(define (naturalize-pitch p)
   (let ((o (ly:pitch-octave p))
         (a (* 4 (ly:pitch-alteration p)))
         ;; alteration, a, in quarter tone steps,
         ;; for historical reasons
         (n (ly:pitch-notename p)))
     (cond
      ((and (> a 1) (or (eqv? n 6) (eqv? n 2)))
       (set! a (- a 2))
       (set! n (+ n 1)))
      ((and (< a -1) (or (eqv? n 0) (eqv? n 3)))
```

```
        (set! a (+ a 2))
        (set! n (- n 1))))
      (cond
       ((> a 2) (set! a (- a 4)) (set! n (+ n 1)))
       ((< a -2) (set! a (+ a 4)) (set! n (- n 1))))
      (if (< n 0) (begin (set! o (- o 1)) (set! n (+ n 7))))
      (if (> n 6) (begin (set! o (+ o 1)) (set! n (- n 7))))
      (ly:make-pitch o n (/ a 4))))

#(define (naturalize music)
   (let ((es (ly:music-property music 'elements))
         (e (ly:music-property music 'element))
         (p (ly:music-property music 'pitch)))
     (if (pair? es)
         (ly:music-set-property!
          music 'elements
          (map naturalize es)))
     (if (ly:music? e)
         (ly:music-set-property!
          music 'element
          (naturalize e)))
     (if (ly:pitch? p)
         (begin
           (set! p (naturalize-pitch p))
           (ly:music-set-property! music 'pitch p)))
     music))

naturalizeMusic =
#(define-music-function (m)
   (ly:music?)
   (naturalize m))

music = \relative c' { c4 d e g }

\score {
  \new Staff {
    \transpose c ais { \music }
    \naturalizeMusic \transpose c ais { \music }
    \transpose c deses { \music }
    \naturalizeMusic \transpose c deses { \music }
  }
  \layout { }
}
```

See also

Notation Reference: [Instrument transpositions], page 27, [Inversion], page 14, [Modal transformations], page 15, [Relative octave entry], page 2, [Retrograde], page 14.

Snippets: Section “Pitches” in *Snippets*.

Internals Reference: Section “TransposedMusic” in *Internals Reference*.

Known issues and warnings

The relative conversion will not affect `\transpose`, `\chordmode` or `\relative` sections in its argument. To use relative mode within transposed music, an additional `\relative` must be placed inside `\transpose`.

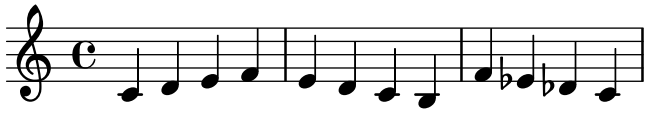
Triple accidentals will not be printed if using `\transpose`. An ‘enharmonically equivalent’ pitch will be used instead (e.g., d-flat rather than e-triple-flat).

Inversion

A music expression can be inverted and transposed in a single operation with:

`\inversion` *`around-pitch to-pitch musicexpr`*

The *`musicexpr`* is inverted interval by interval around *`around-pitch`*, and then transposed so that *`around-pitch`* is mapped to *`to-pitch`*.

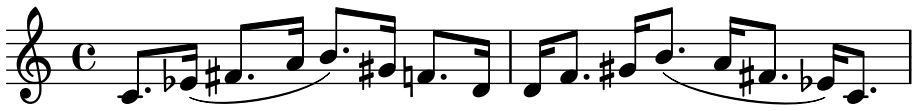
```
music = \relative { c' d e f }
\new Staff {
  \music
  \inversion d' d' \music
  \inversion d' ees' \music
}
```

Note: Motifs to be inverted should be expressed in absolute form or be first converted to absolute form by enclosing them in a `\relative` block.

See also

Notation Reference: [Modal transformations], page 15, [Retrograde], page 14, [Transpose], page 11.

Retrograde

A music expression can be reversed to produce its retrograde:

```
music = \relative { c'8. ees16( fis8. a16 b8.) gis16 f8. d16 }

\new Staff {
  \music
  \retrograde \music
}
```

Known issues and warnings

`\retrograde` is a rather simple tool. Since many events are ‘mirrored’ rather than exchanged, tweaks and directional modifiers for opening spanners need to be added at the matching closing

spanners: `^(` needs to be ended by `^)`, every `\<` or `\cresc` needs to be ended by `\!` or `\endcr`, every `\>` or `\decr` needs to be ended by `\enddecr`. Property-changing commands/overrides with a lasting effect will likely cause surprises.

See also

Notation Reference: [Inversion], page 14, [Modal transformations], page 15, [Transpose], page 11.

Modal transformations

In a musical composition that is based on a scale, a motif is frequently transformed in various ways. It may be *transposed* to start at different places in the scale or it may be *inverted* around a pivot point in the scale. It may also be reversed to produce its *retrograde*, see [Retrograde], page 14.

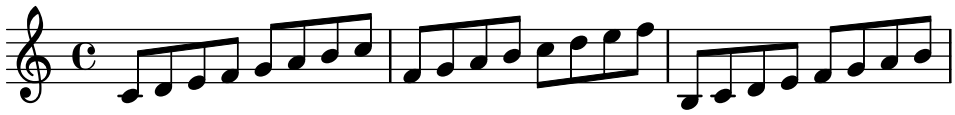
> **Note:** Any note that does not lie within the given scale will be left untransformed.

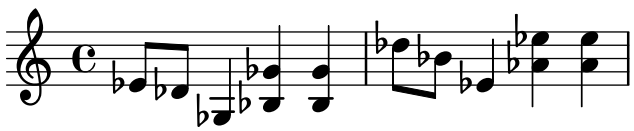
Modal transposition

A motif can be transposed within a given scale with:

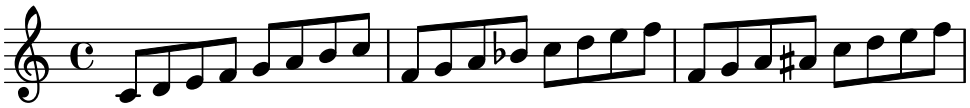
`\modalTranspose` *from-pitch to-pitch scale motif*

The notes of *motif* are shifted within the *scale* by the number of scale degrees given by the interval between *to-pitch* and *from-pitch*:

```
diatonicScale = \relative { c' d e f g a b }
motif = \relative { c'8 d e f g a b c }

\new Staff {
  \motif
  \modalTranspose c f \diatonicScale \motif
  \modalTranspose c b, \diatonicScale \motif
}
```

An ascending scale of any length and with any intervals may be specified:

```
pentatonicScale = \relative { ges aes bes des ees }
motif = \relative { ees'8 des ges,4 <ges' bes,> <ges bes,> }

\new Staff {
  \motif
  \modalTranspose ges ees' \pentatonicScale \motif
}
```

When used with a chromatic scale `\modalTranspose` has a similar effect to `\transpose`, but with the ability to specify the names of the notes to be used:

```
chromaticScale = \relative { c' cis d dis e f fis g gis a ais b }
```

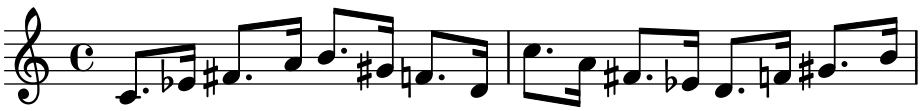
```
motif = \relative { c'8 d e f g a b c }

\new Staff {
  \motif
  \transpose c f \motif
  \modalTranspose c f \chromaticScale \motif
}
```

Modal inversion

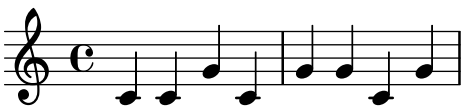
A motif can be inverted within a given scale around a given pivot note and transposed in a single operation with:

`\modalInversion` *around-pitch to-pitch scale motif*

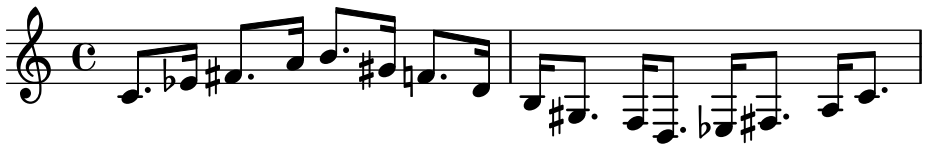
The notes of *motif* are placed the same number of scale degrees from the *around-pitch* note within the *scale*, but in the opposite direction, and the result is then shifted within the *scale* by the number of scale degrees given by the interval between *to-pitch* and *around-pitch*.

So to simply invert around a note in the scale use the same value for *around-pitch* and *to-pitch*:

```
octatonicScale = \relative { ees' f fis gis a b c d }
motif = \relative { c'8. ees16 fis8. a16 b8. gis16 f8. d16 }

\new Staff {
  \motif
  \modalInversion fis' fis' \octatonicScale \motif
}
```

To invert around a pivot between two notes in the scale, invert around one of the notes and then transpose by one scale degree. The two notes specified can be interpreted as bracketing the pivot point:

```
scale = \relative { c' g' }
motive = \relative { c' c g' c, }

\new Staff {
  \motive
  \modalInversion c' g' \scale \motive
}
```

The combined operation of inversion and retrograde produce the retrograde inversion:

```
octatonicScale = \relative { ees' f fis gis a b c d }
motif = \relative { c'8. ees16 fis8. a16 b8. gis16 f8. d16 }
```

```
\new Staff {
  \motif
  \retrograde \modalInversion c' c' \octatonicScale \motif
}
```

See also

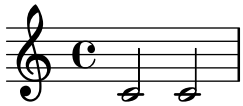
Notation Reference: [Inversion], page 14, [Retrograde], page 14, [Transpose], page 11.

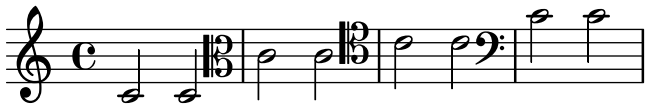
1.1.3 Displaying pitches

This section discusses how to alter the output of pitches.

Clef

Without any explicit command, the default clef for LilyPond is the treble (or *G*) clef.

```
c'2 c'
```

However, the clef can be changed by using the `\clef` command and an appropriate clef name. *Middle C* is shown in each of the following examples.

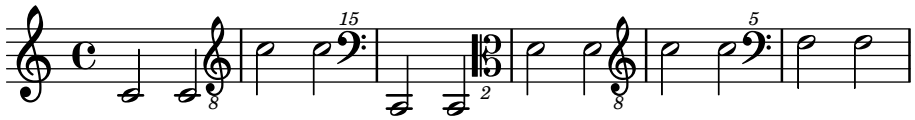
```
\clef treble
c'2 c'
\clef alto
c'2 c'
\clef tenor
c'2 c'
\clef bass
c'2 c'
```

For the full range of possible clef names see Section A.11 [Clef styles], page 755.

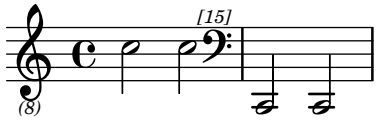
Specialized clefs, such as those used in *Ancient* music, are described in [Mensural clefs], page 497, and [Gregorian clefs], page 504. Music that requires tablature clefs is discussed in [Default tablatures], page 395, and [Custom tablatures], page 413.

For mixing clefs when using cue notes, see the `\cueClef` and `\cueDuringWithClef` commands in [Formatting cue notes], page 243.

By adding `_8` or `^8` to the clef name, the clef is transposed one octave down or up respectively, and `_15` and `^15` transpose by two octaves. Other integers can be used if required. Clef names containing non-alphabetic characters must be enclosed in quotes

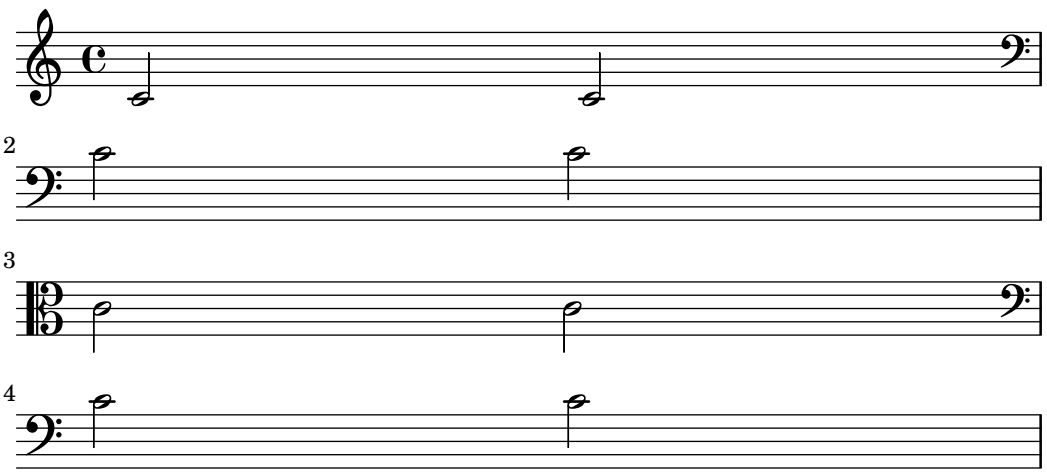
```
\clef treble
c'2 c'
\clef "treble_8"
```

```
c'2 c'
\clef "bass^15"
c'2 c'
\clef "alto_2"
c'2 c'
\clef "G_8"
c'2 c'
\clef "F^5"
c'2 c'
```

Optional octavation can be obtained by enclosing the numeric argument in parentheses or brackets:

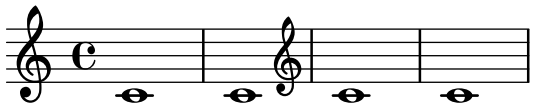
```
\clef "treble_(8)"
c'2 c'
\clef "bass^[15]"
c'2 c'
```

The pitches are displayed as if the numeric argument were given without parentheses/ brackets.

By default, a clef change taking place at a line break will cause the new clef symbol to be printed at the end of the previous line, as a *warning* clef, as well as the beginning of the next. This *warning* clef can be suppressed.

```
\clef treble { c'2 c' } \break
\clef bass { c'2 c' } \break
\clef alto
  \set Staff.explicitClefVisibility = #end-of-line-invisible
  { c'2 c' } \break
  \unset Staff.explicitClefVisibility
\clef bass { c'2 c' } \break
```

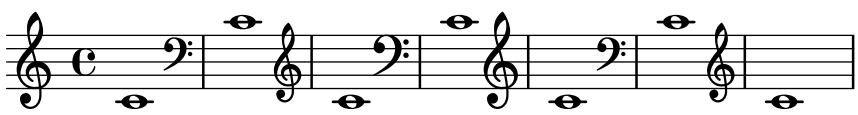


By default, a clef that has previously been printed will not be reprinted if the same `\clef` command is issued again and will be ignored. The command `\set Staff.forceClef = ##t` changes this behavior.

```
\clef treble
c'1
\clef treble
c'1
\set Staff.forceClef = ##t
c'1
\clef treble
c'1
```

To be more precise, it is not the `\clef` command itself that prints a clef. Instead, it sets or changes a property of the `Clef_engraver`, which then decides by its own whether to display a clef or not in the current staff. The `forceClef` property overrides this decision locally to reprint a clef once.

When there is a manual clef change, the glyph of the changed clef will be smaller than normal. This behavior can be overridden.

```
\clef "treble"
c'1
\clef "bass"
c'1
\clef "treble"
c'1
\override Staff.Clef.full-size-change = ##t
\clef "bass"
c'1
\clef "treble"
c'1
\revert Staff.Clef.full-size-change
\clef "bass"
c'1
\clef "treble"
c'1
```



Selected Snippets

Tweaking clef properties

Changing the Clef glyph, its position, or the ottavation does not change the position of subsequent notes on the staff. To get key signatures on their correct staff lines `middleCClefPosition` must also be specified, with positive or negative values moving `middle C` up or down respectively, relative to the staff's center line.

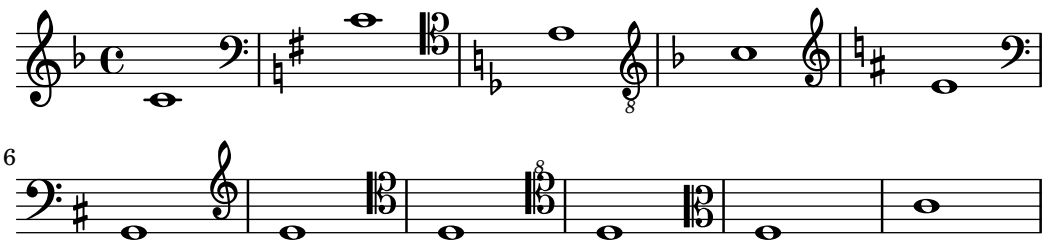
For example, `\clef "treble_8"` is equivalent to setting the `clefGlyph`, `clefPosition` (the vertical position of the clef itself on the staff), `middleCPosition` and `clefTransposition`. Note

that when any of these properties (except `middleCPosition`) are changed a new clef symbol is printed.

The following examples show the possibilities when setting these properties manually. On the first line, the manual changes preserve the standard relative positioning of clefs and notes, whereas on the second line, they do not.

```
{
  % The default treble clef
  \key f \major
  c'1
  % The standard bass clef
  \set Staff.clefGlyph = #"clefs.F"
  \set Staff.clefPosition = #2
  \set Staff.middleCPosition = #6
  \set Staff.middleCClefPosition = #6
  \key g \major
  c'1
  % The baritone clef
  \set Staff.clefGlyph = #"clefs.C"
  \set Staff.clefPosition = #4
  \set Staff.middleCPosition = #4
  \set Staff.middleCClefPosition = #4
  \key f \major
  c'1
  % The standard choral tenor clef
  \set Staff.clefGlyph = #"clefs.G"
  \set Staff.clefPosition = #-2
  \set Staff.clefTransposition = #-7
  \set Staff.middleCPosition = #1
  \set Staff.middleCClefPosition = #1
  \key f \major
  c'1
  % A non-standard clef
  \set Staff.clefPosition = #0
  \set Staff.clefTransposition = #0
  \set Staff.middleCPosition = #-4
  \set Staff.middleCClefPosition = #-4
  \key g \major
  c'1 \break

  % The following clef changes do not preserve
  % the normal relationship between notes, key signatures
  % and clefs:

  \set Staff.clefGlyph = #"clefs.F"
  \set Staff.clefPosition = #2
  c'1
  \set Staff.clefGlyph = #"clefs.G"
  c'1
  \set Staff.clefGlyph = #"clefs.C"
  c'1
  \set Staff.clefTransposition = #7
```

```
  c'1
  \set Staff.clefTransposition = #0
  \set Staff.clefPosition = #0
  c'1

  % Return to the normal clef:

  \set Staff.middleCPosition = #0
  c'1
}
```



See also

Notation Reference: [Mensural clefs], page 497, [Gregorian clefs], page 504, [Default tablatures], page 395, [Custom tablatures], page 413, [Formatting cue notes], page 243.

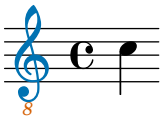
Installed Files: `scm/parser-clef.scm`.

Snippets: Section "Pitches" in *Snippets*.

Internals Reference: Section "Clef_engraver" in *Internals Reference*, Section "Clef" in *Internals Reference*, Section "ClefModifier" in *Internals Reference*, Section "clef-interface" in *Internals Reference*.

Known issues and warnings

Ottavation numbers attached to clefs are treated as separate grobs. So any `\override` done to the *Clef* will also need to be applied, as a separate `\override`, to the *ClefModifier* grob.

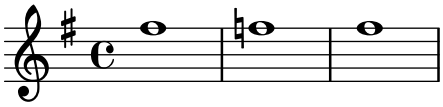
```
\new Staff \with {
  \override Clef.color = #(universal-color 'blue)
  \override ClefModifier.color = #(universal-color 'vermillion)
}

\clef "treble_8" c'4
```

Key signature

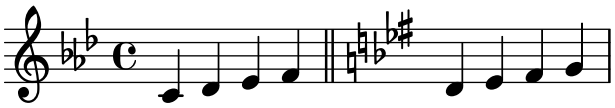
Note: New users are sometimes confused about accidentals and key signatures. In LilyPond, note names are the raw input; key signatures and clefs determine how this raw input is displayed. An unaltered note like `c` means 'C natural', regardless of the key signature or clef. For more information, see Section "Pitches and key signatures" in *Learning Manual*.

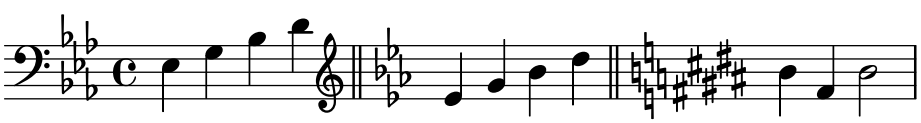
The key signature indicates the tonality in which a piece is played. It is denoted by a set of alterations (flats or sharps) at the start of the staff. The key signature may be altered:

```
\key pitch mode
```

Here, *mode* should be \major or \minor to get a key signature of *pitch*-major or *pitch*-minor, respectively. You may also use the standard mode names, also called *church modes*: \ionian, \dorian, \phrygian, \lydian, \mixolydian, \aeolian, and \locrian.

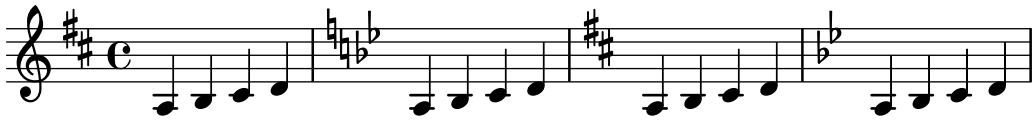
```
\relative {
  \key g \major
  fis''1
  f
  fis
}
```

Additional modes can be defined, by listing the alterations for each scale step when the mode starts on C.

```
freygish = #`((0 . ,NATURAL) (1 . ,FLAT) (2 . ,NATURAL)
    (3 . ,NATURAL) (4 . ,NATURAL) (5 . ,FLAT) (6 . ,FLAT))

\relative {
  \key c \freygish c'4 des e f
  \bar "||" \key d \freygish d es fis g
}
```

Accidentals in the key signature may be printed in octaves other than their traditional positions, or in multiple octaves, by using the flat-positions and sharp-positions properties of KeySignature. Entries in these properties specify the range of staff positions where accidentals will be printed. If a single position is specified in an entry, the accidentals are placed within the octave ending at that staff position.

```
\override Staff.KeySignature.flat-positions = #'((-5 . 5))
\override Staff.KeyCancellation.flat-positions = #'((-5 . 5))
\clef bass \key es \major es g bes d'
\clef treble \bar "||" \key es \major es' g' bes' d''

\override Staff.KeySignature.sharp-positions = #'(2)
\bar "||" \key b \major b' fis' b'2
```

Selected Snippets

Preventing natural signs from being printed when the key signature changes

When the key signature changes, natural signs are automatically printed to cancel any accidentals from previous key signatures. This may be prevented by setting to `f` the `printKeyCancellation` property in the `Staff` context.

```
\relative c' {
  \key d \major
  a4 b cis d
  \key g \minor
  a4 bes c d
  \set Staff.printKeyCancellation = ##f
  \key d \major
  a4 b cis d
  \key g \minor
  a4 bes c d
}
```

Non-traditional key signatures

The commonly used `\key` command sets the `keyAlterations` property, in the `Staff` context.

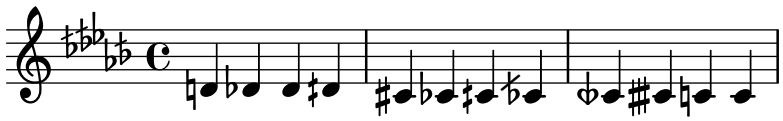
To create non-standard key signatures, set this property directly. The format of this command is a list:

```
\set Staff.keyAlterations =
  #`(((octave . step) . alter) ((octave . step) . alter) ...)
```

where, for each element in the list, `octave` specifies the octave (0 being the octave from middle C to the B above), `step` specifies the note within the octave (0 means C and 6 means B), and `alter` is `,SHARP` `,FLAT` `,DOUBLE-SHARP` etc.

Alternatively, using the more concise format for each item in the list `(step . alter)` specifies the same alteration holds in all octaves.

For microtonal scales where a "sharp" is not 100 cents, `alter` refers to the alteration as a proportion of a 200-cent whole tone.

```
\include "arabic.ly"
\relative do' {
  \set Staff.keyAlterations = #`((0 . ,SEMI-FLAT)
                                 (1 . ,SEMI-FLAT)
                                 (2 . ,FLAT)
                                 (5 . ,FLAT)
                                 (6 . ,SEMI-FLAT))
%\set Staff.extraNatural = ##f
  re reb \dwn reb resd
  dod dob dosd \dwn dob |
  dobsb dodsd do do |
}
```

See also

Music Glossary: Section “church mode” in *Music Glossary*, Section “scordatura” in *Music Glossary*.

Learning Manual: Section “Pitches and key signatures” in *Learning Manual*.

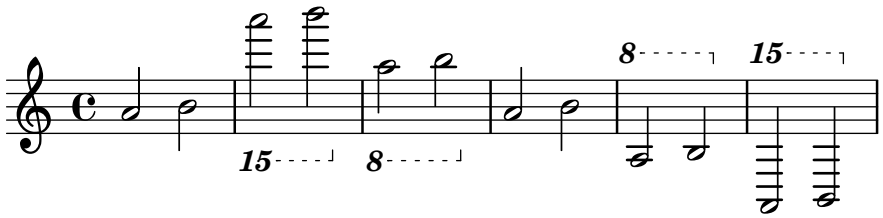
Snippets: Section “Pitches” in *Snippets*.

Internals Reference: Section “KeyChangeEvent” in *Internals Reference*, Section “Key_engraver” in *Internals Reference*, Section “Key_performer” in *Internals Reference*, Section “KeyCancellation” in *Internals Reference*, Section “KeySignature” in *Internals Reference*, Section “key-signature-interface” in *Internals Reference*.

Ottava brackets

Ottava brackets introduce an extra transposition of an octave for the staff:

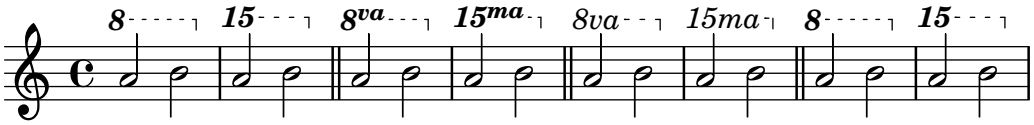
```
\relative c'' {
  a2 b
  \ottava #-2
  a2 b
  \ottava #-1
  a2 b
  \ottava #0
  a2 b
  \ottava #1
  a2 b
  \ottava #2
  a2 b
}
```



By default, only a number is printed at the start of the bracket. That setting may be changed to include an abbreviated ordinal, either in superscript or in normal letters (the latter was formerly used by default); the default bold font weight of these characters may also be altered, as explained in [Selecting font and font size], page 293.

The following example demonstrates various options, as well as how to go back to the current default behavior:

```
\relative c'' {
  \ottava #1
  a'2 b
  \ottava #2
  a'2 b
  \bar "||"
  \set Staff.ottavationMarkups = #ottavation-ordinals
  \ottava #1
  a,2 b
  \ottava #2
  a'2 b
  \bar "||"
```

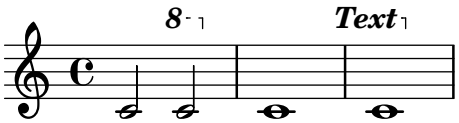
```
  \override Staff.OttavaBracket.font-series = #'medium
  \set Staff.ottavationMarkups = #ottavation-simple-ordinals
  \ottava #1
  a,2 b
  \ottava #2
  a'2 b
  \bar "||"
  \revert Staff.OttavaBracket.font-series
  \set Staff.ottavationMarkups = #ottavation-numbers
  \ottava #1
  a,2 b
  \ottava #2
  a'2 b
}
```

Selected Snippets

Changing ottava text

Internally, `\ottava` sets the properties `ottavation` (for example, to `8va` or `8vb`) and `middleCPosition`. To override the text of the bracket, set `ottavation` after invoking `\ottava`.

Short text is especially useful when a brief ottava is used.

```
{
  c'2
  \ottava #1
  \set Staff.ottavation = #"8"
  c''2
  \ottava #0
  c'1
  \ottava #1
  \set Staff.ottavation = #"Text"
  c''1
}
```

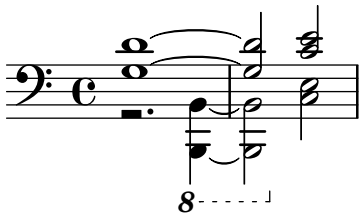


Adding an ottava marking to a single voice

If you have more than one voice on the staff, setting octavation in one voice transposes the position of notes in all voices for the duration of the ottava bracket. If the octavation is only intended to apply to one voice, the `Ottava_spanner_engraver` should be moved to `Voice` context.

```
\layout {
  \context {
    \Staff
    \remove Ottava_spanner_engraver
  }
```

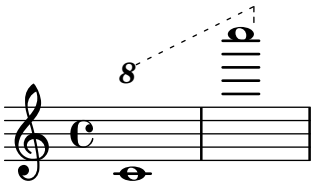
```
  \context {
    \Voice
    \consists Ottava_spanner_engraver
  }
}

{
  \clef bass
  << { <g d'>1~ q2 <c' e'> }
  \\
    {
      r2.
      \ottava -1
      <b,,, b,,>4 ~ |
      q2
      \ottava 0
      <c e>2
    }
  >>
}
```



Modifying the Ottava spanner slope

It is possible to change the slope of the Ottava spanner.

```
\relative c'' {
  \override Staff.OttavaBracket.stencil = #ly:line-spanner::print
  \override Staff.OttavaBracket.bound-details =
    #`((left . ((Y . 0)
                (attach-dir . ,LEFT)
                (padding . 0)
                (stencil-align-dir-y . ,CENTER)))
       (right . ((Y . 5.0) ; Change the number here
                 (padding . 0)
                 (attach-dir . ,RIGHT)
                 (text . ,(make-draw-dashed-line-markup
                           (cons 0 -1.2))))))
  \override Staff.OttavaBracket.left-bound-info =
     #ly:horizontal-line-spanner::calc-left-bound-info-and-text
  \override Staff.OttavaBracket.right-bound-info =
     #ly:horizontal-line-spanner::calc-right-bound-info
  \ottava #1
  c1
  c'''1
}
```



See also

Music Glossary: Section "octavation" in *Music Glossary*.

Notation Reference: [Selecting font and font size], page 293.

Snippets: Section "Pitches" in *Snippets*.

Internals Reference: Section "Ottava_spanner_engraver" in *Internals Reference*, Section "OttavaBracket" in *Internals Reference*, Section "ottava-bracket-interface" in *Internals Reference*.

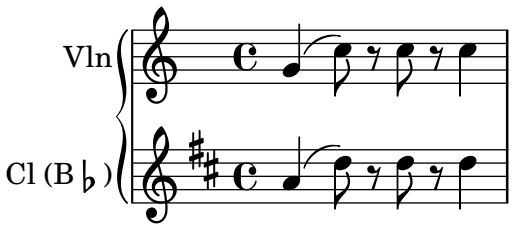
Instrument transpositions

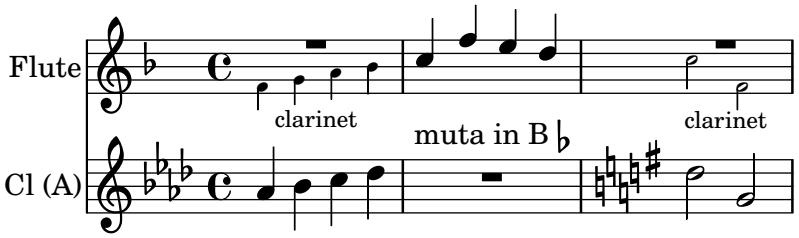
When typesetting scores that involve transposing instruments, some parts can be typeset in a different pitch than the *concert pitch*. In these cases, the key of the *transposing instrument* should be specified; otherwise the MIDI output and cues in other parts will produce incorrect pitches. For more information about quotations, see [Quoting other voices], page 239.

`\transposition` *pitch*

The pitch to use for `\transposition` should correspond to the real sound heard when a `c'` written on the staff is played by the transposing instrument. This pitch is entered in absolute mode, so an instrument that produces a real sound which is one tone higher than the printed music should use `\transposition d'`. `\transposition` should *only* be used if the pitches are *not* being entered in concert pitch.

Here are a few notes for violin and B-flat clarinet where the parts have been entered using the notes and key as they appear in each part of the conductor's score. The two instruments are playing in unison.

```
\new GrandStaff <<
  \new Staff = "violin" \with {
    instrumentName = "Vln"
    midiInstrument = "violin"
  }
  \relative c'' {
    % not strictly necessary, but a good reminder
    \transposition c'
    \key c \major
    g4( c8) r c r c4
  }
  \new Staff = "clarinet" \with {
    instrumentName = \markup { Cl (B\flat) }
    midiInstrument = "clarinet"
  }
  \relative c'' {
    \transposition bes
    \key d \major
    a4( d8) r d r d4
  }
>>
```

The \transposition may be changed during a piece. For example, a clarinetist may be required to switch from an A clarinet to a B-flat clarinet.

```
flute = \relative c'' {
  \key f \major
  \cueDuring "clarinet" #DOWN {
    R1 _\markup\tiny "clarinet"
    c4 f e d
    R1 _\markup\tiny "clarinet"
  }
}
clarinet = \relative c'' {
  \key aes \major
  \transposition a
  aes4 bes c des
  R1^\markup { muta in B\flat }
  \key g \major
  \transposition bes
  d2 g,
}
\addQuote "clarinet" \clarinet
<<
  \new Staff \with { instrumentName = "Flute" }
    \flute
  \new Staff \with { instrumentName = "Cl (A)" }
    \clarinet
>>
```

See also

Music Glossary: Section “concert pitch” in *Music Glossary*, Section “transposing instrument” in *Music Glossary*.

Notation Reference: [Quoting other voices], page 239, [Transpose], page 11.

Snippets: Section “Pitches” in *Snippets*.

Automatic accidentals

There are many different conventions on how to typeset accidentals. LilyPond provides a function to specify which accidental style to use. This function is called as follows:

```
\new Staff <<
```

```
  \accidentalStyle voice
  { ... }
>>
```

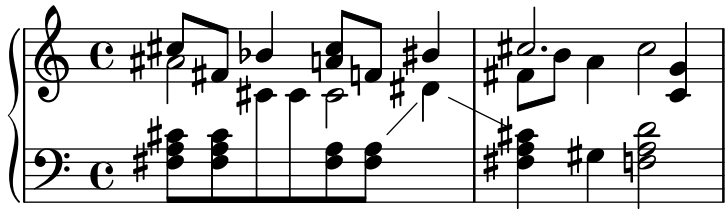
The accidental style normally applies to the current `Staff` (with the exception of the styles `choral`, `piano` and `piano-cautionary`, which are explained below). Optionally, the function can take a second argument that determines in which scope the style should be changed. For example, to use the same style in all staves of the current `StaffGroup`, use:

```
\accidentalStyle StaffGroup.voice
```

The following accidental styles are supported. To demonstrate each style, we use the following example:

```
musicA = {
  <<
    \relative {
      cis''8 fis, bes4 <a cis>8 f bis4 |
      cis2. <c, g'>4 |
    }
    \\
    \relative {
      ais'2 cis, |
      fis8 b a4 cis2 |
    }
  >>
}

musicB = {
  \clef bass
  \new Voice {
    \voiceTwo \relative {
      <fis a cis>8[ <fis a cis>
      \change Staff = up
      cis' cis
      \change Staff = down
      <fis, a> <fis a>]
      \showStaffSwitch
      \change Staff = up
      dis'4 |
      \change Staff = down
      <fis, a cis>4 gis <f a d>2 |
    }
  }
}

\new PianoStaff {
  <<
    \new Staff = "up" {
      \accidentalStyle default
      \musicA
    }
    \new Staff = "down" {
      \accidentalStyle default
      \musicB
```

```
    }
  >>
}
```

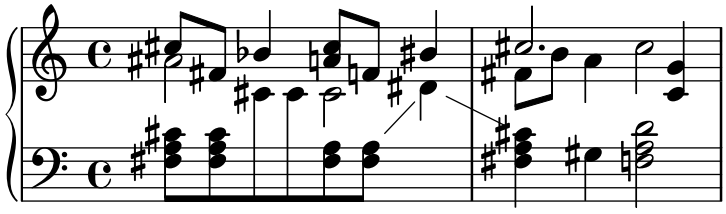


Note that the last lines of this example can be replaced by the following, as long as the same accidental style should be used in both staves.

```
\new PianoStaff {
  <<
    \new Staff = "up" {
      %%% change the next line as desired:
      \accidentalStyle Score.default
      \musicA
    }
    \new Staff = "down" {
      \musicB
    }
  >>
}
```

`default`

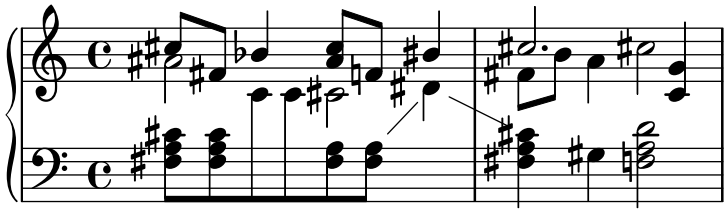
This is the default typesetting behavior. It corresponds to eighteenth-century common practice: accidentals are remembered to the end of the measure in which they occur and only in their own octave. Thus, in the example below, no natural signs are printed before the `b` in the second measure or the last `c`:



`voice`

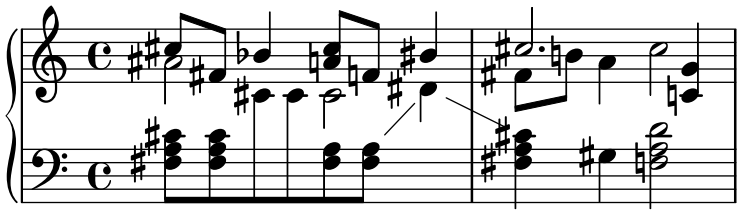
The normal behavior is to remember the accidentals at `Staff`-level. In this style, however, accidentals are typeset individually for each voice. Apart from that, the rule is similar to `default`.

As a result, accidentals from one voice do not get canceled in other voices, which is often an unwanted result: in the following example, it is hard to determine whether the second `a` should be played natural or sharp. The `voice` option should therefore be used only if the voices are to be read solely by individual musicians. If the staff is to be used by one musician (e.g., a conductor or in a piano score) then `modern` or `modern-cautionary` should be used instead.



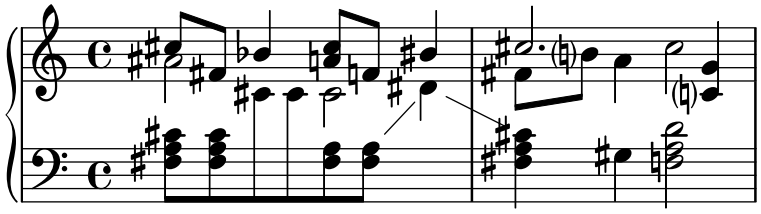
`modern`

This rule corresponds to the common practice in the twentieth century. It omits some extra natural signs, which were traditionally prefixed to a sharp following a double sharp, or a flat following a double flat. The `modern` rule prints the same accidentals as `default`, with two additions that serve to avoid ambiguity: after temporary accidentals, cancellation marks are printed also in the following measure (for notes in the same octave) and, in the same measure, for notes in other octaves. Hence the naturals before the `b` and the `c` in the second measure of the upper staff:



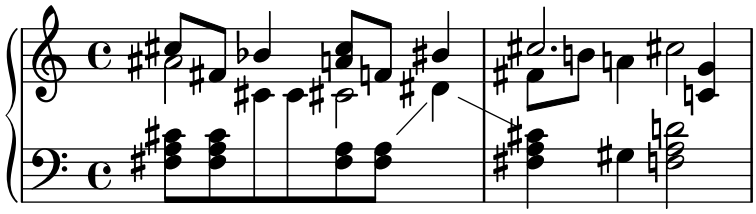
`modern-cautionary`

This rule is similar to `modern`, but the 'extra' accidentals are printed as cautionary accidentals (with parentheses). They can also be printed at a different size by overriding `AccidentalCautionary`'s `font-size` property.



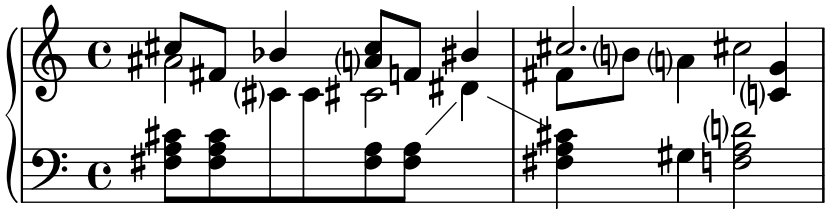
`modern-voice`

This rule is used for multi-voice accidentals to be read both by musicians playing one voice and musicians playing all voices. Accidentals are typeset for each voice, but they *are* canceled across voices in the same `Staff`. Hence, the `a` in the last measure is canceled because the previous cancellation was in a different voice, and the `d` in the lower staff is canceled because of the accidental in a different voice in the previous measure:



`modern-voice-cautionary`

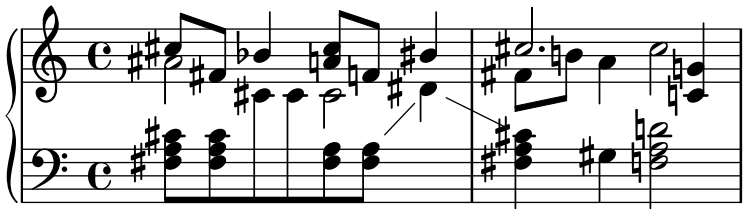
This rule is the same as `modern-voice`, but with the extra accidentals (the ones not typeset by `voice`) typeset as cautionaries. Even though all accidentals typeset by `default` *are* typeset with this rule, some of them are typeset as cautionaries.



`piano`

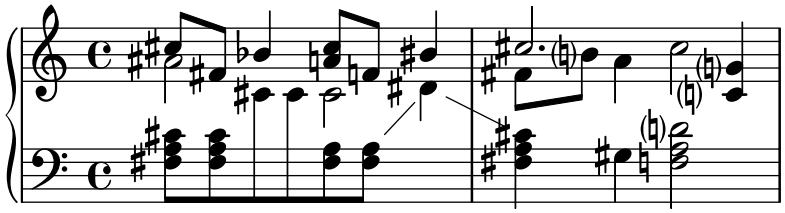
This rule reflects twentieth-century practice for piano notation. Its behavior is very similar to `modern` style, but here accidentals also get canceled across the staves in the same `GrandStaff` or `PianoStaff`, hence all the cancellations of the final notes.

This accidental style applies to the current `GrandStaff` or `PianoStaff` unless qualified with a second argument.



`piano-cautionary`

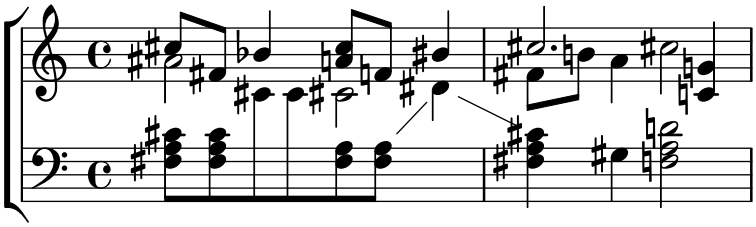
This is the same as `piano` but with the extra accidentals typeset as cautionaries.



`choral`

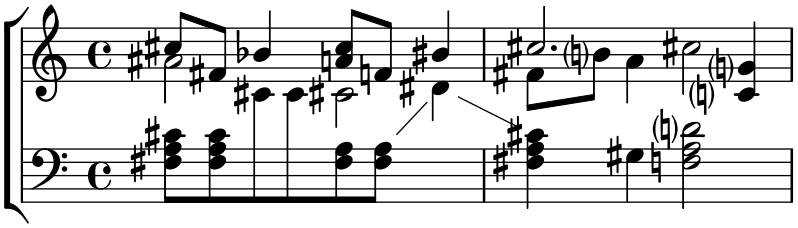
This rule is a combination of the `modern-voice` and the `piano` style. It shows all accidentals required for singers that only follow their own voice, as well as additional accidentals for readers that follow all voices of an entire `ChoirStaff` simultaneously.

This accidental style applies to the current `ChoirStaff` unless qualified with a second argument.



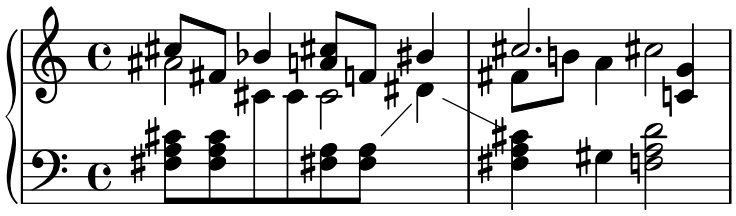
`choral-cautionary`

This is the same as `choral` but with the extra accidentals typeset as cautionaries.



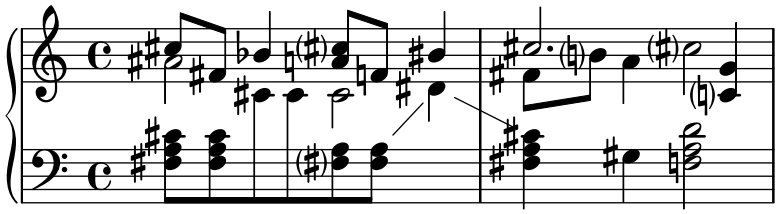
`neo-modern`

This rule reproduces a common practice in contemporary music: accidentals are printed like with `modern`, but they are printed again if the same note appears later in the same measure – except if the note is immediately repeated.



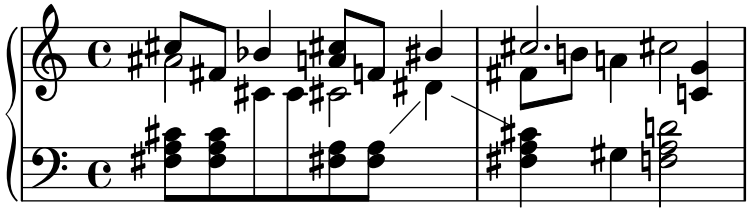
`neo-modern-cautionary`

This rule is similar to `neo-modern`, but the 'extra' accidentals are printed as cautionary accidentals (with parentheses). They can also be printed at a different size by overriding `AccidentalCautionary`'s `font-size` property.



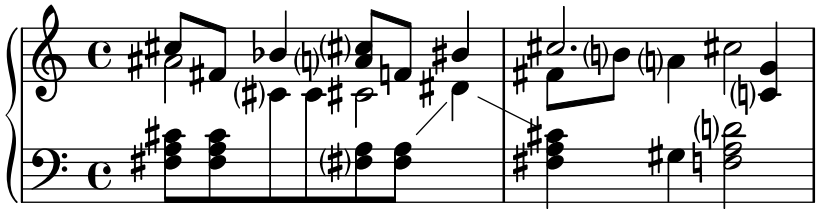
`neo-modern-voice`

This rule is used for multi-voice accidentals to be read both by musicians playing one voice and musicians playing all voices. Accidentals are typeset for each voice as with `neo-modern`, but they are canceled across voices in the same `Staff`.



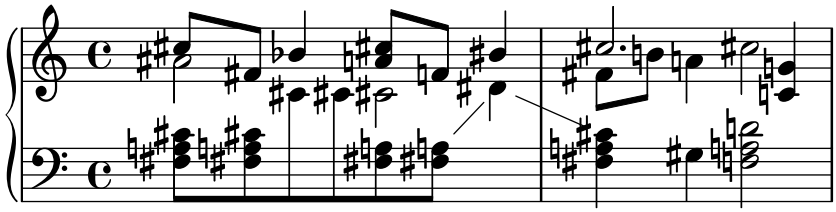
`neo-modern-voice-cautionary`

This rule is similar to `neo-modern-voice`, but the extra accidentals are printed as cautionary accidentals.



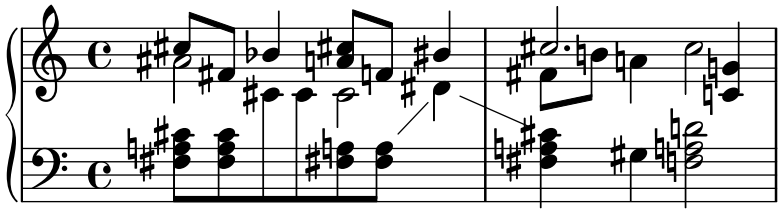
`dodecaphonic`

This rule reflects a practice introduced by composers at the beginning of the 20th century, in an attempt to abolish the hierarchy between natural and non-natural notes. With this style, *every* note gets an accidental sign, including natural signs.



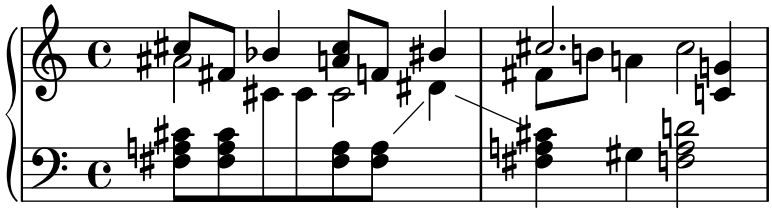
`dodecaphonic-no-repeat`

Like with the dodecaphonic accidental style *every* note gets an accidental sign by default, but accidentals are suppressed for pitches immediately repeated within the same staff.



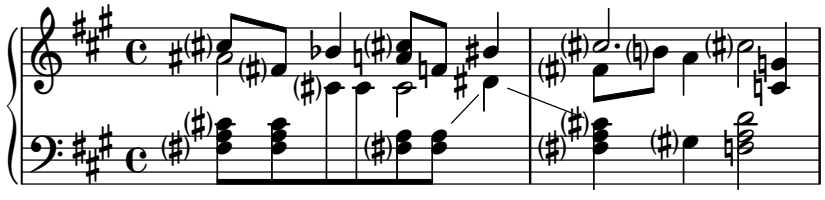
`dodecaphonic-first`

Similar to the dodecaphonic accidental style *every* pitch gets an accidental sign, but only the first time it is encountered in a measure. Accidentals are only remembered for the actual octave but throughout voices.



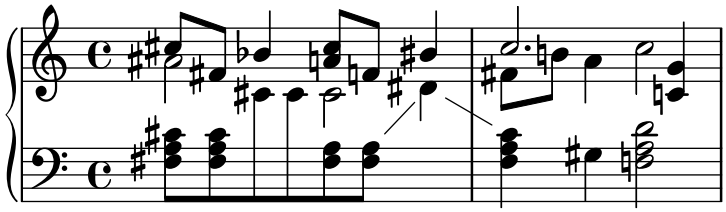
`teaching`

This rule is intended for students, and makes it easy to create scale sheets with automatically created cautionary accidentals. Accidentals are printed like with `modern`, but cautionary accidentals are added for all sharp or flat tones specified by the key signature, except if the note is immediately repeated.



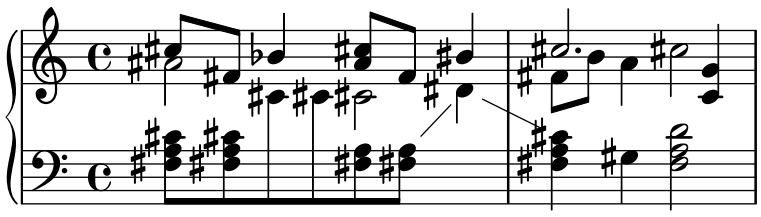
`no-reset`

This is the same as `default` but with accidentals lasting 'forever' and not only within the same measure:



`forget`

This is the opposite of `no-reset`: Accidentals are not remembered at all – and hence all accidentals are typeset relative to the key signature, regardless of what came before in the music.



See also

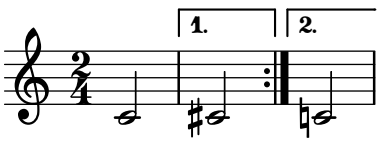
Snippets: Section "Pitches" in *Snippets*.

Internals Reference: Section "Accidental" in *Internals Reference*, Section "Accidental_engraver" in *Internals Reference*, Section "GrandStaff" in *Internals Reference*, Section "PianoStaff" in *Internals Reference*, Section "Staff" in *Internals Reference*, Section "AccidentalSuggestion" in *Internals Reference*, Section "AccidentalPlacement" in *Internals Reference*, Section "accidental-suggestion-interface" in *Internals Reference*.

Known issues and warnings

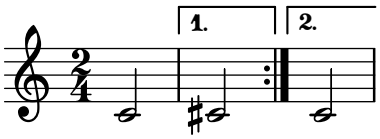
Simultaneous notes are not considered in the automatic determination of accidentals; only previous notes and the key signature are considered. Forcing accidentals with `!` or `?` may be required when the same note name occurs simultaneously with different alterations, as in '`<f! fis!>`'.

In alternative endings, cautionary cancellation should be based on the previous *played* measure, but it is based on the previous *printed* measure. In the following example, the natural `c` in the second alternative does not need a natural sign:



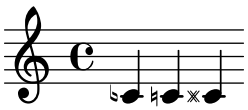
The following workaround can be used: define a function that locally changes the accidental style to `forget`:

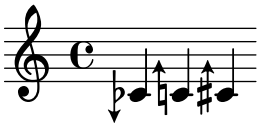
```
forget = #(define-music-function (music) (ly:music?) #{
  \accidentalStyle forget
  #music
  \accidentalStyle modern
#})
{
  \accidentalStyle modern
  \time 2/4
  \repeat volta 2 {
    c'2
  }
  \alternative {
     \volta 1 { cis' }
     \volta 2 { \forget c' }
  }
}
```



Alternate accidental glyphs

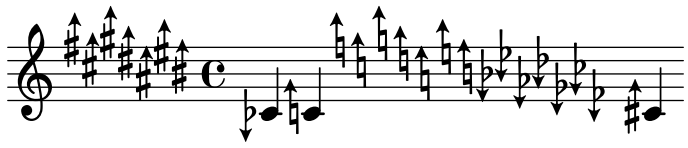
Non-Western and ancient notation systems have their own accidentals. The glyphs are controlled through the `alterationGlyphs` property of the `Staff` context and similar context types. The predefined values for this property are listed in Section A.10 [Accidental glyph sets], page 754.

```
\layout {
  \context {
    \Staff
    alterationGlyphs = #alteration-vaticana-glyph-name-alist
  }
}

{ ces' c' cis' }
```

The property may also be set to a custom associative list mapping alterations to glyph names. Alterations are given as fractions in tones. Glyphs are listed at [Accidental glyphs], page 741.

```
\layout {
  \context {
    \Staff
    alterationGlyphs =
      #'((-1/2 . "accidentals.flat.arrowdown")
         (0 . "accidentals.natural.arrowup")
         (1/2 . "accidentals.sharp.arrowup"))
  }
}

{ ces' c' cis' }
```

The `padding-pairs` property of `KeySignature` and `KeyCancellation` objects is an associative list mapping pairs of glyphs to the padding that should be added between these glyphs in key signatures.

```
\layout {
  \context {
    \Staff
    alterationGlyphs =
      #'((-1/2 . "accidentals.flat.arrowdown")
         (0 . "accidentals.natural.arrowup")
         (1/2 . "accidentals.sharp.arrowup"))
    \override KeySignature.padding-pairs =
      #'((("accidentals.sharp.arrowup" . "accidentals.sharp.arrowup")
```

```
            . 0.25)
          (("accidentals.flat.arrowdown" . "accidentals.flat.arrowdown")
            . 0.3))
    \override KeyCancellation.padding-pairs =
      #'((("accidentals.natural.arrowup" . "accidentals.natural.arrowup")
            . 0.7))
  }
}

{
  \key cis \major
  ces' c'
  \key ces \major
  cis'
}
```



See also

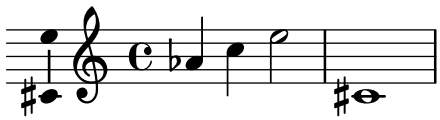
Notation Reference: Section A.10 [Accidental glyph sets], page 754, [Accidental glyphs], page 741.

Internals Reference: Section "accidental-switch-interface" in *Internals Reference*, Section "Alteration_glyph_engraver" in *Internals Reference*, Section "key-signature-interface" in *Internals Reference*.

Ambitus

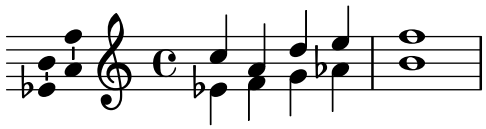
The term *ambitus* (pl. ambitus) denotes a range of pitches for a given voice in a part of music. It may also denote the pitch range that a musical instrument is capable of playing. Ambitus are printed on vocal parts so that performers can easily determine if it matches their capabilities.

Ambitus are denoted at the beginning of a piece near the initial clef. The range is graphically specified by two note heads that represent the lowest and highest pitches. Accidentals are only printed if they are not part of the key signature.

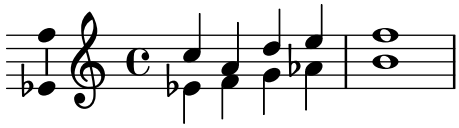
```
\layout {
  \context {
    \Voice
    \consists Ambitus_engraver
  }
}

\relative {
  aes' c e2
  cis,1
}
```

Selected Snippets

Adding ambitus per voice

Ambitus can be added per voice. In this case, the ambitus must be moved manually to prevent collisions.

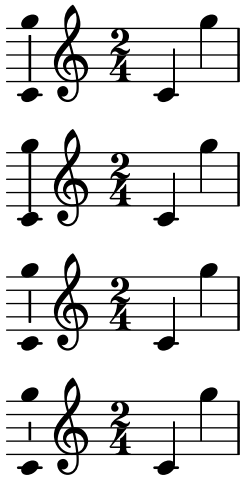
```
\new Staff <<
  \new Voice \with {
    \consists "Ambitus_engraver"
  } \relative c'' {
    \override Ambitus.X-offset = #2.0
    \voiceOne
    c4 a d e
    f1
  }
  \new Voice \with {
    \consists "Ambitus_engraver"
  } \relative c' {
    \voiceTwo
    es4 f g as
    b1
  }
>>
```

Ambitus with multiple voices

Adding the `Ambitus_engraver` to the `Staff` context creates a single ambitus per staff, even in the case of staves with multiple voices.

```
\new Staff \with {
  \consists "Ambitus_engraver"
  }
<<
  \new Voice \relative c'' {
    \voiceOne
    c4 a d e
    f1
  }
  \new Voice \relative c' {
    \voiceTwo
    es4 f g as
    b1
  }
>>
```

Changing the ambitus gap

It is possible to change the default gap between the ambitus noteheads and the line joining them.

```
\layout {
  \context {
    \Voice
    \consists "Ambitus_engraver"
  }
}

\new Staff {
  \time 2/4
  % Default setting
  c'4 g''
}

\new Staff {
  \time 2/4
  \override AmbitusLine.gap = #0
  c'4 g''
}

\new Staff {
  \time 2/4
  \override AmbitusLine.gap = #1
  c'4 g''
}

\new Staff {
  \time 2/4
  \override AmbitusLine.gap = #1.5
  c'4 g''
}
```

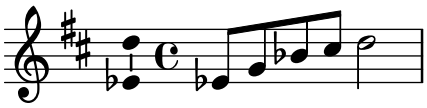


Ambitus after key signature

By default, ambitus are positioned at the left of the clef. The `\ambitusAfter` function allows for changing this placement. Syntax is `\ambitusAfter` `grob-interface` (see

Graphical Object Interfaces (http://lilypond.org/doc/v2.22/Documentation/internals/graphical-object-interfaces) for a list of possible values for grob-interface.)

A common use case is printing the ambitus between key signature and time signature.

```
\new Staff \with {
  \consists Ambitus_engraver
} \relative {
  \ambitusAfter key-signature
  \key d \major
  es'8 g bes cis d2
}
```

See also

Music Glossary: Section “ambitus” in *Music Glossary*.

Snippets: Section “Pitches” in *Snippets*.

Internals Reference: Section “Ambitus_engraver” in *Internals Reference*, Section “Voice” in *Internals Reference*, Section “Staff” in *Internals Reference*, Section “Ambitus” in *Internals Reference*, Section “AmbitusAccidental” in *Internals Reference*, Section “AmbitusLine” in *Internals Reference*, Section “AmbitusNoteHead” in *Internals Reference*, Section “ambitus-interface” in *Internals Reference*.

Known issues and warnings

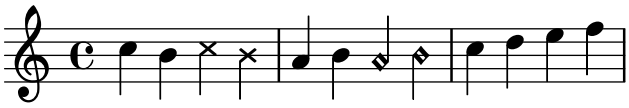
There is no collision handling in the case of multiple per-voice ambitus.

1.1.4 Note heads

This section suggests ways of altering note heads.

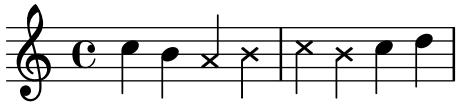
Special note heads

The appearance of note heads may be altered:

```
\relative c'' {
  c4 b
  \override NoteHead.style = #'cross
  c4 b
  \revert NoteHead.style
  a b
  \override NoteHead.style = #'harmonic
  a b
  \revert NoteHead.style
  c4 d e f
}
```

To see all note head styles, see Section A.9 [Note head styles], page 753.

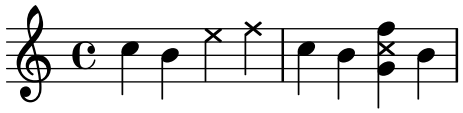
The cross style is used to represent a variety of musical intentions. The following generic predefined commands modify the note head in both staff and tablature contexts and can be used to represent any musical meaning:

```
\relative {
  c''4 b
  \xNotesOn
   a b c4 b
  \xNotesOff
  c4 d
}
```



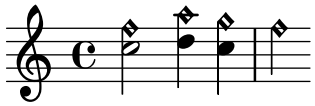
The music function form of this predefined command may be used inside and outside chords to generate crossed note heads in both staff and tablature contexts:

```
\relative {
  c''4 b
  \xNote { e f }
  c b < g \xNote c f > b
}
```



As synonyms for \xNote, \xNotesOn and \xNotesOff, \deadNote, \deadNotesOn and \deadNotesOff can be used. The term *dead note* is commonly used by guitarists.

There is also a similar shorthand for diamond shapes:

```
\relative c'' {
  <c f\harmonic>2 <d a'\harmonic>4 <c g'\harmonic> f\harmonic
}
```

Predefined commands

\harmonic, \xNotesOn, \xNotesOff, \xNote.

See also

Snippets: Section “Pitches” in *Snippets*.

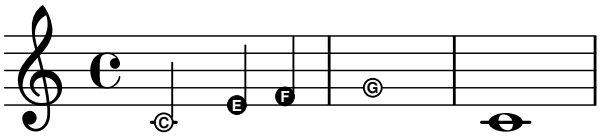
Notation Reference: Section A.9 [Note head styles], page 753, [Chorded notes], page 192, [Indicating harmonics and dampened notes], page 442.

Internals Reference: Section “note-event” in *Internals Reference*, Section “Note_heads_engraver” in *Internals Reference*, Section “Ledger_line_engraver” in *Internals Reference*, Section “NoteHead” in *Internals Reference*, Section “LedgerLineSpanner” in *Internals Reference*, Section “note-head-interface” in *Internals Reference*, Section “ledger-line-spanner-interface” in *Internals Reference*.

Easy notation note heads

The 'easy play' note head includes a note name inside the head. It is used in music for beginners. To make the letters readable, it should be printed in a large font size. To print with a larger font, see Section 4.2.2 [Setting the staff size], page 614.

```
#(set-global-staff-size 26)
\relative c' {
  \easyHeadsOn
  c2 e4 f
  g1
  \easyHeadsOff
  c,1
}
```



Predefined commands

`\easyHeadsOn`, `\easyHeadsOff`.

Selected Snippets

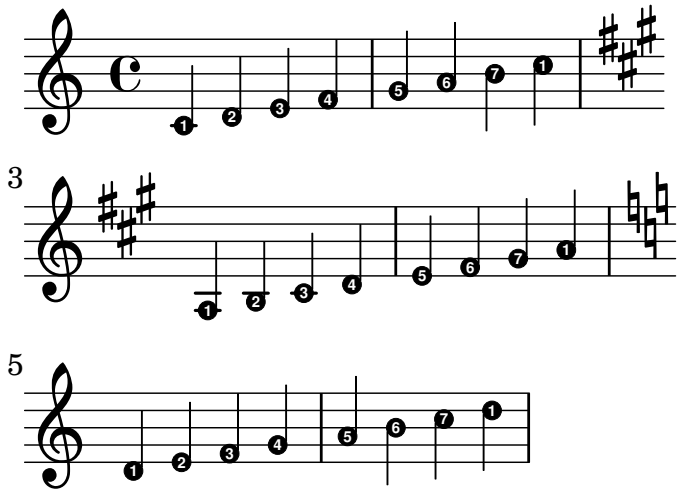
Numbers as easy note heads

Easy notation note heads use the `note-names` property of the `NoteHead` object to determine what appears inside the note head. By overriding this property, it is possible to print numbers representing the scale-degree.

A simple engraver can be created to do this for every note head object it sees.

```
#(define Ez_numbers_engraver
   (make-engraver
    (acknowledgers
     ((note-head-interface engraver grob source-engraver)
      (let* ((context (ly:translator-context engraver))
     (tonic-pitch (ly:context-property context 'tonic))
     (tonic-name (ly:pitch-notename tonic-pitch))
     (grob-pitch
      (ly:event-property (event-cause grob) 'pitch))
     (grob-name (ly:pitch-notename grob-pitch))
     (delta (modulo (- grob-name tonic-name) 7))
     (note-names
      (make-vector 7 (number->string (1+ delta)))))

(ly:grob-set-property! grob 'note-names note-names))))))

#(set-global-staff-size 26)

\layout {
  ragged-right = ##t
  \context {
    \Voice
    \consists \Ez_numbers_engraver
```

```
  }
}

\relative c' {
  \easyHeadsOn
  c4 d e f
  g4 a b c \break

  \key a \major
  a,4 b cis d
  e4 fis gis a \break

  \key d \dorian
  d,4 e f g
  a4 b c d
}
```



See also

Notation Reference: Section 4.2.2 [Setting the staff size], page 614.

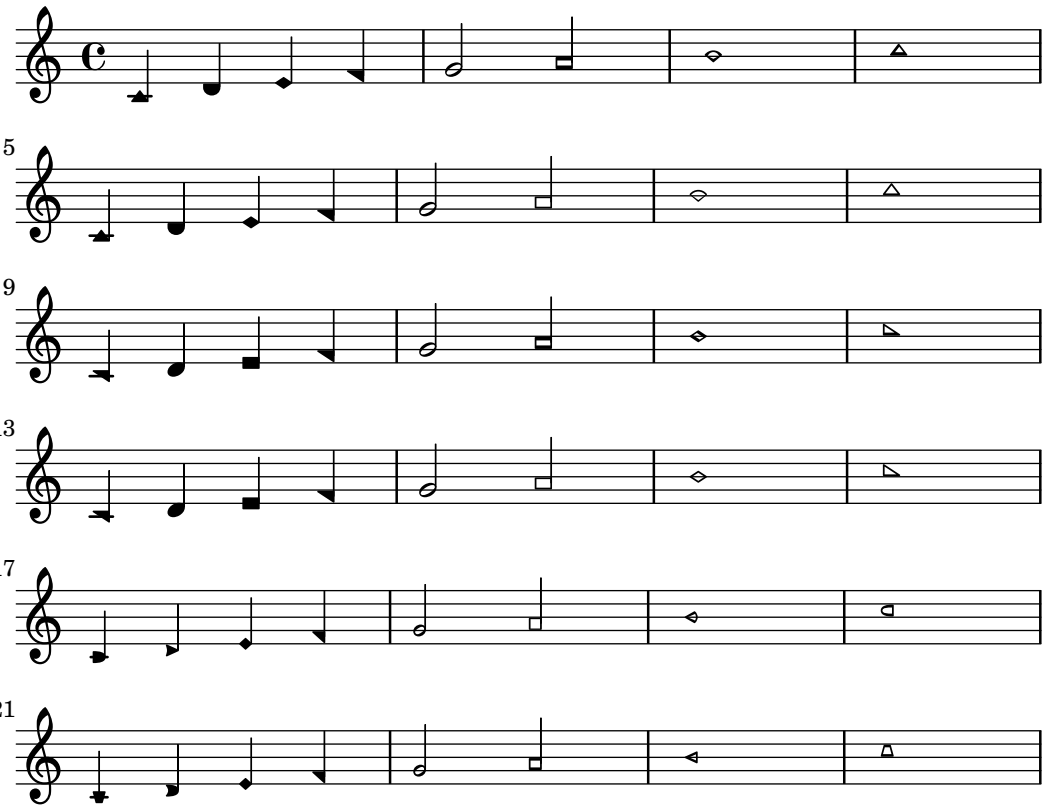
Snippets: Section "Pitches" in *Snippets*.

Internals Reference: Section "note-event" in *Internals Reference*, Section "Note_heads_engraver" in *Internals Reference*, Section "NoteHead" in *Internals Reference*, Section "note-head-interface" in *Internals Reference*.

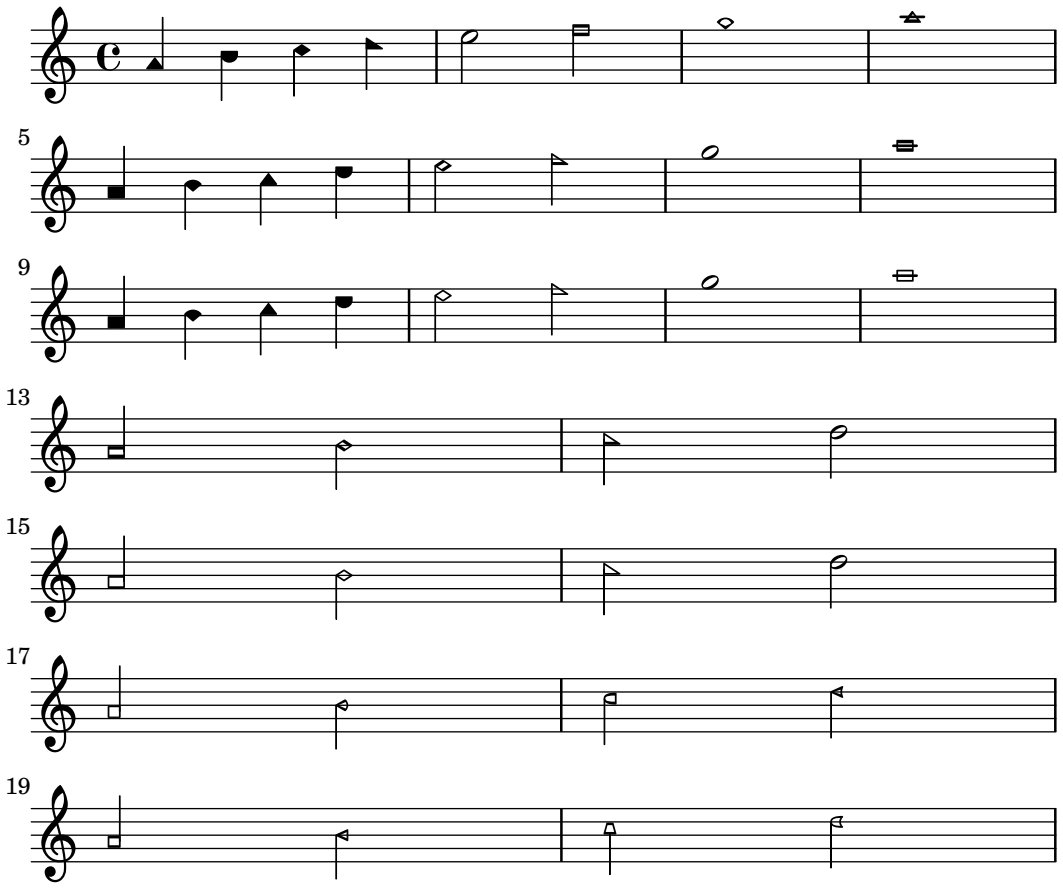
Shape note heads

In shape note head notation, the shape of the note head corresponds to the harmonic function of a note in the scale. This notation was popular in nineteenth-century American song books. Shape note heads can be produced in Sacred Harp, Southern Harmony, Funk (Harmonia Sacra), Walker, and Aiken (Christian Harmony) styles:

```
\relative c'' {
  \aikenHeads
  c, d e f g2 a b1 c \break
  \aikenThinHeads
  c,4 d e f g2 a b1 c \break
  \sacredHarpHeads
  c,4 d e f g2 a b1 c \break
```

```
  \southernHarmonyHeads
  c,4 d e f g2 a b1 c \break
  \funkHeads
  c,4 d e f g2 a b1 c \break
  \walkerHeads
  c,4 d e f g2 a b1 c \break
}
```

Shapes are typeset according to the step in the scale, where the base of the scale is determined by the \key command. When writing in a minor key, the scale step can be determined from the relative major:

```
\relative c'' {
  \key a \minor
  \aikenHeads
  a b c d e2 f g1 a \break
  \aikenHeadsMinor
  a,4 b c d e2 f g1 a \break
  \aikenThinHeadsMinor
  a,4 b c d e2 f g1 a \break
  \sacredHarpHeadsMinor
  a,2 b c d \break
  \southernHarmonyHeadsMinor
  a2 b c d \break
  \funkHeadsMinor
  a2 b c d \break
  \walkerHeadsMinor
  a2 b c d \break
}
```



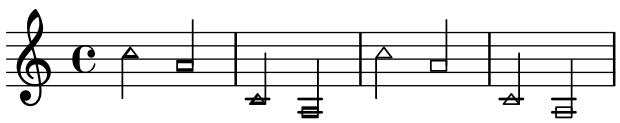
Predefined commands

\aikenHeads, \aikenHeadsMinor, \aikenThinHeads, \aikenThinHeadsMinor, \funkHeads, \funkHeadsMinor, \sacredHarpHeads, \sacredHarpHeadsMinor, \southernHarmonyHeads, \southernHarmonyHeadsMinor, \walkerHeads, \walkerHeadsMinor.

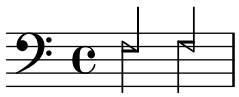
Selected Snippets

Aiken head thin variant noteheads

Aiken head white notes get harder to read at smaller staff sizes, especially with ledger lines. Losing interior white space makes them appear as quarter notes.

```
\score {
  {
    \aikenHeads
    c''2 a' c' a

    % Switch to thin-variant noteheads
    \set shapeNoteStyles = ##(doThin reThin miThin
                              faThin sol laThin tiThin)
    c'' a' c' a
  }
}
```

Direction of merged 'fa' shape note heads

Using property `NoteCollision.fa-merge-direction`, the direction of "fa" shape note heads ("fa", "faThin", etc.) can be controlled independently of the stem direction if two voices with the same pitch and different stem directions are merged. If this property is not set, the "down" glyph variant is used.

```
{
  \clef bass

  << { \aikenHeads
       f2
       \override Staff.NoteCollision.fa-merge-direction = #UP
       f2 }
  \\ { \aikenHeads
       f2
       f2 }
  >>
}
```

Applying note head styles depending on the step of the scale

The `shapeNoteStyles` property can be used to define various note head styles for each step of the scale (as set by the key signature or the `tonic` property).

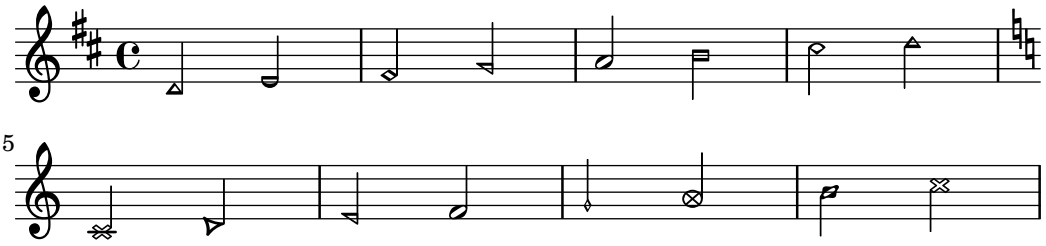
This property requires a set of symbols, which can be purely arbitrary (geometrical expressions such as `triangle`, `cross`, and `xcircle` are allowed) or based on old American engraving tradition (some latin note names are also allowed).

That said, to imitate old American song books, there are several predefined note head styles available through shortcut commands such as `\aikenHeads` or `\sacredHarpHeads`.

This example shows different ways to obtain shape note heads, and demonstrates the ability to transpose a melody without losing the correspondence between harmonic functions and note head styles.

```
fragment = {
  \key c \major
  c2 d
  e2 f
  g2 a
  b2 c
}

\new Staff {
  \transpose c d
  \relative c' {
    \set shapeNoteStyles = ##(do re mi fa
                              #f la ti)
    \fragment
  }

  \break
```

```
  \relative c' {
    \set shapeNoteStyles = ##(cross triangle fa #f
                              mensural xcircle diamond)
    \fragment
  }
}
```



To see all note head styles, see Section A.9 [Note head styles], page 753.

See also

Snippets: Section “Pitches” in *Snippets*.

Notation Reference: Section A.9 [Note head styles], page 753.

Internals Reference: Section “note-event” in *Internals Reference*, Section “Note_heads_engraver” in *Internals Reference*, Section “NoteHead” in *Internals Reference*, Section “note-head-interface” in *Internals Reference*.

Improvisation

Improvisation is sometimes denoted with slashed note heads, where the performer may choose any pitch but should play the specified rhythm. Such note heads can be created:

```
\new Voice \with {
  \consists Pitch_squash_engraver
} \relative {
  e''8 e g a a16( bes) a8 g
  \improvisationOn
  e8 ~
  2 ~ 8 f4 f8 ~
  2
  \improvisationOff
  a16( bes) a8 g e
}
```

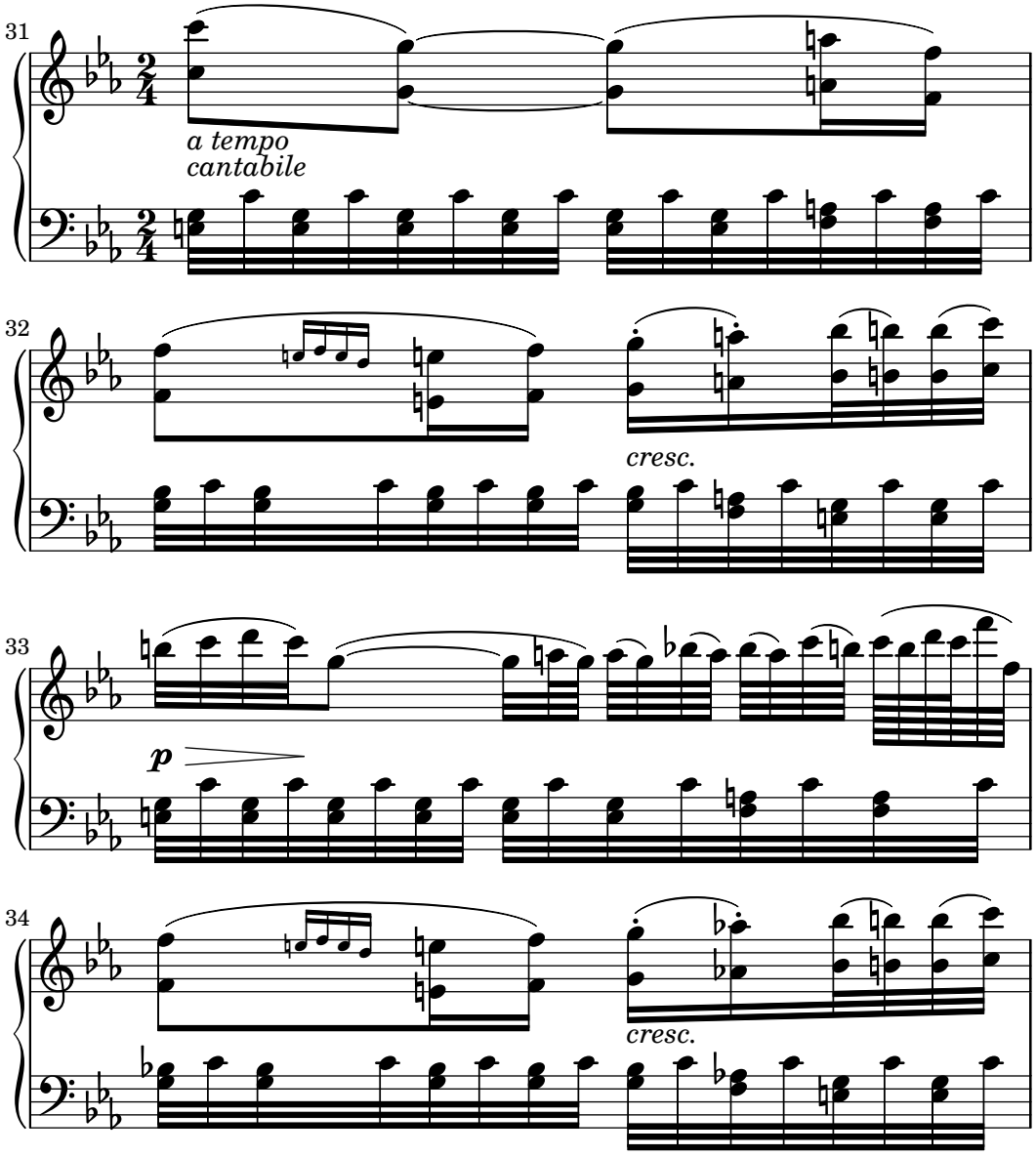
Predefined commands

`\improvisationOn`, `\improvisationOff`.

See also

Snippets: Section “Pitches” in *Snippets*.

Internals Reference: Section “Pitch_squash_engraver” in *Internals Reference*, Section “Voice” in *Internals Reference*, Section “RhythmicStaff” in *Internals Reference*.

1.2 Rhythms

This section discusses rhythms, rests, durations, beaming and bars.

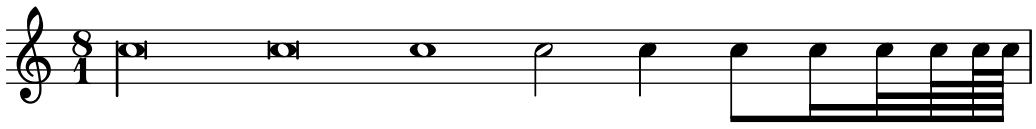
1.2.1 Writing rhythms

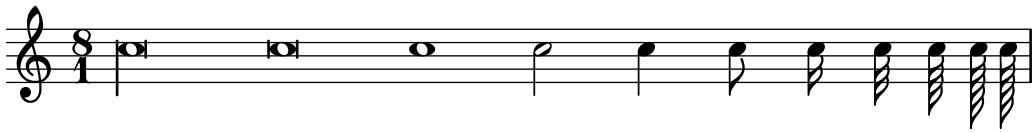
Durations

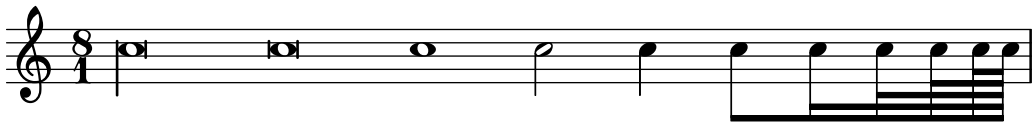
The durations of notes are entered using numbers and dots. The number entered is based on the reciprocal value of the length of the note. For example, a quarter note is designated using the numerical value of `4` as it is a 1/4 note, a half note using `2`, an eighth using `8` and so on. Durations as short as `1024` notes can be entered but shorter values, while possible, can only be entered as beamed notes. Also see Section 1.2.4 [Beams], page 91.

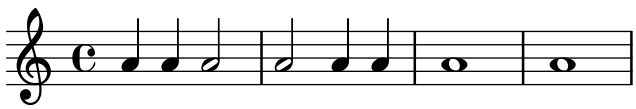
For notes longer than a whole use the `\longa` – double breve – and `\breve` commands. A note with the duration of a quadruple breve is possible using the `\maxima` command but is only supported within ancient music notation. See Section 2.9 [Ancient notation], page 493.

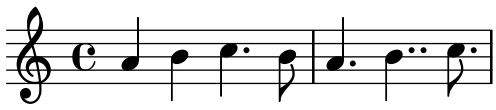
```
\relative {
  \time 8/1
```

```
  c''\longa c\breve c1 c2
  c4 c8 c16 c32 c64 c128 c128
}
```

Here are the same durations with automatic beaming turned off.

```
\relative {
  \time 8/1
  \autoBeamOff
  c''\longa c\breve c1 c2
  c4 c8 c16 c32 c64 c128 c128
}
```

Isolated durations – durations without a pitch – that occur within a music sequence will take their pitch from the preceding note or chord.

```
\relative {
  \time 8/1
  c'' \longa \breve 1 2
  4 8 16 32 64 128 128
}
```

Isolated pitches – pitches without a duration – that occur within a music sequence will take their duration from the preceding note or chord. If there is no preceding duration, then default for the note is always 4, a quarter note.

```
\relative { a' a a2 a a4 a a1 a }
```

Place a dot (.) after the duration to obtain 'dotted' note lengths. Double-dotted notes are specified by appending two dots, and so on.

```
\relative { a'4 b c4. b8 a4. b4.. c8. }
```

To avoid clashing with staff lines, dots on notes are normally moved up. In polyphonic situations however, they can be placed, manually, above or below the staff as required. See Section 5.4.1 [Direction and placement], page 694.

Some note durations cannot be represented using just numbers and dots but only by tying two or more notes together. See [Ties], page 58.

To specify durations that align the syllables of lyrics and notes together see Section 2.1 [Vocal music], page 313.

Notes can also be spaced proportionately to their duration, see Section 4.5.6 [Proportional notation], page 649.

Predefined commands

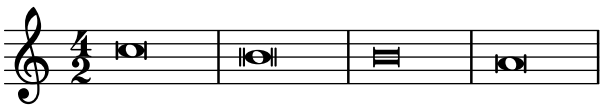
`\autoBeamOn`, `\autoBeamOff`, `\dotsUp`, `\dotsDown`, `\dotsNeutral`.

Selected Snippets

Alternative breve notes

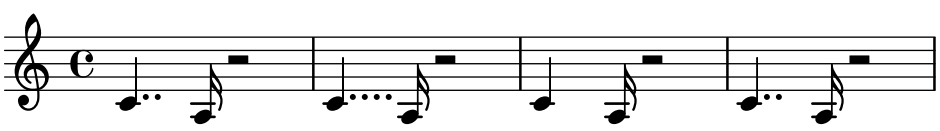
Breve notes are also available with two vertical lines on each side of the notehead instead of one line and in baroque style.

```
\relative c'' {
  \time 4/2
  c\breve |
  \override Staff.NoteHead.style = #'altdefault
  b\breve
  \override Staff.NoteHead.style = #'baroque
  b\breve
  \revert Staff.NoteHead.style
  a\breve
}
```



Changing the number of augmentation dots per note

The number of augmentation dots on a single note can be changed independently of the dots placed after the note.

```
\relative c' {
  c4.. a16 r2 |
  \override Dots.dot-count = #4
  c4.. a16 r2 |
  \override Dots.dot-count = #0
  c4.. a16 r2 |
  \revert Dots.dot-count
  c4.. a16 r2 |
}
```

See also

Music Glossary: Section “breve” in *Music Glossary*, Section “longa” in *Music Glossary*, Section “maxima” in *Music Glossary*, Section “note value” in *Music Glossary*, Section “Duration names notes and rests” in *Music Glossary*.

Notation Reference: Section 1.2.4 [Beams], page 91, [Ties], page 58, [Stems], page 267, Section 1.2.1 [Writing rhythms], page 48, Section 1.2.2 [Writing rests], page 61, Section 2.1 [Vocal music], page 313, Section 2.9 [Ancient notation], page 493, Section 4.5.6 [Proportional notation], page 649.

Snippets: Section "Rhythms" in *Snippets*.

Internals Reference: Section "Dots" in *Internals Reference*, Section "DotColumn" in *Internals Reference*.

Known issues and warnings

While there is no fundamental limit to rest durations (longest or shortest), there is a limit to the number of glyphs possible so only rests between `1024` and `\maxima` may be printed.

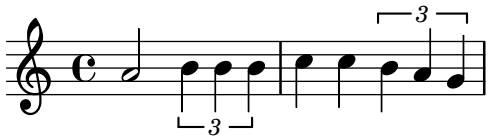
Tuplets

Tuplets are made from a music expression with the `\tuplet` command, multiplying the speed of the music expression by a fraction:

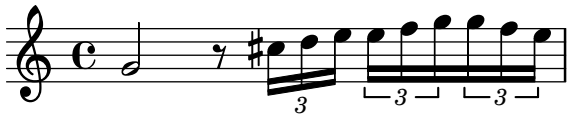
```
\tuplet fraction { music }
```

The fraction's numerator will be printed over or under the notes, optionally with a bracket. The most common tuplets are triplets (3 notes played within the duration normally allowed for 2).

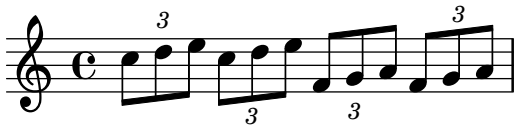
```
\relative {
  a'2 \tuplet 3/2 { b4 4 4 }
  c4 c \tuplet 3/2 { b4 a g }
}
```



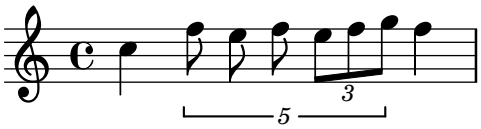
When entering long passages of tuplets, having to write a separate `\tuplet` command for each group is inconvenient. It is possible to specify the duration of one tuplet group directly before the music in order to have the tuplets grouped automatically:

```
\relative {
  g'2 r8 \tuplet 3/2 8 { cis16 d e e f g g f e }
}
```

Tuplet brackets may be manually placed above or below the staff:

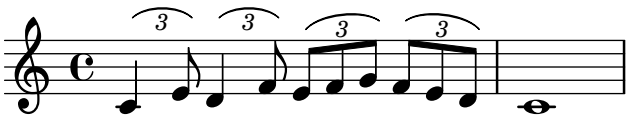
```
\relative {
  \tupletUp \tuplet 3/2 { c''8 d e }
  \tupletNeutral \tuplet 3/2 { c8 d e }
  \tupletDown \tuplet 3/2 { f,8 g a }
  \tupletNeutral \tuplet 3/2 { f8 g a }
}
```



Tuplets may be nested:

```
\relative {
  \autoBeamOff
  c''4 \tuplet 5/4 { f8 e f \tuplet 3/2 { e[ f g] } } f4
}
```

Modifying nested tuplets which begin at the same musical moment must be done with `\tweak`; see Section 5.3.4 [The `\tweak` command], page 685.

Tuplet brackets may be replaced with slurs, as is preferred in many older editions:

```
\relative {
  \tuplet 3/2 4 {
    \override TupletBracket.tuplet-slur = ##t
    c'4 e8 d4 f8
    \override TupletBracket.bracket-visibility = ##t
    e f g f e d
  } c1
}
```

By default, a bracket is only printed if all of the notes it spans are not beamed together; in some cases (for example with slurs, as in the example above) it may be preferable to change that behavior, through the `bracket-visibility` property as detailed in one of the following snippets.

More generally, either or both the `TupletBracket` and `TupletNumber` objects may be hidden or shown as explained in Section 5.4.7 [Visibility of objects], page 704; however, a more flexible way of modifying the duration of notes without printing a tuplet bracket is also introduced in [Scaling durations], page 56.

Predefined commands

`\tupletUp`, `\tupletDown`, `\tupletNeutral`.

Selected Snippets

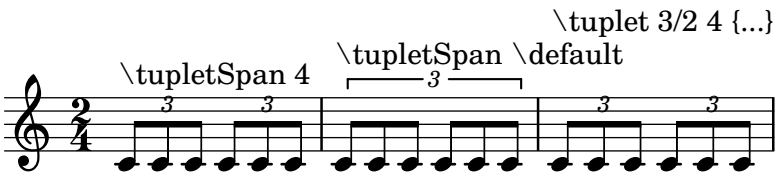
Entering several tuplets using only one \tuplet command

The property `tupletSpannerDuration` sets how long each of the tuplets contained within the brackets after `\tuplet` should last. Many consecutive tuplets can then be placed within a single `\tuplet` expression, thus saving typing.

There are several ways to set `tupletSpannerDuration`. The command `\tupletSpan` sets it to a given duration, and clears it when instead of a duration `\default` is specified. Another way is to use an optional argument with `\tuplet`.

```
\relative c' {
  \time 2/4
  \tupletSpan 4
  \tuplet 3/2 { c8^"\\tupletSpan 4" c c c c c }
```

```
  \tupletSpan \default
  \tuplet 3/2 { c8^"\\tupletSpan \\default" c c c c c }
  \tuplet 3/2 4 { c8^"\\tuplet 3/2 4 {...}" c c c c c }
}
```

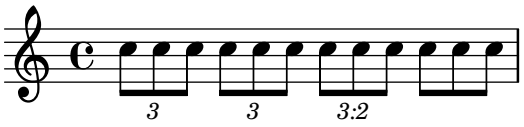


Changing the tuplet number

By default, only the numerator of the tuplet number is printed over the tuplet bracket, i.e., the numerator of the argument to the `\tuplet` command.

Alternatively, *num*:*den* of the tuplet number may be printed, or the tuplet number may be suppressed altogether.

```
\relative c'' {
  \tuplet 3/2 { c8 c c }
  \tuplet 3/2 { c8 c c }
  \override TupletNumber.text = #tuplet-number::calc-fraction-text
  \tuplet 3/2 { c8 c c }
  \omit TupletNumber
  \tuplet 3/2 { c8 c c }
}
```

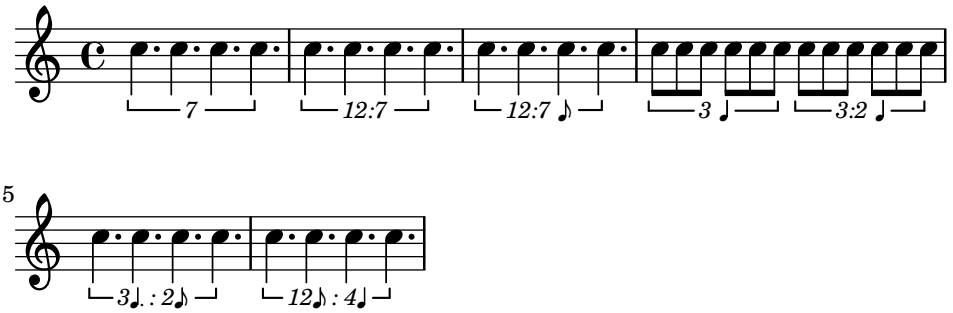


Non-default tuplet numbers

LilyPond also provides formatting functions to print tuplet numbers different than the actual fraction, as well as to append a note value to the tuplet number or tuplet fraction.

```
\relative c'' {
  \once \override TupletNumber.text =
    #(tuplet-number::non-default-tuplet-denominator-text 7)
  \tuplet 3/2  { c4. c4. c4. c4. }
  \once \override TupletNumber.text =
    #(tuplet-number::non-default-tuplet-fraction-text 12 7)
  \tuplet 3/2  { c4. c4. c4. c4. }
  \once \override TupletNumber.text =
    #(tuplet-number::append-note-wrapper
      (tuplet-number::non-default-tuplet-fraction-text 12 7)
      (ly:make-duration 3 0))
  \tuplet 3/2  { c4. c4. c4. c4. }
  \once \override TupletNumber.text =
    #(tuplet-number::append-note-wrapper
      tuplet-number::calc-denominator-text
      (ly:make-duration 2 0))
  \tuplet 3/2  { c8 c8 c8 c8 c8 c8 }
  \once \override TupletNumber.text =
    #(tuplet-number::append-note-wrapper
```

```
      tuplet-number::calc-fraction-text
      (ly:make-duration 2 0))
  \tuplet 3/2  { c8 c8 c8 c8 c8 c8 }
  \once \override TupletNumber.text =
    #(tuplet-number::fraction-with-notes
      (ly:make-duration 2 1) (ly:make-duration 3 0))
  \tuplet 3/2  { c4. c4. c4. c4. }
  \once \override TupletNumber.text =
    #(tuplet-number::non-default-fraction-with-notes 12
      (ly:make-duration 3 0) 4 (ly:make-duration 2 0))
  \tuplet 3/2  { c4. c4. c4. c4. }
}
```

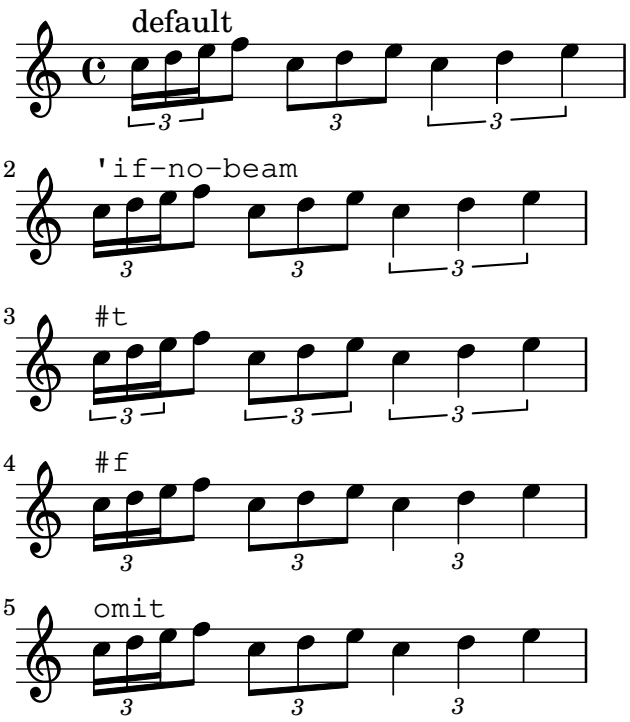


Controlling tuplet bracket visibility

The default behavior of tuplet-bracket visibility is to print a bracket unless there is a beam of the same length as the tuplet.

To control the visibility of tuplet brackets, set the property `'bracket-visibility` to either `#t` (always print a bracket), `'if-no-beam` (only print a bracket if there is no beam) or `#f` (never print a bracket). The latter is in fact equivalent to omitting the `TupletBracket` object altogether from the printed output.

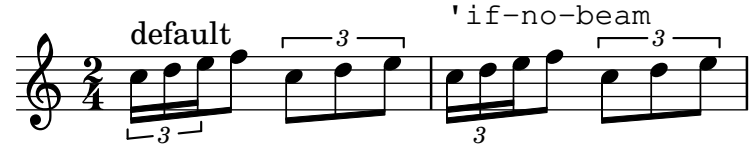
```
music = \relative c'' {
  \tuplet 3/2 { c16[ d e } f8]
  \tuplet 3/2 { c8 d e }
  \tuplet 3/2 { c4 d e }
}

\new Voice {
  \relative c' {
    \override Score.TextMark.non-musical = ##f
    \textMark "default" \music
    \override TupletBracket.bracket-visibility = #'if-no-beam
    \textMark \markup \typewriter "'if-no-beam" \music
    \override TupletBracket.bracket-visibility = ##t
    \textMark \markup \typewriter "#t" \music
    \override TupletBracket.bracket-visibility = ##f
    \textMark \markup \typewriter "#f" \music
    \omit TupletBracket
    \textMark \markup \typewriter "omit" \music
  }
}
```



Printing tuplet brackets on the note head side

Whichever option you choose for controlling the tuplet bracket visibility, it will show or hide the tuplet bracket irrespectively of tuplet bracket placement (stem side or note head side). However, when placing the tuplet bracket on the note head side some authors recommend always printing the tuplet bracket. The option `visible-over-note-heads` can be used to achieve this.

```
music = \relative c'' {
  \tupletNeutral \tuplet 3/2 { c16[ d e } f8]
  \tupletUp \tuplet 3/2 { c8 d e }
}

\new Voice {
  \relative c' {
    \time 2/4
    \override TupletBracket.visible-over-note-heads = ##t
    \override Score.TextMark.non-musical = ##f
    { \textMark \markup "default" \music }
    \override TupletBracket.bracket-visibility = #'if-no-beam
    { \textMark \markup \typewriter "'if-no-beam" \music }
  }
}
```

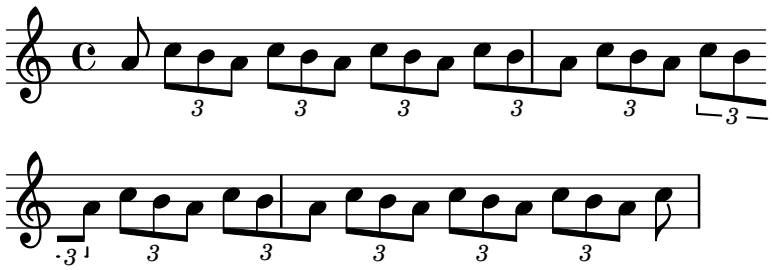


Permitting line breaks within beamed tuplets

This artificial example shows how both manual and automatic line breaks may be permitted to within a beamed tuplet. Note that such off-beat tuplets have to be beamed manually.

```
\layout {
```

```
  \context {
    \Voice
    % Permit line breaks within tuplets
    \remove "Forbid_line_break_engraver"
    % Allow beams to be broken at line breaks
    \override Beam.breakable = ##t
  }
}
\relative c'' {
  a8
  \repeat unfold 5 { \tuplet 3/2 { c[ b a] } }
  % Insert a manual line break within a tuplet
  \tuplet 3/2 { c[ b \bar "" \break a] }
  \repeat unfold 5 { \tuplet 3/2 { c[ b a] } }
  c8
}
```



See also

Music Glossary: Section “triplet” in *Music Glossary*, Section “tuplet” in *Music Glossary*, Section “polymetric” in *Music Glossary*.

Learning Manual: Section “Tweaking methods” in *Learning Manual*.

Notation Reference: Section 5.4.1 [Direction and placement], page 694, Section 5.4.7 [Visibility of objects], page 704, [Time administration], page 137, [Scaling durations], page 56, Section 5.3.4 [The `\tweak` command], page 685, [Polymetric notation], page 83.

Snippets: Section “Rhythms” in *Snippets*.

Internals Reference: Section “TupletBracket” in *Internals Reference*, Section “TupletNumber” in *Internals Reference*, Section “TimeScaledMusic” in *Internals Reference*.

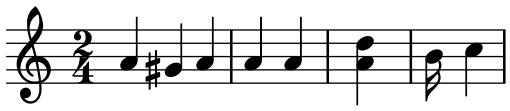
Scaling durations

The duration of single notes, rests or chords may be multiplied by a fraction `N/M` by appending `*N/M` (or `*N` if `M` is 1) to the duration. Factors may also be added by using Scheme expressions evaluating to a number or musical length like `*#(ly:music-length music)`. This is convenient for scaling a duration of ‘`1`’ to let a note or multi-measure rest stretch to a length derived from a music variable.

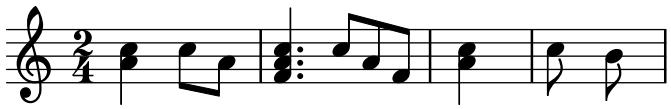
Adding a factor will not affect the appearance of the notes or rests produced, but the altered duration will be used in calculating the position within the measure and setting the duration in the MIDI output. Multiplying factors may be combined like `*L*M/N`. Factors are part of the duration: if a duration is not specified for subsequent notes, the default duration taken from the preceding note will include any scaling factor.

In the following example, the first three notes take up exactly two beats, but no triplet bracket is printed.

```
\relative {
```

```
  \time 2/4
  % Alter durations to triplets
  a'4*2/3 gis a
  % Normal durations
  a4 a
  % Double the duration of chord
  <a d>4*2
  % Duration of quarter, appears like sixteenth
  b16*4 c4
}
```

The duration of spacer rests may also be modified by a multiplier. This is useful for skipping many measures, e.g., `s1*23`.

Longer stretches of music may be compressed by a fraction in the same way, as if every note, chord or rest had the fraction as a multiplier. This leaves the appearance of the music unchanged but the internal duration of the notes will be multiplied by the given scale factor, usually *num*/*den*. Here is an example showing how music can be compressed and expanded:

```
\relative {
  \time 2/4
  % Normal durations
  <c'' a>4 c8 a
  % Scale music by *2/3
  \scaleDurations 2/3 {
    <c a f>4. c8 a f
  }
  % Scale music by *2
  \scaleDurations 2 {
    <c' a>4 c8 b
  }
}
```

One application of this command is in polymetric notation, see [Polymetric notation], page 83.

See also

Notation Reference: [Tuplets], page 51, [Invisible rests], page 63, [Polymetric notation], page 83.

Snippets: Section “Rhythms” in *Snippets*.

Known issues and warnings

The calculation of the position within a measure must take into account all the scaling factors applied to the notes within that measure and any fractional carry-out from earlier measures. This calculation is carried out using rational numbers. If an intermediate numerator or denominator in that calculation exceeds 2^30 the execution and typesetting will stop at that point without indicating an error.

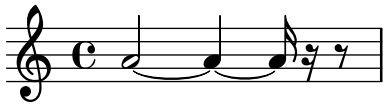
Ties

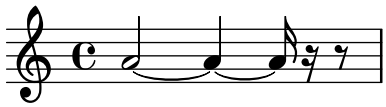
A tie connects two adjacent note heads of the same pitch. The tie in effect extends the duration of a note.

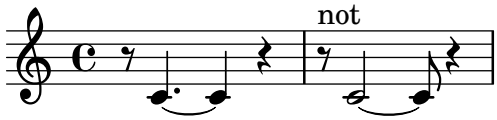
Ties that connect notes to nothing are called *laissez vibrer* articulation; see [Ties], page 59, for the `\laissezVibrer` command. Ties that connect nothing to notes (as needed in seconda volta sections, for example), can be entered with the `\repeatTie` command; see [Ties], page 59.

> **Note:** Ties should not be confused with *slurs*, which indicate articulation, or *phrasing slurs*, which indicate musical phrasing. A tie is just a way of extending a note duration, similar to the augmentation dot.

A tie is entered by appending a tilde symbol (~) to the first of each pair of notes being tied. This indicates that the note should be tied to the following note, which must be at the same pitch.

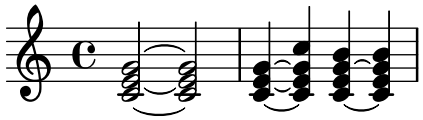
```
{ a'2~ 4~ 16 r r8 }
```

Ties can make use of the 'last explicit pitch' interpretation of isolated durations:

```
{ a'2~ 4~ 16 r r8 }
```

Ties are used either when the note crosses a bar line, or when dots cannot be used to denote the rhythm. Ties should also be used when note values cross larger subdivisions of the measure:

```
\relative {
  r8 c'4.~ 4 r4 |
  r8^"not" c2~ 8 r4
}
```

If you need to tie many notes across bar lines, it may be easier to use automatic note splitting, see [Automatic note splitting], page 87. This mechanism automatically splits long notes, and ties them across bar lines.

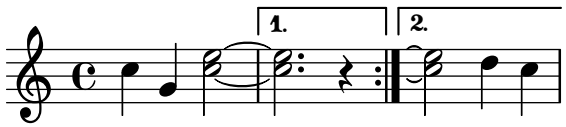
When a tie is applied to a chord, all note heads whose pitches match are connected. When no note heads match, no ties will be created. Chords may be partially tied by placing the ties inside the chord.

```
\relative c' {
  <c e g>2~ 2 |
  <c e g>4~ <c e g c>
    <c~ e g~ b> <c e g b> |
}
```



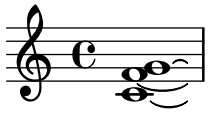
When a tie continues into alternative endings, you have to specify the repeated tie as follows:

```
\relative {
  \repeat volta 2 { c'' g <c e>2~ }
  \alternative {
    % the following note is tied normally
    \volta 1 { <c e>2. r4 }
    % the following note has a repeated tie
    \volta 2 { <c e>2\repeatTie d4 c }
  }
}
```



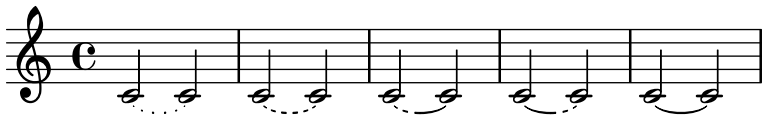
L.v. ties (*laissez vibrer*) indicate that notes must not be damped at the end. It is used in notation for piano, harp and other string and percussion instruments. They can be entered as follows:

```
<c' f' g'>1\laissezVibrer
```

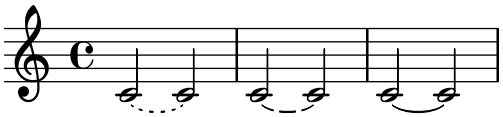


Ties may be made to curve up or down manually; see Section 5.4.1 [Direction and placement], page 694.

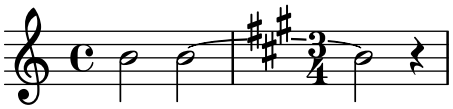
Ties may be made dashed, dotted, or a combination of solid and dashed.

```
\relative c' {
  \tieDotted
  c2~ 2
  \tieDashed
  c2~ 2
  \tieHalfDashed
  c2~ 2
  \tieHalfSolid
  c2~ 2
  \tieSolid
  c2~ 2
}
```

Custom dash patterns can be specified:

```
\relative c' {
  \tieDashPattern #0.3 #0.75
```

```
  c2~ 2
  \tieDashPattern #0.7 #1.5
  c2~ 2
  \tieSolid
  c2~ 2
}
```

Dash pattern definitions for ties have the same structure as dash pattern definitions for slurs. For more information about complex dash patterns, see [Slurs], page 151.

Override *whiteout* and *layer* layout properties of objects that should cause a gap in ties.

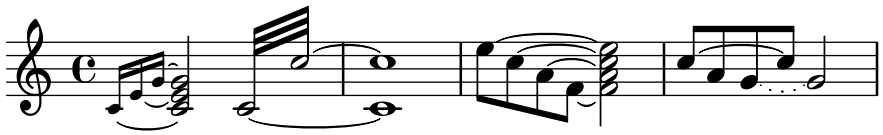
```
\relative {
  \override Tie.layer = #-2
  \override Staff.TimeSignature.layer = #-1
  \override Staff.KeySignature.layer = #-1
  \override Staff.TimeSignature.whiteout = ##t
  \override Staff.KeySignature.whiteout = ##t
  b'2 b~
  \time 3/4
  \key a \major
  b r4
}
```

Predefined commands

\tieUp, \tieDown, \tieNeutral, \tieDotted, \tieDashed, \tieDashPattern, \tieHalfDashed, \tieHalfSolid, \tieSolid.

Selected Snippets

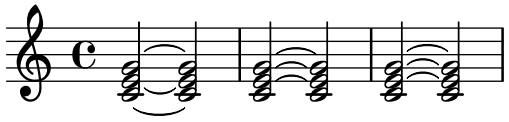
Using ties with arpeggios

Ties are sometimes used to write out arpeggios. In this case, two tied notes need not be consecutive. This can be achieved by setting the tieWaitForNote property to #t. The same feature is also useful, for example, to tie a tremolo to a chord, but in principle, it can also be used for ordinary consecutive notes.

```
\relative c' {
  \set tieWaitForNote = ##t
  \grace { c16[ ~ e ~ g] ~ } <c, e g>2
  \repeat tremolo 8 { c32 ~ c' ~ } <c c,>1
  e8 ~ c ~ a ~ f ~ <e' c a f>2
  \tieUp
  c8 ~ a
  \tieDown
  \tieDotted
  g8 ~ c g2
}
```

Engraving ties manually

Ties may be engraved manually by changing the `tie-configuration` property of the `TieColumn` object. The first number indicates the distance from the center of the staff in half staff-spaces, and the second number indicates the direction (1 = up, -1 = down).

Note that LilyPond makes a distinction between exact and inexact values for the first number. If using an exact value (i.e., either an integer or a fraction like `(/ 4 5)`), the value serves as a rough vertical position that gets further tuned by LilyPond to make the tie avoid staff lines. If using an inexact value like a floating point number, it is taken as the vertical position without further adjustments.

```
\relative c' {
  <c e g>2~ <c e g>
  \override TieColumn.tie-configuration =
    #'((0.0 . 1) (-2.0 . 1) (-4.0 . 1))
  <c e g>2~ <c e g>
  \override TieColumn.tie-configuration =
    #'((0 . 1) (-2 . 1) (-4 . 1))
  <c e g>2~ <c e g>
}
```

See also

Music Glossary: Section “tie” in *Music Glossary*, Section “laissez vibrer” in *Music Glossary*.

Notation Reference: [Slurs], page 151, [Automatic note splitting], page 87.

Snippets: Section “Expressive marks” in *Snippets*, Section “Rhythms” in *Snippets*.

Internals Reference: Section “LaissezVibrerTie” in *Internals Reference*, Section “LaissezVibrerTieColumn” in *Internals Reference*, Section “TieColumn” in *Internals Reference*, Section “Tie” in *Internals Reference*.

Known issues and warnings

Switching staves when a tie is active will not produce a slanted tie.

Changing clefs or ottavations during a tie is not really well-defined. In these cases, a slur may be preferable.

1.2.2 Writing rests

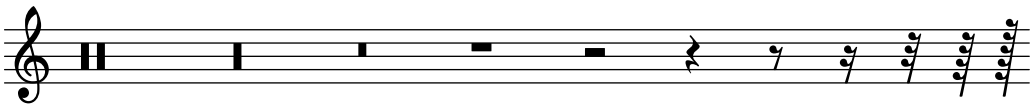
Rests are entered as part of the music in music expressions.

Rests

Rests are entered like notes with the note name `r`. Durations longer than a whole rest use the following predefined commands:

```
\new Staff {
  % These two lines are just to prettify this example
  \time 16/1
```

```
  \omit Staff.TimeSignature
  % Print a maxima rest, equal to four breves
  r\maxima
  % Print a longa rest, equal to two breves
  r\longa
  % Print a breve rest
  r\breve
  r1 r2 r4 r8 r16 r32 r64 r128
}
```



Whole measure rests, centered in the middle of the measure, must be entered as multi-measure rests. They can be used for a single measure as well as many measures and are discussed in [Full measure rests], page 66.

To explicitly specify a rest's vertical position, write a note followed by `\rest`. A rest of the duration of the note will be placed at the staff position where the note would appear. This allows for precise manual formatting of polyphonic music, since the automatic rest collision formatter will not move these rests.

```
\relative { a'4\rest d4\rest }
```

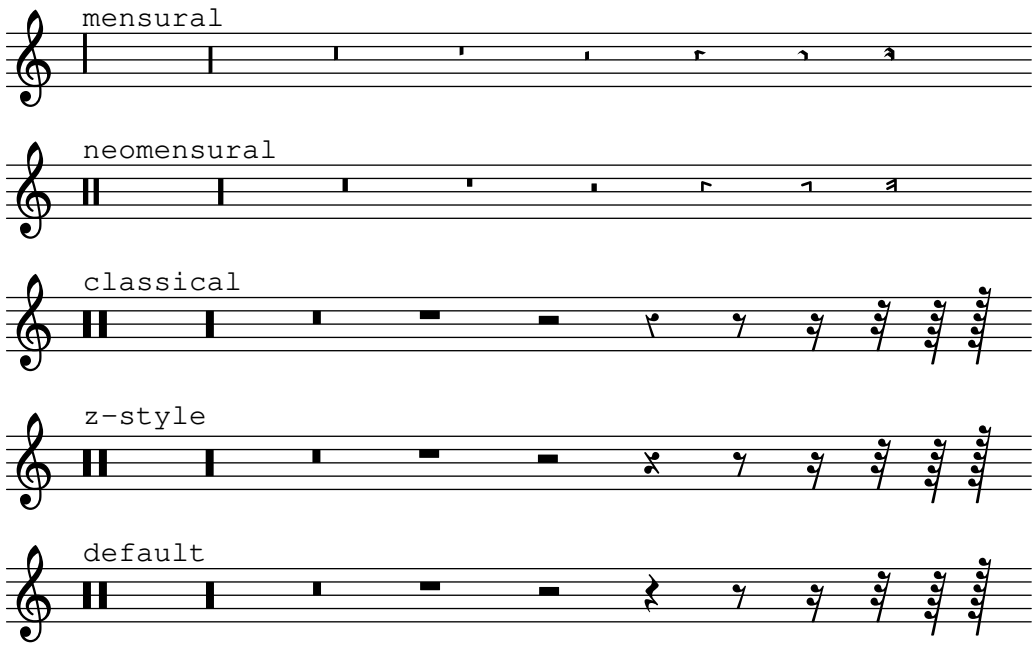
Selected Snippets

Rest styles

Rests may be used in various styles.

```
\new Staff \relative c {
  \omit Score.TimeSignature
  \cadenzaOn

  \override Staff.Rest.style = #'mensural
  r\maxima^\markup \typewriter { mensural }
  r\longa r\breve r1 r2 r4 r8 r16 s32 s64 s128 s128
  \bar ""
  \break

  \override Staff.Rest.style = #'neomensural
  r\maxima^\markup \typewriter { neomensural }
  r\longa r\breve r1 r2 r4 r8 r16 s32 s64 s128 s128
  \bar ""
  \break

  \override Staff.Rest.style = #'classical
  r\maxima^\markup \typewriter { classical }
  r\longa r\breve r1 r2 r4 r8 r16 r32 r64 r128 s128
  \bar ""
  \break
```

```
  \override Staff.Rest.style = #'z
  r\maxima^\markup \typewriter { z-style }
  r\longa r\breve r1 r2 r4 r8 r16 r32 r64 r128 s128
  \bar ""
  \break

  \override Staff.Rest.style = #'default
  r\maxima^\markup \typewriter { default }
  r\longa r\breve r1 r2 r4 r8 r16 r32 r64 r128 s128
}
```



See also

Music Glossary: Section “breve” in *Music Glossary*, Section “longa” in *Music Glossary*, Section “maxima” in *Music Glossary*.

Notation Reference: [Full measure rests], page 66.

Snippets: Section “Rhythms” in *Snippets*.

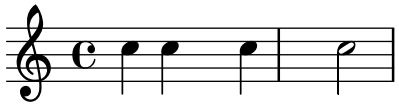
Internals Reference: Section “Rest” in *Internals Reference*.

Known issues and warnings

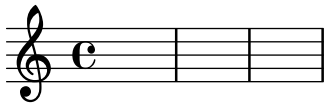
There is no fundamental limit to rest durations (both in terms of longest and shortest), but the number of glyphs is limited: there are rests from 1024th to maxima (8× whole).

Invisible rests

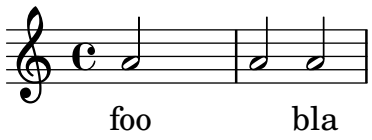
There are two forms of invisible rests: the *spacer rest* named ‘s’, and the `\skip` command. The spacer rest is a note that does not produce output. Like any other note or rest, its duration sets the default duration of following notes.

```
\relative c'' {
  c4 c s c |
  s2 c |
}
```

Also like other notes and rests, it implicitly causes `Staff` and `Voice` contexts to be created if none exist.

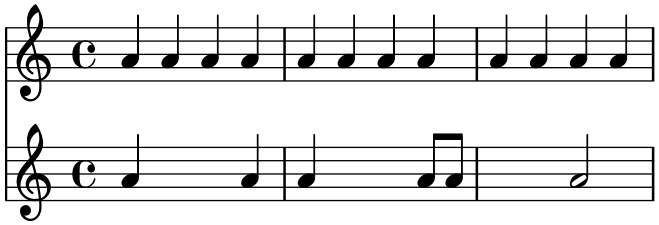
```
{ s1 s s }
```



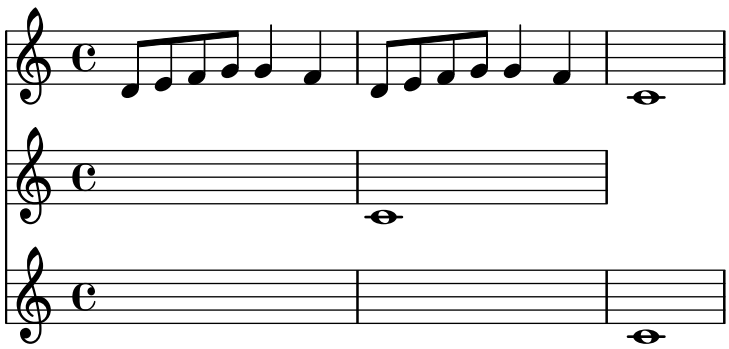
Spacer rests are available only in note mode and chord mode. In other situations, for example, when entering lyrics, the command `\skip` is used to skip a musical moment. The `\skip` command accepts either an explicit duration or a piece of music as an argument and skips the duration of the argument. The duration of the `\skip` is ignored if lyrics derive their durations from the notes in an associated melody through `\addlyrics` or `\lyricsto`.

```
<<
  {
    a'2 \skip2 a'2 a'2
  }
  \new Lyrics {
    \lyricmode {
      foo2 \skip 1 bla2
    }
  }
>>
```

When the argument to `\skip` is music, the default duration of the following note is implicitly set by the last note of the argument. However, to preserve backward compatibility with the legacy implementation of `\skip`, a numeric duration argument does not affect the duration of the subsequent note.

```
<<
  {
    \repeat unfold 12 { a'4 }
  }
  {
    a'4 \skip 2 a' |
    a'4 \skip { a'8 a' a' a' } a' a' |
    s2 a'
  }
>>
```



The \skip command preserves the effect of an enclosing unfoldRepeats command, unlike the skip-of-length Scheme function.

```
MyCadenza = \fixed c' {
  \repeat volta 2 {
    d8 e f g g4 f4
  }
}

music = <<
  \new Staff {
    \MyCadenza
    c'1
  }
  \new Staff {
    #(skip-of-length MyCadenza)
    c'1
  }
  \new Staff {
    \skip \MyCadenza
    c'1
  }
>>

\unfoldRepeats \music
```

The \skip command simply skips musical time; it creates no output of any kind.

```
% This is valid input, but does nothing
{ \skip 1 \skip1 \skip 1 }
```

See also

Learning Manual: Section “Visibility and color of objects” in *Learning Manual*.

Notation Reference: [Hidden notes], page 259, Section 5.4.7 [Visibility of objects], page 704.

Snippets: Section “Rhythms” in *Snippets*.

Internals Reference: Section “SkipMusic” in *Internals Reference*.

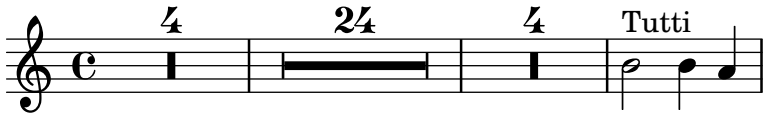
Known issues and warnings

Because duration and music arguments to the \skip command affect the duration of subsequent music differently, it is good practice to provide an explicit duration for the music immediately following the command.

Full measure rests

Rests for one or more full measures are entered like notes with the note name uppercase 'R'. Their duration is entered identically to the duration notation used for notes, including the ability to use duration multipliers, as explained in [Scaling durations], page 56:

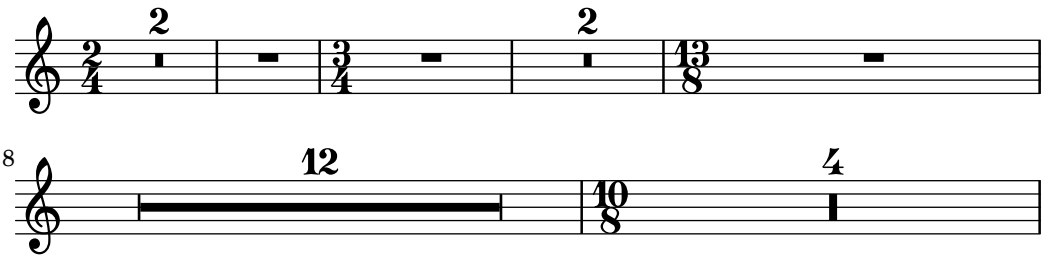
```
% Rest measures contracted to single measure
\compressMMRests {
  R1*4
  R1*24
  R1*4
  b'2^"Tutti" b'4 a'4
}
```



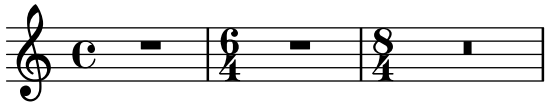
The example above also demonstrates how to compress multiple empty measures, as explained in [Compressing empty measures], page 248.

The duration of a multi-measure rest must always be equal to the length of one or several measures. Therefore, some time signatures require the use of augmentation dots or fractions:

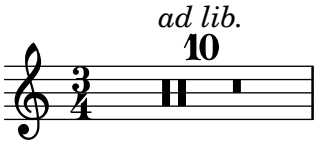
```
\compressMMRests {
  \time 2/4
  R1 | R2 |
  \time 3/4
  R2. | R2.*2 |
  \time 13/8
  R1*13/8 | R1*13/8*12 |
  \time 10/8
  R4*5*4 |
}
```



A full-measure rest is printed as either a whole or breve rest, centered in the measure, depending on the time signature.

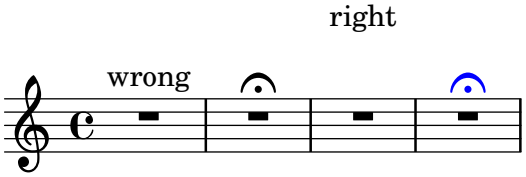
```
\time 4/4
R1 |
\time 6/4
R1*3/2 |
\time 8/4
R1*2 |
```

Markups can be added to multi-measure rests.

```
\compressMMRests {
  \time 3/4
  R2.*10^\markup { \italic "ad lib." }
}
```



> **Note:** Markups and articulations attached to multi-measure rests are `MultiMeasureRestText` and `MultiMeasureRestScript` types, not `TextScript` and `Script`. Overrides must be directed to the correct object, or they will be ignored. See the following example:

```
% This fails, as the wrong object name is specified
\override TextScript.padding = #5
\override Script.color = #blue
R1^"wrong"
R1\fermata
% This is the correct object name to be specified
\override MultiMeasureRestText.padding = #5
\override MultiMeasureRestScript.color = #blue
R1^"right"
R1\fermata
```



When a multi-measure rest immediately follows a `\partial` setting, resulting bar-check warnings may not be displayed.

Predefined commands

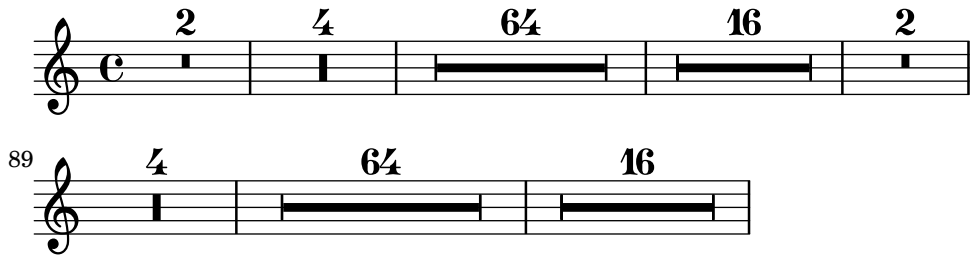
`\textLengthOn`, `\textLengthOff`, `\compressMMRests`.

Selected Snippets

Multi-measure rest length control

Multi-measure rests have length according to their total duration which is under the control of `MultiMeasureRest.space-increment`. Note that the default value is `2.0`.

```
\relative c' {
  \compressEmptyMeasures
  R1*2 R1*4 R1*64 R1*16
  \override Staff.MultiMeasureRest.space-increment = 2.5
  R1*2 R1*4 R1*64 R1*16
}
```



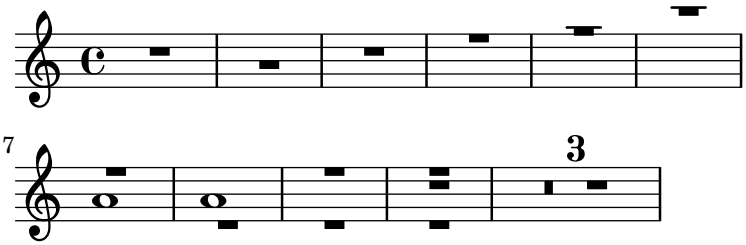
Positioning multi-measure rests

Unlike ordinary rests, there is no predefined command to change the staff position of a multi-measure rest symbol of either form by attaching it to a note. However, in polyphonic music multi-measure rests in odd-numbered and even-numbered voices are vertically separated.

The positioning of multi-measure rests can be controlled as follows:

```
\relative c'' {
  % Multi-measure rests by default are set under the fourth line
  R1
  % They can be moved using an override
  \override MultiMeasureRest.staff-position = #-2
  R1
  \override MultiMeasureRest.staff-position = #0
  R1
  \override MultiMeasureRest.staff-position = #2
  R1
  \override MultiMeasureRest.staff-position = #3
  R1
  \override MultiMeasureRest.staff-position = #6
  R1
  \revert MultiMeasureRest.staff-position
  \break

  % In two Voices, odd-numbered voices are under the top line
  << { R1 } \\ { a1 } >>
  % Even-numbered voices are under the bottom line
  << { a1 } \\ { R1 } >>
  % Multi-measure rests in both voices remain separate
  << { R1 } \\ { R1 } >>

  % Separating multi-measure rests in more than two voices
  % requires an override
  << { R1 } \\ { R1 } \\
     \once \override MultiMeasureRest.staff-position = #0
     { R1 }
  >>

  % Using compressed bars in multiple voices requires another override
  % in all voices to avoid multiple instances being printed
  \compressMMRests
  <<
   \revert MultiMeasureRest.direction
    { R1*3 }
    \\
```

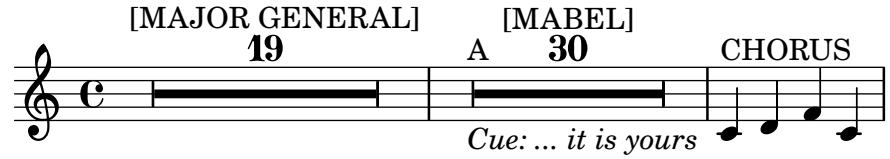
```
    \revert MultiMeasureRest.direction
     { R1*3 }
  >>
}
```



Multi-measure rest markup

Markups attached to a multi-measure rest will be centered above or below it. Long markups attached to multi-measure rests do not cause the measure to expand. To expand a multi-measure rest to fit the markup, use an empty chord with an attached markup before the multi-measure rest. Text attached to a spacer rest in this way is left-aligned to the position where the note would be placed in the measure, but if the measure length is determined by the length of the text, the text will appear to be centered.

```
\relative c' {
  \compressMMRests {
    \textLengthOn
    <>^\markup { [MAJOR GENERAL] }
    R1*19
    <>_\markup { \italic { Cue: ... it is yours } }
    <>^\markup { A }
    R1*30^\markup { [MABEL] }
    \textLengthOff
    c4^\markup { CHORUS } d f c
  }
}
```



See also

Music Glossary: Section “multi-measure rest” in *Music Glossary*.

Notation Reference: [Durations], page 48, [Scaling durations], page 56, [Compressing empty measures], page 248, Section 1.8 [Text], page 277, Section 1.8.2 [Formatting text], page 289, [Text scripts], page 279.

Snippets: Section “Rhythms” in *Snippets*.

Internals Reference: Section “MultiMeasureRest” in *Internals Reference*, Section “MultiMeasureRestNumber” in *Internals Reference*, Section “MultiMeasureRestScript” in *Internals Reference*, Section “MultiMeasureRestText” in *Internals Reference*.

Known issues and warnings

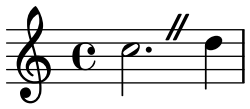
Fingerings over multi-measure rests (e.g., `R1*10-4`) may result in the fingering numeral colliding with the bar counter numeral.

There is no way to automatically condense multiple ordinary rests into a single multi-measure rest.

Multi-measure rests do not take part in rest collisions.

Caesuras

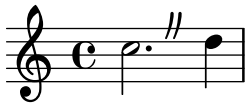
The `\caesura` command calls for unmetered silence: typically, a short break in sound that does not shorten the previous note.

```
\fixed c'' { c2. \caesura d4 }
```

In chants and hymns, `\caesura` can serve more generally as a phrase division; for more information, see the references at the end of this section. For a break in sound that shortens the previous note, see [Breath marks], page 156.

Articulations may follow `\caesura` to indicate the relative duration or significance of the break; these create `CaesuraScript` grobs.

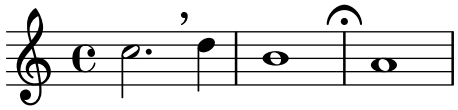
```
\fixed c'' { c2. \caesura \fermata d4 }
```

By default, `\caesura` creates a `BreathingSign` grob. The `breath` element of the `caesuraType` context property controls which of several predefined signs `\caesura` creates. See Section A.16 [List of breath marks], page 826.

```
\fixed c'' {
  \set Score.caesuraType = #'((breath . curvedcaesura))
  c2. \caesura d4
}
```

To designate one or more `CaesuraScript` grobs to be created as a normal part of an unarticulated caesura, set the `scripts` element of the `caesuraType` context property. (Additional scripts can still be attached as articulations.) In conjunction with the `breath` element, the scripts listed in the `script` element attach to the `BreathingSign`; otherwise, if a `BarLine` is present, they attach to it.

The `caesuraTypeTransform` context property can be set to a Scheme function to enable a degree of automatic adaptation. The `at-bar-line-substitute-caesura-type` function generator supports styles where the notation differs at a bar line.

```
\fixed c' {
  \set Score.caesuraType =
    #'((breath . spacer)
       (scripts . (outsidecomma)))
  \set Score.caesuraTypeTransform =
    #(at-bar-line-substitute-caesura-type
      '((scripts . (fermata))))
  c'2. \caesura d'4
```

```
  b1 \caesura
  a1
}
```

Predefined commands

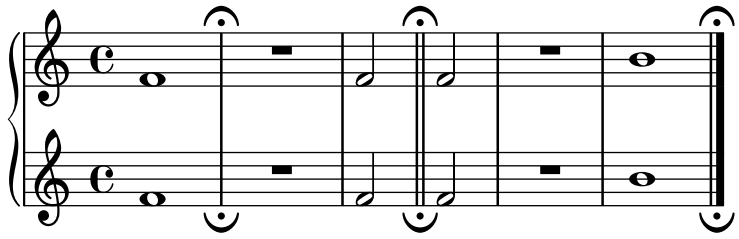
`\caesura`.

Selected Snippets

Positioning opposing fermatas on a bar line

This snippet demonstrates a command that prints fermatas both above and below a bar line. If there would not otherwise be a bar line, it adds a double bar line. Semantically, the command codes a longer-than-normal caesura, which might be considered misuse depending on the situation.

```
twoWayFermata = {
  \once \set Staff.caesuraType = #'((underlying-bar-line . "||"))
  \once \set Staff.caesuraTypeTransform = ##f
  \caesura ^\fermata _\fermata
}

music = {
  f'1 \twoWayFermata
  R1
  f'2 \twoWayFermata f'2
  R1
  b'1 \twoWayFermata \fine
}

\new GrandStaff <<
  \new Staff \music
  \new Staff \music
>>
```



See also

Music Glossary: Section “caesura” in *Music Glossary*.

Notation Reference: [Breath marks], page 156, [Divisiones], page 505, [Kievan bar lines], page 515, [Phrase bar lines in hymn tunes], page 374.

Snippets: Section “Expressive marks” in *Snippets*.

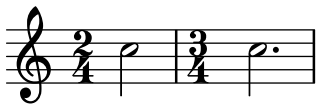
Internals Reference: Section “BreathingSign” in *Internals Reference*, Section “Caesura_engraver” in *Internals Reference*, Section “CaesuraEvent” in *Internals Reference*,

Section “CaesuraScript” in *Internals Reference*, Section “caesuraTypeTransform” in *Internals Reference*, Section “caesuraType” in *Internals Reference*.

1.2.3 Displaying rhythms

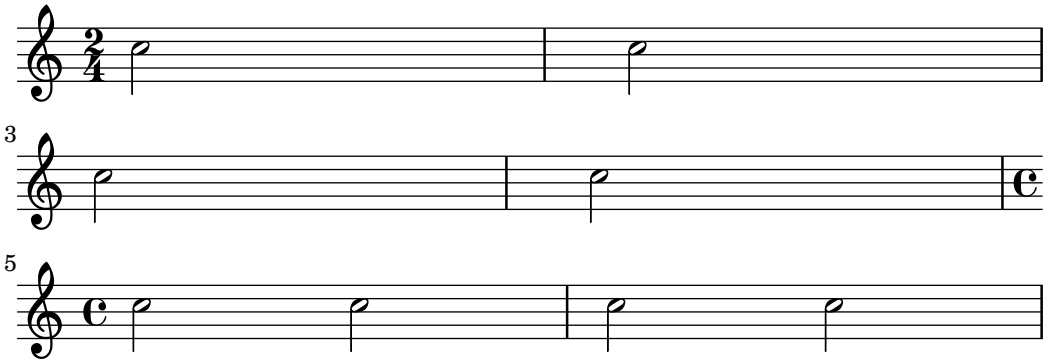
Time signature

The time signature is set as follows:

```
\time 2/4 c''2
\time 3/4 c''2.
```

Mid-measure time signature changes are covered in [Upbeats], page 80.

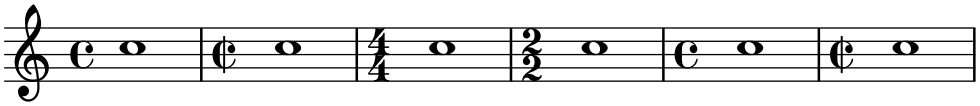
Time signatures are printed at the beginning of a piece and whenever the time signature changes. If a change takes place at the end of a line a warning time signature sign is printed there. This default behavior may be changed, see Section 5.4.7 [Visibility of objects], page 704.

```
\relative c'' {
  \time 2/4
  c2 c
  \break
  c c
  \break
  \time 4/4
  c c c c
}
```



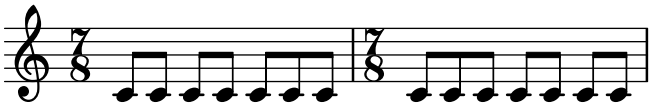
The time signature symbol that is used in 2/2 and 4/4 time can be changed to a numeric style:

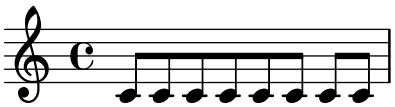
```
\relative c'' {
  % Default style
  \time 4/4 c1
  \time 2/2 c1
  % Change to numeric style
  \numericTimeSignature
  \time 4/4 c1
  \time 2/2 c1
  % Revert to default style
  \defaultTimeSignature
  \time 4/4 c1
```

```
  \time 2/2 c1
}
```

Mensural time signatures are covered in [Mensural time signatures], page 498.

In addition to setting the printed time signature, the `\time` command also sets the values of the time-signature-based properties `baseMoment`, `beatStructure`, and `beamExceptions`. The predefined default values for these properties can be found in `scm/time-signature-settings.scm`.

The default value of `beatStructure` can be overridden in the `\time` command itself by supplying it as the optional first argument:

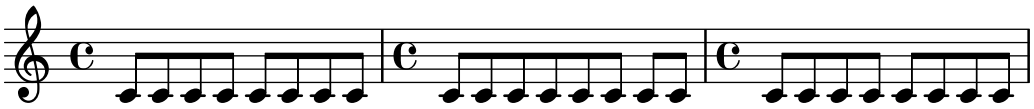
```
\score {
  \new Staff {
    \relative {
      \time 2,2,3 7/8
      \repeat unfold 7 { c'8 } |
      \time 3,2,2 7/8
      \repeat unfold 7 { c8 } |
    }
  }
}
```

Alternatively, the default values of all these time-signature-based variables, including `baseMoment` and `beamExceptions`, can be set together. The values can be set independently for several different time signatures. The new values take effect when a subsequent `\time` command with the same value of the time signature is executed:

```
\score {
  \new Staff {
    \relative c' {
      \overrideTimeSignatureSettings
        4/4        % timeSignatureFraction
        1/4        % baseMomentFraction
        3,1        % beatStructure
        #'()       % beamExceptions
      \time 4/4
      \repeat unfold 8 { c8 } |
    }
  }
}
```

`\overrideTimeSignatureSettings` takes four arguments:

1. *`timeSignatureFraction`*, a fraction describing the time signature to which these values apply.

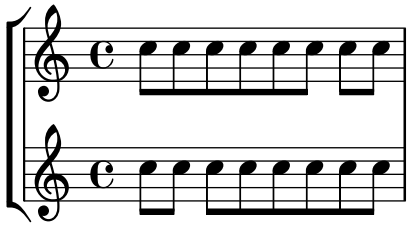
2. *baseMomentFraction*, a fraction containing the numerator and denominator of the basic timing unit for the time signature.
3. *beatStructure*, a Scheme list indicating the structure of the beats in the measure, in units of the base moment.
4. *beamExceptions*, an alist containing any beaming rules for the time signature that go beyond ending at every beat, as described in [Setting automatic beam behavior], page 94.

Changed values of default time signature properties can be restored to the original values:

```
\score {
  \relative {
    \repeat unfold 8 { c'8 } |
    \overrideTimeSignatureSettings
      4/4        % timeSignatureFraction
      1/4        % baseMomentFraction
      3,1        % beatStructure
      #'()       % beamExceptions
    \time 4/4
    \repeat unfold 8 { c8 } |
    \revertTimeSignatureSettings 4/4
    \time 4/4
    \repeat unfold 8 { c8 } |
  }
}
```

Different values of default time signature properties can be established for different staves by enabling polymetric notation (see [Polymetric notation], page 83).

```
\score {
  \new StaffGroup <<
    \new Staff {
      \overrideTimeSignatureSettings
        4/4        % timeSignatureFraction
        1/4        % baseMomentFraction
        3,1        % beatStructure
        #'()       % beamExceptions
      \time 4/4
      \repeat unfold 8 {c''8}
    }
    \new Staff {
      \overrideTimeSignatureSettings
        4/4        % timeSignatureFraction
        1/4        % baseMomentFraction
        1,3        % beatStructure
        #'()       % beamExceptions
      \time 4/4
      \repeat unfold 8 {c''8}
    }
  >>
  \layout {
```

```
    \enablePolymeter
  }
}
```



A further method of changing these time-signature-related variables, which avoids reprinting the time signature at the time of the change, is shown in [Setting automatic beam behavior], page 94.

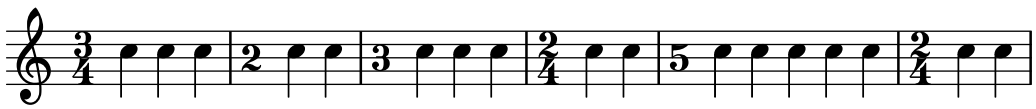
Predefined commands

`\numericTimeSignature`, `\defaultTimeSignature`.

Selected Snippets

Time signature printing only the numerator as a number (instead of the fraction)

Sometimes, a time signature should not print the whole fraction (for example, 7/4), but only the numerator (digit 7 in this case). This can be easily done by using `\override Staff.TimeSignature.style = #'single-digit` to change the style permanently. By using `\revert Staff.TimeSignature.style`, this setting can be reversed. To apply the single-digit style to only one time signature, use the `\override` command and prefix it with a `\once`.

```
\relative c'' {
  \time 3/4
  c4 c c
  % Change the style permanently
  \override Staff.TimeSignature.style = #'single-digit
  \time 2/4
  c4 c
  \time 3/4
  c4 c c
  % Revert to default style:
  \revert Staff.TimeSignature.style
  \time 2/4
  c4 c
  % single-digit style only for the next time signature
  \once \override Staff.TimeSignature.style = #'single-digit
  \time 5/4
  c4 c c c c
  \time 2/4
  c4 c
}
```

See also

Music Glossary: Section “time signature” in *Music Glossary*

Notation Reference: [Mensural time signatures], page 498, [Polymetric notation], page 83, [Setting automatic beam behavior], page 94, [Time administration], page 137.

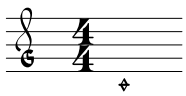
Installed Files: `scm/time-signature-settings.scm`.

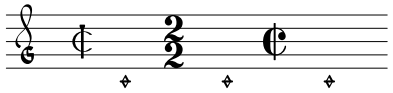
Snippets: Section “Rhythms” in *Snippets*.

Internals Reference: Section “TimeSignature” in *Internals Reference*, Section “Timing_translator” in *Internals Reference*.

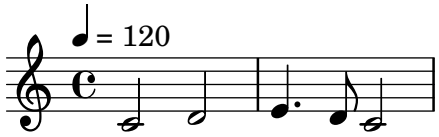
Known issues and warnings

`\numericTimeSignature` and `\defaultTimeSignature` have no effect when used in a `MensuralStaff`. To use these modern time signatures in a `MensuralStaff`, either select them already when creating the context:

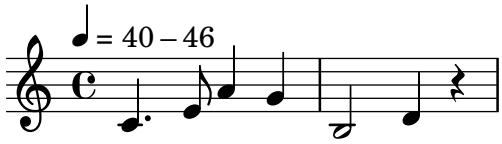
```
\new MensuralStaff \with { \numericTimeSignature } {
  c'1
}
```

or use an explicit `\override`:

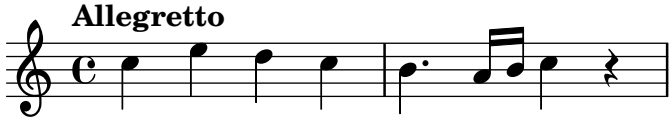
```
\new MensuralStaff {
  \time 2/2
  c'1
  \override MensuralStaff.TimeSignature.style = #'numbered
  \time 2/2
  c'
  \override MensuralStaff.TimeSignature.style = #'default
  \time 2/2
  c'
}
```

Metronome marks

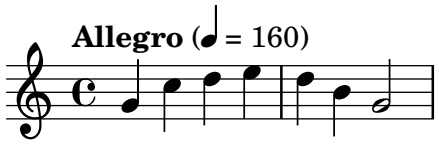
A basic metronome mark is simple to write:

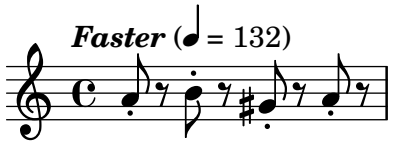
```
\relative {
  \tempo 4 = 120
  c'2 d
  e4. d8 c2
}
```

Metronome marks may also be printed as a range of two numbers:

```
\relative {
```

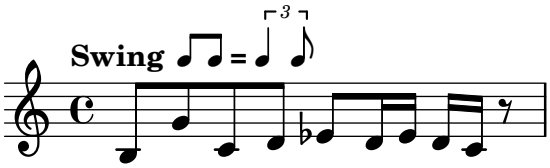
```
  \tempo 4 = 40 - 46
  c'4. e8 a4 g
  b,2 d4 r
}
```

Tempo indications with text can be used instead:

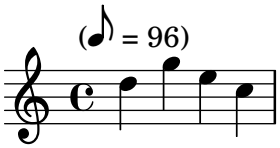
```
\relative {
  \tempo "Allegretto"
    c''4 e d c
    b4. a16 b c4 r4
}
```

Combining a metronome mark and text will automatically place the metronome mark within parentheses:

```
\relative {
  \tempo "Allegro" 4 = 160
  g'4 c d e
  d4 b g2
}
```

In general, the text can be any markup object:

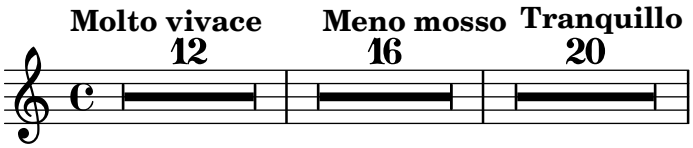
```
\relative {
  \tempo \markup { \italic Faster } 4 = 132
  a'8-. r8 b-. r gis-. r a-. r
}
```

A particularly useful markup command is \rhythm, which prints a rhythmic pattern. See Section A.12.4 [Markup for music and musical symbols], page 794.

```
\relative {
  \tempo \markup {
    Swing
    \hspace #0.4
    \rhythm { 8[ 8] } = \rhythm { \tuplet 3/2 { 4 8 } }
  }
```

```
  b8 g' c, d ees d16 ees d c r8
}
```

A parenthesized metronome mark with no textual indication may be written by including an empty string in the input:

```
\relative {
  \tempo "" 8 = 96
  d''4 g e c
}
```

In a part for an instrument with long periods of rests (see [Full measure rests], page 66), tempo indications sometimes follow each other closely. The command `\markLengthOn` provides extra horizontal space to prevent tempo indications from overlapping, and `\markLengthOff` restores the default behavior of ignoring tempo marks for horizontal spacing.

```
\compressMMRests {
  \markLengthOn
  \tempo "Molto vivace"
  R1*12
  \tempo "Meno mosso"
  R1*16
  \markLengthOff
  \tempo "Tranquillo"
  R1*20
}
```



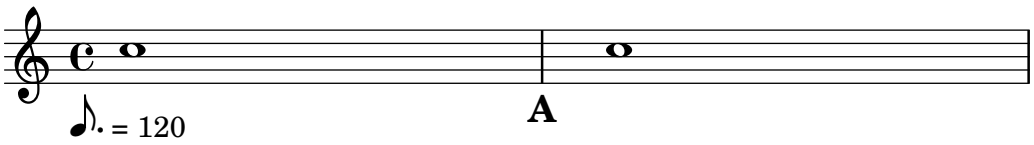
Selected Snippets

Printing metronome and rehearsal marks below the staff

By default, metronome and rehearsal marks are printed above the staff. To place them below the staff simply set the `direction` property of `MetronomeMark` or `RehearsalMark` appropriately.

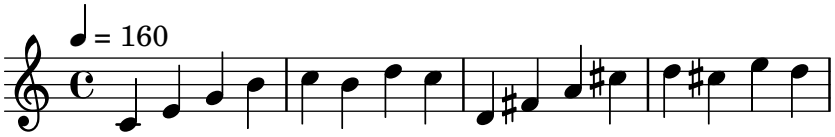
```
\layout {
  indent = 0
  ragged-right = ##f
}

{
  % Metronome marks below the staff
```

```
  \override Score.MetronomeMark.direction = #DOWN
  \tempo 8. = 120
  c''1

  % Rehearsal marks below the staff
  \override Score.RehearsalMark.direction = #DOWN
  \mark \default
  c''1
}
```



Changing the tempo without a metronome mark

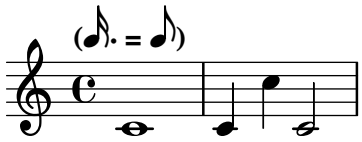
To change the tempo in MIDI output without printing anything, make the metronome mark invisible.

```
\score {
  \new Staff \relative c' {
    \tempo 4 = 160
    c4 e g b
    c4 b d c
    \set Score.tempoHideNote = ##t
    \tempo 4 = 96
    d,4 fis a cis
    d4 cis e d
  }
  \layout { }
  \midi { }
}
```

Creating metronome marks in markup mode

New metronome marks can be created in markup mode, but they will not change the tempo in MIDI output.

```
\relative c' {
  \tempo \markup {
    \concat {
      (
      \smaller \general-align #Y #DOWN \note {16.} #1
      " = "
      \smaller \general-align #Y #DOWN \note {8} #1
      )
    }
  }
  c1
  c4 c' c,2
```

```
}
```



For more details, see Section 1.8.2 [Formatting text], page 289.

See also

Music Glossary: Section “metronome” in *Music Glossary*, Section “metronomic indication” in *Music Glossary*, Section “tempo indication” in *Music Glossary*, Section “metronome mark” in *Music Glossary*.

Notation Reference: Section 1.8.2 [Formatting text], page 289, Section 3.6 [Creating MIDI output], page 587, [Full measure rests], page 66.

Snippets: Section “Staff notation” in *Snippets*.

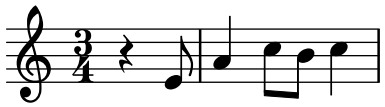
Internals Reference: Section “MetronomeMark” in *Internals Reference*.

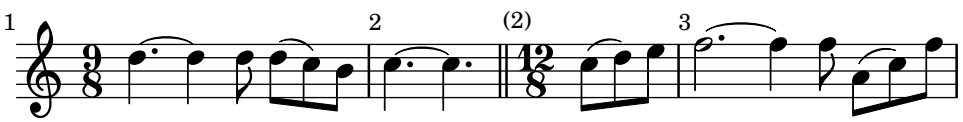
Upbeats

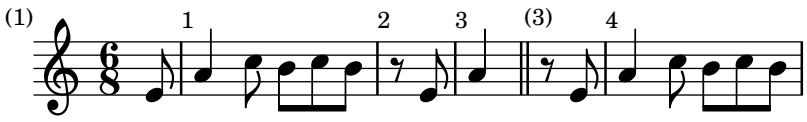
Partial or pickup measures, such as an *anacrusis* or an *upbeat*, are entered using the `\partial` command:

```
\partial duration
```

When `\partial` is used at the beginning of a score, *`duration`* is the length of the music preceding the first bar.

```
\relative {
  \time 3/4
  \partial 4.
  r4 e'8 | a4 c8 b c4 |
}
```

When `\partial` is used after the beginning of a score, *`duration`* is the *remaining* length of the current measure. It does not create a new numbered bar.

```
\relative {
  \set Score.barNumberVisibility = #all-bar-numbers-visible
  \override Score.BarNumber.break-visibility =
    #end-of-line-invisible
  \time 9/8
  d''4.~ 4 d8 d( c) b | c4.~ 4. \bar "||"
  \time 12/8
  \partial 4.
  c8( d) e | f2.~ 4 f8 a,( c) f |
}
```

The \partial command is *required* when the time signature changes in mid measure, but it may also be used alone.

```
\relative {
  \set Score.barNumberVisibility = #all-bar-numbers-visible
  \override Score.BarNumber.break-visibility =
    #end-of-line-invisible
  \time 6/8
  \partial 8
  e'8 | a4 c8 b[ c b] |
  \partial 4
  r8 e,8 | a4 \bar "||"
  \partial 4
  r8 e8 | a4
  c8 b[ c b] |
}
```

The \partial command sets the Timing.measurePosition property, which is a rational number that indicates how much of the measure has passed.

See also

Music Glossary: Section “anacrusis” in *Music Glossary*.

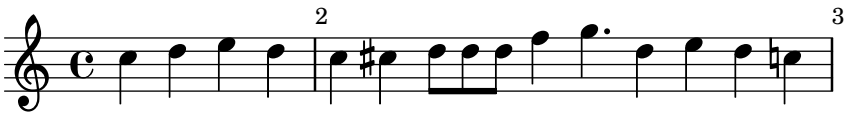
Notation Reference: [Grace notes], page 130.

Snippets: Section “Rhythms” in *Snippets*.

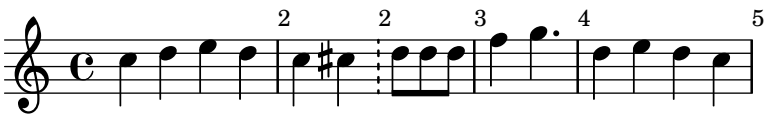
Internal Reference: Section “Timing_translator” in *Internals Reference*.

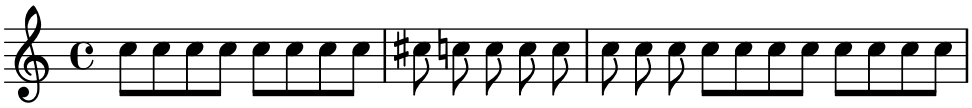
Unmetered music

In music such as cadenzas, it may be desirable to disable automatic measure demarcation and all that it entails: numbering bars, resetting accidentals, etc. Music between \cadenzaOn and \cadenzaOff does not count toward the length of a measure.

```
\relative c'' {
  % Show all bar numbers
  \override Score.BarNumber.break-visibility = #all-visible
  c4 d e d
  \cadenzaOn
  c4 cis d8[ d d] f4 g4.
  \cadenzaOff
  d4 e d c
}
```

To divide an unmetered passage into irregular measures, temporarily re-enable timing and use \partial to create a tiny measure. The \bar command alone does not start a new measure.

```
cadenzaMeasure = {
  \cadenzaOff
```

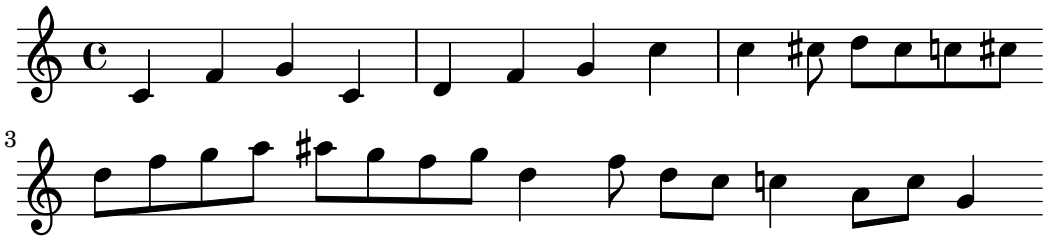
```
  \partial 1024 s1024
  \cadenzaOn
}

\relative c'' {
  % Show all bar numbers
  \override Score.BarNumber.break-visibility = #all-visible
  c4 d e d
  \cadenzaOn
  c4 cis \bar "!" d8[ d d] \cadenzaMeasure f4 g4.
  \cadenzaMeasure
  \cadenzaOff
  d4 e d c
}
```

Automatic beaming is disabled by \cadenzaOn. Therefore, all beaming in cadenzas must be entered manually. See [Manual beams], page 102.

```
\relative {
  \repeat unfold 8 { c''8 }
  \cadenzaOn
  cis8 c c c c
  \bar"|"
  c8 c c
  \cadenzaOff
  \repeat unfold 8 { c8 }
}
```

These predefined commands affect all staves in the score, even when placed in just one Voice context. To change this, move the Timing_translator from the Score context to the Staff context. See [Polymetric notation], page 83.

Within a cadenza section, automatic breaks are disabled: since there is no metric, it is not possible to determine automatically where they would be appropriate. Therefore, in a long cadenza passage, you must insert possible break points at appropriate places using the \allowBreak command or other solutions in Section 4.3.1 [Line breaking], page 617.

```
\relative {
  c'4 f g c, d f g c
  \cadenzaOn
  c4 cis8
  \allowBreak
  d[ cis c cis]
  \allowBreak
  d[ f g a]
  \allowBreak
  ais[ g f g]
```

```
  \allowBreak
  d4 f8
  \allowBreak
  d[ cis] c4
  \allowBreak
  a8[ c] g4
}
```



Predefined commands

`\cadenzaOn`, `\cadenzaOff`.

See also

Music Glossary: Section “cadenza” in *Music Glossary*.

Notation Reference: Section 5.4.7 [Visibility of objects], page 704, [Polymetric notation], page 83, [Manual beams], page 102, [Accidentals], page 6.

Snippets: Section “Rhythms” in *Snippets*.

Polymetric notation

Polymetric notation is supported explicitly or by manually modifying the visible time signature symbol and/or scaling note durations.

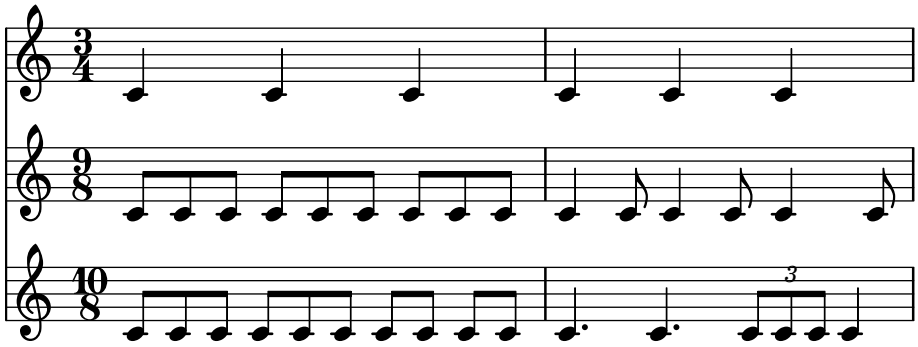
Different time signatures with equal-length measures

Set a common time signature for each staff, and set the `timeSignatureFraction` to the desired fraction. Then use the `\scaleDurations` function to scale the durations of the notes in each staff to the common time signature.

In the following example, music with the time signatures of 3/4, 9/8 and 10/8 are used in parallel. In the second staff, shown durations are multiplied by 2/3 (because 2/3 * 9/8 = 3/4) and in the third staff, the shown durations are multiplied by 3/5 (because 3/5 * 10/8 = 3/4). It may be necessary to insert beams manually, as the duration scaling will affect the auto-beaming rules.

```
\relative <<
  \new Staff {
    \time 3/4
    c'4 c c |
    c4 c c |
  }
  \new Staff {
    \time 3/4
    \set Staff.timeSignatureFraction = 9/8
    \scaleDurations 2/3 {
      \repeat unfold 3 { c8[ c c] }
      \repeat unfold 3 { c4 c8 }
    }
```

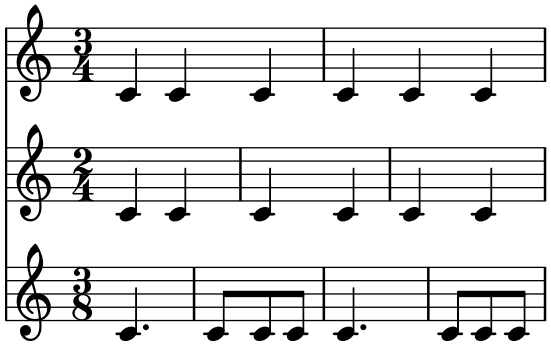
```
  }
  \new Staff {
    \time 3/4
    \set Staff.timeSignatureFraction = 10/8
    \scaleDurations 3/5 {
      \repeat unfold 2 { c8[ c c] }
      \repeat unfold 2 { c8[ c] } |
      c4. c \tuplet 3/2 { c8[ c c] } c4
    }
  }
>>
```



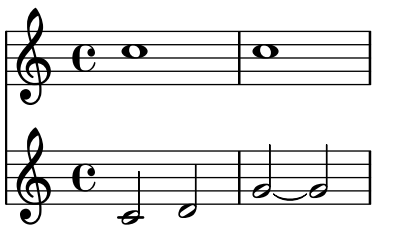
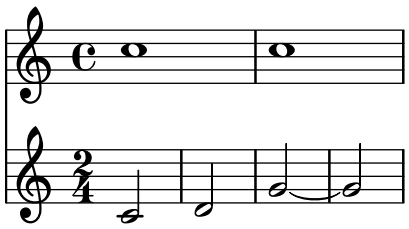
Different time signatures with unequal-length measures

Each staff can be given its own independent time signature as soon as `\enablePolymeter` is placed in the `\layout` block.

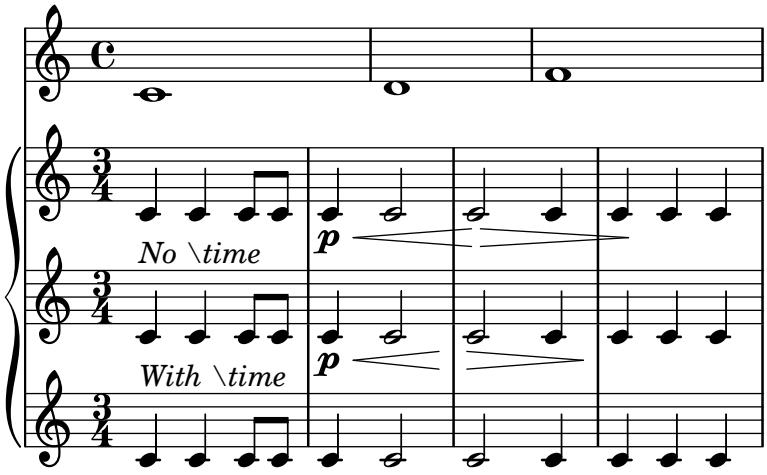
```
\layout {
  \enablePolymeter
}

% Now each staff has its own time signature.

\relative <<
  \new Staff {
    \time 3/4
    c'4 c c |
    c4 c c |
  }
  \new Staff {
    \time 2/4
    c4 c |
    c4 c |
    c4 c |
  }
  \new Staff {
    \time 3/8
    c4. |
    c8 c c |
    c4. |
    c8 c c |
  }
>>
```



To have just one polymetric score, include `\enablePolymeter` in a `\layout` block inside the `\score` block.

```
\score {
  <<
    \new Staff { c''1 1 }
    \new Staff { c'2 d' g'2~ 2 }
  >>
}

\score {
  \layout {
    \enablePolymeter
  }
  <<
    \new Staff { \time 4/4 c''1 1 }
    \new Staff { \time 2/4 c'2 d' g'2~ 2 }
  >>
}
```



When using polymeter, all staves should include a `\time` command if their meter is not the default 4/4. This is true even for special staves without actual staff lines, such as `Dynamics` contexts, since the placement of certain spanners like hairpins is synchronized with bar lines.



In order to use this feature with MIDI output, also include `\enablePolymeter` in a `\midi` block.

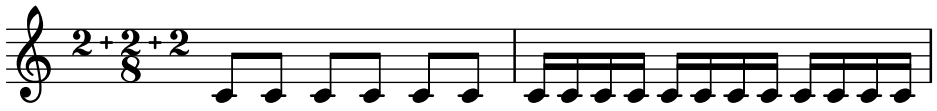
```
\layout {
  \enablePolymeter
}

\midi {
  \enablePolymeter
}
```

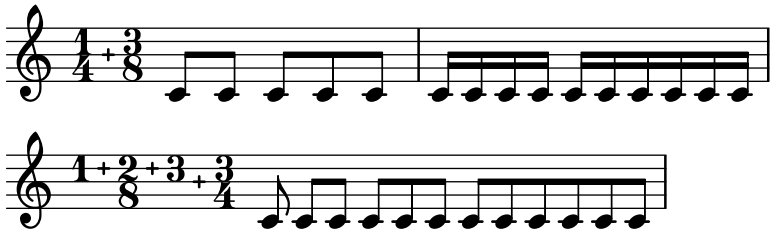
Compound time signatures

These are created using the `\compoundMeter` function. The syntax for this is:

```
\compoundMeter #'(list of lists)
```

The simplest construction is a single list, where the *last* number indicates the bottom number of the time signature and those that come before it, the top numbers.

```
\relative {
  \compoundMeter #'((2 2 2 8))
  \repeat unfold 6 c'8 \repeat unfold 12 c16
}
```

More complex meters can be constructed using additional lists. Also, automatic beaming settings will be adjusted depending on the values.

```
\relative {
  \compoundMeter #'((1 4) (3 8))
  \repeat unfold 5 c'8 \repeat unfold 10 c16
}

\relative {
  \compoundMeter #'((1 2 3 8) (3 4))
  \repeat unfold 12 c'8
}
```

See also

Music Glossary: Section “polymetric” in *Music Glossary*, Section “polymetric time signature” in *Music Glossary*, Section “meter” in *Music Glossary*.

Notation Reference: [Automatic beams], page 91, [Manual beams], page 102, [Time signature], page 72, [Scaling durations], page 56.

Snippets: Section “Rhythms” in *Snippets*.

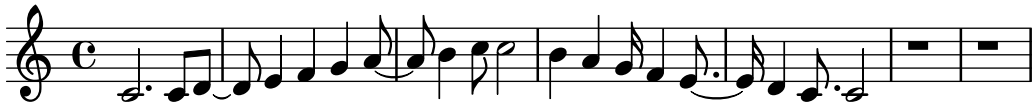
Internals Reference: Section “TimeSignature” in *Internals Reference*, Section “Timing_translator” in *Internals Reference*, Section “Staff” in *Internals Reference*.

Known issues and warnings

Although notes that occur at the same moment in each of the different staves will be placed at the same horizontal location, bar lines (in each staff) may cause inconsistent spacing within each of the different time signatures.

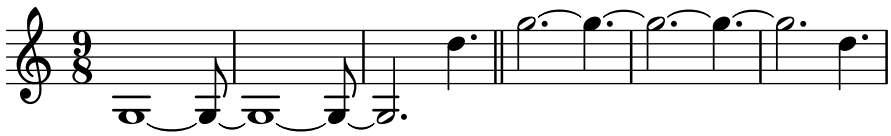
Automatic note splitting

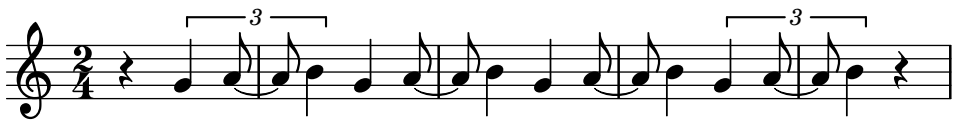
Long notes which overrun bar lines can be converted automatically to tied notes. This is done by replacing the `Note_heads_engraver` with the `Completion_heads_engraver`. Similarly, long rests which overrun bar lines are split automatically by replacing the `Rest_engraver` with the `Completion_rest_engraver`. In the following example, notes and rests crossing the bar lines are split, notes are also tied.

```
\new Voice \with {
  \remove Note_heads_engraver
  \consists Completion_heads_engraver
  \remove Rest_engraver
  \consists Completion_rest_engraver
}
\relative {
  c'2. c8 d4 e f g a b c8 c2 b4 a g16 f4 e d c8. c2 r1*2
}
```

These engravers split all running notes and rests at the bar line, and inserts ties for notes. One of its uses is to debug complex scores: if the measures are not entirely filled, then the ties show exactly how much each measure is off.

The property `completionUnit` sets a preferred duration for the split notes.

```
\new Voice \with {
  \remove Note_heads_engraver
  \consists Completion_heads_engraver
} \relative {
  \time 9/8 g\breve. d''4. \bar "||"
```

```
  \set completionUnit = \musicLength 4.
  g\breve. d4.
}
```

These engravers split notes with scaled duration, such as those in tuplets, into notes with the same scale factor as in the input note.

```
\new Voice \with {
  \remove Note_heads_engraver
  \consists Completion_heads_engraver
} \relative {
  \time 2/4 r4
  \tuplet 3/2 {g'4 a b}
  \scaleDurations 2/3 {g a b}
  g4*2/3 a b
  \tuplet 3/2 {g4 a b}
  r4
}
```

See also

Music Glossary: Section “tie” in *Music Glossary*

Learning Manual: Section “Engravers explained” in *Learning Manual*, Section “Adding and removing engravers” in *Learning Manual*.

Snippets: Section “Rhythms” in *Snippets*.

Internals Reference: Section “Note_heads_engraver” in *Internals Reference*, Section “Completion_heads_engraver” in *Internals Reference*, Section “Rest_engraver” in *Internals Reference*, Section “Completion_rest_engraver” in *Internals Reference*, Section “Forbid_line_break_engraver” in *Internals Reference*.

Known issues and warnings

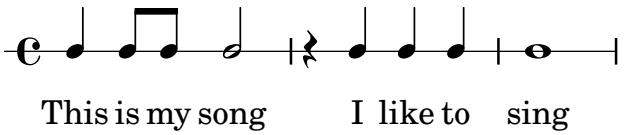
For consistency with previous behavior, notes and rests with duration longer than a measure, such as `c1*2`, are split into notes without any scale factor, `{ c1 c1 }`. The property `completionFactor` controls this behavior, and setting it to `#f` cause split notes and rests to have the scale factor of the input durations.

Showing melody rhythms

Sometimes you might want to show only the rhythm of a melody. This can be done with the rhythmic staff. All pitches of notes on such a staff are squashed, and the staff itself has a single line

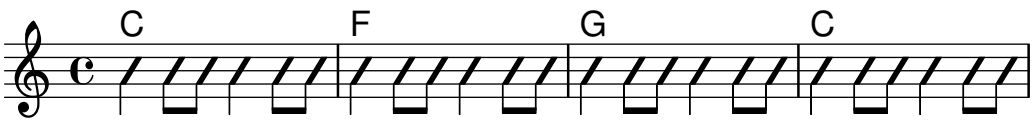
```
<<
  \new RhythmicStaff {
    \new Voice = "myRhythm" \relative {
      \time 4/4
```

```
      c'4 e8 f g2
      r4 g g f
      g1
    }
  }
  \new Lyrics {
    \lyricsto "myRhythm" {
      This is my song
      I like to sing
    }
  }
>>
```



Guitar chord charts often show the strumming rhythms. This can be done with the `Pitch_squash_engraver` and `\improvisationOn`.

```
<<
  \new ChordNames {
    \chordmode {
      c1 f g c
    }
  }
  \new Voice \with {
    \consists Pitch_squash_engraver
  } \relative c'' {
    \improvisationOn
    c4 c8 c c4 c8 c
    f4 f8 f f4 f8 f
    g4 g8 g g4 g8 g
    c4 c8 c c4 c8 c
  }
>>
```



Music containing chords can also be used as input to `RhythmicStaff` and for use with the `Pitch_squash_engraver` if the chords are first reduced to single notes with the `\reduceChords` music function:

```
\new RhythmicStaff {
  \time 4/4
  \reduceChords {
    <c>2
    <e>2
    <c e g>2
    <c e g>4
    <c e g>4
  }
```

```
}
```

Predefined commands

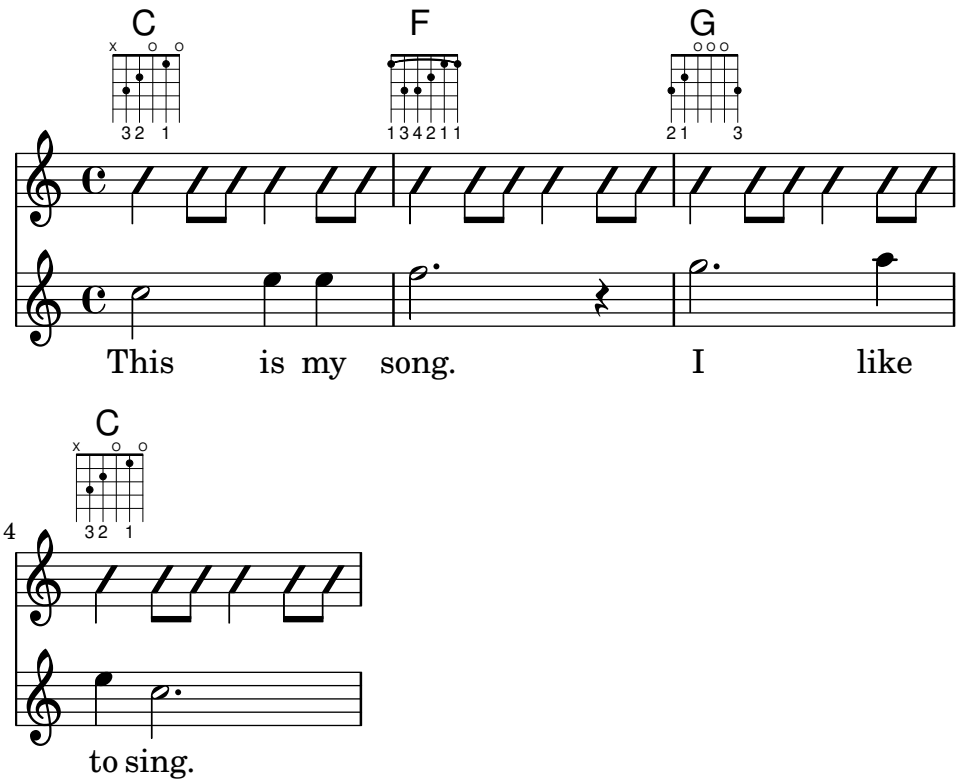
`\improvisationOn`, `\improvisationOff`, `\reduceChords`.

Selected Snippets

Guitar strum rhythms

For guitar music, it is possible to show strum rhythms, along with melody notes, chord names and fret diagrams.

```
\include "predefined-guitar-fretboards.ly"
<<
  \new ChordNames {
    \chordmode {
      c1 | f | g | c
    }
  }
  \new FretBoards {
    \chordmode {
      c1 | f | g | c
    }
  }
  \new Voice \with {
    \consists "Pitch_squash_engraver"
  } {
    \relative c'' {
      \improvisationOn
      c4 c8 c c4 c8 c
      f4 f8 f f4 f8 f
      g4 g8 g g4 g8 g
      c4 c8 c c4 c8 c
    }
  }
  \new Voice = "melody" {
    \relative c'' {
      c2 e4 e4
      f2. r4
      g2. a4
      e4 c2.
    }
  }
  \new Lyrics {
    \lyricsto "melody" {
      This is my song.
      I like to sing.
    }
  }
>>
```



See also

Snippets: Section “Rhythms” in *Snippets*.

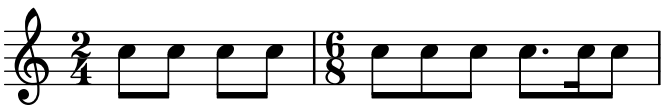
Internals Reference: Section “RhythmicStaff” in *Internals Reference*, Section “Pitch_squash_engraver” in *Internals Reference*.

1.2.4 Beams

Automatic beams

By default, beams are inserted automatically:

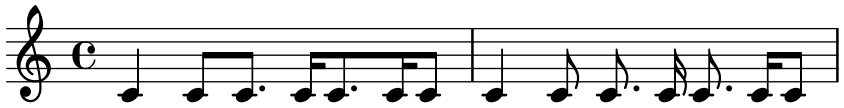
```
\relative c'' {
  \time 2/4 c8 c c c
  \time 6/8 c8 c c c8. c16 c8
}
```



If these automatic decisions are not satisfactory, beaming can be entered explicitly; see [Manual beams], page 102. Beams *must* be entered manually if beams are to be extended over rests.

If automatic beaming is not required, it may be turned off with `\autoBeamOff` and on with `\autoBeamOn`:

```
\relative c' {
  c4 c8 c8. c16 c8. c16 c8
  \autoBeamOff
  c4 c8 c8. c16 c8.
  \autoBeamOn
```

```
  c16 c8
}
```

Note: If beams are used to indicate melismata in songs, then automatic beaming should be switched off with `\autoBeamOff` and the beams indicated manually. Using `\partCombine` with `\autoBeamOff` can produce unintended results. See the snippets for more information.

Beaming patterns that differ from the automatic defaults can be created; see [Setting automatic beam behavior], page 94.

Predefined commands

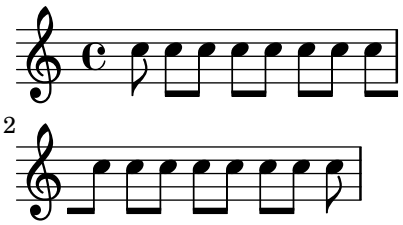
`\autoBeamOff`, `\autoBeamOn`.

Selected Snippets

Beams across line breaks

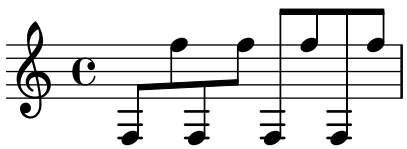
Line breaks are normally forbidden when beams cross bar lines. This behavior can be changed as shown:

```
\relative c'' {
  \override Beam.breakable = ##t
  c8 c[ c] c[ c] c[ c] c[ \break
  c8] c[ c] c[ c] c[ c] c
}
```



Changing beam knee gap

Kneed beams are inserted automatically when a large gap is detected between the note heads. This behavior can be tuned through the `auto-knee-gap` property. A kneed beam is drawn if the gap is larger than the value of `auto-knee-gap` plus the width of the beam object (which depends on the duration of the notes and the slope of the beam). By default `auto-knee-gap` is set to 5.5 staff spaces.

```
{
  f8 f''8 f8 f''8
  \override Beam.auto-knee-gap = #6
  f8 f''8 f8 f''8
}
```

Partcombine and autoBeamOff

The function of `\autoBeamOff` when used with `\partCombine` can be difficult to understand.

It may be preferable to use

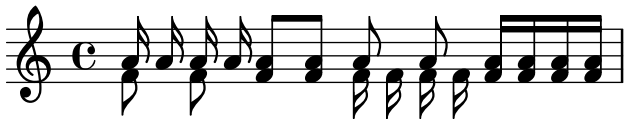
`\set Staff.autoBeaming = ##f`

instead, to ensure that autobeaming will be turned off for the entire staff.

`\partCombine` apparently works with 3 voices – stem up single, stem down single, stem up combined.

An `\autoBeamOff` call in the first argument to `\partCombine` will apply to the voice that is active at the time the call is processed, either stem up single or stem up combined. An `\autoBeamOff` call in the second argument will apply to the voice that is stem down single.

In order to use `\autoBeamOff` to stop all autobeaming when used with `\partCombine`, it will be necessary to use *three* calls to `\autoBeamOff`.

```
{
  %\set Staff.autoBeaming = ##f % turns off all autobeaming
  \partCombine
  {
    \autoBeamOff % applies to split up stems
    \repeat unfold 4 a'16
    %\autoBeamOff % applies to combined up stems
    \repeat unfold 4 a'8
    \repeat unfold 4 a'16
  }
  {
    \autoBeamOff % applies to down stems
    \repeat unfold 4 f'8
    \repeat unfold 8 f'16 |
  }
}
```

See also

Notation Reference: [Manual beams], page 102, [Setting automatic beam behavior], page 94.

Installed Files: `scm/auto-beam.scm`.

Snippets: Section “Rhythms” in *Snippets*.

Internals Reference: Section “Auto_beam_engraver” in *Internals Reference*, Section “Beam_engraver” in *Internals Reference*, Section “Beam” in *Internals Reference*, Section “BeamEvent” in *Internals Reference*, Section “BeamForbidEvent” in *Internals Reference*, Section “beam-interface” in *Internals Reference*, Section “unbreakable-spanner-interface” in *Internals Reference*.

Known issues and warnings

The properties of a beam are determined at the *start* of its construction and any additional beam property changes that occur before the beam has been completed will not take effect until the *next*, new beam starts.

Setting automatic beam behavior

When automatic beaming is enabled, the placement of automatic beams is determined by three context properties: `baseMoment`, `beatStructure`, and `beamExceptions`. The default values of these variables may be overridden as described below, or alternatively the default values themselves may be changed as explained in [Time signature], page 72.

If a `beamExceptions` rule is defined for the time signature in force, that rule alone is used to determine the beam placement; the values of `baseMoment` and `beatStructure` are ignored.

If no `beamExceptions` rule is defined for the time signature in force, the beam placement is determined by the values of `baseMoment` and `beatStructure`.

Beaming based on `baseMoment` *and* `beatStructure`

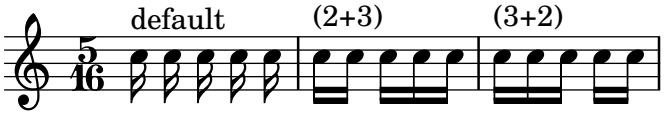
By default, `beamExceptions` rules are defined for most common time signatures, so the `beamExceptions` rules must be disabled if automatic beaming is to be based on `baseMoment` and `beatStructure`. The `beamExceptions` rules are disabled by

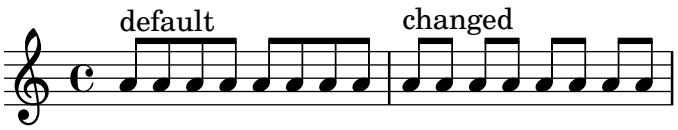
```
\set Timing.beamExceptions = #'()
```

When `beamExceptions` is set to `#'()`, either due to an explicit setting or because no `beamExceptions` rules are defined internally for the time signature in force, the ending points for beams are on beats as specified by the context properties `baseMoment` and `beatStructure`. `beatStructure` is a scheme list that defines the length of each beat in the measure in units of `baseMoment`. By default, `baseMoment` is one over the denominator of the time signature. By default, each unit of length `baseMoment` is a single beat.

Note that there are separate `beatStructure` and `baseMoment` values for each time signature. Changes to these variables apply only to the time signature that is currently in force, hence those changes must be placed after the `\time` command which starts a new time signature section, not before it. New values given to a particular time signature are retained and reinstated whenever that time signature is reestablished.

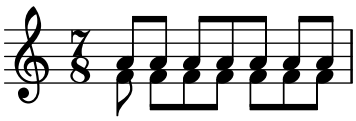
```
\relative c'' {
  \time 5/16
  c16^"default" c c c c |
  % beamExceptions are unlikely to be defined for 5/16 time,
  % but let's disable them anyway to be sure
  \set Timing.beamExceptions = #'()
  \set Timing.beatStructure = 2,3
  c16^"(2+3)" c c c c |
  \set Timing.beatStructure = 3,2
  c16^"(3+2)" c c c c |
}
```



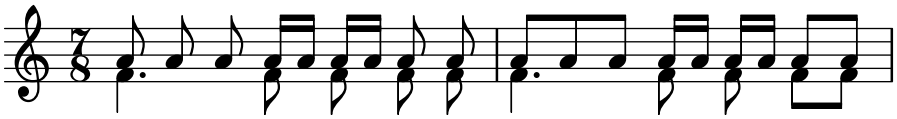

```
\relative {
  \time 4/4
  a'8^"default" a a a a a a a
  % Disable beamExceptions because they are definitely
  % defined for 4/4 time
  \set Timing.beamExceptions = #'()
  \set Timing.baseMoment = \musicLength 4
  \set Timing.beatStructure = 1,1,1,1
  a8^"changed" a a a a a a a
```

```
}
```

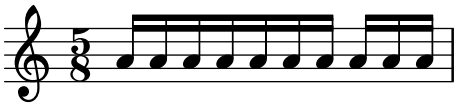
Beam setting changes can be limited to specific contexts. If no setting is included in a lower-level context, the setting of the enclosing context will apply.

```
\new Staff {
  \time 7/8
  % No need to disable beamExceptions
  % as they are not defined for 7/8 time
  \set Staff.beatStructure = 2,3,2
  <<
    \new Voice = one {
      \relative {
        a'8 a a a a a a
      }
    }
    \new Voice = two {
      \relative {
        \voiceTwo
        \set Voice.beatStructure = 1,3,3
        f'8 f f f f f f
      }
    }
  >>
}
```



When multiple voices are used the Staff context must be specified if the beaming is to be applied to all voices in the staff:

```
\time 7/8
% rhythm 3-1-1-2
% Change applied to Voice by default --  does not work correctly
% Because of auto-generated voices, all beating will
% be at baseMoment (1 . 8)
\set beatStructure = 3,1,1,2
<< \relative {a'8 a a a16 a a a a8 a} \\ \relative {f'4. f8 f f f} >>

% Works correctly with context Staff specified
\set Staff.beatStructure = 3,1,1,2
<< \relative {a'8 a a a16 a a a a8 a} \\ \relative {f'4. f8 f f f} >>
```

The value of baseMoment can be adjusted to change the beaming behavior, if desired. When this is done, the value of beatStructure must be set to be compatible with the new value of baseMoment.

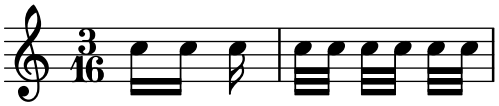
```
\time 5/8
% No need to disable beamExceptions
% as they are not defined for 5/8 time
\set Timing.baseMoment = \musicLength 16
\set Timing.beatStructure = 7,3
\repeat unfold 10 { a'16 }
```

baseMoment is a *moment*; a unit of musical duration. For more information about this type, see [Time administration], page 137.

By default baseMoment is set to one over the denominator of the time signature. Any exceptions to this default can be found in scm/time-signature-settings.scm.

Beaming based on beamExceptions

Special auto-beaming rules (other than ending a beam on a beat) are defined in the beamExceptions property.

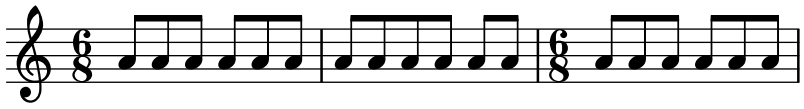
The value for beamExceptions, a somewhat complex Scheme data structure, is easiest generated with the \beamExceptions function. This function is given one or more manually beamed measure-long rhythmic patterns (measures have to be separated by a bar check | since the function has no other way to discern the measure length). Here is a simple example:

```
\relative c'' {
  \time 3/16
  \set Timing.beatStructure = 2,1
  \set Timing.beamExceptions =
    \beamExceptions { 32[ 32] 32[ 32] 32[ 32] }
  c16 c c |
  \repeat unfold 6 { c32 } |
}
```

Note: A beamExceptions value must be *complete* exceptions list. That is, every exception that should be applied must be included in the setting. It is not possible to add, remove, or change only one of the exceptions. While this may seem cumbersome, it means that the current beaming settings need not be known in order to specify a new beaming pattern.

When the time signature is changed, default values of Timing.baseMoment, Timing .beatStructure, and Timing.beamExceptions are set. Setting the time signature will reset the automatic beaming settings for the Timing context to the default behavior.

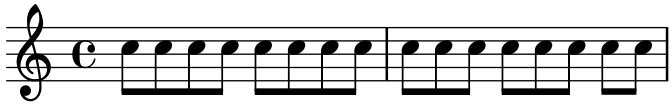
```
\relative a' {
  \time 6/8
```

```
  \repeat unfold 6 { a8 }
  % group (4 + 2)
  \set Timing.beatStructure = 4,2
  \repeat unfold 6 { a8 }
  % go back to default behavior
  \time 6/8
  \repeat unfold 6 { a8 }
}
```

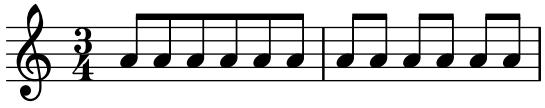


The default automatic beaming settings for a time signature are determined in `scm/time-signature-settings.scm`. Changing the default automatic beaming settings for a time signature is described in [Time signature], page 72.

Many automatic beaming settings for a time signature contain an entry for `beamExceptions`. For example, 4/4 time tries to beam the measure in two if there are only eighth notes. The `beamExceptions` rule can override the `beatStructure` setting if `beamExceptions` is not reset.

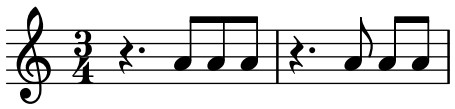
```
\time 4/4
\set Timing.baseMoment = \musicLength 8
\set Timing.beatStructure = 3,3,2
% This won't beam (3 3 2) because of beamExceptions
\repeat unfold 8 {c''8} |
% This will beam (3 3 2) because we clear beamExceptions
\set Timing.beamExceptions = #'()
\repeat unfold 8 {c''8}
```

In a similar fashion, eighth notes in 3/4 time are beamed as a full measure by default. To beam eighth notes in 3/4 time on the beat, reset `beamExceptions`.

```
\time 3/4
% by default we beam in (6) due to beamExceptions
\repeat unfold 6 {a'8} |
% This will beam (1 1 1) due to default baseMoment and beatStructure
\set Timing.beamExceptions = #'()
\repeat unfold 6 {a'8}
```



In engraving from the Romantic and Classical periods, beams often begin midway through the measure in 3/4 time, but modern practice is to avoid the false impression of 6/8 time (see Gould, p. 153). Similar situations arise in 3/8 time. This behavior is controlled by the context property `beamHalfMeasure`, which has effect only in time signatures with 3 in the numerator:

```
\relative a' {
  \time 3/4
  r4. a8 a a |
  \set Timing.beamHalfMeasure = ##f
```

```
  r4. a8 a a |
}
```

How automatic beaming works

When automatic beaming is enabled, the placement of automatic beams is determined by the context properties `baseMoment`, `beatStructure`, and `beamExceptions`.

The following rules, in order of priority, apply when determining the appearance of beams:

- If a manual beam is specified with `[...]` set the beam as specified, otherwise
- if a beam ending rule is defined in `beamExceptions` for the beam type, use it to determine the valid places where beams may end, otherwise
- if a beam ending rule is defined in `beamExceptions` for a longer beam type, use it to determine the valid places where beams may end, otherwise
- use the values of `baseMoment` and `beatStructure` to determine the ends of the beats in the measure, and end beams at the end of beats.

In the rules above, the *beam type* is the duration of the shortest note in the beamed group.

The default beaming rules can be found in `scm/time-signature-settings.scm`.

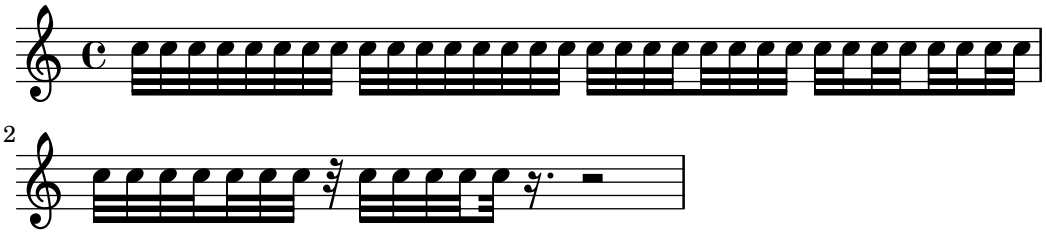
Selected Snippets

Subdividing beams

The beams of consecutive 16th (or shorter) notes are, by default, not subdivided. That is, the three (or more) beams stretch unbroken over entire groups of notes. This behavior can be modified to subdivide the beams into sub-groups by setting the property `subdivideBeams`. When set, multiple beams will be subdivided at intervals defined by the current value of `baseMoment` by reducing the multiple beams to the number of beams that indicates the metric value of the subdivision. If the group following the division is shorter than the current metric value (usually because the beam is incomplete) the number of beams reflects the longest possible subdivision group. However, if there is only one note left after the division this restriction isn't applied. Note that `baseMoment` defaults to one over the denominator of the current time signature if not set explicitly. It must be set to a fraction giving the duration of the beam sub-group using the `ly:make-moment` function, as shown in this snippet. Also, when `baseMoment` is changed, `beatStructure` should also be changed to match the new `baseMoment`:

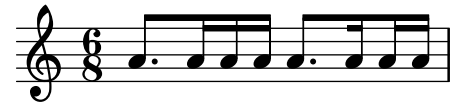
```
\relative c'' {
  c32[ c c c c c c c]
  \set subdivideBeams = ##t
  c32[ c c c c c c c]

  % Set beam sub-group length to an eighth note
  \set baseMoment = \musicLength 8
  \set beatStructure = 2,2,2,2
  c32[ c c c c c c c]

  % Set beam sub-group length to a sixteenth note
  \set baseMoment = \musicLength 16
  \set beatStructure = 4,4,4,4
  c32[ c c c c c c c]
```

```
  % Shorten beam by 1/32
  \set baseMoment = \musicLength 8
  \set beatStructure = 2,2,2,2
  c32[ c c c c c c] r32

  % Shorten beam by 3/32
  \set baseMoment = \musicLength 8
  \set beatStructure = 2,2,2,2
  c32[ c c c c] r16.
  r2
}
```



Strict beat beaming

Beamlets can be set to point in the direction of the beat to which they belong. The first beam avoids sticking out flags (the default); the second beam strictly follows the beat.

```
\relative c'' {
  \time 6/8
  a8. a16 a a
  \set strictBeatBeaming = ##t
  a8. a16 a a
}
```

Conducting signs, measure grouping signs

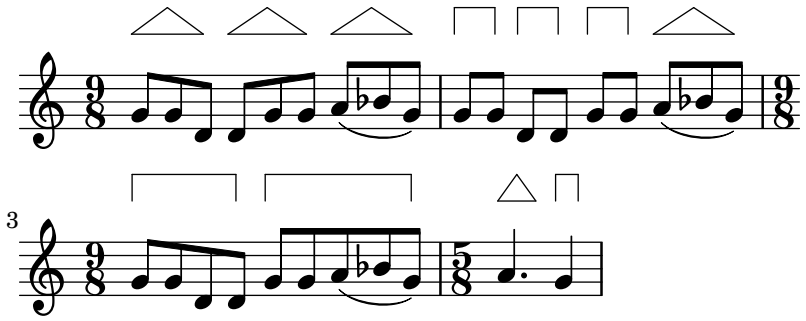
Beat grouping within a measure is controlled by the `beatStructure` context property. Values of `beatStructure` are established for many time signatures in file `scm/time-signature-settings.scm`. Values of `beatStructure` can be changed or set with `\set`. Alternatively, `\time` can be used to both set the time signature and establish the beat structure. For this, you specify the internal grouping of beats in a measure as a list of numbers (in Scheme syntax) before the time signature.

`\time` applies to the `Timing` context, so it will not reset values of `beatStructure` or `baseMoment` that are set in other lower-level contexts, such as `Voice`.

If the `Measure_grouping_engraver` is included in one of the display contexts, measure grouping signs will be created. Such signs ease reading rhythmically complex modern music. In the example, the 9/8 measure is grouped in two different patterns using the two different methods, while the 5/8 measure is grouped according to the default setting in `scm/time-signature-settings.scm`:

```
\score {
  \new Voice \relative c'' {
    \time 9/8
```

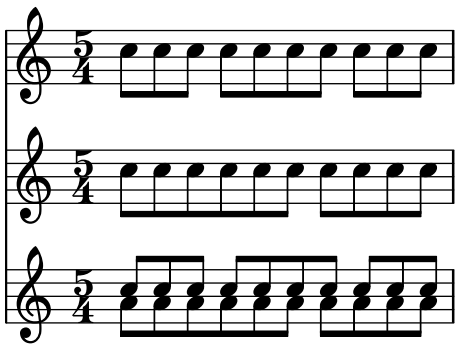
```
    g8 g d d g g a( bes g) |
    \set Timing.beatStructure = 2,2,2,3
    g8 g d d g g a( bes g) |
    \time 4,5 9/8
    g8 g d d g g a( bes g) |
    \time 5/8
    a4. g4 |
  }
  \layout {
    \context {
      \Staff
      \consists "Measure_grouping_engraver"
    }
  }
}
```



Beam endings in Score context

Beam-ending rules specified in the Score context apply to all staves, but can be modified at both Staff and Voice levels:

```
\relative c'' {
  \time 5/4
  % Set default beaming for all staves
  \set Score.baseMoment = \musicLength 8
  \set Score.beatStructure = 3,4,3
  <<
    \new Staff {
      c8 c c c c c c c c c
    }
    \new Staff {
      % Modify beaming for just this staff
      \set Staff.beatStructure = 6,4
      c8 c c c c c c c c c
    }
    \new Staff {
      % Inherit beaming from Score context
      <<
        {
          \voiceOne
          c8 c c c c c c c c c
        }
        % Modify beaming for this voice only
        \new Voice {
```

```
            \voiceTwo
            \set Voice.beatStructure = 6,4
            a8 a a a a a a a a a
          }
        >>
      }
    >>
}
```

See also

Notation Reference: [Time signature], page 72.

Installed Files: `scm/time-signature-settings.scm`.

Snippets: Section "Rhythms" in *Snippets*.

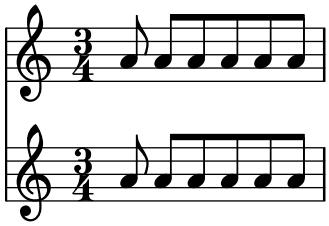
Internals Reference: Section "Auto_beam_engraver" in *Internals Reference*, Section "Beam" in *Internals Reference*, Section "BeamForbidEvent" in *Internals Reference*, Section "beam-interface" in *Internals Reference*.

Known issues and warnings

If a score ends while an automatic beam has not been ended and is still accepting notes, this last beam will not be typeset at all. The same holds for polyphonic voices, entered with << ... \\ ... >>. If a polyphonic voice ends while an automatic beam is still accepting notes, it is not typeset. The workaround for these problems is to manually beam the last beam in the voice or score.

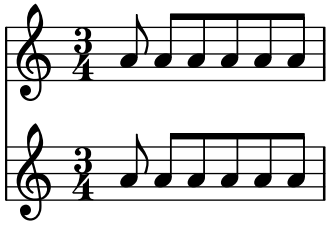
By default, the `Timing` translator is aliased to the `Score` context. This means that setting the time signature in one staff will affect the beaming of the other staves as well. Thus, a time signature setting in a later staff will reset custom beaming that was set in an earlier staff. One way to avoid this problem is to set the time signature in only one staff.

```
<<
  \new Staff {
    \time 3/4
    \set Timing.baseMoment = \musicLength 8
    \set Timing.beatStructure = 1,5
    \set Timing.beamExceptions = #'()
    \repeat unfold 6 { a'8 }
  }
  \new Staff {
    \repeat unfold 6 { a'8 }
  }
>>
```



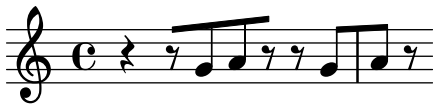
The default beam settings for the time signature can also be changed, so that the desired beaming will always be used. Changes in automatic beaming settings for a time signature are described in [Time signature], page 72.

```
<<
  \new Staff {
    \overrideTimeSignatureSettings
      3/4               % timeSignatureFraction
      1/8               % baseMomentFraction
      1,5               % beatStructure
      #'() % beamExceptions
    \time 3/4
    \repeat unfold 6 { a'8 }
  }
  \new Staff {
    \time 3/4
    \repeat unfold 6 { a'8 }
  }
>>
```

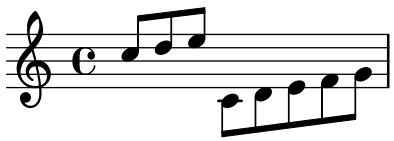


Manual beams

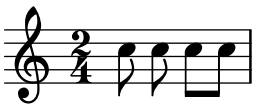
In some cases it may be necessary to override the automatic beaming algorithm. For example, the auto-beamer will not put beams over rests or bar lines, and in choral scores the beaming is often set to follow the meter of the lyrics rather than the notes. Such beams can be specified manually by marking the begin and end point with `[` and `]`.

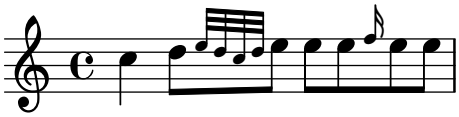
```
\relative { r4 r8[ g' a r] r g[ | a] r }
```

Beaming direction can be set manually using direction indicators:

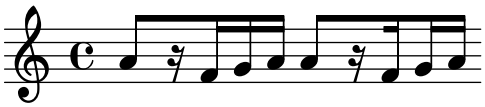
```
\relative { c''8^[ d e] c,_[ d e f g] }
```



Individual notes may be marked with \noBeam to prevent them from being beamed:

```
\relative {
  \time 2/4
  c''8 c\noBeam c c
}
```

Grace note beams and normal note beams can occur simultaneously. Unbeamed grace notes are not put into normal note beams.

```
\relative {
  c''4 d8[
  \grace { e32 d c d }
  e8] e[ e
  \grace { f16 }
  e8 e]
}
```

Even more strict manual control with the beams can be achieved by setting the properties stemLeftBeamCount and stemRightBeamCount. They specify the number of beams to draw on the left and right side, respectively, of the next note. If either property is set, its value will be used only once, and then it is erased. In this example, the last f is printed with only one beam on the left side, i.e., the eighth-note beam of the group as a whole.

```
\relative a' {
  a8[ r16 f g a]
  a8[ r16
  \set stemLeftBeamCount = #2
  \set stemRightBeamCount = #1
  f16
  \set stemLeftBeamCount = #1
  g16 a]
}
```

Predefined commands

\noBeam.

Selected Snippets

Flat flags and beam nibs

Flat flags on lone notes and beam nibs at the ends of beamed figures are both possible with a combination of stemLeftBeamCount, stemRightBeamCount and paired [] beam indicators.

For right-pointing flat flags on lone notes, use paired [] beam indicators and set stemLeftBeamCount to zero (see Example 1).

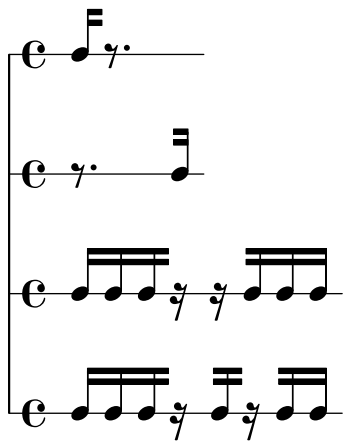
For left-pointing flat flags, set `stemRightBeamCount` instead (Example 2).

For right-pointing nibs at the end of a run of beamed notes, set `stemRightBeamCount` to a positive value. And for left-pointing nibs at the start of a run of beamed notes, set `stemLeftBeamCount` instead (Example 3).

Sometimes it may make sense for a lone note surrounded by rests to carry both a left- and right-pointing flat flag. Do this with paired `[]` beam indicators alone (Example 4).

(Note that `\set stemLeftBeamCount` is always equivalent to `\once \set`. In other words, the beam count settings are not "sticky", so the pair of flat flags attached to the lone `c'16[]` in the last example have nothing to do with the `\set` two notes prior.)

```
\score {
  <<
    % Example 1
    \new RhythmicStaff {
      \set stemLeftBeamCount = #0
      c16[]
      r8.
    }
    % Example 2
    \new RhythmicStaff {
      r8.
      \set stemRightBeamCount = #0
      16[]
    }
    % Example 3
    \new RhythmicStaff {
      16 16
      \set stemRightBeamCount = #2
      16 r r
      \set stemLeftBeamCount = #2
      16 16 16
    }
    % Example 4
    \new RhythmicStaff {
      16 16
      \set stemRightBeamCount = #2
      16 r16
      16[]
      r16
      \set stemLeftBeamCount = #2
      16 16
    }
  >>
}
```



See also

Notation Reference: Section 5.4.1 [Direction and placement], page 694, [Grace notes], page 130.

Snippets: Section "Rhythms" in *Snippets*.

Internals Reference: Section "Beam" in *Internals Reference*, Section "BeamEvent" in *Internals Reference*, Section "Beam_engraver" in *Internals Reference*, Section "beam-interface" in *Internals Reference*, Section "Stem_engraver" in *Internals Reference*.

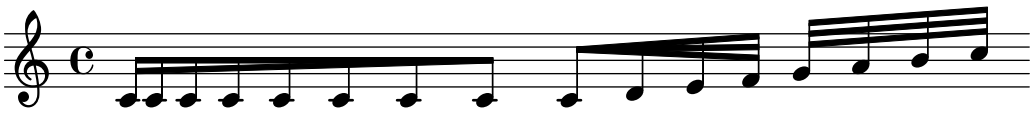
Feathered beams

Feathered beams are used to indicate that a small group of notes should be played at an increasing (or decreasing) tempo, without changing the overall tempo of the piece. The extent of the feathered beam must be indicated manually using `[` and `]`, and the beam feathering is turned on by specifying a direction to the `Beam` property `grow-direction`.

If the placement of the notes and the sound in the MIDI output is to reflect the *ritardando* or *accelerando* indicated by the feathered beam the notes must be grouped as a music expression delimited by braces and preceded by a `featherDurations` command which specifies the ratio between the durations of the first and last notes in the group.

The square brackets show the extent of the beam and the braces show which notes are to have their durations modified. Normally these would delimit the same group of notes, but this is not required: the two commands are independent.

In the following example the eight 16th notes occupy exactly the same time as a half note, but the first note is one half as long as the last one, with the intermediate notes gradually lengthening. The first four 32nd notes gradually speed up, while the last four 32nd notes are at a constant tempo.

```
\relative c' {
  \override Beam.grow-direction = #LEFT
  \featherDurations 2/1
  { c16[ c c c c c c c] }
  \override Beam.grow-direction = #RIGHT
  \featherDurations 2/3
  { c32[ d e f] }
  % revert to non-feathered beams
  \override Beam.grow-direction = #'()
  { g32[ a b c] }
}
```

The spacing in the printed output represents the note durations only approximately, but the MIDI output is exact.

Predefined commands

`\featherDurations`.

See also

Snippets: Section “Rhythms” in *Snippets*.

Known issues and warnings

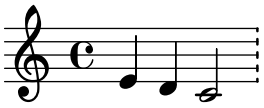
The `\featherDurations` command only works with very short music snippets, and when numbers in the fraction are small.

1.2.5 Bars

Bar lines

Bar lines are used to delimit measures and sections, and to indicate repetition. Normally, simple bar lines are automatically inserted into the printed output at places according to the current time signature. Various commands insert other kinds of bar lines automatically as part of their effect (see [Automatic bar lines], page 115).

A bar line inserted automatically can be changed to another type with the `\bar` command:

```
\relative { e'4 d c2 \bar "!" }
```

The final note of a measure is not required to end on the automatically inserted bar line: the note is assumed to carry over into the next measure. But if a long sequence of such carry-over measures appears, the music can appear compressed or even flowing off the page. This is because automatic line breaks happen only at the end of complete measures, i.e., where all notes end before the end of a measure.

> **Note:** An incorrect duration can inhibit line breaks, leading to a line of highly compressed music or music that flows off the page.

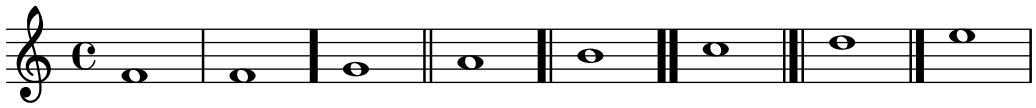
Line breaks are also permitted at manually inserted bar lines even within incomplete measures. To allow a line break without printing a bar line, use `\allowBreak`; see Section 4.3.1 [Line breaking], page 617.

This and other special bar lines may be inserted manually at any point. When they coincide with the end of a measure they replace the simple bar line which would have been inserted there automatically. When they do not coincide with the end of a measure the specified bar line is inserted at that point in the printed output.

Manual bar lines are purely visual. They do not affect any of the properties that a normal bar line would affect, such as measure numbers and accidentals. They do not affect the calculation and placement of subsequent automatic bar lines. When a manual bar line is placed where a normal bar line already exists, the effects of the original bar line are not altered.

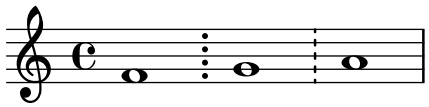
Various single and double bar lines are available for manual insertion:

```
\relative {
  f'1 \bar "|"
  f1 \bar "."
  g1 \bar "||"     % see \section
  a1 \bar ".|"
  b1 \bar ".."
  c1 \bar "|.|"
  d1 \bar "|."     % see \fine
  e1
}
```



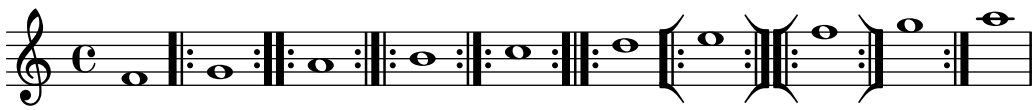
together with dotted and dashed bar lines:

```
\relative {
  f'1 \bar ";"
  g1 \bar "!"
  a1
}
```



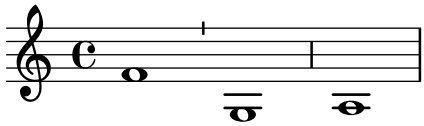
and various repeat bar lines:

```
\relative {
  f'1 \bar ".|:"
  g1 \bar ":..:"
  a1 \bar ":|.|:"
  b1 \bar ":|.:"
  c1 \bar ":.|.:"
  d1 \bar "[|:"
  e1 \bar ":|][|:"
  f1 \bar ":|]"
  g1 \bar ":|."
  a1
}
```



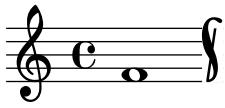
Ticks and short bar lines are also available; however, in the context of Gregorian chant, using `\divisioMinima` and `\divisioMaior` is preferable (see [Divisiones], page 505).

```
f'1 \bar "'"
g1 \bar ","
a1
```



LilyPond supports Kievan notation and provides a special Kievan bar line:

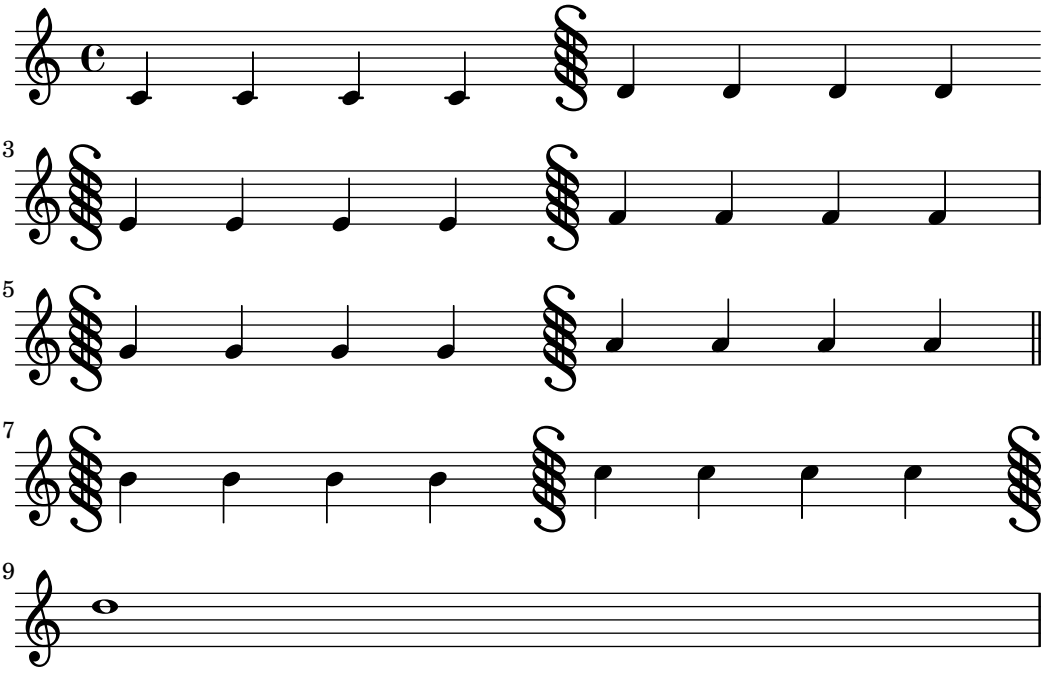
```
f'1 \bar "k"
```



Further details of this notation are explained in Section 2.9.5 [Typesetting Kievan square notation], page 513.

There are various in-staff segno signs which differ in their behavior at line breaks:

```
\fixed c' {
  c4 4 4 4
  \bar "S"
  d4 4 4 4 \break
  \bar "S"
  e4 4 4 4
  \bar "S-|"
  f4 4 4 4 \break
  \bar "S-|"
  g4 4 4 4
  \bar "S-||"
  a4 4 4 4 \break
  \bar "S-||"
  b4 4 4 4
  \bar "S-S"
  c'4 4 4 4 \break
  \bar "S-S"
  d'1
}
```

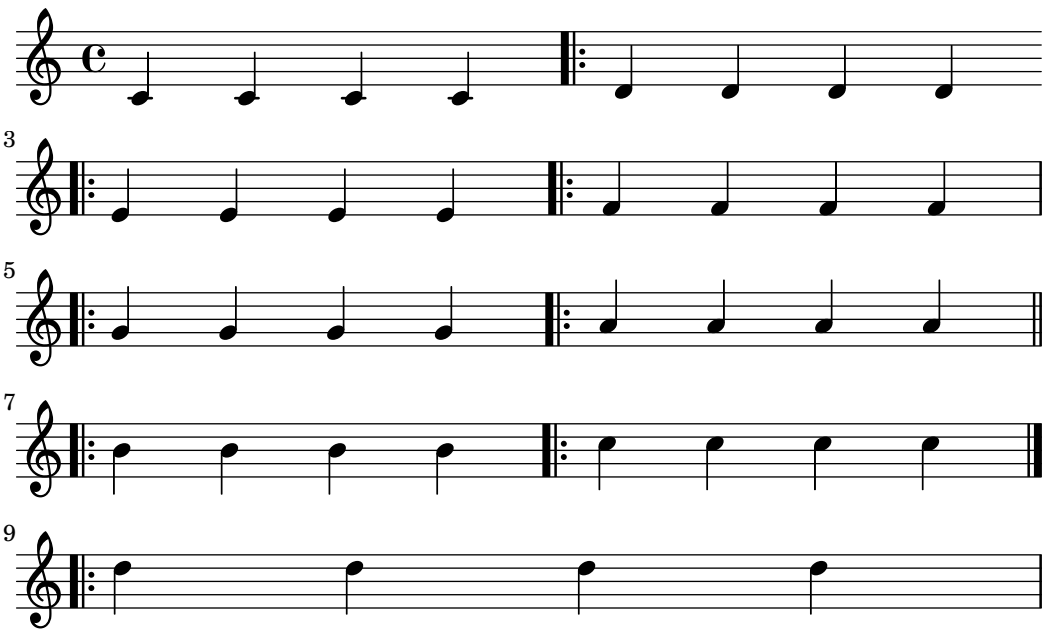


Although the bar line types signifying repeats may be inserted manually they do not in themselves cause LilyPond to recognize a repeated section. Such repeated sections are better entered

using the various repeat commands (see Section 1.4 [Repeats], page 168), which automatically print the appropriate bar lines, which can be customized (see [Automatic bar lines], page 115).

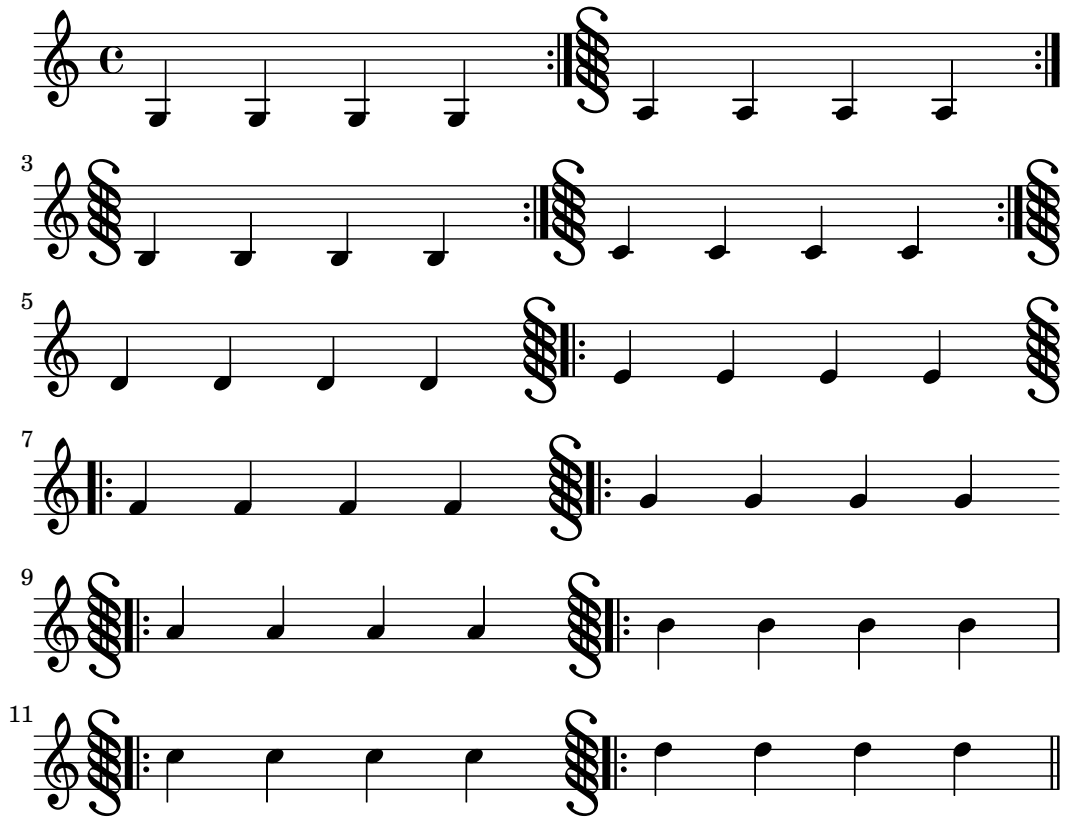
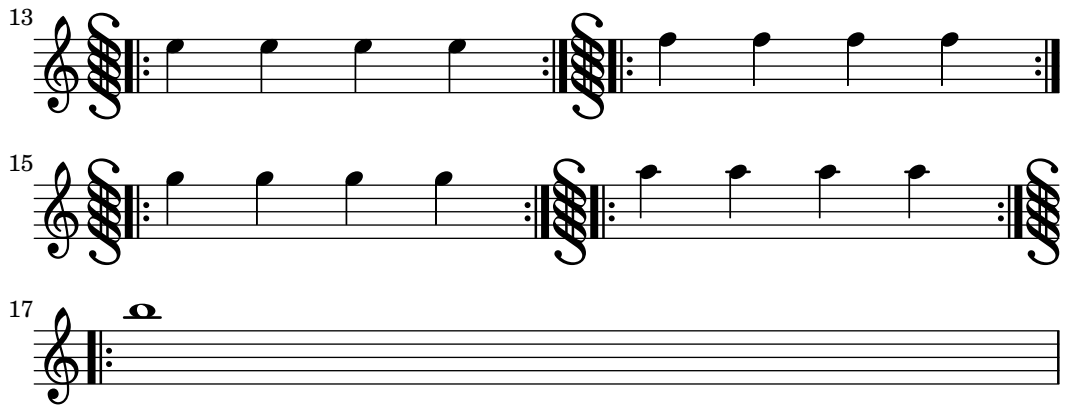
In addition, you can specify ".|:-||", which is equivalent to ".|:" except at line breaks, where it gives a double bar line at the end of the line and a start repeat at the beginning of the next line.

```
\fixed c' {
  c4 4 4 4
  \bar ".|:"
  d4 4 4 4 \break
  \bar ".|:"
  e4 4 4 4
  \bar ".|:-|"
  f4 4 4 4 \break
  \bar ".|:-|"
  g4 4 4 4
  \bar ".|:-||"
  a4 4 4 4 \break
  \bar ".|:-||"
  b4 4 4 4
  \bar ".|:-|."
  c'4 4 4 4 \break
  \bar ".|:-|."
  d'4 4 4 4
}
```



There are various combinations of repeats with the segno sign:

```
\fixed c' {
  g,4 4 4 4
  \bar ":|.S"
  a,4 4 4 4 \break
  \bar ":|.S"
  b,4 4 4 4
  \bar ":|.S-S"
```

```
  c4 4 4 4 \break
  \bar ":|.S-S"
  d4 4 4 4
  \bar "S.|:-S"
  e4 4 4 4 \break
  \bar "S.|:-S"
  f4 4 4 4
  \bar "S.|:"
  g4 4 4 4 \break
  \bar "S.|:"
  a4 4 4 4
  \bar "S.|:-|"
  b4 4 4 4 \break
  \bar "S.|:-|"
  c'4 4 4 4
  \bar "S.|:-||"
  d'4 4 4 4 \break
  \bar "S.|:-||"
  e'4 4 4 4
  \bar ":|.S.|:"
  f'4 4 4 4 \break
  \bar ":|.S.|:"
  g'4 4 4 4
  \bar ":|.S.|:-S"
  a'4 4 4 4 \break
  \bar ":|.S.|:-S"
  b'1
}
```



Many of the repeat and segno bar lines above can be inserted automatically by `\repeat` commands (see Section 1.4 [Repeats], page 168).

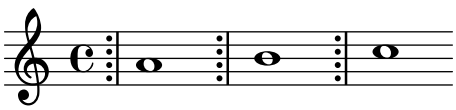
New bar line types can be defined with `\defineBarLine`:

`\defineBarLine` *bar-type* `#'(`*eol-bar bol-bar span-bar*`)`

Briefly, the *bar-type* argument specifies the bar line glyph to use in the middle of a staff line, and also serves as the name by which this bar line type is referenced. The other arguments specify the bar line glyph to use at the end or beginning of a line, or in the span between multiple staves. Setting any of *eol-bar*, *bol-bar*, or *span-bar* to `#t` means to use the same bar line type specified by *bar-type* for the corresponding position. Setting them to `#f` means to print no bar line in the corresponding position.

In more detail, the *bar-type* argument is a string that serves a dual purpose: It specifies the bar line glyph to be printed when it occurs in the middle of a staff line; and it identifies the bar line object that can be invoked with `\bar` *bar-type*. It must have the form *midglyph* or *midglyph-annotation* (with a literal hyphen), where *annotation* is an arbitrary string, and *midglyph* is a string each of whose characters is the name of one of the predefined bar line elements listed below. The resulting bar line glyph to be used in the middle of a line is the concatenation of these elements. For example, a *bar-type* of either `";|"` or `";|-other"` specifies a compound bar line consisting of a dotted line (‘`;`’) paired with a solid line (‘`|`’):

```
\defineBarLine ";|" #'(#t #t #t)
\defineBarLine ";|-other" #'(#f #f #f)
\fixed c' {
   \bar ";|" a1 \bar ";|" b1 \bar ";|-other" c'1 \bar ";|-other"
}
```

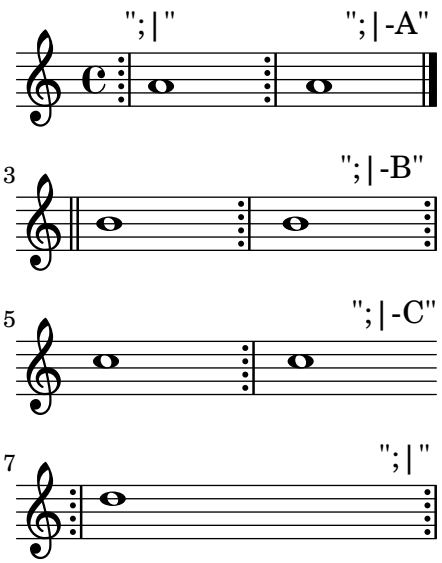


The *annotation* (‘`other`’ in the second example above) is used to distinguish this bar type from others with the same *midglyph* but different line break or multi-staff behavior. (By convention, the string specified in *eol-bar* is often used as the annotation, so we might have named the second example ‘`";|-f"`’.)

The arguments *eol-bar* and *bol-bar* specify the bar line to be printed at the end of the line and beginning of the next line, when `\bar` *bar-type* occurs at a line break. *bol-bar* also applies when `\bar` *bar-type* is used at the beginning of a score. The format of these arguments is the same as that of *bar-type*. The string of bar line elements specifies the bar line glyph to print at the corresponding line position. In addition, either of these arguments can be `#t` as a shorthand for copying the value of *bar-type*; or `#f` to print no bar line. For example, all of the bar line

types in this example print a dotted-solid line pair in the middle of a staff line, but have different behavior at ends or beginnings of lines:

```
% dotted-solid everywhere
\defineBarLine  ";|"  #'( #t #t #t)
%   solid-bold at EOL, solid-solid at BOL
\defineBarLine  ";|-A" #'( "|."  "||"  #f )
%   dotted-solid at EOL, nothing at BOL
\defineBarLine  ";|-B" #'( #t  #f  #f )
%   nothing at EOL, dotted-solid at BOL
\defineBarLine  ";|-C" #'( #f  #t  #f )
\relative c'' {
  \bar ";|"  \textMark "\";|\""
  a1  \bar ";|-A"
  a1  \bar ";|-A"  \textEndMark "\";|-A\""  \break
  b1  \bar ";|-B" b \bar ";|-B"  \textEndMark "\";|-B\""  \break
  c1  \bar ";|-C" c \bar ";|-C"  \textEndMark "\";|-C\""   \break
  d1  \bar ";|" \textEndMark "\";|\""
}
```

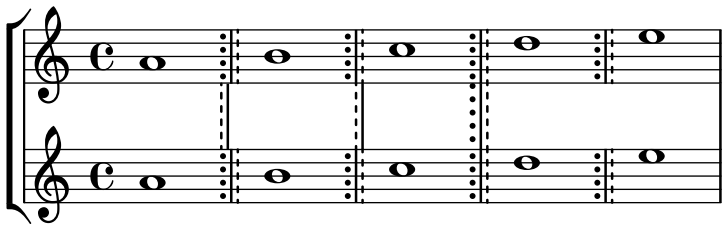


Note: The *eol-bar* or *bol-bar* strings may be names of previously defined bar line types. In a single staff context, it does not matter: the bar line elements in the given string are used regardless of any features of the defined bar line named by the string. In particular, any annotation is ignored in this context. However, in a multi-staff system it is important that *eol-bar* and *bol-bar* refer to previously defined bar line types (including *bar-type* itself), or be `#t` or `#f`. This is explained in more detail below.

The argument *span-bar* has an effect only in multi-staff systems (see [Grouping staves], page 217), where it specifies what to print between grouped staves. This argument should be a string of bar line elements, of the same length as *bar-type* or shorter. (Extra elements are ignored.) Each element will be printed in line with the corresponding element of *bar-type*. A space character (‘ ’) can be used to omit a bar line element but leave space for it. Setting *span-bar* to `#t` makes it the same as the mid-line glyph. Setting it to `#f` omits the span bar, and setting it to `""` (an empty string) makes a zero-width span bar. Here are some examples:

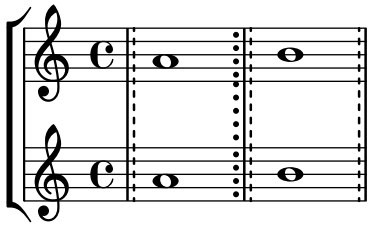
```
\defineBarLine  ";|!-A"  #'(#t #t "!|")
\defineBarLine  ";|!-B"  #'(#t #t " !|")
\defineBarLine  ";|!-C"  #'(#t #t #t)
```

```
\defineBarLine  ";|!-D"  #'(#t #t #f)
\fixed c' {
  \new StaffGroup <<
    \new Staff {
      a1 \bar ";|!-A"
      b  \bar ";|!-B"
      c' \bar ";|!-C"
      d' \bar ";|!-D"
      e'
    }
    \new Staff {
      a1 b c' d' e'
    }
  >>
}
```



At line breaks, instead of using *span-bar*, the bar line types referenced by *eol-bar* and *bol-bar* are used to determine the span bar to print. In the context of a staff group, if *eol-bar* and *bol-bar* do not refer to defined bar line types, LilyPond issues a warning, and no span bar is printed at line breaks. It is allowed for *eol-bar* or *bol-bar* to be `#f`, in which case no span bar is printed at the corresponding line position. These arguments can also be `#t`, or equivalently, equal to *bar-type*, in which case the current *span-bar* does determine the span bar to print at the corresponding line position:

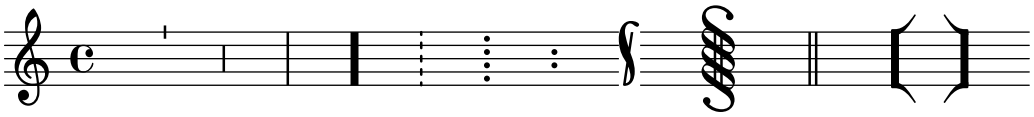
```
\defineBarLine  "!|-t"  #'(#t #t #t)
\defineBarLine  "|!-t"  #'(#t #t #t)
\defineBarLine  ";|!-bad"  #'("|!" "!|" #t)  % fails at line breaks
\defineBarLine  ";|!-good" #'("!|-t" "|!-t" #t)
\relative c'' {
  \new StaffGroup <<
    \new Staff {
      \bar ";|!-good"
      a1 \bar ";|!-good"
      % \bar ";|!-bad"     % "WARNING: No span bar glyph defined..."
      b1 \bar ";|!-good"
    }
    \new Staff {
      a1 b1
    }
  >>
}
```



Note: If *span-bar* is a string, it should contain *only* bar line elements, or space (‘ ’), and not an annotation such as allowed in the other arguments. If *span-bar* contains an annotation, LilyPond issues a warning. The one exception is that it may be equal to *bar-type*, in which case no warning is issued even if *bar-type* includes an annotation.

All the available bar line elements are shown below. Most also have predefined bar types (for arguments to `\bar`) that reference them individually. Some elements are primarily intended to be combined with others and so do not have predefined individual bar types.

```
\defineBarLine ":" #'(#f #t #f)
\defineBarLine "=" #'(#t #f #t)
\defineBarLine "[" #'(#f #t #f)
\defineBarLine "]" #'(#t #f #f)

\new Staff {
  s1 \bar "'"
  s1 \bar ","
  s1 \bar "|"
  s1 \bar "."
  s1 \bar "!"
  s1 \bar ";"
  s1 \bar ":"
  s1 \bar "k"
  s1 \bar "S"
  s1 \bar "="
  s1 \bar "["
  s1 \bar "]"
  s1 \bar ""
}
```

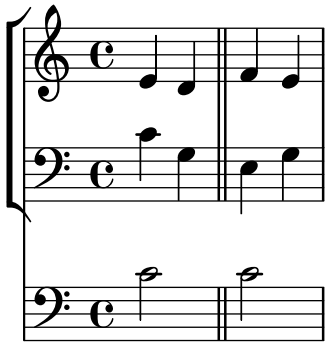


The `"="` bar line provides a double span bar line for use in combination with the segno sign. Using it as a stand-alone double thin bar line is not recommended; `\bar "||"` is preferred.

If additional elements are needed, LilyPond provides a simple way to define them. For more information on modifying or adding bar lines, see file `scm/bar-line.scm`.

In scores with many staves, a `\bar` command in one staff is automatically applied to all staves. The resulting bar lines are connected between different staves of a `StaffGroup`, `PianoStaff`, or `GrandStaff`.

```
<<
  \new StaffGroup <<
    \new Staff \relative {
      e'4 d
      \bar "||"
```

```
      f4 e
    }
    \new Staff \relative { \clef bass c'4 g e g }
  >>
  \new Staff \relative { \clef bass c'2 c2 }
>>
```

The bar type used for automatically inserted measure bar lines is `"|"`. This may be changed at any time with '`\set Timing.measureBarType = bartype`'.

See also

Notation Reference: Section 4.3.1 [Line breaking], page 617, Section 1.4 [Repeats], page 168, [Grouping staves], page 217.

Installed Files: `scm/bar-line.scm`.

Snippets: Section "Rhythms" in *Snippets*.

Internals Reference: Section "BarLine" in *Internals Reference* (created at `Staff` level), Section "SpanBar" in *Internals Reference* (across staves), Section "Timing_translator" in *Internals Reference* (for Timing properties).

Automatic bar lines

Various commands other than `\bar` can also create bar lines as part of their effect. The bar lines created in these cases can be changed by setting context properties. If a property is set to `'()` or is unset, it is ignored; otherwise, the value must be a predefined bar type or one previously defined with the `\defineBarLine` command (see [Bar lines], page 106).

Multiple reasons for creating different automatic bar lines may apply at the same time. Conflicts are resolved in part by providing properties for predetermined combinations and in part by a priority scheme. The table below presents the available properties in order of increasing priority.

`underlyingRepeatBarType`
: Used at points of repetition or departure where no bar line would otherwise appear. This is expected when repeated sections are not aligned to measures. Several commands employ this bar type: `\codaMark`, `\inStaffSegno`, `\repeat segno`, `\repeat volta`, and `\segnoMark`.

`caesuraType underlying-bar-line`
: Used at `\caesura`; see [Phrase bar lines in hymn tunes], page 374.

`measureBarType`
: Used at a measure boundary.

`caesuraType bar-line`
: Used at `\caesura`; see [Phrase bar lines in hymn tunes], page 374.

`sectionBarType`
: Used at a section break created by `\section`.

`fineBarType`
: Used at `\fine`.

`doubleRepeatBarType`
`doubleRepeatSegnoBarType`
`endRepeatBarType`
`endRepeatSegnoBarType`
`fineSegnoBarType`
`fineStartRepeatSegnoBarType`
`segnoBarType`
`startRepeatBarType`
`startRepeatSegnoBarType`
: Only one of these bar types is used at a time; which one is used depends on the structure of the piece.

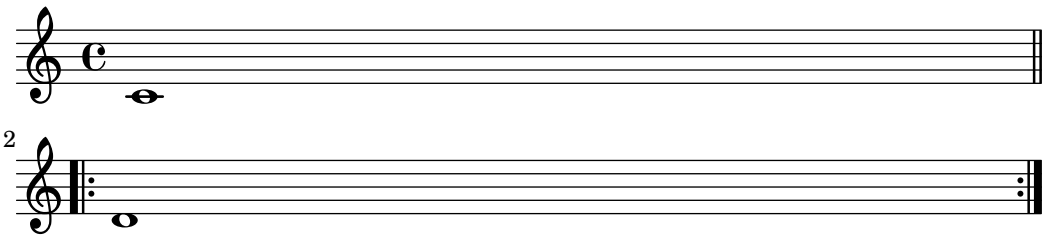
  Properties with `startRepeat` or `endRepeat` in the name are used at the start or end of a repeated section created by `\repeat volta`, and properties with `doubleRepeat` in the name are used where the end of one repeated section and the start of another coincide.

  Properties with `segno` in the name are used at an in-staff segno, which can be created by `\repeat segno` or `\segnoMark` when the `segnoStyle` property is set to `bar-line`, or created by `\inStaffSegno`.

  Properties with `fine` in the name are used at `\fine`.

Priority applies independently to beginning-, middle-, and end-of-line bar lines, allowing a lower-priority bar line to appear where higher-priority bar types have no glyphs defined (see [Bar lines], page 106).

```
\fixed c' {
  c1 \section \break
  \repeat volta 2 d1
}
```



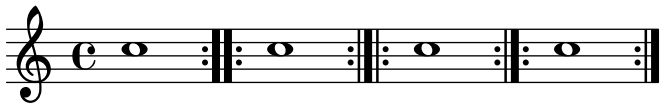
Selected Snippets

Setting the double repeat default for volte

There are three different styles of double repeats for volte, that can be set using `doubleRepeatBarType`.

```
\relative c'' {
  \repeat volta 2 { c1 }
  \set Score.doubleRepeatBarType = #":..:"
  \repeat volta 2 { c1 }
  \set Score.doubleRepeatBarType = #":|.|:"
  \repeat volta 2 { c1 }
```

```
  \set Score.doubleRepeatBarType = #":|.:"
  \repeat volta 2 { c1 }
}
```



See also

Notation Reference: [Bar lines], page 106, Section 1.4 [Repeats], page 168.

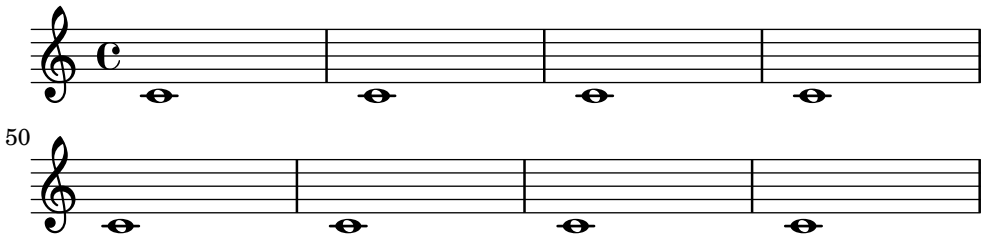
Snippets: Section "Rhythms" in *Snippets*.

Internals Reference: Section "Repeat_acknowledge_engraver" in *Internals Reference*.

Bar numbers

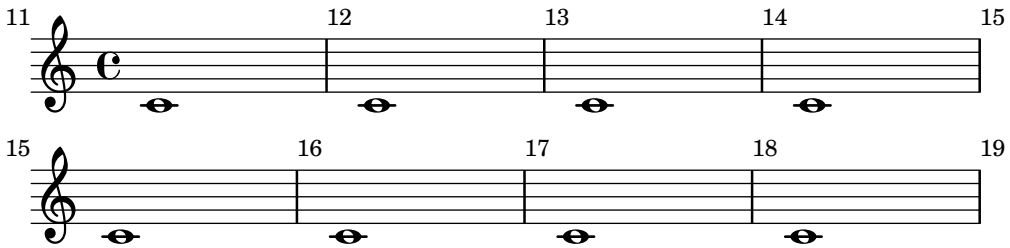
Bar numbers are typeset by default at the start of every line except the first line. The number itself is stored in the `currentBarNumber` property, which is normally updated automatically for every measure. It may also be set manually:

```
\relative c' {
  c1 c c c
  \break
  \set Score.currentBarNumber = #50
  c1 c c c
}
```



The default behavior of only printing bar numbers at the start of every line can be changed through the `break-visibility` property of `BarNumber`. This takes three values which may be set to `#t` or `#f` to specify whether the corresponding bar number is visible or not. The order of the three values is `end of line visible`, `middle of line visible`, `beginning of line visible`. In the following example bar numbers are printed at all possible places:

```
\relative c' {
  \override Score.BarNumber.break-visibility = ##(#t #t #t)
  \set Score.currentBarNumber = #11
  c1 | c | c | c |
  \break
  c1 | c | c | c |
}
```

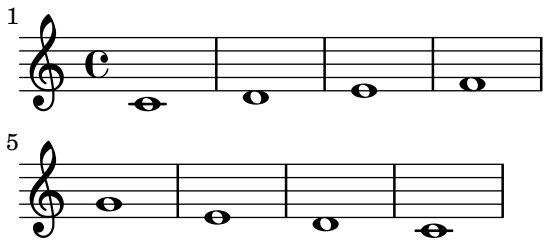


Selected Snippets

Printing the bar number for the first measure

By default, the first bar number in a score is suppressed if it is less than or equal to 1. By setting `barNumberVisibility` to `all-bar-numbers-visible`, any bar number can be printed for the first measure and all subsequent measures.

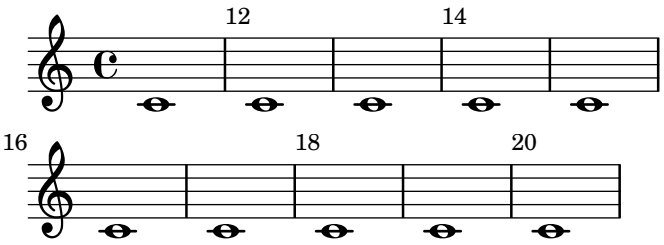
```
\layout {
  indent = 0
  ragged-right = ##t
}

\relative c' {
  \set Score.barNumberVisibility = #all-bar-numbers-visible
  c1 | d | e | f \break
  g1 | e | d | c
}
```



Printing bar numbers at regular intervals

By setting the `barNumberVisibility` property, bar numbers can be printed at regular intervals. Here the bar numbers are printed every two measures except at the end of the line.

```
\relative c' {
  \override Score.BarNumber.break-visibility = #end-of-line-invisible
  \set Score.currentBarNumber = #11
  % Print a bar number every second measure
  \set Score.barNumberVisibility = #(every-nth-bar-number-visible 2)
  c1 | c | c | c | c
  \break
  c1 | c | c | c | c
}
```

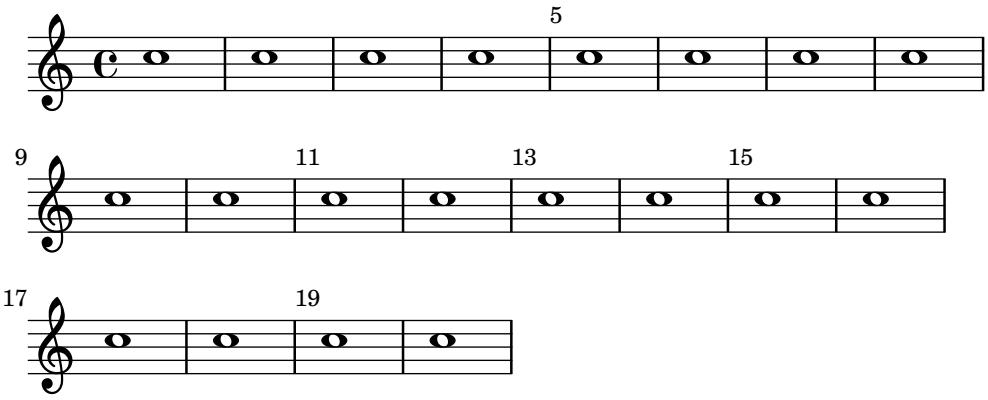


Printing bar numbers with changing regular intervals

Using the `set-bar-number-visibility` context function, bar number intervals can be changed.

```
\relative c' {
  \override Score.BarNumber.break-visibility = #end-of-line-invisible
  \context Score \applyContext #(set-bar-number-visibility 4)
  \repeat unfold 10 c'1
```

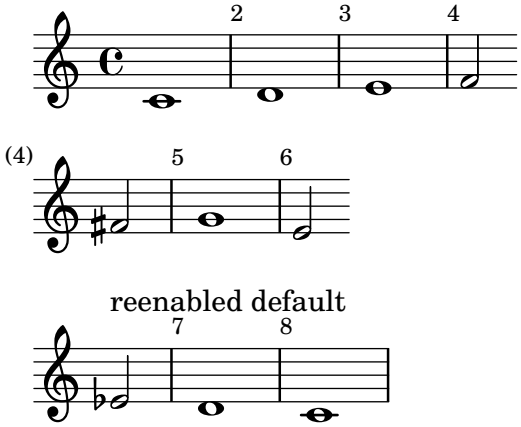
```
  \context Score \applyContext #(set-bar-number-visibility 2)
  \repeat unfold 10 c
}
```



Printing bar numbers for broken measures

By default a `BarNumber` of a broken measure is not repeated at the beginning of the new line. Use `first-bar-number-invisible-save-broken-bars` for `barNumberVisibility` to get a parenthesized `BarNumber` there.

```
\layout {
  \context {
    \Score
    barNumberVisibility = #first-bar-number-invisible-save-broken-bars
    \override BarNumber.break-visibility = ##(#f #t #t)
  }
}

\relative c' {
  c1 | d | e | f2 \bar "" \break
  fis | g1 | e2 \bar "" \break
  <>^"reenabled default"
  % back to default -
  % \unset Score.barNumberVisibility would do so as well
  \set Score.barNumberVisibility =
    #first-bar-number-invisible-and-no-parenthesized-bar-numbers
  es | d1 | c
}
```



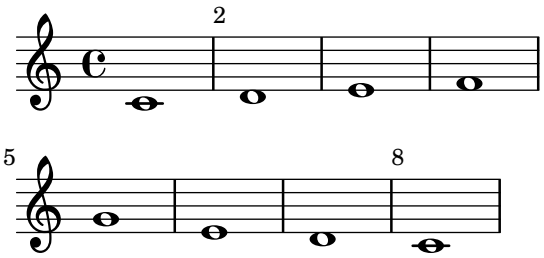
Printing bar numbers using modulo-bar-number-visible

If the remainder of the division of the current BarNumber by the first argument of modulo-bar-number-visible equals its second argument print the BarNumber.

Useful to print the BarNumber at certain distances, p.e:

- (modulo-bar-number-visible 3 2) -> prints 2,5,8
- (modulo-bar-number-visible 4 2) -> prints 2,6,10
- (modulo-bar-number-visible 3 1) -> prints 3,5,7
- (modulo-bar-number-visible 5 2) -> prints 2,7,12

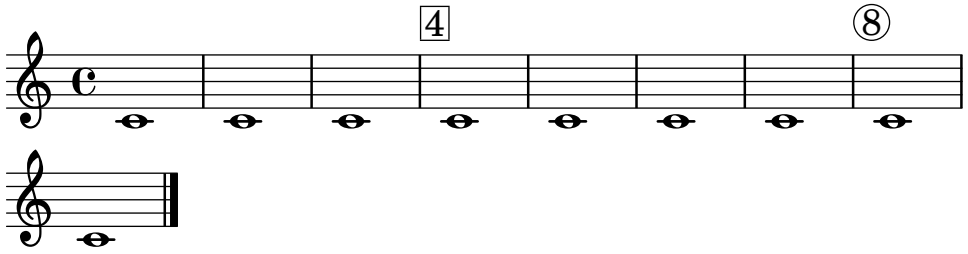
```
\layout {
  \context {
    \Score
    \override BarNumber.break-visibility = ##(#f #t #t)
    barNumberVisibility = #(modulo-bar-number-visible 3 2)
  }
}

\relative c' {
  c1 | d | e | f \break
  g1 | e | d | c
}
```



Printing bar numbers inside boxes or circles

Bar numbers can also be printed inside boxes or circles.

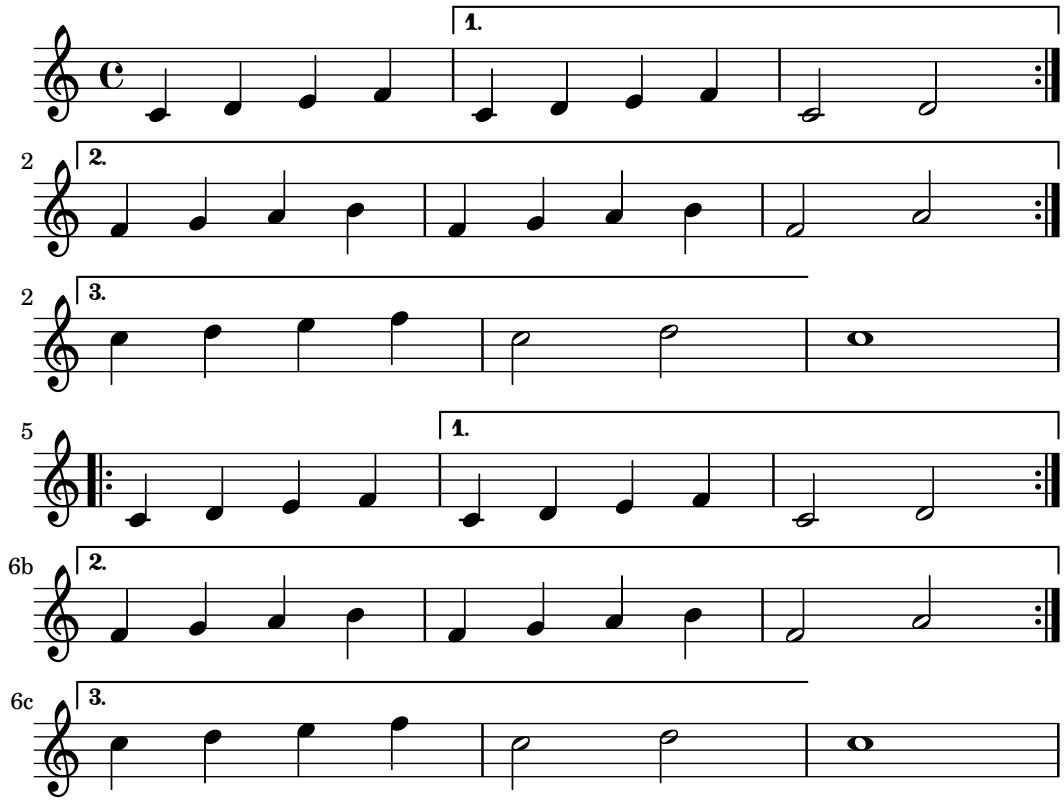
```
\relative c' {
  % Prevent bar numbers at the end of a line and permit them elsewhere
  \override Score.BarNumber.break-visibility = #end-of-line-invisible
  \set Score.barNumberVisibility = #(every-nth-bar-number-visible 4)

  % Increase the size of the bar number by 2
  \override Score.BarNumber.font-size = #2

  % Draw a box round the following bar number(s)
  \override Score.BarNumber.stencil
    = #(make-stencil-boxer 0.1 0.25 ly:text-interface::print)
  \repeat unfold 5 { c1 }

  % Draw a circle round the following bar number(s)
  \override Score.BarNumber.stencil
    = #(make-stencil-circler 0.1 0.25 ly:text-interface::print)
  \repeat unfold 4 { c1 } \bar "|."
}
```



Alternative bar numbering

Two alternative methods for bar numbering can be set, especially for when using repeated music.

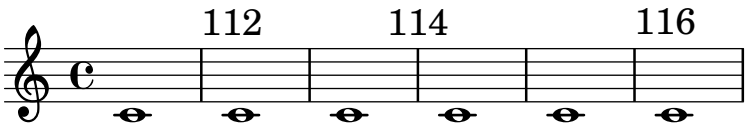
```
\relative c'{
  \set Score.alternativeNumberingStyle = #'numbers
  \repeat volta 3 { c4 d e f | }
    \alternative {
      { c4 d e f | c2 d \break }
      { f4 g a b | f4 g a b | f2 a | \break }
      { c4 d e f | c2 d }
    }
  c1 \break
  \set Score.alternativeNumberingStyle = #'numbers-with-letters
  \repeat volta 3 { c,4 d e f | }
    \alternative {
      { c4 d e f | c2 d \break }
      { f4 g a b | f4 g a b | f2 a | \break }
      { c4 d e f | c2 d }
    }
  c1
}
```



Aligning bar numbers

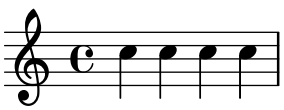
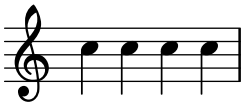
Bar numbers by default are right-aligned to their parent object. This is usually the left edge of a line or, if numbers are printed within a line, the left hand side of a bar line. The numbers may also be positioned directly over the bar line or left-aligned to the bar line.

```
\relative c' {
  \set Score.currentBarNumber = #111
  \override Score.BarNumber.break-visibility = #all-visible
  % Increase the size of the bar number by 2
  \override Score.BarNumber.font-size = #2
  % Print a bar number every second measure
  \set Score.barNumberVisibility = #(every-nth-bar-number-visible 2)
  c1 | c1
  % Center-align bar numbers
  \override Score.BarNumber.self-alignment-X = #CENTER
  c1 | c1
  % Left-align bar numbers
  \override Score.BarNumber.self-alignment-X = #LEFT
  c1 | c1
}
```



Removing bar numbers from a score

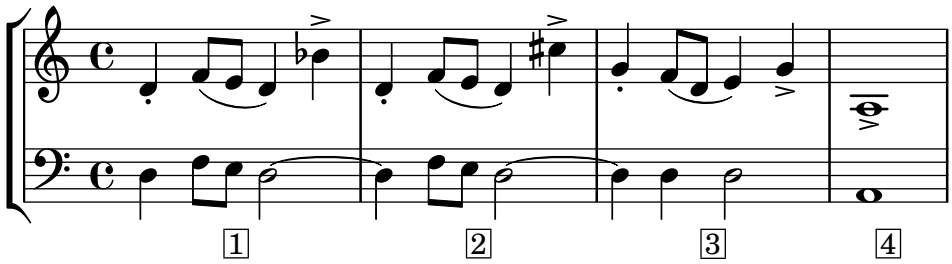
Bar numbers can be removed entirely by removing the `Bar_number_engraver` from the `Score` context.

```
\layout {
  \context {
    \Score
    \omit BarNumber
    % or:
    %\remove "Bar_number_engraver"
  }
}

\relative c'' {
  c4 c c c \break
  c4 c c c
}
```

Measure-centered bar numbers

For film scores, a common convention is to center bar numbers within their measure. This is achieved through setting the `centerBarNumbers` context property to true. When this is used, the type of the bar number grobs is `CenteredBarNumber` rather than `BarNumber`.

This example demonstrates a number of settings: the centered bar numbers are boxed and placed below the staves.

```
\layout {
  \context {
    \Score
    centerBarNumbers = ##t
    barNumberVisibility = #all-bar-numbers-visible
    \override CenteredBarNumber.stencil
      = #(make-stencil-boxer 0.1 0.25 ly:text-interface::print)
    \override CenteredBarNumberLineSpanner.direction = #DOWN
  }
}

\new StaffGroup <<
  \new Staff \relative c' {
    d4-. f8( e d4) bes'-> |
    d,-. f8( e d4) cis'-> |
    g-. f8( d e4) g-> |
    a,1-> |
  }
  \new Staff \relative c {
    \clef bass
    d4 f8 e d2~ |
    4 f8 e d2~ |
    4 4 2 |
    a1 |
  }
>>
```



See also

Snippets: Section “Rhythms” in *Snippets*.

Internals Reference: Section “BarNumber” in *Internals Reference*, Section “CenteredBarNumber” in *Internals Reference*, Section “CenteredBarNumberLineSpanner” in *Internals Reference*, Section “Bar_number_engraver” in *Internals Reference*, Section “Centered_bar_number_align_engraver” in *Internals Reference*.

Known issues and warnings

Bar numbers may collide with the top of the `StaffGroup` bracket, if there is one. To solve this, the `padding` property of `BarNumber` can be used to position the number correctly. See Section "StaffGroup" in *Internals Reference* and Section "BarNumber" in *Internals Reference* for more.

Bar and bar number checks

Bar checks help detect errors in the entered durations. A bar check may be entered using the bar symbol, `|`, at any place where a bar line is expected to fall. If bar check lines are encountered at other places, a list of warnings is printed in the log file, showing the line numbers and lines in which the bar checks failed. In the next example, the second bar check will signal an error.

```
\time 3/4 c2 e4 | g2 |
```

An incorrect duration can result in a completely garbled score, especially if the score is polyphonic, so a good place to start correcting input is by scanning for failed bar checks and incorrect durations.

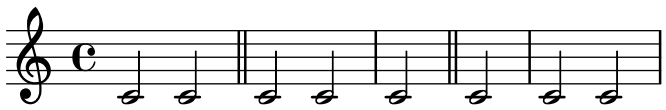
If successive bar checks are off by the same musical interval, only the first warning message is displayed. This allows the warning to focus on the source of the timing error.

Bar checks can also be inserted in lyrics:

```
\lyricmode {
  \time 2/4
  Twin -- kle | Twin -- kle |
}
```

Note that bar check marks in lyrics are evaluated at the musical moment when the syllable *following* the check mark is processed. If the lyrics are associated with the notes of a voice which has a rest at the beginning of a bar, then no syllable can be located at the start of that bar and a warning will be issued if a bar check mark is placed in the lyrics at that position.

It is also possible to redefine the action taken when a bar check or pipe symbol, `|`, is encountered in the input, so that it does something other than a bar check. This is done by assigning a music expression to `"|"`. In the following example `|` is set to insert a double bar line wherever it appears in the input, rather than checking for end of bar.

```
"|" = \bar "||"
{
  c'2 c' |
  c'2 c'
  c'2 | c'
  c'2 c'
}
```

When copying large pieces of music, it can be helpful to check that the LilyPond bar number corresponds to the original that you are entering from. This can be checked with `\barNumberCheck`, for example,

```
\barNumberCheck #123
```

will print a warning if the `currentBarNumber` is not 123 when it is processed.

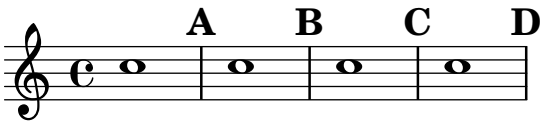
See also

Snippets: Section "Rhythms" in *Snippets*.

Rehearsal marks

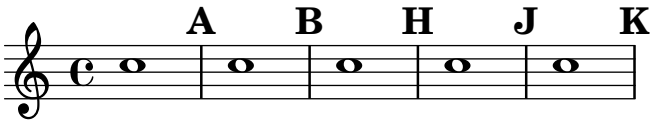
To print a rehearsal mark, use the `\mark` command.

```
\relative c'' {
  c1 \mark \default
  c1 \mark \default
  c1 \mark \default
  c1 \mark \default
}
```



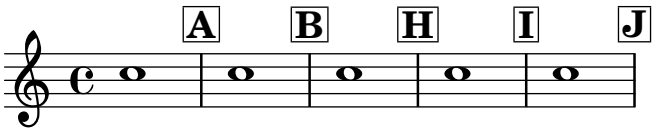
The mark is incremented automatically if you use `\mark \default`, but you can also use an integer argument to set the mark manually. The value to use is stored in the property `rehearsalMark`.

```
\relative c'' {
  c1 \mark \default
  c1 \mark \default
  c1 \mark #8
  c1 \mark \default
  c1 \mark \default
}
```



The letter 'I' is skipped in accordance with engraving traditions. If you wish to include the letter 'I', then use one of the following commands, depending on which style of rehearsal mark you want (letters only, letters in a hollow box, or letters in a hollow circle).

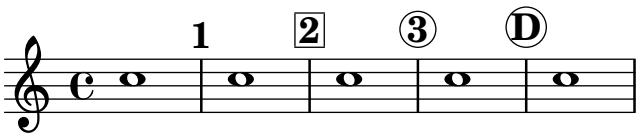
```
\set Score.rehearsalMarkFormatter = #format-mark-alphabet
\set Score.rehearsalMarkFormatter = #format-mark-box-alphabet
\set Score.rehearsalMarkFormatter = #format-mark-circle-alphabet
\relative c'' {
  \set Score.rehearsalMarkFormatter = #format-mark-box-alphabet
  c1 \mark \default
  c1 \mark \default
  c1 \mark #8
  c1 \mark \default
  c1 \mark \default
}
```



The style is defined by the property `rehearsalMarkFormatter`. It is a function taking the current mark (an integer) and the current context as argument. It should return a markup object. In the following example, `rehearsalMarkFormatter` is set to a predefined procedure. After a few measures, it is set to a procedure that produces a boxed number.

```
\relative c'' {
```

```
  \set Score.rehearsalMarkFormatter = #format-mark-numbers
  c1 \mark \default
  c1 \mark \default
  \set Score.rehearsalMarkFormatter = #format-mark-box-numbers
  c1 \mark \default
  \set Score.rehearsalMarkFormatter = #format-mark-circle-numbers
  c1 \mark \default
  \set Score.rehearsalMarkFormatter = #format-mark-circle-letters
  c1
}
```



The file `scm/translation-functions.scm` contains the definitions of `format-mark-letters` (the default format), `format-mark-box-letters`, `format-mark-numbers`, and `format-mark-box-numbers`. These can be used as inspiration for other formatting functions.

You may use `format-mark-barnumbers`, `format-mark-box-barnumbers`, and `format-mark-circle-barnumbers` to get bar numbers instead of incremented numbers or letters.

For common tweaks to the positioning of rehearsal marks, see Section 1.8.2 [Formatting text], page 289. For more precise control, consider `break-alignable-interface` (see Section 5.4.9 [Aligning objects], page 711).

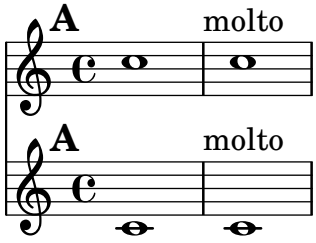
The file `scm/translation-functions.scm` contains the definitions of `format-mark-numbers` and `format-mark-letters`. They can be used as inspiration for other formatting functions.

Selected Snippets

Printing marks on every staff

Although text marks are normally only printed above the topmost staff, they may also be printed on every staff.

```
\score {
  <<
    \new Staff { \mark \default c''1 \textMark "molto" c'' }
    \new Staff { \mark \default c'1 \textMark "molto" c' }
  >>
  \layout {
    \context {
      \Score
      \remove Mark_engraver
      \remove Text_mark_engraver
      \remove Staff_collecting_engraver
    }
    \context {
      \Staff
      \consists Mark_engraver
      \consists Text_mark_engraver
      \consists Staff_collecting_engraver
    }
  }
}
```



See also

Notation Reference: Section A.8 [The Emmentaler font], page 739, Section 1.8.2 [Formatting text], page 289, Section 5.4.9 [Aligning objects], page 711, [Music notation inside markup], page 302, [Metronome marks], page 76, [Section labels], page 283.

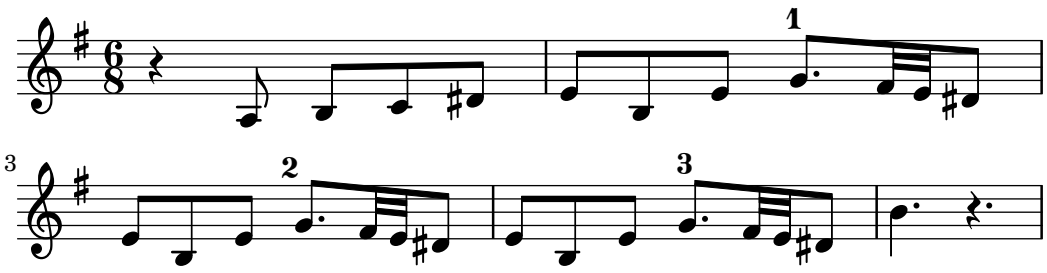
Installed Files: `scm/translation-functions.scm`.

Snippets: Section "Rhythms" in *Snippets*.

Internals Reference: Section "AdHocMarkEvent" in *Internals Reference*, Section "RehearsalMark" in *Internals Reference*, Section "RehearsalMarkEvent" in *Internals Reference*.

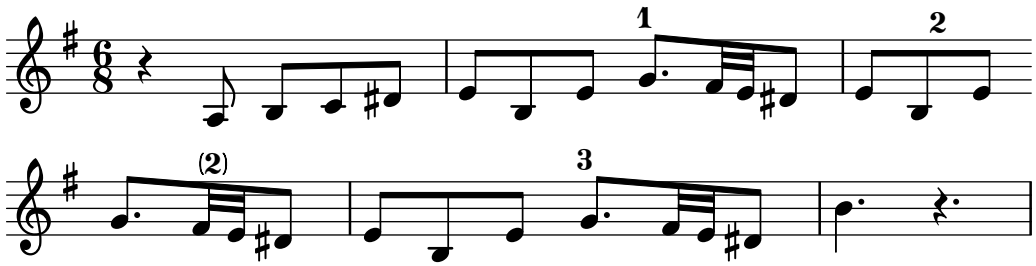
Measure counts

Measure counts are a way to number consecutive measures, for example as an aid for musicians to count measures in written-out repeats. Using this feature requires adding the `Measure_counter_engraver` to a context type, usually `Staff` or `Score`.

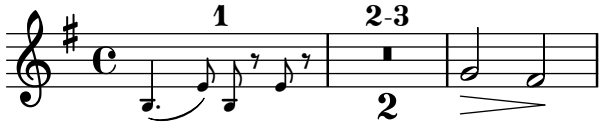
```
\layout {
  \context {
    \Staff
    \consists Measure_counter_engraver
  }
}

\relative c' {
  \time 6/8
  \key e \minor
  r4 a8 b c dis
  \startMeasureCount
  \repeat unfold 3 {
    e8 b e g8. fis32 e dis8
  }
  \stopMeasureCount
  b'4. r
}
```

Broken measures are numbered in parentheses.

```
\layout {
```

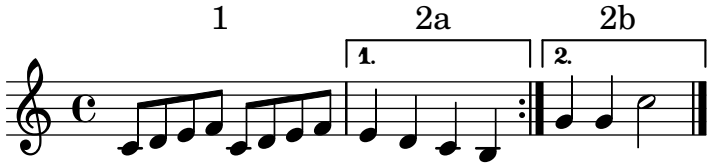
```
  \context {
    \Staff
    \consists Measure_counter_engraver
  }
}

\relative c' {
  \time 6/8
  \key e \minor
  r4 a8 b c dis
  \startMeasureCount
  e8 b e g8. fis32 e dis8
  e8 b e \break g8. fis32 e dis8
  e8 b e g8. fis32 e dis8
  \stopMeasureCount
  b'4. r
}
```



Compressed multi-measure rests receive special treatment: the full measure range is shown.

```
\layout {
  \context {
    \Staff
    \consists Measure_counter_engraver
  }
  \context {
    \Voice
    \override MultiMeasureRestNumber.direction = #DOWN
  }
}

\compressMMRests {
  \key e \minor
  \startMeasureCount
  \new CueVoice {
    b4.( e'8) b8 r e' r
  }
  R1*2
  \stopMeasureCount
  g'2\> fis'2\!
}
```

Measure counters honor alternative numbering styles. If the style is `numbers-with-letters`, they render best with a textual font.

```
\layout {
  \context {
    \Score
    alternativeNumberingStyle = #'numbers-with-letters
  }
  \context {
    \Staff
    \consists Measure_counter_engraver
    \override MeasureCounter.Y-offset = 6
    \override MeasureCounter.font-encoding = #'latin1
    \override MeasureCounter.font-size = 1
  }
}

\relative c' {
  \startMeasureCount
  \repeat volta 2 {
    c8 d e f c d e f
  }
  \alternative {
    { e4 d c b }
    { g'4 g c2 }
  }
  \bar "|."
  \stopMeasureCount
}
```



Predefined commands

`\startMeasureCount`, `\stopMeasureCount`.

See also

Notation Reference: Section 5.1.4 [Modifying context plug-ins], page 667, [Compressing empty measures], page 248, Section 4.3 [Breaks], page 617, [Bar numbers], page 117.

Internals Reference: Section “Measure_counter_engraver” in *Internals Reference*, Section “MeasureCounter” in *Internals Reference*, Section “measure-counter-interface” in *Internals Reference*.

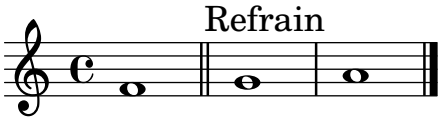
Section divisions

The `\section` command marks a point where one section of music ends and another begins. It does not have to be followed by more music: it may also be used to emphasize that the written end of the music is not the end of the piece, such as at a *D.C.* instruction or where one movement continues into the next without a break. `\section` normally creates a double bar line, but its effect can depend on other notation, e.g., repeat bar lines.

The \fine command ends the piece, normally with a final bar line. It is not limited to use at the written end of the music: it may also appear inside \repeat (see [Al-fine repeats], page 174).

A section can optionally be named with \sectionLabel (see [Section labels], page 283).

```
\fixed c' {
  f1
  \section
  \sectionLabel "Refrain"
  g1
  a1
  \fine
}
```



For details on interactions of \fine and \section bar lines with other types of bar lines, and options for changing their appearance, see [Automatic bar lines], page 115.

See also

Music Glossary: Section “fine” in *Music Glossary*.

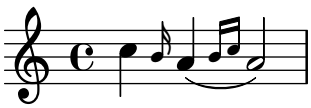
Notation Reference: [Automatic bar lines], page 115, [Divisiones], page 505, [Al-fine repeats], page 174, [Section labels], page 283.

Internals Reference: Section “FineEvent” in *Internals Reference*, Section “SectionEvent” in *Internals Reference*.

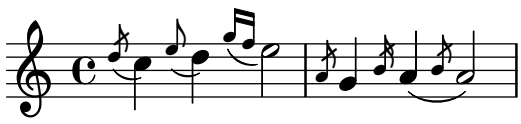
1.2.6 Special rhythmic concerns

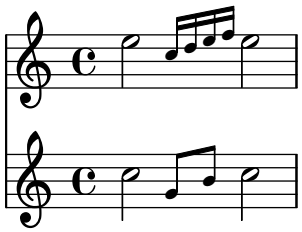
Grace notes

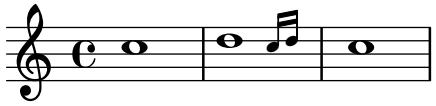
Grace notes are musical ornaments, printed in a smaller font, that take up no additional logical time in a measure.

```
\relative {
  c''4 \grace b16 a4(
  \grace { b16 c16 } a2)
}
```

There are three other types of grace notes possible; the *acciaccatura* – an unmeasured grace note indicated by a slurred note with a slashed stem – and the *appoggiatura*, which takes a fixed fraction of the main note it is attached to and prints without the slash. It is also possible to write a grace note with a slashed stem, like the *acciaccatura* but without the slur, so as to place it between notes that are slurred themselves, using the \slashedGrace function.

```
\relative {
  \acciaccatura d''8 c4
  \appoggiatura e8 d4
  \acciaccatura { g16 f } e2
  \slashedGrace a,8 g4
  \slashedGrace b16 a4(
```

```
  \slashedGrace b8 a2)
}
```

The placement of grace notes is synchronized between different staves. In the following example, there are two sixteenth grace notes for every eighth grace note

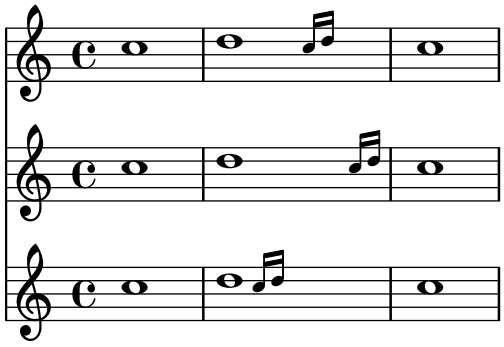
```
<<
  \new Staff \relative { e''2 \grace { c16 d e f } e2 }
  \new Staff \relative { c''2 \grace { g8 b } c2 }
>>
```

If you want to end a note with a grace, use the \afterGrace command. It takes two arguments: the main note, and the grace notes following the main note.

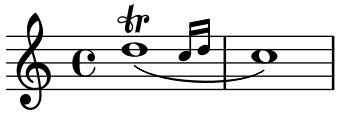
```
\relative { c''1 \afterGrace d1 { c16[ d] } c1 }
```

This will place the grace notes *after* the start of the main note. The point of time where the grace notes are placed is a given fraction of the main note's duration. The default setting of

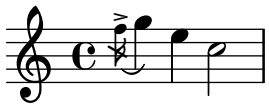
```
afterGraceFraction = 3/4
```

may be redefined at top level. Individual \afterGrace commands may have the fraction specified right after the command itself instead.

The following example shows the results from setting with the default space, setting it at 15/16, and finally at 1/2 of the main note.

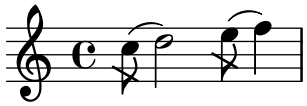
```
<<
  \new Staff \relative {
    c''1 \afterGrace d1 { c16[ d] } c1
  }
  \new Staff \relative {
    c''1 \afterGrace 15/16 d1 { c16[ d] } c1
  }
  \new Staff \relative {
    c''1 \afterGrace 1/2 d1 { c16[ d] } c1
  }
>>
```

The effect of \afterGrace can also be achieved using spacers. The following example places the grace note after a space lasting 7/8 of the main note.

```
\new Voice \relative {
  <<
    { d''1^\trill_( }
    { s2 s4. \grace { c16 d } }
  >>
  c1)
}
```

A \grace music expression will introduce special typesetting settings, for example, to produce smaller type, and set directions. Hence, when introducing layout tweaks to override the special settings, they should be placed inside the grace expression. The overrides should also be reverted inside the grace expression. Here, the grace note's default stem direction is overridden and then reverted.

```
\new Voice \relative {
  \acciaccatura {
    \stemDown
    f''16->
    \stemNeutral
  }
  g4 e c2
}
```

Selected Snippets

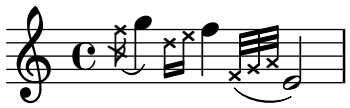
Using grace note slashes with normal heads

The slash through the stem found in acciaccaturas can be applied in other situations.

```
\relative c'' {
  \override Flag.stroke-style = #"grace"
  c8( d2) e8( f4)
}
```

Tweaking grace layout within music

The layout of grace expressions can be changed throughout the music using the functions `add-grace-property` and `remove-grace-property`.

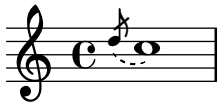
The following example undefines the `Stem` direction for this grace, so that stems do not always point up, and changes the default note heads to crosses.

```
\relative c'' {
  \new Staff {
    $(remove-grace-property 'Voice 'Stem 'direction)
    $(add-grace-property 'Voice 'NoteHead 'style 'cross)
    \new Voice {
       \acciaccatura { f16 } g4
       \grace { d16 e } f4
       \appoggiatura { f,32 g a } e2
    }
  }
}
```

Redefining grace note global defaults

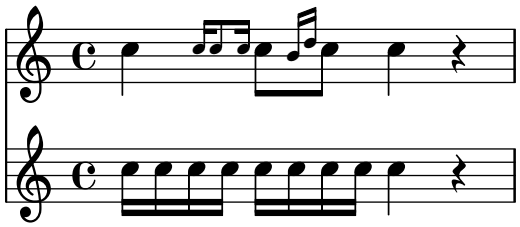
The global defaults for grace notes are stored in the following identifiers.

```
startGraceMusic
stopGraceMusic
startAcciaccaturaMusic
stopAcciaccaturaMusic
startAppoggiaturaMusic
stopAppoggiaturaMusic
```

They are defined in file `ly/grace-init.ly`. By redefining them other effects may be obtained.

```
startAcciaccaturaMusic = {
  <>(
  \override Flag.stroke-style = #"grace"
  \slurDashed
}

stopAcciaccaturaMusic = {
  \revert Flag.stroke-style
  \slurSolid
  <>)
}

\relative c'' {
  \acciaccatura d8 c1
}
```

Positioning grace notes with floating space

Setting the property `'strict-grace-spacing` makes the musical columns for grace notes 'floating', i.e., decoupled from the non-grace notes: first the normal notes are spaced, then the (musical columns of the) graces are put left of the musical columns for the main notes.

```
\relative c'' {
  <<
    \override Score.SpacingSpanner.strict-grace-spacing = ##t
    \new Staff \new Voice {
      \afterGrace c4 { c16[ c8 c16] }
      c8[ \grace { b16 d } c8]
      c4 r
    }
    \new Staff {
      c16 c c c c c c c c4 r
    }
  >>
}
```

See also

Music Glossary: Section "grace notes" in *Music Glossary*, Section "acciaccatura" in *Music Glossary*, Section "appoggiatura" in *Music Glossary*.

Notation Reference: [Scaling durations], page 56, [Manual beams], page 102.

Installed Files: `ly/grace-init.ly`.

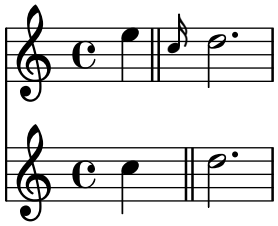
Snippets: Section "Rhythms" in *Snippets*.

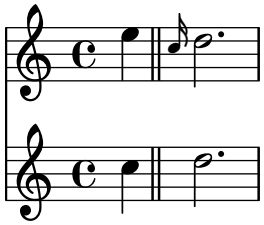
Internals Reference: Section "GraceMusic" in *Internals Reference*, Section "Grace_beam_engraver" in *Internals Reference*, Section "Grace_auto_beam_engraver" in *Internals Reference*, Section "Grace_engraver" in *Internals Reference*, Section "Grace_spacing_engraver" in *Internals Reference*.

Known issues and warnings

A multi-note beamed *acciaccatura* is printed without a slash, and looks exactly the same as a multi-note beamed *appoggiatura*.

Grace note synchronization can also lead to surprises. Staff notation, such as key signatures, bar lines, etc., are also synchronized. Take care when you mix staves with grace notes and staves without, for example,

```
<<
  \new Staff \relative { e''4 \section \grace c16 d2. }
  \new Staff \relative { c''4 \section d2. }
>>
```

This can be remedied by inserting grace skips of the corresponding durations in the other staves. For the above example

```
<<
  \new Staff \relative { e''4 \section \grace c16 d2. }
  \new Staff \relative { c''4 \section \grace s16 d2. }
>>
```

Please make sure that you use the \grace command for the spacer part, even if the visual part uses \acciaccatura or \appoggiatura because otherwise an ugly slur fragment will be printed, connecting the invisible grace note with the following note.

Grace sections should only be used within sequential music expressions. Nesting or juxtaposing grace sections is not supported, and might produce crashes or other errors.

Each grace note in MIDI output has a length of 1/4 of its actual duration. If the combined length of the grace notes is greater than the length of the preceding note a "Going back in MIDI time" error will be generated. Either make the grace notes shorter in duration, for example:

```
c'8 \acciaccatura { c'8[ d' e' f' g'] }
```

becomes:

```
c'8 \acciaccatura { c'16[ d' e' f' g'] }
```

Or explicitly change the musical duration:

```
c'8 \acciaccatura { \scaleDurations 1/2 { c'8[ d' e' f' g'] } }
```

See [Scaling durations], page 56.

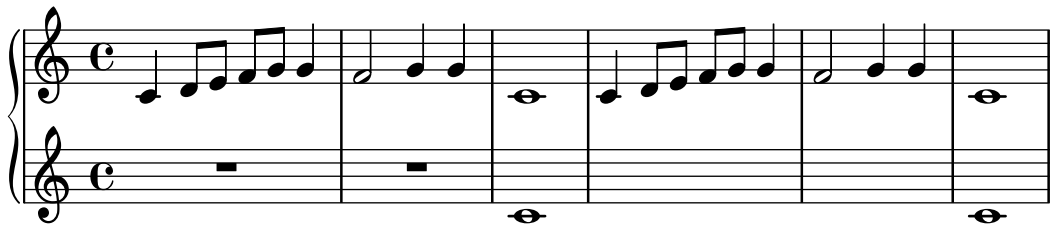
Aligning to cadenzas

In an orchestral context, cadenzas present a special problem: when constructing a score that includes a measured cadenza or other solo passage, all other instruments should skip just as many notes as the length of the cadenza, otherwise they will start too soon or too late.

One solution to this problem is to use the functions mmrest-of-length and skip-of-length. These Scheme functions take a defined piece of music as an argument and generate a multi-measure rest or \skip exactly as long as the piece.

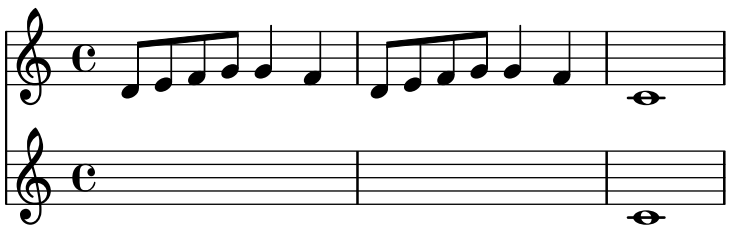
```
MyCadenza = \relative {
  c'4 d8 e f g g4
  f2 g4 g
}

\new GrandStaff <<
```

```
  \new Staff {
    \MyCadenza c'1
    \MyCadenza c'1
  }
  \new Staff {
    #(mmrest-of-length MyCadenza)
    c'1
    #(skip-of-length MyCadenza)
    c'1
  }
>>
```



Another solution is to use the \skip command.

```
MyCadenza = \fixed c' {
  \repeat volta 2 {
    d8 e f g g4 f4
  }
}

music = <<
  \new Staff {
    \MyCadenza
    c'1
  }
  \new Staff {
    \skip \MyCadenza
    c'1
  }
>>

\unfoldRepeats \music
```



See also

Music Glossary: Section “cadenza” in *Music Glossary*.

Snippets: Section “Rhythms” in *Snippets*.

Time administration

Time is administered by the `Timing_translator`, which by default is to be found in the `Score` context. An alias, `Timing`, is added to the context in which the `Timing_translator` is placed. To ensure that the `Timing` alias is available, you may need to explicitly instantiate the containing context (such as `Voice` or `Staff`).

The following properties of `Timing` are used to keep track of timing within the score.

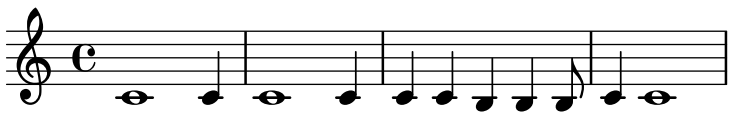
`currentBarNumber`
: The current measure number. For an example showing the use of this property see [Bar numbers], page 117.

`measureLength`
: The length of the measures in the current time signature. For a 4/4 time this is 1, and for 6/8 it is 3/4. Its value determines when bar lines are inserted and how automatic beams should be generated.

`measurePosition`
: The point within the measure where we currently are. This quantity is reset by subtracting `measureLength` whenever `measureLength` is reached or exceeded. When that happens, `currentBarNumber` is incremented.

`timing`
: If set to true, the above variables are updated for every time step. When set to false, the engraver stays in the current measure indefinitely.

Timing can be changed by setting any of these variables explicitly. In the next example, the default 4/4 time signature is printed, but `measureLength` is set to 5/4. At 4/8 through the third measure, the `measurePosition` is advanced by 1/8 to 5/8, shortening that bar by 1/8. The next bar line then falls at 9/8 rather than 5/4.

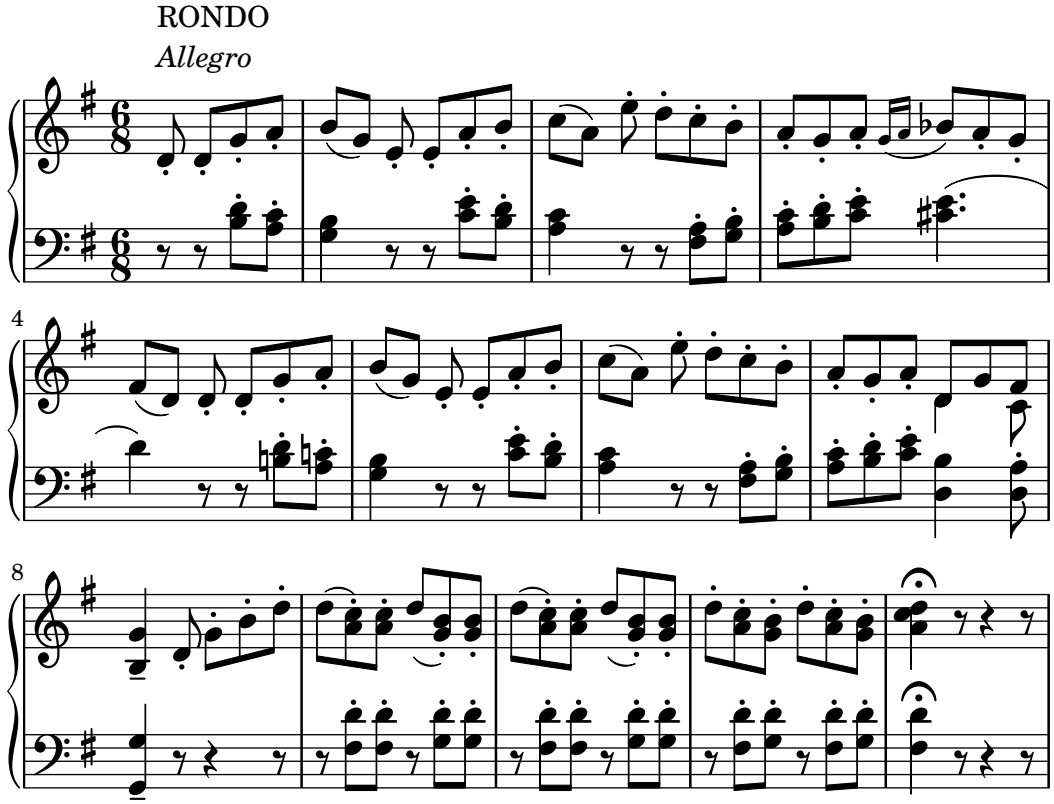
```
\new Voice \relative {
  \set Timing.measureLength = \musicLength 4*5
  c'1 c4 |
  c1 c4 |
  c4 c
  \set Timing.measurePosition = \musicLength 8*5
  b4 b b8 |
  c4 c1 |
}
```

As the example illustrates, `\musicLength` *`music`* computes the musical length of the given music. For example, `\musicLength 8` is the length of an eighth note and `\musicLength {8. 8 8}` is the length of seven sixteenth notes.

See also

Notation Reference: [Bar numbers], page 117, [Unmetered music], page 81.

Snippets: Section “Rhythms” in *Snippets*.

Internals Reference: Section “Timing_translator” in *Internals Reference*, Section “Score” in *Internals Reference*.

1.3 Expressive marks

This section lists various expressive marks that can be created in a score.

1.3.1 Expressive marks attached to notes

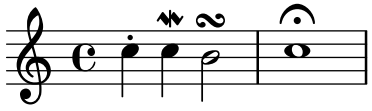
This section explains how to create expressive marks that are attached to notes: articulations, ornamentations, and dynamics. Methods to create new dynamic markings are also discussed.

Articulations and ornamentations

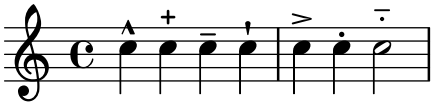
A variety of symbols that denote articulations, ornamentations, and other performance indications can be attached to a note using this syntax:

*note**name*

The possible values for *name* are listed in Section A.15 [List of articulations], page 824. For example:

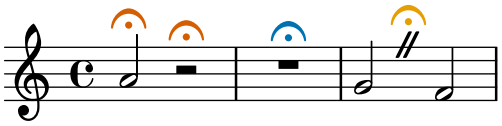
```
\relative {
  c''4\staccato c\mordent b2\turn
  c1\fermata
}
```

Some of these articulations have shorthands for easier entry. Shorthands are appended to the note name, and their syntax consists of a dash - followed by a symbol signifying the articulation. Predefined shorthands exist for *marcato*, *stopped*, *tenuto*, *staccatissimo*, *accent*, *staccato*, and *portato*. Their corresponding output appears as follows:

```
\relative {
```

```
  c''4-^ c-+ c-- c-!
  c4-> c-. c2-_
}
```

The rules for the default placement of articulations are defined in `scm/script.scm`. Articulations and ornamentations may be manually placed above or below the staff; see Section 5.4.1 [Direction and placement], page 694.

The type of grob that an articulation creates depends on what it is attached to.

- On notes or ordinary rests, articulations create `Script` objects.
- On multi-measure rests, articulations create `MultiMeasureRestScript` objects.
- On `\caesura`, articulations create `CaesuraScript` objects.

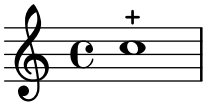
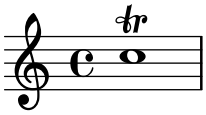
```
\override Score.Script.color = #(universal-color 'vermillion)
\override Score.MultiMeasureRestScript.color = #(universal-color 'blue)
\override Score.CaesuraScript.color = #(universal-color 'orange)
a'2\fermata r\fermata
R1\fermata
g'2 \caesura \fermata f'2
```

In addition to articulations, text and markups can be attached to notes. See [Text scripts], page 279.

For more information about the ordering of `Script` and `TextScript` grobs that are attached to notes, see Section "Placement of objects" in *Learning Manual*.

Selected Snippets

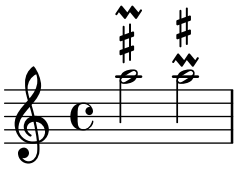
Modifying default values for articulation shorthand notation

The shorthands are defined in 'ly/script-init.ly', where the variables `dashHat`, `dashPlus`, `dashDash`, `dashBang`, `dashLarger`, `dashDot`, and `dashUnderscore` are assigned default values. The default values for the shorthands can be modified. For example, to associate the `-+` (`dashPlus`) shorthand with the *trill* symbol instead of the default `+` symbol, assign the value `\trill` to the variable `dashPlus`:

```
\paper { tagline = ##f }

\relative c'' { c1-+ }

dashPlus = \trill

\relative c'' { c1-+ }
```

Controlling the vertical ordering of scripts

The vertical ordering of scripts is controlled with the `'script-priority` property. The lower this number, the closer it will be put to the note. In this example, the `TextScript` (the *sharp* symbol) first has the lowest priority, so it is put lowest in the first example. In the second, the *prall trill* (the `Script`) has the lowest, so it is on the inside. When two objects have the same priority, the order in which they are entered determines which one comes first.

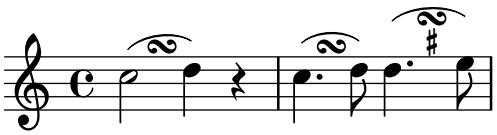
```
\relative c''' {
  \once \override TextScript.script-priority = #-100
  a2^\prall^\markup { \sharp }

  \once \override Script.script-priority = #-100
  a2^\prall^\markup { \sharp }
}
```



Creating a delayed turn

Creating a delayed turn, where the lower note of the turn uses the accidental, requires several overrides. The `outside-staff-priority` property must be set to `#f`, as otherwise this would take precedence over the `avoid-slur` property. Changing the fractions `2/3` and `1/3` adjusts the horizontal position.

```
\relative c'' {
  \after 2*2/3 \turn c2( d4) r |
  \after 4 \turn c4.( d8)
  \after 4
  {
    \once \set suggestAccidentals = ##t
    \once \override AccidentalSuggestion.outside-staff-priority = ##f
    \once \override AccidentalSuggestion.avoid-slur = #'inside
    \once \override AccidentalSuggestion.font-size = -3
    \once \override AccidentalSuggestion.script-priority = -1
    \once \hideNotes
    cis8\turn \noBeam
  }
  d4.( e8)
}
```



See also

Music Glossary: Section “tenuto” in *Music Glossary*, Section “accent” in *Music Glossary*, Section “staccato” in *Music Glossary*, Section “portato” in *Music Glossary*.

Learning Manual: Section “Placement of objects” in *Learning Manual*.

Notation Reference: [Text scripts], page 279, Section 5.4.1 [Direction and placement], page 694, Section A.15 [List of articulations], page 824, [Trills], page 166.

Installed Files: `scm/script.scm`.

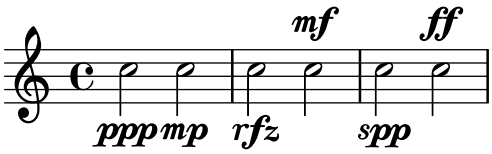
Snippets: Section “Expressive marks” in *Snippets*.

Internals Reference: Section “CaesuraScript” in *Internals Reference*, Section “MultiMeasureRestScript” in *Internals Reference*, Section “Script” in *Internals Reference*, Section “TextScript” in *Internals Reference*.

Dynamics

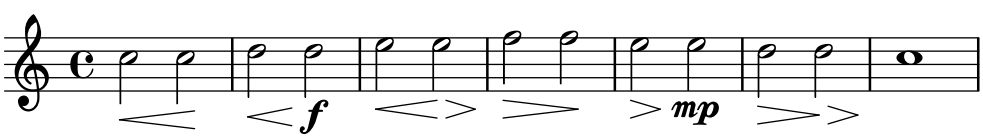
Absolute dynamic marks are specified using a command after a note, such as `c4\ff`. The available dynamic marks are `\ppppp`, `\pppp`, `\ppp`, `\pp`, `\p`, `\mp`, `\mf`, `\f`, `\ff`, `\fff`, `\ffff`, `\fffff`, `\fp`, `\sf`, `\sff`, `\sp`, `\spp`, `\sfz`, `\rfz`, and `\n`. Dynamic marks may be manually placed above or below the staff; see Section 5.4.1 [Direction and placement], page 694.

```
\relative c'' {
  c2\ppp c\mp
  c2\rfz c^\mf
  c2_\spp c^\ff
}
```



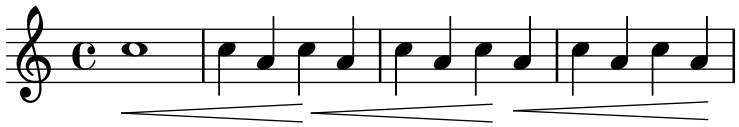
A *crescendo* mark is started with `\<` and terminated with `\!`, an absolute dynamic, or an additional crescendo or decrescendo mark. A *decrescendo* mark is started with `\>` and is also terminated with `\!`, an absolute dynamic, or another crescendo or decrescendo mark. `\cr` and `\decr` may be used instead of `\<` and `\>`; `\endcr` and `\enddecr` maybe used instead of `\!` to end a crescendo or decrescendo mark, respectively. *Hairpins* are engraved by default using this notation.

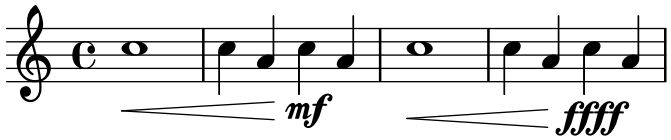
```
\relative c'' {
  c2\< c\!
  d2\< d\f
  e2\< e\>
  f2\> f\!
  e2\> e\mp
  d2\> d\>
  c1\!
}
```



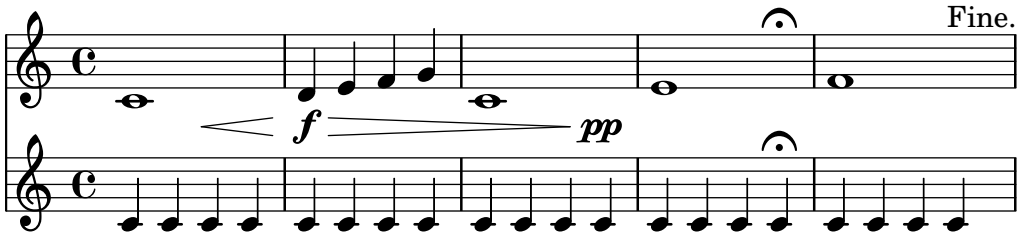
A hairpin that is terminated with `\!` will end at the right edge of the note that has the `\!` assigned to it. In the case where it is terminated with the start of another *crescendo* or *decrescendo* mark, it will end at the center of the note that has the next `\<` or `\>` assigned to it. The next hairpin will then start at the right edge of the same note instead of the usual left

edge had it been terminated with \! before. A hairpin ending on a downbeat will stop at the preceding bar line.

```
\relative {
  c''1\< | c4 a c\< a | c4 a c\! a\< | c4 a c a\!
}
```

Hairpins that are terminated with absolute dynamic marks instead of \! will also be engraved in a similar way. However, the length of the absolute dynamic itself can alter where the preceding hairpin ends.

```
\relative {
  c''1\< | c4 a c\mf a | c1\< | c4 a c\ffff a
}
```

Often, marks like *crescendo* or *decrescendo* should begin or end at some point of time during a sustained note. This can be achieved with \after, which can also be used to create delayed articulations or text scripts:

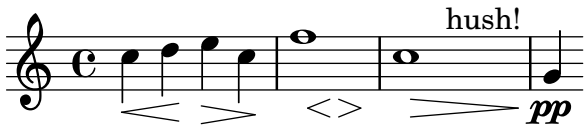
```
<<
  \relative {
    \after 2 \< c'1
    d4\f\> e f g
    \after 2. \pp c,1
    \after 2. \fermata e
    \after 2. ^"Fine." f
  }
  \relative {
    \repeat unfold 12 c'4
    c c c c\fermata
    c c c c
  }
>>
```



Multiple instances of \after can be used to engrave multiple marks on one note. This is particularly useful when adding a crescendo and decrescendo to the same note:

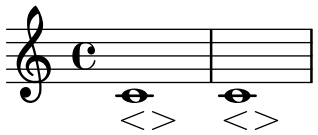
```
\relative {
  c''4\< d\! e\> c\!
  \after 4 \< \after 2\> \after 2. \! f1
```

```
  \textLengthOn
  \after 4 \> \after 2. ^"hush!" c1
  g4\pp
}
```

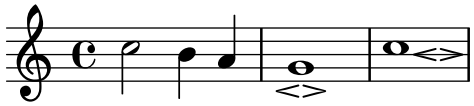


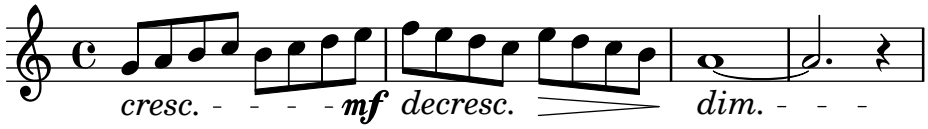
If the first in such a sequence of marks on a single note is supposed to coincide with the onset of the note, it is convenient to attach it to an empty chord <>. This way, all marks can be entered in their natural visual order:

```
{
  <>\< \after 4 \> \after 2 \! c'1
  % easier to write and read than:
  \after 4 \> \after 2 \! c'1\<
}
```

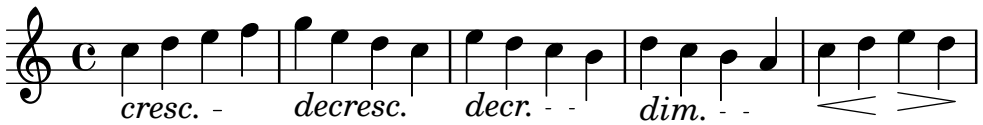


The \espressivo command can also be used to indicate a crescendo and decrescendo on the same note. However, be warned that this is implemented as an articulation, not a dynamic.

```
\relative {
  c''2 b4 a
  g1\espressivo
  \after 2. \espressivo c
}
```

Textual crescendo marks begin with \cresc. Textual decrescendos begin with \decresc or \dim. Extender lines are engraved as required.

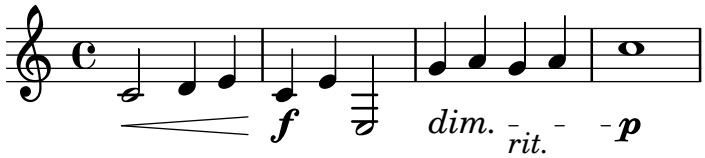
```
\relative {
  g'8\cresc a b c b c d e\mf |
  f8\decresc e d c e\> d c b |
  a1\dim ~ |
  a2. r4\! |
}
```

Textual marks for dynamic changes can also replace hairpins:

```
\relative c'' {
  \crescTextCresc
  c4\< d e f\! |
  \dimTextDecresc
```

```
  g4\> e d c\! |
  \dimTextDecr
  e4\> d c b\! |
  \dimTextDim
  d4\> c b a\! |
  \crescHairpin
  \dimHairpin
  c4\< d\! e\> d\! |
}
```

To create new absolute dynamic marks or text that should be aligned with dynamics, see [New dynamic marks], page 149.

Vertical positioning of dynamics is handled by Section "DynamicLineSpanner" in *Internals Reference*.

A `Dynamics` context is available to engrave dynamics on their own horizontal line. Use spacer rests to indicate timing. (Notes in a `Dynamics` context will also take up musical time, but will not be engraved.) The `Dynamics` context can usefully contain some other items such as text scripts, text spanners, and piano pedal marks.

```
<<
  \new Staff \relative {
    c'2 d4 e |
    c4 e e,2 |
    g'4 a g a |
    c1 |
  }
  \new Dynamics {
    s1\< |
    s1\f |
    s2\dim s2-"rit." |
    s1\p |
  }
>>
```

Predefined commands

`\dynamicUp`, `\dynamicDown`, `\dynamicNeutral`, `\crescTextCresc`, `\dimTextDim`, `\dimTextDecr`, `\dimTextDecresc`, `\crescHairpin`, `\dimHairpin`.

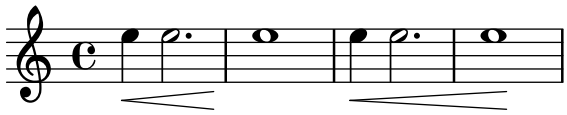
Selected Snippets

Setting hairpin behavior at bar lines

If the note which ends a hairpin falls on a downbeat, the hairpin stops at the bar line immediately preceding. This behavior can be controlled by overriding the `'to-barline` property.

```
\relative c'' {
```

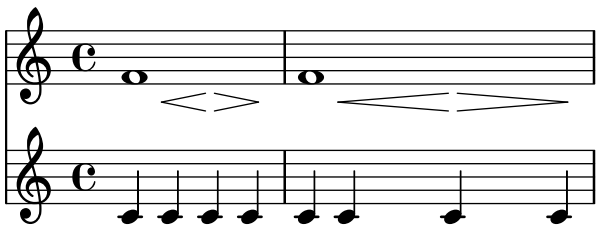
```
  e4\< e2.
  e1\!
  \override Hairpin.to-barline = ##f
  e4\< e2.
  e1\!
}
```



Setting the minimum length of hairpins

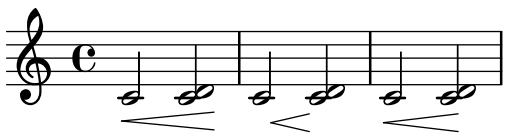
If hairpins are too short, they can be lengthened by modifying the `minimum-length` property of the `Hairpin` object.

```
<<
  {
    \after 4 \< \after 2 \> \after 2. \! f'1
    \override Hairpin.minimum-length = #8
    \after 4 \< \after 2 \> \after 2. \! f'1
  }
  {
    \repeat unfold 8 c'4
  }
>>
```



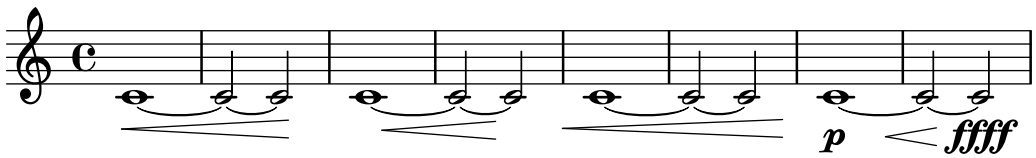
Aligning the ends of hairpins to NoteColumn directions

The ends of hairpins may be aligned to the `LEFT`, `CENTER` or `RIGHT` of `NoteColumn` grobs by overriding the property `endpoint-alignments`, which is a pair of numbers representing the left and right ends of the hairpin. `endpoint-alignments` are expected to be directions (either -1, 0 or 1). Other values will be transformed with a warning. The right end of a hairpin terminating at a rest is not affected, always ending at the left edge of the rest.

```
{
  c'2\< <c' d'>\! |
  \override Hairpin.endpoint-alignments = #'(1 . -1)
  c'2\< <c' d'>\! |
  \override Hairpin.endpoint-alignments = #`(,LEFT . ,CENTER)
  c'2\< <c' d'>\! |
}
```

Moving the ends of hairpins

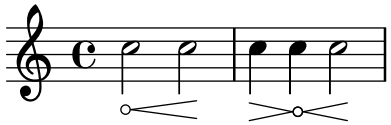
The ends of hairpins may be offset by setting the `shorten-pair` property of the `Hairpin` object. Positive values move endpoints to the right, negative to the left. Unlike the `minimum-length` property, this property only affects the appearance of the hairpin; it does not adjust horizontal spacing (including the position of bounding dynamics). This method is thus suitable for fine-tuning a hairpin within its allotted space.

```
{
  c'1~\<
  c'2~ c'\!
  \once \override Hairpin.shorten-pair = #'(2 . 2)
  c'1~\<
  c'2~ c'\!
  \once \override Hairpin.shorten-pair = #'(-2 . -2)
  c'1~\<
  c'2~ c'\!
  c'1~\p-\tweak shorten-pair #'(2 . 0)\<
  c'2~ c'\ffff
}
```



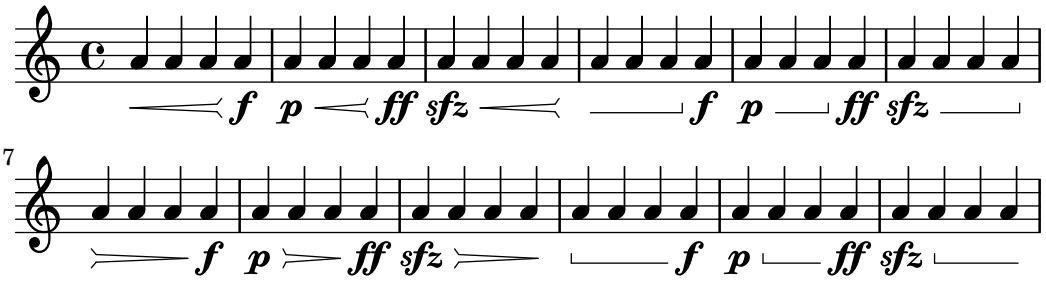
Printing hairpins using al niente notation

Hairpin dynamics may be printed with a circled tip ("al niente" notation) by setting the `circled-tip` property of the `Hairpin` object to `#t`.

```
\relative c'' {
  \override Hairpin.circled-tip = ##t
  c2\< c\!
  c4\> c\< c2\!
}
```

Printing hairpins in various styles

Hairpin dynamics may be created in a variety of styles.

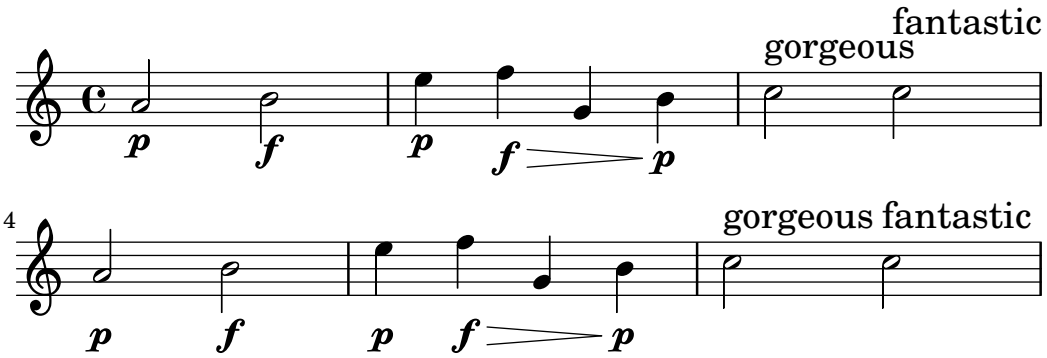
```
\relative c'' {
  \override Hairpin.stencil = #flared-hairpin
  a4\< a a a\f
  a4\p\< a a a\ff
  a4\sfz\< a a a\!
  \override Hairpin.stencil = #constante-hairpin
  a4\< a a a\f
  a4\p\< a a a\ff
  a4\sfz\< a a a\!
  \override Hairpin.stencil = #flared-hairpin
  a4\> a a a\f
```

```
  a4\p\> a a a\ff
  a4\sfz\> a a a\!
  \override Hairpin.stencil = #constante-hairpin
  a4\> a a a\f
  a4\p\> a a a\ff
  a4\sfz\> a a a\!
}
```

Vertically aligned dynamics and textscripts

All `DynamicLineSpanner` objects (hairpins and dynamic texts) are placed with their reference line at least `'staff-padding` from the staff, unless other notation forces them to be farther. Setting `'staff-padding` to a sufficiently large value aligns the dynamics.

The same idea, together with `\textLengthOn`, is used to align the text scripts along their baseline.

```
music = \relative c' {
  a'2\p b\f
  e4\p f\f\> g, b\p
  c2^\markup { \huge gorgeous } c^\markup { \huge fantastic }
}

{
  \music
  \break
  \override DynamicLineSpanner.staff-padding = #3
  \textLengthOn
  \override TextScript.staff-padding = #1
  \music
}
```

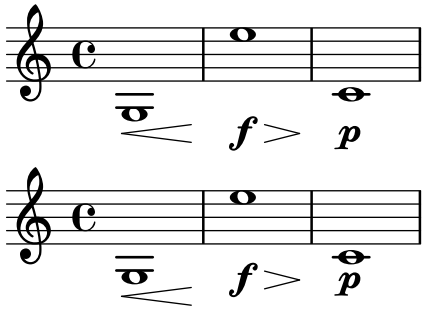


Breaking vertical alignment of dynamics and textscripts

By default, LilyPond uses `DynamicLineSpanner` grobs to vertically align successive dynamic objects like hairpins and dynamic text. However, this is not always wanted. By inserting

\breakDynamicSpan, which ends the alignment spanner prematurely, this vertical alignment can be avoided.

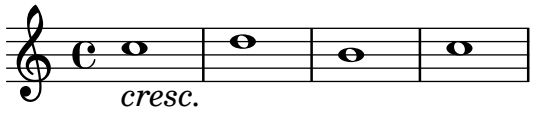
```
{ g1\< |
  e''\f\> |
  c'\p }

{ g1\< |
  e''\breakDynamicSpan\f\> |
  c'\p }
```



Hiding the extender line for text dynamics

Text style dynamic changes (such as *cresc.* and *dim.*) are printed with a dashed line showing their extent. This line can be suppressed in the following way:

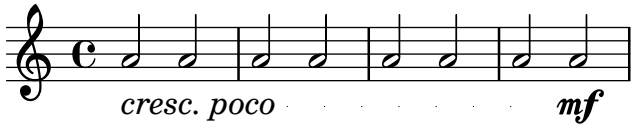
```
\relative c'' {
  \override DynamicTextSpanner.style = #'none
  \crescTextCresc
  c1\< | d | b | c\!
}
```



Changing text and spanner styles for text dynamics

The text used for *crescendos* and *decrescendos* can be changed by modifying the context properties `crescendoText` and `decrescendoText`.

The style of the spanner line can be changed by modifying the `'style` property of `DynamicTextSpanner`. The default value is `'dashed-line`, and other possible values include `'line`, `'dotted-line` and `'none`.

```
\relative c'' {
  \set crescendoText = \markup { \italic { cresc. poco } }
  \set crescendoSpanner = #'text
  \override DynamicTextSpanner.style = #'dotted-line
  a2\< a
  a2 a
  a2 a
  a2 a\mf
}
```

See also

Music Glossary: Section “al niente” in *Music Glossary*, Section “crescendo” in *Music Glossary*, Section “decrescendo” in *Music Glossary*, Section “hairpin” in *Music Glossary*.

Learning Manual: Section “Articulations and dynamics” in *Learning Manual*.

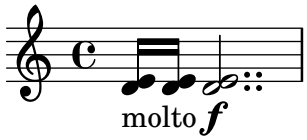
Notation Reference: Section 5.4.1 [Direction and placement], page 694, [New dynamic marks], page 149, Section 3.6.9 [Enhancing MIDI output], page 597, Section 3.6.4 [Controlling MIDI dynamics], page 589.

Snippets: Section “Expressive marks” in *Snippets*.

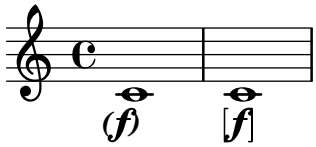
Internals Reference: Section “DynamicText” in *Internals Reference*, Section “Hairpin” in *Internals Reference*, Section “DynamicLineSpanner” in *Internals Reference*, Section “Dynamics” in *Internals Reference*.

New dynamic marks

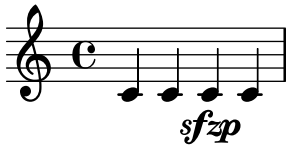
The easiest way to create dynamic indications is to use `\markup` objects.

```
moltoF = \markup { molto \dynamic f }

\relative {
  <d' e>16_\moltoF <d e>
  <d e>2..
}
```

In markup mode, editorial dynamics (within parentheses or square brackets) can be created. The syntax for markup mode is described in Section 1.8.2 [Formatting text], page 289.

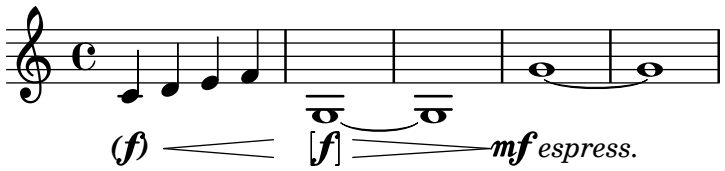
```
roundF = \markup {
    \center-align \concat { \bold { \italic ( }
          \dynamic f \bold { \italic ) } } }
boxF = \markup { \bracket { \dynamic f } }
\relative {
  c'1_\roundF
  c1_\boxF
}
```



Simple, centered dynamic marks are easily created with the `make-dynamic-script` function.

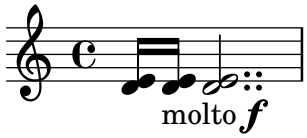
```
sfzp = #(make-dynamic-script "sfzp")
\relative {
  c'4 c c\sfzp c
}
```

In general, make-dynamic-script takes any markup object as its argument. The dynamic font only contains the characters f,m,p,r,s and z, so if a dynamic mark that includes plain text or punctuation symbols is desired, markup commands that reverts font family and font encoding to normal text should be used, for example \normal-text. The interest of using make-dynamic-script instead of an ordinary markup is ensuring the vertical alignment of markup objects and hairpins that are attached to the same note head.

```
roundF = \markup { \center-align \concat {
           \normal-text { \bold { \italic ( } }
           \dynamic f
           \normal-text { \bold { \italic ) } } } }
boxF = \markup { \bracket { \dynamic f } }
mfEspress = \markup { \center-align \line {
              \hspace #3.7 mf \normal-text \italic espress. } }
roundFdynamic = #(make-dynamic-script roundF)
boxFdynamic = #(make-dynamic-script boxF)
mfEspressDynamic = #(make-dynamic-script mfEspress)
\relative {
  c'4_\roundFdynamic\< d e f
  g,1~_\boxFdynamic\>
  g1
  g'1~\mfEspressDynamic
  g1
}
```

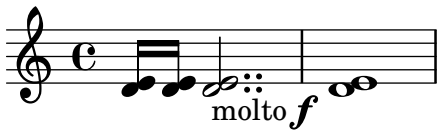


The Scheme form of markup mode may be used instead. Its syntax is explained in Section "Markup construction in Scheme" in *Extending*.

```
moltoF = #(make-dynamic-script
            (markup #:normal-text "molto"
                    #:dynamic "f"))
\relative {
  <d' e>16 <d e>
  <d e>2..\moltoF
}
```



To left-align the dynamic text rather than centering it on a note use a \tweak:

```
moltoF = \tweak DynamicText.self-alignment-X #LEFT
         #(make-dynamic-script
            (markup #:normal-text "molto"
                    #:dynamic "f"))
\relative {
  <d' e>16 <d e>
  <d e>2..\moltoF <d e>1
```

```
}
```

Font settings in markup mode are described in [Selecting font and font size], page 293.

See also

Notation Reference: Section 1.8.2 [Formatting text], page 289, [Selecting font and font size], page 293, Section 3.6.9 [Enhancing MIDI output], page 597, Section 3.6.4 [Controlling MIDI dynamics], page 589.

Extending LilyPond: Section “Markup construction in Scheme” in *Extending*.

Snippets: Section “Expressive marks” in *Snippets*.

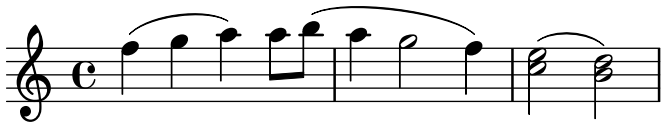
1.3.2 Expressive marks as curves

This section explains how to create various expressive marks that are curved: normal slurs, phrasing slurs, breath marks, falls, and doits.

Slurs

Slurs are entered using parentheses:

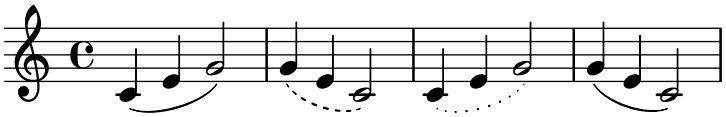
> **Note:** In polyphonic music, a slur must be terminated in the same voice it began.

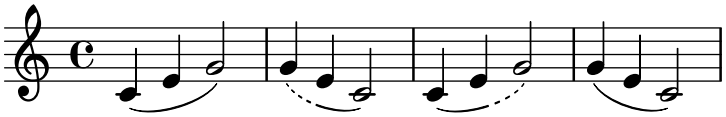
```
\relative {
  f''4( g a) a8 b(
  a4 g2 f4)
  <c e>2( <b d>2)
}
```

Slurs may be manually placed above or below the staff; see Section 5.4.1 [Direction and placement], page 694.

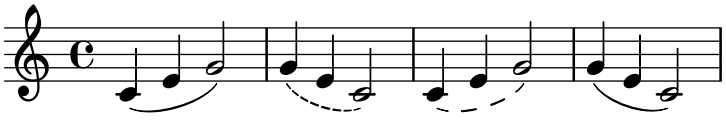
Simultaneous or overlapping slurs require special attention. Most occurrences of outer slurs actually indicate phrasing, and phrasing slurs may overlap a regular slur, see [Phrasing slurs], page 155. When multiple regular slurs are needed in a single `Voice`, matching slur starts and ends need to be labeled by preceding them with `\=` followed by an identifying key (a symbol or non-negative integer).

```
\fixed c' {
  <c~ f\=1( g\=2( >2 <c e\=1) a\=2) >
}
```

Slurs can be solid, dotted, or dashed. Solid is the default slur style:

```
\relative {
  c'4( e g2)
  \slurDashed
  g4( e c2)
  \slurDotted
  c4( e g2)
  \slurSolid
  g4( e c2)
}
```

Slurs can also be made half-dashed (the first half dashed, the second half solid) or half-solid (the first half solid, the second half dashed):

```
\relative {
  c'4( e g2)
  \slurHalfDashed
  g4( e c2)
  \slurHalfSolid
  c4( e g2)
  \slurSolid
  g4( e c2)
}
```

Custom dash patterns for slurs can be defined:

```
\relative {
  c'4( e g2)
  \slurDashPattern #0.7 #0.75
  g4( e c2)
  \slurDashPattern #0.5 #2.0
  c4( e g2)
  \slurSolid
  g4( e c2)
}
```

Predefined commands

`\slurUp`, `\slurDown`, `\slurNeutral`, `\slurDashed`, `\slurDotted`, `\slurHalfDashed`, `\slurHalfSolid`, `\slurDashPattern`, `\slurSolid`.

Selected Snippets

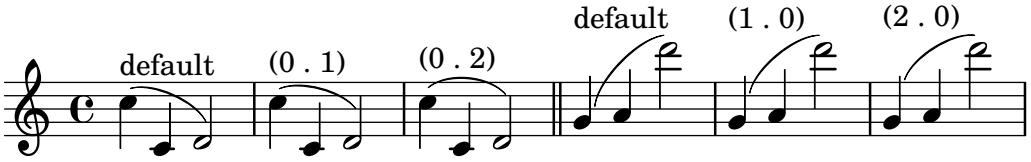
Adjusting slur positions vertically

Using `\override Slur.positions` it is possible to set the vertical position of the start and end points of a slur to absolute values (or rather, forcing LilyPond's slur algorithm to consider these values as desired). In many cases, this means a lot of trial and error until good values are found. You probably have tried the `\offset` command next just to find out that it doesn't work for slurs, emitting a warning instead.

The code in this snippet allows you to tweak the vertical start and end positions by specifying *relative* changes, similar to `\offset`.

Syntax: `\offsetPositions #'(`*dy1 . dy2*`)`

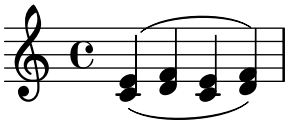
```
offsetPositions =
#(define-music-function (offsets) (number-pair?)
  #{
     \once \override Slur.control-points =
       #(lambda (grob)
          (match-let ((((_ . y1) _ _ (_ . y2))
                       (ly:slur::calc-control-points grob))
                      ((off1 . off2) offsets))
            (set! (ly:grob-property grob 'positions)
                  (cons (+ y1 off1) (+ y2 off2)))
            (ly:slur::calc-control-points grob)))
  #})

\relative c'' {
  c4(^"default" c, d2)
  \offsetPositions #'(0 . 1)
  c'4(^"(0 . 1)" c, d2)
  \offsetPositions #'(0 . 2)
  c'4(^"(0 . 2)" c, d2)
  \bar "||"
  g4(^"default" a d'2)
  \offsetPositions #'(1 . 0)
  g,,4(^"(1 . 0)" a d'2)
  \offsetPositions #'(2 . 0)
  g,,4(^"(2 . 0)" a d'2)
}
```



Using double slurs for legato chords

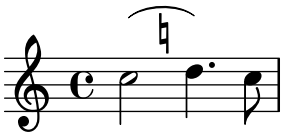
Some composers write two *slurs* when they want legato chords. This can be achieved by setting `doubleSlurs`.

```
\relative c' {
  \set doubleSlurs = ##t
  <c e>4( <d f> <c e> <d f>)
}
```



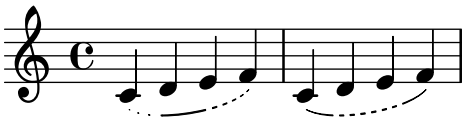
Positioning text markups inside slurs

Text markups need to have the `outside-staff-priority` property set to false in order to be printed inside slurs.

```
\relative c'' {
  \override TextScript.avoid-slur = #'inside
  \override TextScript.outside-staff-priority = ##f
  c2(^\markup { \halign #-10 \natural } d4.) c8
}
```

Making slurs with complex dash structure

Slurs can be made with complex dash patterns by defining the `dash-definition` property. `dash-definition` is a list of `dash-elements`. A `dash-element` is a list of parameters defining the dash behavior for a segment of the slur.

The slur is defined in terms of the bezier parameter t which ranges from 0 at the left end of the slur to 1 at the right end of the slur. `dash-element` is a list `(start-t stop-t dash-fraction dash-period)`. The region of the slur from `start-t` to `stop-t` will have a fraction `dash-fraction` of each `dash-period` black. `dash-period` is defined in terms of staff spaces. `dash-fraction` is set to 1 for a solid slur.

```
\relative c' {
  \once \override
    Slur.dash-definition = #'((0 0.3 0.1 0.75)
                              (0.3 0.6 1 1)
                              (0.65 1.0 0.4 0.75))
  c4( d e f)
  \once \override
    Slur.dash-definition = #'((0 0.25 1 1)
                              (0.3 0.7 0.4 0.75)
                              (0.75 1.0 1 1))
  c4( d e f)
}
```

See also

Music Glossary: Section “slur” in *Music Glossary*.

Learning Manual: Section “On the un-nestedness of brackets and ties” in *Learning Manual*.

Notation Reference: Section 5.4.1 [Direction and placement], page 694, [Phrasing slurs], page 155.

Snippets: Section “Expressive marks” in *Snippets*.

Internals Reference: Section “Slur” in *Internals Reference*.

Phrasing slurs

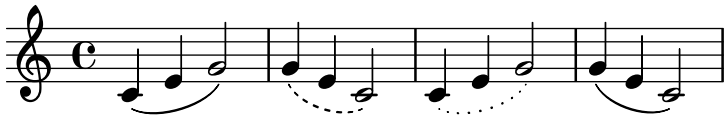
Phrasing slurs (or phrasing marks) that indicate a musical sentence are written using the commands `\(` and `\)` respectively:

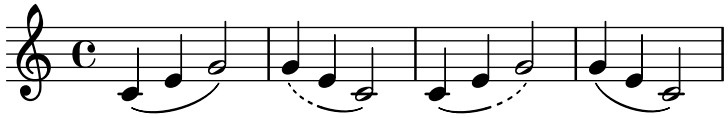
```
\relative {
  c''4\( d( e) f(
  e2) d\)
}
```

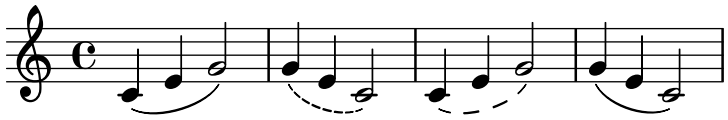
Typographically, a phrasing slur behaves almost exactly like a normal slur. However, they are treated as different objects; a `\slurUp` will have no effect on a phrasing slur. Phrasing may be manually placed above or below the staff; see Section 5.4.1 [Direction and placement], page 694.

Simultaneous or overlapping phrasing slurs are entered using `\=` as with regular slurs, see [Slurs], page 151.

Phrasing slurs can be solid, dotted, or dashed. Solid is the default style for phrasing slurs:

```
\relative {
  c'4\( e g2\)
  \phrasingSlurDashed
  g4\( e c2\)
  \phrasingSlurDotted
  c4\( e g2\)
  \phrasingSlurSolid
  g4\( e c2\)
}
```

Phrasing slurs can also be made half-dashed (the first half dashed, the second half solid) or half-solid (the first half solid, the second half dashed):

```
\relative {
  c'4\( e g2\)
  \phrasingSlurHalfDashed
  g4\( e c2\)
  \phrasingSlurHalfSolid
  c4\( e g2\)
  \phrasingSlurSolid
  g4\( e c2\)
}
```

Custom dash patterns for phrasing slurs can be defined:

```
\relative {
  c'4\( e g2\)
  \phrasingSlurDashPattern #0.7 #0.75
  g4\( e c2\)
  \phrasingSlurDashPattern #0.5 #2.0
  c4\( e g2\)
  \phrasingSlurSolid
  g4\( e c2\)
}
```

Dash pattern definitions for phrasing slurs have the same structure as dash pattern definitions for slurs. For more information about complex dash patterns, see the snippets under [Slurs], page 151.

Predefined commands

`\phrasingSlurUp`, `\phrasingSlurDown`, `\phrasingSlurNeutral`, `\phrasingSlurDashed`, `\phrasingSlurDotted`, `\phrasingSlurHalfDashed`, `\phrasingSlurHalfSolid`, `\phrasingSlurDashPattern`, `\phrasingSlurSolid`.

See also

Learning Manual: Section "On the un-nestedness of brackets and ties" in *Learning Manual*.

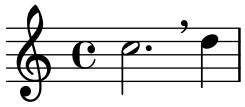
Notation Reference: Section 5.4.1 [Direction and placement], page 694, [Slurs], page 151.

Snippets: Section "Expressive marks" in *Snippets*.

Internals Reference: Section "PhrasingSlur" in *Internals Reference*.

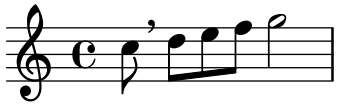
Breath marks

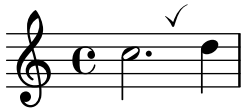
The `\breathe` command calls for the performer to shorten the previous note to take a breath.

```
\fixed c'' { c2. \breathe d4 }
```

For a short break in sound that is not taken away from the previous note, see [Caesuras], page 70.

Unlike other expressive marks, a breath mark is treated as a separate music event; therefore, any expressive marks pertaining to the preceding note, and any brackets indicating manual beams, slurs, or phrasing slurs, must be placed before `\breathe`. `\breathe` does not accept articulations itself, but see [Caesuras], page 70.

A breath mark ends an automatic beam; to override this, see [Manual beams], page 102.

```
\fixed c'' { c8 \breathe d e f g2 }
```

The breathMarkType context property controls which of several predefined breath marks the \breathe command creates. See Section A.16 [List of breath marks], page 826.

```
\fixed c'' {
  \set breathMarkType = #'tickmark
  c2. \breathe d4
}
```

See also

Music Glossary: Section “breath mark” in *Music Glossary*.

Notation Reference: [Caesuras], page 70, [Divisiones], page 505.

Snippets: Section “Expressive marks” in *Snippets*.

Internals Reference: Section “BreathingEvent” in *Internals Reference*, Section “BreathingSign” in *Internals Reference*, Section “Breathing_sign_engraver” in *Internals Reference*.

Falls and doits

Falls and *doits* can be added to notes using the \bendAfter command. The direction of the fall or doit is indicated with a plus or minus (up or down). The number indicates the pitch interval that the fall or doit will extend *beyond* the main note.

```
\relative c'' {
  c2\bendAfter #+4
  c2\bendAfter #-4
  c2\bendAfter #+6.5
  c2\bendAfter #-6.5
  c2\bendAfter #+8
  c2\bendAfter #-8
}
```

Selected Snippets

Adjusting the shape of falls and doits

The shortest-duration-space property may be tweaked to adjust the shape of *falls* and *doits*.

```
\relative c'' {
  \override Score.SpacingSpanner.shortest-duration-space = #4.0
  c2-\bendAfter #5
  c2-\bendAfter #-4.75
  c2-\bendAfter #8.5
  c2-\bendAfter #-6
}
```

See also

Music Glossary: Section “fall” in *Music Glossary*, Section “doit” in *Music Glossary*.

Snippets: Section “Expressive marks” in *Snippets*.

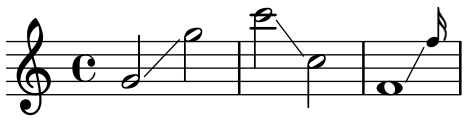
1.3.3 Expressive marks as lines

This section explains how to create various expressive marks that follow a linear path: glissandi, arpeggios, and trills.

Glissando

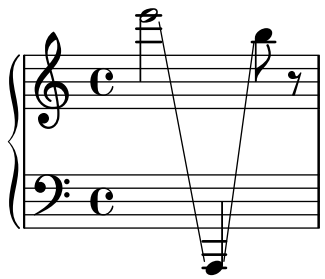
A *glissando* is created by appending `\glissando` to a note:

```
\relative {
  g'2\glissando g'
  c2\glissando c,
  \afterGrace f,1\glissando f'16
}
```



A glissando can connect notes across staves:

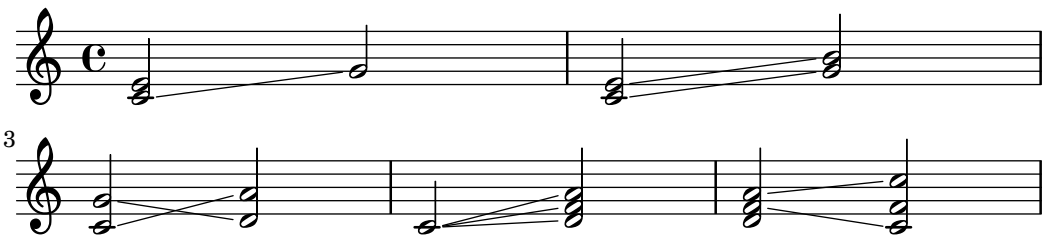
```
\new PianoStaff <<
  \new Staff = "right" {
    e'''2\glissando
    \change Staff = "left"
    a,,4\glissando
    \change Staff = "right"
    b''8 r |
  }
  \new Staff = "left" {
    \clef bass
    s1
  }
>>
```



A glissando can connect notes in chords. If anything other than a direct one-to-one pairing of the notes in the two chords is required, the connections between the notes are defined by setting `\glissandoMap` to a Scheme list. The elements are pairs of integers; each pair *(x . y)* creates a glissando line from the *x*-th note of the first chord to the *y*-th note of the second chord. Notes are numbered from zero in the order in which they appear in the input `.ly` file. Not all notes need be part in a glissando.

```
\relative {
```

```
  <c' e>2\glissando g'
  <c, e>\glissando <g' b>
  \break
  \set glissandoMap = #'((0 . 1) (1 . 0))
  <c, g'>\glissando <d a'>
  \set glissandoMap = #'((0 . 0) (0 . 1) (0 . 2))
  c\glissando <d f a>
  \set glissandoMap = #'((2 . 2) (0 . 0))
  <f d a'>\glissando <c f c'>
}
```

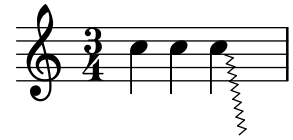


Different styles of glissandi can be created. For details, see Section 5.4.5 [Line styles], page 702.

Selected Snippets

Contemporary glissando

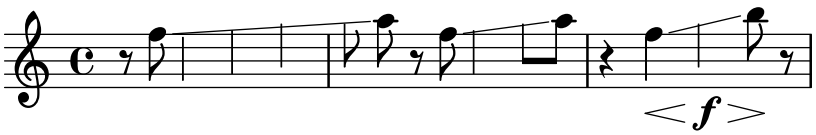
A contemporary glissando without a final note can be typeset using a hidden note and cadenza timing.

```
\relative c'' {
  \time 3/4
  \override Glissando.style = #'zigzag
  c4 c
  \cadenzaOn
  c4\glissando
  \hideNotes
  c,,4
  \unHideNotes
  \cadenzaOff
  \bar "|"
}
```

Adding timing marks to long glissandi

Skipped beats in very long glissandi are sometimes indicated by timing marks, often consisting of stems without noteheads. Such stems can also be used to carry intermediate expression markings.

If the stems do not align well with the glissando, they may need to be repositioned slightly.

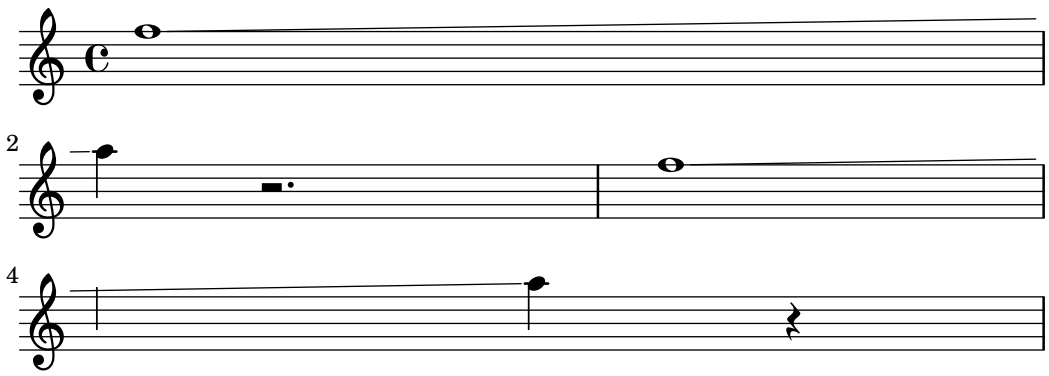
```
glissandoSkipOn = {
  \override NoteColumn.glissando-skip = ##t
```

```
  \hide NoteHead
  \override NoteHead.no-ledgers = ##t
}

glissandoSkipOff = {
  \revert NoteColumn.glissando-skip
  \undo \hide NoteHead
  \revert NoteHead.no-ledgers
}

\relative c'' {
  r8 f8\glissando
  \glissandoSkipOn
  f4 g a a8\noBeam
  \glissandoSkipOff
  a8

  r8 f8\glissando
  \glissandoSkipOn
  g4 a8
  \glissandoSkipOff
  a8 |

  r4 f\glissando \<
  \glissandoSkipOn
  a4\f \>
  \glissandoSkipOff
  b8\! r |
}
```

Making glissandi breakable

Setting the `breakable` property to `#t` in combination with `after-line-breaking` allows a glissando to break if it occurs at a line break:

```
glissandoSkipOn = {
  \override NoteColumn.glissando-skip = ##t
  \hide NoteHead
  \override NoteHead.no-ledgers = ##t
}

\relative c'' {
  \override Glissando.breakable = ##t
  \override Glissando.after-line-breaking = ##t
  f1\glissando |
  \break
  a4 r2. |
  f1\glissando
  \once \glissandoSkipOn
```

```
  \break
  a2 a4 r4 |
}
```



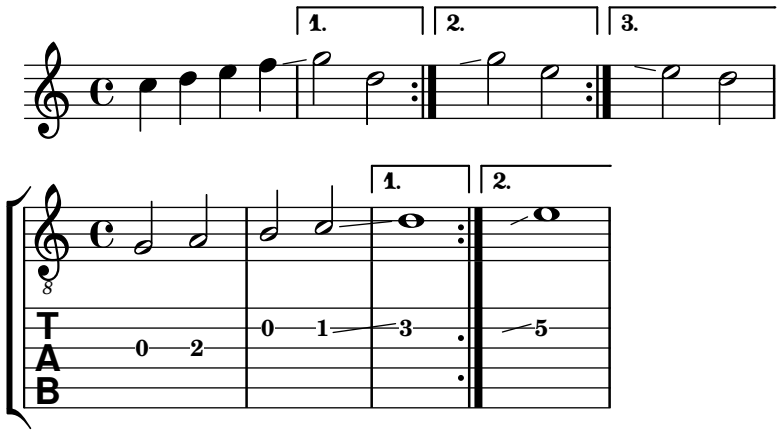
Extending glissandi across repeats

A glissando which extends into several `\alternative` blocks can be simulated by adding a hidden grace note with a glissando at the start of each `\alternative` block. The grace note should be at the same pitch as the note which starts the initial glissando. This is implemented here with a music function which takes the pitch of the grace note as its argument.

Note that in polyphonic music the grace note must be matched with corresponding grace notes in all other voices.

```
repeatGliss = #(define-music-function (grace)
  (ly:pitch?)
  #{
    % the next two lines ensure the glissando is long enough
    % to be visible
    \once \override Glissando.springs-and-rods
      = #ly:spanner::set-spacing-rods
    \once \override Glissando.minimum-length = #3.5
    \once \hideNotes
    \grace $grace \glissando
  #})

\score {
  \relative c'' {
    \repeat volta 3 { c4 d e f\glissando }
    \alternative {
      { g2 d }
      { \repeatGliss f g2 e }
      { \repeatGliss f e2 d }
    }
  }
}

music =  \relative c' {
  \voiceOne
  \repeat volta 2 {
    g a b c\glissando
  }
  \alternative {
```

```
    { d1 }
    { \repeatGliss c \once \omit StringNumber e1\2 }
  }
}

\score {
  \new StaffGroup <<
    \new Staff <<
      \new Voice { \clef "G_8" \music }
    >>
    \new TabStaff  <<
      \new TabVoice { \clef "moderntab" \music }
    >>
  >>
}
```



See also

Music Glossary: Section “glissando” in *Music Glossary*.

Notation Reference: Section 5.4.5 [Line styles], page 702.

Snippets: Section “Expressive marks” in *Snippets*.

Internals Reference: Section “Glissando” in *Internals Reference*.

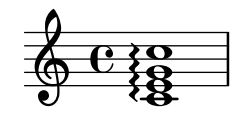
Known issues and warnings

Printing text over the line (such as *gliss.*) is not supported.

Arpeggio

An *arpeggio* on a chord (also known as a broken chord) is denoted by appending `\arpeggio` to the chord construct:

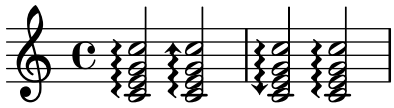
```
\relative { <c' e g c>1\arpeggio }
```



Different types of arpeggios may be written. `\arpeggioNormal` reverts to a normal arpeggio:

```
\relative {
  <c' e g c>2\arpeggio
```

```
  \arpeggioArrowUp
  <c e g c>2\arpeggio

  \arpeggioArrowDown
  <c e g c>2\arpeggio

  \arpeggioNormal
  <c e g c>2\arpeggio
}
```



These predefined commands internally modify the `arpeggio-direction` property; see their full definition in the `ly/property-init.ly` file.

Special *bracketed* arpeggio symbols can be created:

```
\relative {
  <c' e g c>2

  \arpeggioBracket
  <c e g c>2\arpeggio

  \arpeggioParenthesis
  <c e g c>2\arpeggio

  \arpeggioParenthesisDashed
  <c e g c>2\arpeggio

  \arpeggioNormal
  <c e g c>2\arpeggio
}
```

These predefined commands internally override the `Arpeggio` object's `stencil` property, and may also adapt its `X-extent` (that is, the horizontal dimension it takes not to collide with other objects).

The dash properties of the parenthesis arpeggio are controlled with the `dash-definition` property (see [Slurs], page 151).

Arpeggios can be explicitly written out with ties. For more information, see [Ties], page 58.

Predefined commands

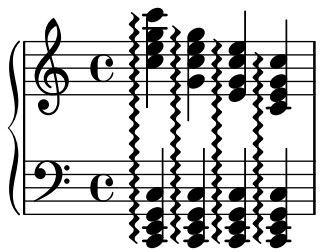
`\arpeggio`, `\arpeggioArrowUp`, `\arpeggioArrowDown`, `\arpeggioNormal`, `\arpeggioBracket`, `\arpeggioParenthesis`, `\arpeggioParenthesisDashed`.

Selected Snippets

Creating cross-staff arpeggios in a piano staff

In a PianoStaff, it is possible to let an *arpeggio* cross between the staves by setting the property PianoStaff.connectArpeggios.

```
\new PianoStaff \relative c'' <<
  \set PianoStaff.connectArpeggios = ##t
  \new Staff {
    <c e g c>4\arpeggio
    <g c e g>4\arpeggio
    <e g c e>4\arpeggio
    <c e g c>4\arpeggio
  }
  \new Staff {
    \clef bass
    \repeat unfold 4 {
      <c,, e g c>4\arpeggio
    }
  }
>>
```

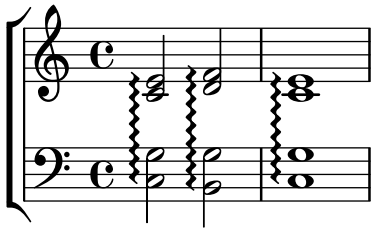


Creating cross-staff arpeggios in other contexts

Cross-staff *arpeggios* can be created in contexts other than GrandStaff, PianoStaff and StaffGroup if the Span_arpeggio_engraver is included in the Score context.

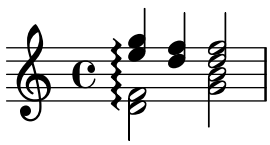
```
\score {
  \new ChoirStaff {
    \set Score.connectArpeggios = ##t
    <<
      \new Voice \relative c' {
        <c e>2\arpeggio
        <d f>2\arpeggio
        <c e>1\arpeggio
      }
      \new Voice \relative c {
        \clef bass
        <c g'>2\arpeggio
        <b g'>2\arpeggio
        <c g'>1\arpeggio
      }
    >>
  }
  \layout {
    \context {
      \Score
      \consists "Span_arpeggio_engraver"
```

```
    }
  }
}
```



Creating arpeggios across notes in different voices

An *arpeggio* can be drawn across notes in different voices on the same staff if the `Span_arpeggio_engraver` is added to the `Staff` context:

```
\new Staff \with {
  \consists "Span_arpeggio_engraver"
}
\relative c' {
  \set Staff.connectArpeggios = ##t
  <<
    { <e' g>4\arpeggio <d f> <d f>2 }
    \\
    { <d, f>2\arpeggio <g b>2 }
  >>
}
```

See also

Music Glossary: Section “arpeggio” in *Music Glossary*.

Notation Reference: [Slurs], page 151, [Ties], page 58.

Installed Files: `ly/property-init.ly`.

Snippets: Section “Expressive marks” in *Snippets*.

Internals Reference: Section “Arpeggio” in *Internals Reference*, Section “Slur” in *Internals Reference*, Section “PianoStaff” in *Internals Reference*.

Known issues and warnings

Predefined commands such as `\arpeggioArrowUp` only apply to the current context, and thus will not affect arpeggios spanning several voices or staves. In such cases, these commands need to be used in a `\context` block within `\layout`, or in a `\with` block, as explained in Section 5.1.5 [Changing context default settings], page 668. Alternatively, rather than using predefined shortcuts, it may be advisable to directly override the relevant properties for the `Arpeggio` object in the appropriate context; for example:

```
\override Staff.Arpeggio.stencil = #ly:arpeggio::brew-chord-bracket
```

to print cross-voice arpeggio brackets at the `Staff` level, or

```
\override PianoStaff.Arpeggio.arpeggio-direction = #UP
```

to print cross-staff arrowed arpeggios (pointing upwards) in a `PianoStaff` context.

It is not possible to mix connected arpeggios and unconnected arpeggios in one PianoStaff at the same point in time.

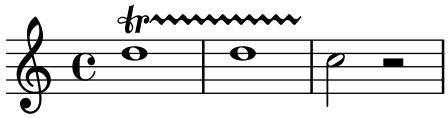
The simple way of setting parenthesis-style arpeggio brackets does not work for cross-staff arpeggios; see [Staff-change lines], page 384.

Trills

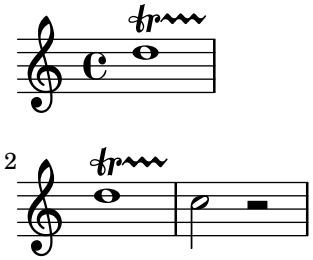
Short trills without an extender line are printed with \trill; see [Articulations and ornamentations], page 138.

Longer trills with an extender line are made with \startTrillSpan and \stopTrillSpan:

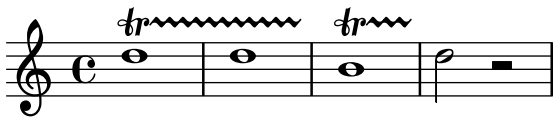
```
\relative {
  d''1\startTrillSpan
  d1
  c2\stopTrillSpan
  r2
}
```



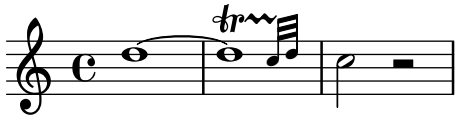
A trill spanner crossing a line break will restart exactly above the first note on the new line.

```
\relative {
  d''1\startTrillSpan
  \break
  d1
  c2\stopTrillSpan
  r2
}
```

Consecutive trill spans will work without explicit \stopTrillSpan commands, since successive trill spanners will automatically become the right bound of the previous trill.

```
\relative {
  d''1\startTrillSpan
  d1
  b1\startTrillSpan
  d2\stopTrillSpan
  r2
}
```



Trills can also be combined with grace notes. The syntax of this construct and the method to precisely position the grace notes are described in [Grace notes], page 130.

```
\relative {
  d''1~\afterGrace
  d1\startTrillSpan { c32[ d]\stopTrillSpan }
  c2 r2
}
```

Trills that require an auxiliary note with an explicit pitch can be typeset with the `\pitchedTrill` command. The first argument is the main note, and the second is the *trilled* note, printed as a stemless note head in parentheses.

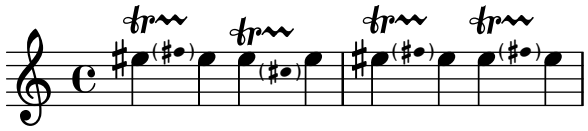
```
\relative {
  \pitchedTrill
  d''2\startTrillSpan fis
  d2
  c2\stopTrillSpan
  r2
}
```

The Accidental of the first pitched trill in a measure is always printed, even for naturals.

```
{
  \key d \major
  \pitchedTrill
  d'2\startTrillSpan cis d\stopTrillSpan
  \pitchedTrill
  d2\startTrillSpan c d\stopTrillSpan
  \pitchedTrill
  d2\startTrillSpan e d\stopTrillSpan
}
```

Subsequent accidentals (of the same note in the same measure) will need to be added manually.

```
\relative {
  \pitchedTrill
  eis''4\startTrillSpan fis
  eis4\stopTrillSpan
  \pitchedTrill
  eis4\startTrillSpan cis
  eis4\stopTrillSpan
  \pitchedTrill
```

```
  eis4\startTrillSpan fis
  eis4\stopTrillSpan
  \pitchedTrill
  eis4\startTrillSpan fis!
  eis4\stopTrillSpan
}
```

Predefined commands

`\startTrillSpan`, `\stopTrillSpan`.

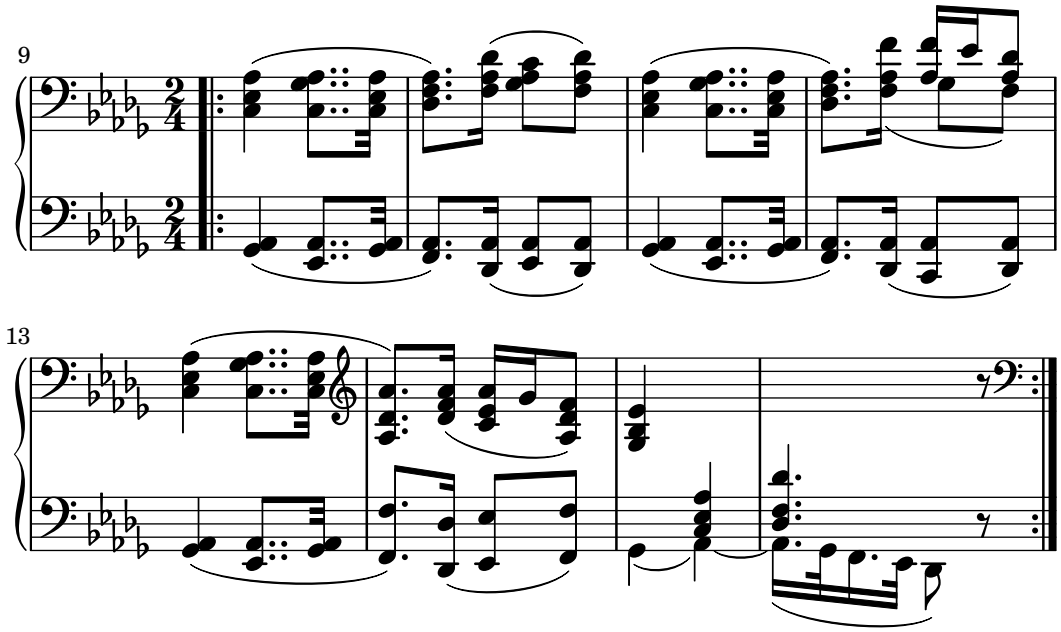
See also

Music Glossary: Section “trill” in *Music Glossary*.

Notation Reference: [Articulations and ornamentations], page 138, [Grace notes], page 130.

Snippets: Section “Expressive marks” in *Snippets*.

Internals Reference: Section “TrillSpanner” in *Internals Reference*, Section “TrillPitchHead” in *Internals Reference*, Section “TrillPitchAccidental” in *Internals Reference*, Section “TrillPitchParentheses” in *Internals Reference*, Section “TrillPitchGroup” in *Internals Reference*, Section “Pitched_trill_engraver” in *Internals Reference*.

1.4 Repeats

Repetition is a central concept in music, and multiple notations exist for repetitions. LilyPond supports the following kinds of repeats:

`volta` This is the standard notation for repeats with or without alternative endings. The repeated section is framed between repeat bar lines, but the starting bar line is omitted when the repeated section begins the piece. Alternative endings are printed in sequence, bracketed, and numbered with the volte to which they apply.

`segno` This supports various *da capo* and *dal segno* cases. The repeated section begins with a segno mark, except at the start of the piece. Alternative endings are printed in sequence and marked with coda marks, and a section label such as 'Coda' can optionally be applied to the final alternative. The repeated section ends with an instruction such as *D.S.*

`unfold` The repeated music is written out in full a specified number of times.

`percent` These are beat or measure repeats. They look like single slashes or percent signs.

`tremolo` This is used to write tremolo beams.

Chord constructs can be repeated using the chord repetition symbol, `q`. See [Chord repetition], page 194.

1.4.1 Long repeats

This section discusses how to input long (usually multi-measure) repeats.

Written-out repeats

The `\repeat unfold` command repeats music by writing it out a number of times. The syntax is the same as the `\repeat volta` and `\repeat segno` commands, which are documented in following sections.

To avoid redundancy, unfolding is not demonstrated in detail here; however, some of the examples in following sections illustrate repeats in multiple forms using the `\unfoldRepeats` command to convert the `volta` or `segno` form to the `unfold` form. For another important use of the `\unfoldRepeats` command, see Section 3.6.6 [Using repeats with MIDI], page 594.

There are some points of interest specific to the `\repeat unfold` command.

In some cases, especially in a `\relative` context, the outcome of unfolding is not the same as of writing the input music expression multiple times, e.g.,

```
\repeat unfold 2 { a'4 b c d | }
```

differs from the following by an octave change:

```
a'4 b c d |
a'4 b c d |
```

Also, nesting `\repeat unfold` can be practical in ways that nesting `\repeat volta` or `\repeat segno` would not be.

> **Note:** If you include `\relative` inside a `\repeat` without explicitly instantiating the `Voice` context, extra (unwanted) staves will appear. See Section "An extra staff appears" in *Application Usage*.

See also

Snippets: Section "Repeats" in *Snippets*.

Internals Reference: Section "RepeatedMusic" in *Internals Reference*, Section "UnfoldedRepeatedMusic" in *Internals Reference*.

Simple repeats

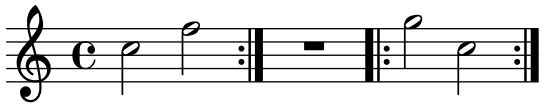
This is the syntax for a repeat without variation:

```
\repeat volta repeatcount musicexpr
```

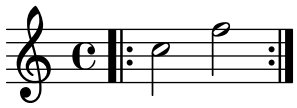
where *musicexpr* is the music expression to be repeated.

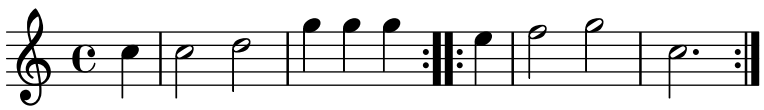
```
\fixed c'' {
```

```
  \repeat volta 2 { c2 f }
  R1
  \repeat volta 2 { g2 c }
}
```



By default, a starting bar line is not automatically printed at the beginning of a piece, in accordance with classical engraving conventions. However, in some contexts, these bar lines are traditionally added, such as in lead sheets for jazz standards. This can be achieved by setting the `printInitialRepeatBar` property.

```
\fixed c'' {
  \set Score.printInitialRepeatBar = ##t
  \repeat volta 2 { c2 f }
}
```

A repeated section that starts in the middle of a measure usually ends at the same position in a later measure so that the two ends make a complete measure. The repeat bar lines are not measure boundaries in such cases, so no bar checks should be placed there. Likewise, no `\partial` command should be placed within the repeated music, because the measures are complete; however, a `\partial` command should be placed before the repeat when there is a truly incomplete measure the first time through.

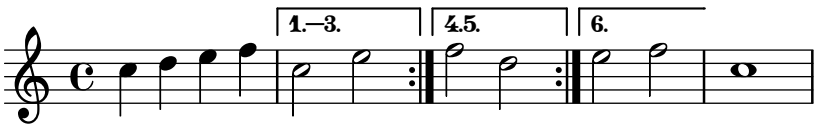
```
\fixed c'' {
  \partial 4
  \repeat volta 2 {
    c4
    c2 d
    g4 g g
  }
  \repeat volta 2 {
    e4
    f2 g
    c2.
  }
}
```

Alternative endings

Repeats with alternative endings can be written two ways. This is the preferred syntax:

```
\repeat volta repeatcount {
  musicexpr...
  \alternative {
    \volta numberlist musicexpr
    \volta numberlist musicexpr
```

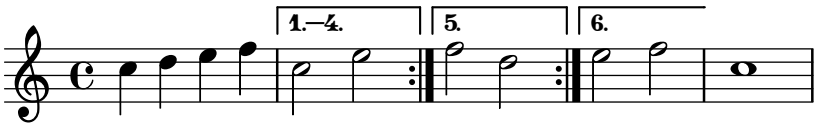
```
    ...
  }
}
```

where *musicexpr* is a music expression, *musicexpr...* is any number of them, and *numberlist* is a comma-separated list of volta numbers chosen from the range 1 to *repeatcount*.

```
\fixed c'' {
  \repeat volta 6 {
    c4 d e f
    \alternative {
      \volta 1,2,3 { c2 e }
      \volta 4,5 { f2 d }
      \volta 6 { e2 f }
    }
  }
  c1
}
```

An older syntax where the \alternative block follows outside the repeated music expression is still supported and has the same effect.

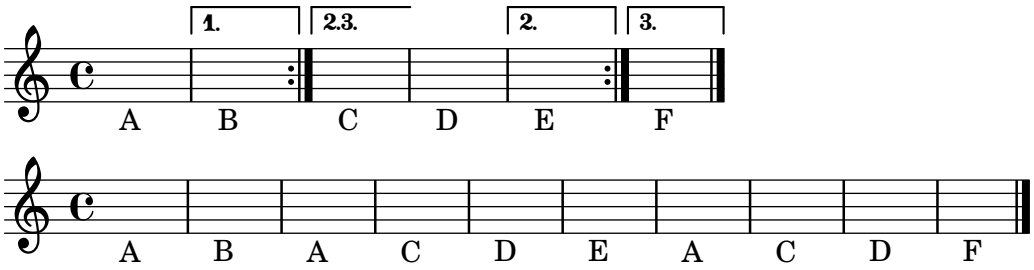
```
\repeat volta repeatcount musicexpr
\alternative {
  \volta numberlist musicexpr
  \volta numberlist musicexpr
  ...
}
```

\volta specifications within an \alternative block are optional on an all-or-none basis. If they are omitted, alternatives are used once each, but the first is repeated as needed to satisfy the repeat count.

```
\fixed c'' {
  \repeat volta 6 {
    c4 d e f
    \alternative {
      { c2 e }
      { f2 d }
      { e2 f }
    }
  }
  c1
}
```

\alternative blocks can be nested.

```
music = \fixed c' {
  \repeat volta 3 {
```

```
    s1_"A"
    \alternative {
      \volta 1 { s1_"B" }
      \volta 2,3 {
        s1_"C"
        \once \set Score.voltaSpannerDuration = \musicLength 1
        s1_"D"
        \alternative {
          \volta 2 { s1_"E" }
          \volta 3 { s1_"F" }
        }
      }
    }
  }
  \fine
}

\score { \music }
\score { \unfoldRepeats \music }
```



Note: Every element in an `\alternative` block is treated as an alternative ending. Something as simple as a bar check on the wrong side of a bracket can produce unexpected results.

Note: If you include `\relative` inside a `\repeat` without explicitly instantiating the `Voice` context, extra (unwanted) staves will appear. See Section "An extra staff appears" in *Application Usage*.

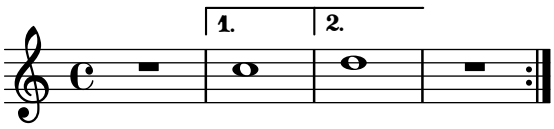
Note: When alternative bar numbering is enabled, it is applied to the outermost bracketed alternatives.

Other variation in repeated sections

An `\alternative` block can be used within a `\repeat` block to produce notation similar to alternative endings (see [Alternative endings], page 170).

```
\fixed c'' {
  \repeat volta 2 {
    R1
    \alternative {
      \volta 1 { c1 }
      \volta 2 { d1 }
```

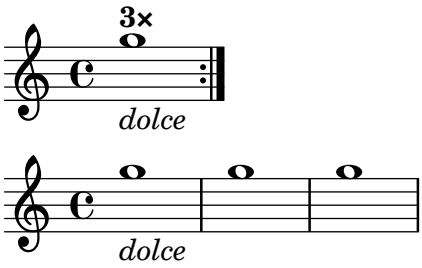
```
    }
    R1
  }
}
```



The \volta command is not limited to use on the elements of an \alternative block. It can be used anywhere within a \repeat to designate music for particular volte, though it does not create brackets in other cases.

When a \repeat is unfolded, volta-specific music is omitted from every volta to which it does not apply. Providing an empty Scheme list in place of volta numbers removes the music entirely.

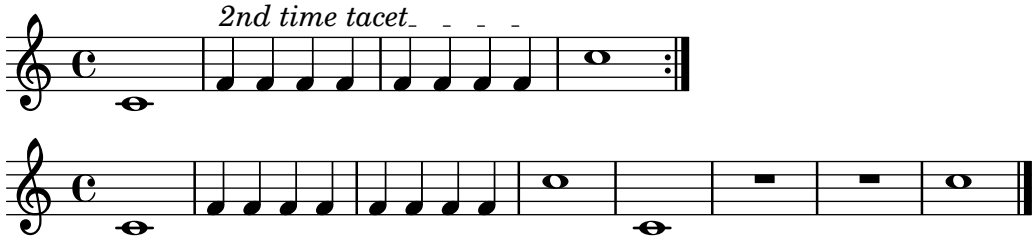
```
music = \repeat volta 3 {
  \volta #'() { s1*0^\markup { \bold "3×" } }
  \volta 1 { s1*0_\markup { \italic dolce } }
  g''1
}

\score { \music }
\score { \unfoldRepeats \music }
```



When a \repeat is unfolded, it may be desirable not only to filter out volta-specific music, but also to add music that was not present in the folded form. The \unfolded command designates music to be ignored until the enclosing \repeat is unfolded.

```
music = \fixed c' {
  \repeat volta 2 {
    c1
    <<
      \volta #'() {
        \once \override TextSpanner.bound-details.left.text =
          "2nd time tacet"
        s4*7\startTextSpan s4\stopTextSpan
      }
      \volta 1 { f4 f f f | f f f f }
      \volta 2 { \unfolded { R1*2 } }
    >>
    c'1
  }
  \fine
}
```

```
\score { \music }
\score { \unfoldRepeats \music }
```

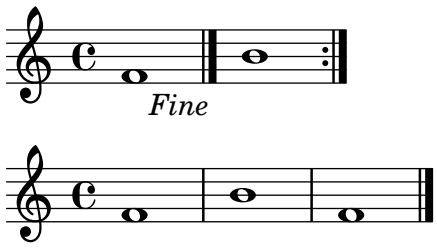


Note: The `\volta` and `\unfolded` commands function with respect to the innermost repeat enclosing them.

Al-fine repeats

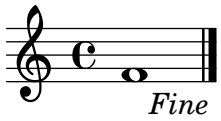
The `\fine` command marks the end of the music but does not enforce it. When a repeat containing `\fine` is unfolded, the `\fine` command is unfolded like any other music. For correct unfolding, it is necessary to specify the volta in which the *Fine* should be performed and the volte in which any following music should be performed (see [Other variation in repeated sections], page 172).

```
music = \fixed c' {
  \repeat volta 2 {
    f1
    \volta 2 \fine
    \volta 1 b1
  }
}

\score { \music }
\score { \unfoldRepeats \music }
```

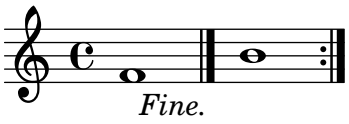


As shown immediately above, at the written end of the music, `\fine` creates a final bar line without a *Fine* instruction. To force *Fine* to appear in such cases, set the `finalFineTextVisibility` context property.

```
\fixed c' {
  \set Score.finalFineTextVisibility = ##t
  f1
  \fine
}
```



To change the text that \fine prints, set the fineText context property.

```
\fixed c' {
  \set Score.fineText = "Fine."
  \repeat volta 2 {
    f1
    \volta 2 \fine
    \volta 1 b1
  }
}
```

For details on interactions with other types of bar lines and options for changing their appearance, see [Automatic bar lines], page 115.

See also

Music Glossary: Section “fine” in *Music Glossary*.

Notation Reference: [Automatic bar lines], page 115, [Other variation in repeated sections], page 172, [Section divisions], page 129.

Snippets: Section “Repeats” in *Snippets*.

Internals Reference: Section “FineEvent” in *Internals Reference*, Section “Jump_engraver” in *Internals Reference*, Section “JumpScript” in *Internals Reference*.

Segno repeat structure

\repeat segno differs from \repeat volta only in the resulting notation. Refer to the preceding sections for general information on entering music with repetition, alternatives, and variation. This section covers particulars of segno notation without fully reiterating the input syntax.

\repeat segno notates repetition with *D.C.* or *D.S.* instructions. It marks the beginning of the repeated section with a segno mark when it is not the beginning of the piece. It also marks alternative endings with coda marks in lieu of volta brackets, provided that the endings are intended to be performed in order, e.g., not \volta 1,3 then \volta 2,4.

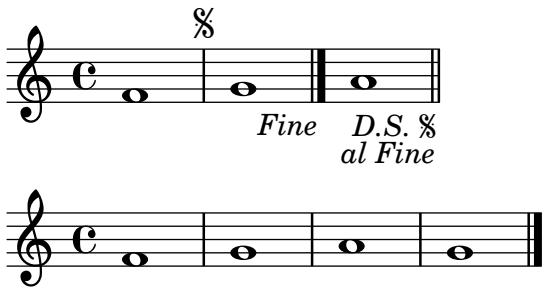
When alternative bar numbering is enabled, it is applied to alternatives notated with volta brackets whether they are created by \repeat segno or \repeat volta, but it is not applied to alternative endings notated with coda marks.

Demonstrations of common uses follow.

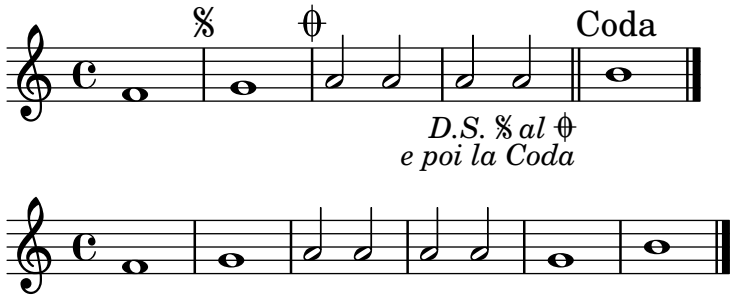
al fine Repeat instructions include *al Fine* if a \fine command appears at any prior point (see [Al-fine repeats], page 174).

```
music = \fixed c' {
  f1
  \repeat segno 2 {
    g1
    \volta 2 \fine
    \volta 1 a1
  }
  \section
}

\score { \music }
```

```
\score { \unfoldRepeats \music }
```



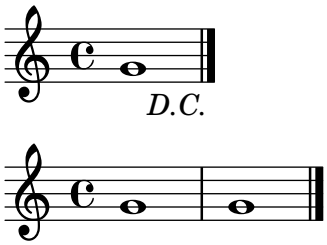
alla coda The beginning of each alternative ending is marked with an implied `\codaMark \default`. Repeat instructions in alternatives include '*al . . . e poi la . . .*' referring to the mark at the first alternative and the mark to skip to. Provided that the duration of the final alternative is zero, the automatic mark is suppressed, allowing a section label to be set instead.

```
music = \fixed c' {
  f1
  \repeat segno 2 {
    g1
    \alternative {
      \volta 1 { \repeat unfold 4 { a2 } }
      \volta 2 \volta #'() {
        \section
        \sectionLabel "Coda"
      }
    }
  }
  b1
  \fine
}

\score { \music }
\score { \unfoldRepeats \music }
```

The return instruction can be abbreviated by setting an alternative formatting procedure (see [Segno repeat appearance], page 178).

da capo Repeat instructions include *D.C.* when the repeated section begins at the beginning of the score. The supported *da capo* cases parallel the supported *dal segno* cases.

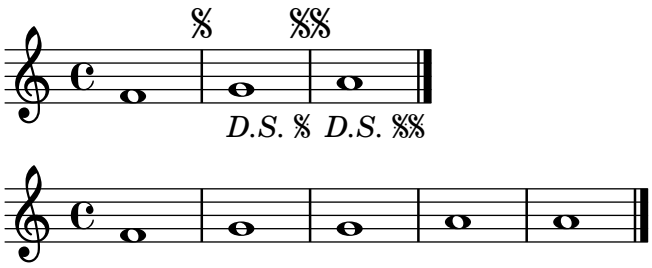
```
music = \fixed c' {
  \repeat segno 2 {
```

```
    g1
  }
  \fine
}

\score { \music }
\score { \unfoldRepeats \music }
```



dal segno Repeat instructions include *D.S.* when the repeated section begins after the beginning of the score. The beginning of the repeated section is marked with an implied `\segnoMark \default`.

```
music = \fixed c' {
  f1
  \repeat segno 2 {
    g1
  }
  \repeat segno 2 {
    a1
  }
  \fine
}

\score { \music }
\score { \unfoldRepeats \music }
```



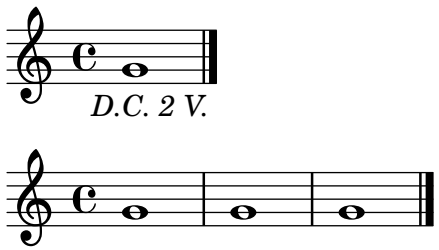
A *dal-segno* repeat starting at the beginning of the score can be forced (see [Segno repeat appearance], page 178).

multiple return

A repeat instruction to be performed more than once includes '*. . . V.*'. The number of times the instruction is performed is one less than the number of times the passage is performed.

```
music = \fixed c' {
  \repeat segno 3 {
    g1
  }
  \fine
```

```
}

\score { \music }
\score { \unfoldRepeats \music }
```



See also

Music Glossary: Section “da capo” in *Music Glossary*, Section “dal segno” in *Music Glossary*, Section “fine” in *Music Glossary*.

Notation Reference: [Al-fine repeats], page 174, [Alternative endings], page 170, [Automatic bar lines], page 115, [Other variation in repeated sections], page 172, [Section divisions], page 129, [Section labels], page 283, [Simple repeats], page 169.

Snippets: Section “Repeats” in *Snippets*.

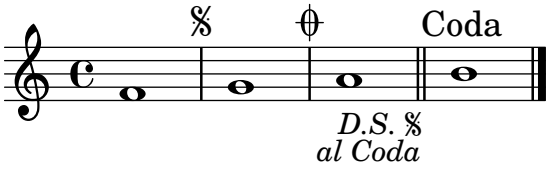
Internals Reference: Section “CodaMark” in *Internals Reference*, Section “JumpScript” in *Internals Reference*, Section “SectionLabel” in *Internals Reference*, Section “SegnoMark” in *Internals Reference*.

Segno repeat appearance

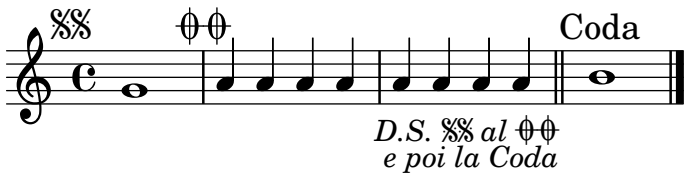
The marks and return instructions that `\repeat segno` creates are adjustable in some respects.

Return instructions are formatted with the Scheme procedure specified in the `dalSegnoTextFormatter` property. There is a predefined alternative formatter that creates shorter instructions.

```
\fixed c' {
  \set Score.dalSegnoTextFormatter = #format-dal-segno-text-brief
  f1
  \repeat segno 2 {
    g1
    \alternative {
      \volta 1 { a1 }
      \volta 2 \volta #'() {
        \section
        \sectionLabel "Coda"
      }
    }
  }
  b1
  \fine
}
```

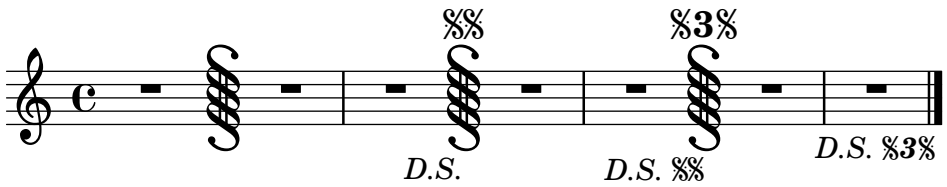


The sequence numbers of the marks at the beginning of the repeated section and the beginning of the first alternative may be set explicitly without interfering with automatic return instructions (see [Manual repeat marks], page 183).

```
\fixed c' {
  \repeat segno 2 {
    \volta #'() { \segnoMark 2 }
    g1
    \alternative {
      \volta 1 {
        \volta #'() { \codaMark 2 }
        \repeat unfold 8 { a4 }
      }
      \volta 2 \volta #'() {
        \section
        \sectionLabel "Coda"
      }
    }
  }
  b1
  \fine
}
```

Without the explicit `\segnoMark 2`, the above would have been rendered as a *da-capo* repeat.

As an alternative to printing a segno as a mark above the staff, it is possible to print it as a bar line by setting the `segnoStyle` property to `bar-line`. To avoid ambiguity, only the first segno bar remains unmarked.

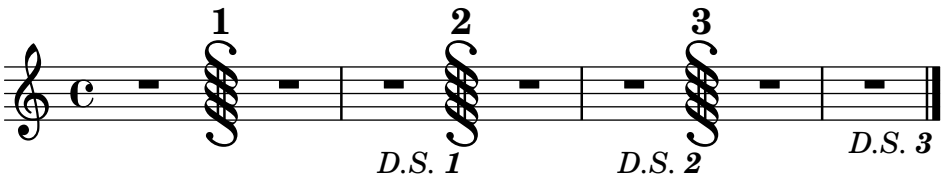
```
\fixed c' {
  \set Score.segnoStyle = #'bar-line
  R1
  \repeat unfold 3 {
    \repeat segno 2 {
      R1*2
    }
  }
  \fine
}
```



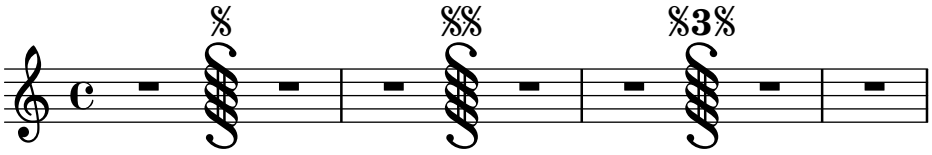
Where a segno bar coincides with other special bar lines, a combination bar line is chosen automatically from a predetermined set. For each supported combination, the bar line can be customized by setting a context property (see [Automatic bar lines], page 115).

Segno and coda marks are formatted with procedures specified in the segnoMarkFormatter and codaMarkFormatter properties. These are interchangeable with procedures used to format rehearsal marks (see [Rehearsal marks], page 125).

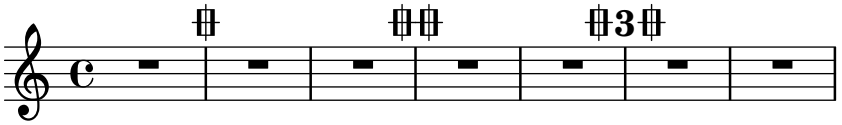
```
\fixed c' {
  \set Score.segnoMarkFormatter = #format-mark-numbers
  \set Score.segnoStyle = #'bar-line
  R1
  \repeat unfold 3 {
    \repeat segno 2 {
      R1*2
    }
  }
  \fine
}
```



There is a predefined alternative segno formatter that prints a mark even over the first bar line:

```
\fixed c' {
  \set Score.segnoMarkFormatter = #format-segno-mark
  \set Score.segnoStyle = #'bar-line
  R1
  \repeat unfold 3 {
    \segnoMark \default
    R1*2
  }
}
```

There is a predefined alternative coda mark formatter that uses \varcoda signs.

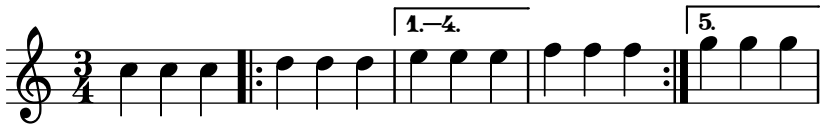
```
\fixed c' {
  \set Score.codaMarkFormatter = #format-varcoda-mark
  R1
  \repeat unfold 3 {
    \codaMark \default
    R1*2
  }
}
```



Selected Snippets

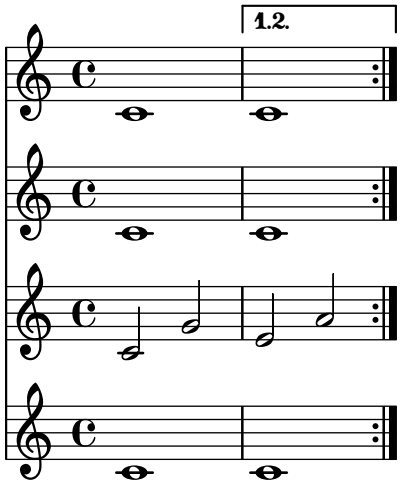
Shortening volta brackets

By default, the volta brackets will be drawn over all of the alternative music, but it is possible to shorten them by setting `voltaSpannerDuration`. In the next example, the bracket only lasts one measure, which is a duration of 3/4.

```
\relative c'' {
  \time 3/4
  c4 c c
  \set Score.voltaSpannerDuration = \musicLength 2.
  \repeat volta 5 { d4 d d }
  \alternative {
    {
      e4 e e
      f4 f f
    }
    { g4 g g }
  }
}
```

Adding volta brackets to additional staves

The `Volta_engraver` by default resides in the `Score` context, and brackets for the repeat are thus normally only printed over the topmost staff. This can be adjusted by adding the `Volta_engraver` to the `Staff` context where the brackets should appear; see also the "Volta multi staff" snippet.

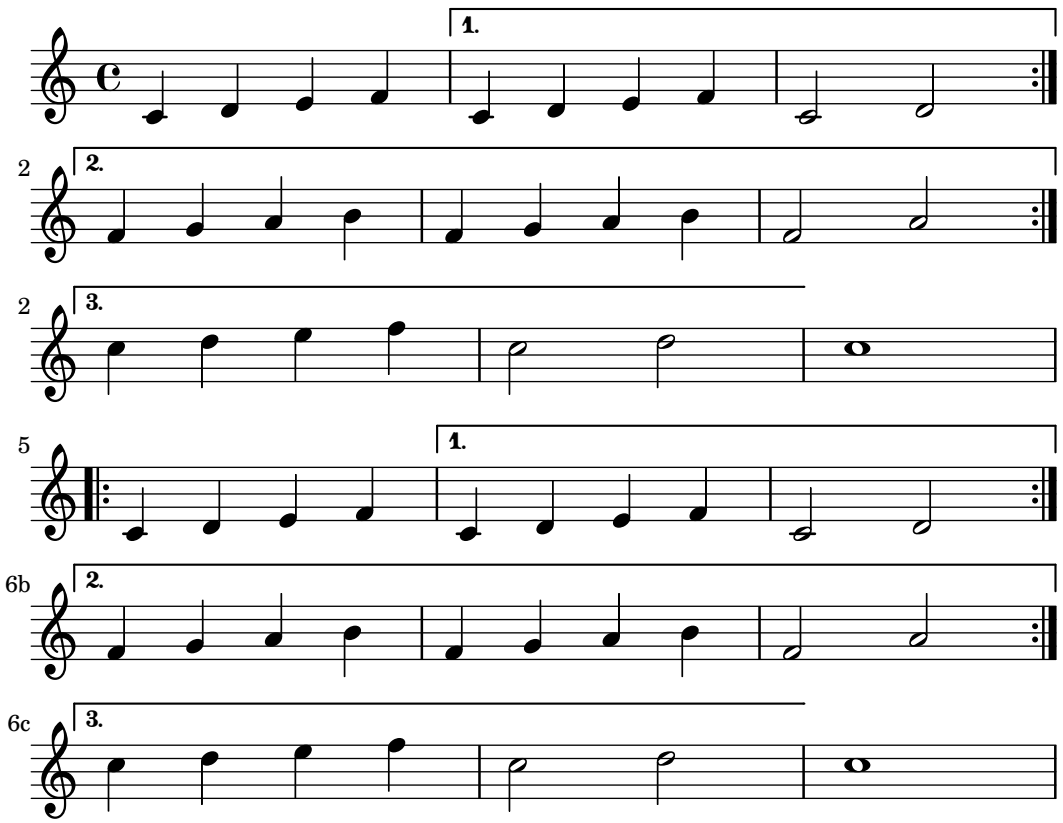
```
<<
  \new Staff { \repeat volta 2 { c'1 } \alternative { c' } }
  \new Staff { \repeat volta 2 { c'1 } \alternative { c' } }
  \new Staff \with { \consists "Volta_engraver" } { c'2 g' e' a' }
  \new Staff { \repeat volta 2 { c'1 } \alternative { c' } }
>>
```



Alternative bar numbering

Two alternative methods for bar numbering can be set, especially for when using repeated music.

```
\relative c'{
  \set Score.alternativeNumberingStyle = #'numbers
  \repeat volta 3 { c4 d e f | }
    \alternative {
      { c4 d e f | c2 d \break }
      { f4 g a b | f4 g a b | f2 a | \break }
      { c4 d e f | c2 d }
    }
  c1 \break
  \set Score.alternativeNumberingStyle = #'numbers-with-letters
  \repeat volta 3 { c,4 d e f | }
    \alternative {
      { c4 d e f | c2 d \break }
      { f4 g a b | f4 g a b | f2 a | \break }
      { c4 d e f | c2 d }
    }
  c1
}
```



See also

Music Glossary: Section “repeat” in *Music Glossary*, Section “volta” in *Music Glossary*.

Notation Reference: [Automatic bar lines], page 115, [Bar lines], page 106, Section 5.1.4 [Modifying context plug-ins], page 667, [Modifying ties and slurs], page 717, [Time administration], page 137.

Installed Files: `ly/engraver-init.ly`.

Snippets: Section “Repeats” in *Snippets*.

Internals Reference: Section “VoltaBracket” in *Internals Reference*, Section “RepeatedMusic” in *Internals Reference*, Section “VoltaRepeatedMusic” in *Internals Reference*, Section “UnfoldedRepeatedMusic” in *Internals Reference*.

Known issues and warnings

For repeats in `volta` form, spanners (slurs, etc.) that cross into alternatives work for the first alternative only. They likewise cannot wrap around from the end of an alternative back to the beginning of the repeated section.

The visual appearance of a continuing slur or tie in subsequent alternatives can be achieved with `\repeatTie` if the slur extends into only one note in the alternative block, although this method does not work in `TabStaff`; see [Ties], page 59. Other methods which may be tailored to indicate continuing slurs over several notes in alternative blocks, and which also work in `TabStaff` contexts, are shown in [Modifying ties and slurs], page 717.

The visual appearance of a continuing glissando in subsequent alternatives can be achieved by coding a glissando starting on a hidden grace note. See [Glissando], page 161.

If a repeat that begins with an incomplete measure has an `\alternative` block that contains modifications to the `measureLength` property, using `\unfoldRepeats` will result in wrongly-placed bar lines and bar check warnings.

A nested repeat like

```
\repeat ...
\repeat ...
\alternative
```

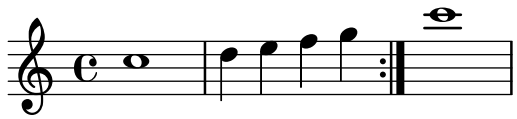
is ambiguous, since it is not clear to which `\repeat` the `\alternative` belongs. This ambiguity is resolved by always having the `\alternative` belong to the inner `\repeat`. For clarity, it is advisable to use braces in such situations.

Manual repeat marks

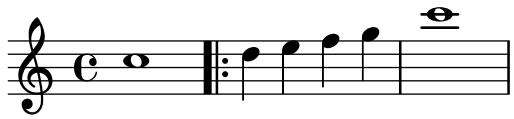
> **Note:** These methods are only used for displaying unusual repeat constructs, and may produce unexpected behavior. In most cases, repeats should be created using the standard `\repeat` command or by printing the relevant bar lines. For more information, see [Bar lines], page 106.

The property `repeatCommands` can be used to control the layout of volta-style repeats. Its value is a Scheme list. In general, each element is itself a list, `'(`*command args*`...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`
: End a repeated section.

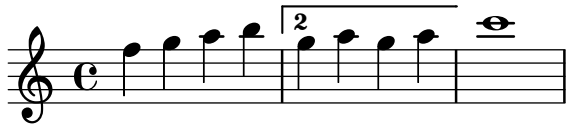
```
\relative {
  c''1
  d4 e f g
  \set Score.repeatCommands = #'(end-repeat)
  c1
}
```

`start-repeat`

Start a repeated section.

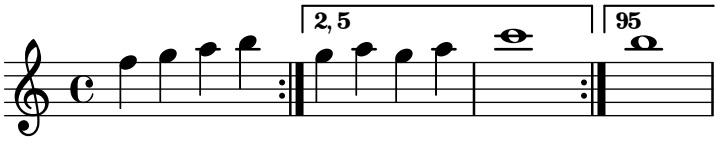
```
\relative {
  c''1
  \set Score.repeatCommands = #'(start-repeat)
  d4 e f g
  c1
}
```

As per standard engraving practice, repeat signs are not printed at the beginning of a piece.

`volta` *text*

If *text* is markup, start a volta bracket with that label; if *text* is `#f`, end a volta bracket. A volta bracket which is not ended explicitly will not be printed.

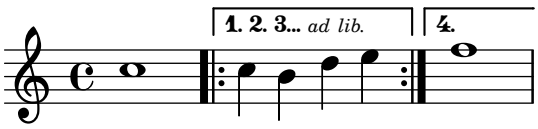
```
\relative {
  f''4 g a b
  \set Score.repeatCommands = #'((volta "2"))
  g4 a g a
  \set Score.repeatCommands = #'((volta #f))
  c1
}
```

Multiple repeat commands may occur at the same point:

```
\relative {
  f''4 g a b
  \set Score.repeatCommands = #'((volta "2, 5") end-repeat)
  g4 a g a
  c1
  \set Score.repeatCommands = #'((volta #f) (volta "95") end-repeat)
  b1
  \set Score.repeatCommands = #'((volta #f))
}
```



Text can be included with the volta bracket. The text can be a number or numbers or markup text, see Section 1.8.2 [Formatting text], page 289. The simplest way to use markup text is to define the markup first, then include the markup in a Scheme list.

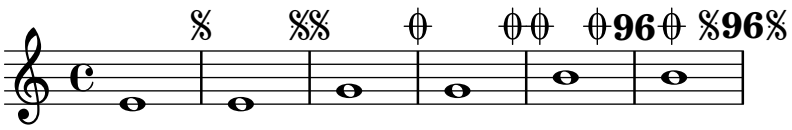
```
voltaAdLib = \markup { 1. 2. 3... \text \italic { ad lib. } }
\relative {
  c''1
```

```
  \set Score.repeatCommands =
    #(list(list 'volta voltaAdLib) 'start-repeat)
  c4 b d e
  \set Score.repeatCommands = #'((volta #f) (volta "4.") end-repeat)
  f1
  \set Score.repeatCommands = #'((volta #f))
}
```

Segno and coda marks can be created with the `\segnoMark`, `\inStaffSegno`, and `\codaMark` commands. This is the syntax for the mark commands:

```
\codaMark n
\segnoMark n
```

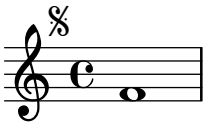
where *n* is a sequence number, or `\default` to use the next automatically. Rehearsal, segno, and coda marks are counted independently.

```
\fixed c' {
  e1
  \segnoMark \default
  e1
  \segnoMark \default
  g1
  \codaMark \default
  g1
  \codaMark \default
  b1
  \codaMark 96
  b1
  \segnoMark 96
}
```



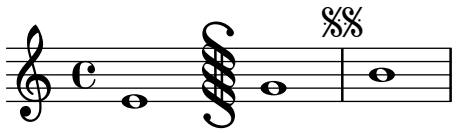
At the beginning of a piece, `\segnoMark \default` and `\codaMark \default` create no mark. Specify '1' to force a mark.

```
\fixed c' {
  \segnoMark 1
  f1
}
```

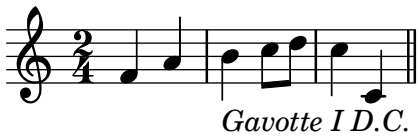


The `\inStaffSegno` command is equivalent to `\segnoMark \default` with the extra effect of temporarily setting the `segnoStyle` property to `bar-line` to force printing it as a bar line.

```
\fixed c' {
```

```
  e1
  \inStaffSegno
  g1
  \segnoMark \default
  b1
}
```

For more information on changing the appearance of segno and coda marks, see [Segno repeat appearance], page 178.

To create arbitrary jump instructions, use the `\jump` command.

```
\fixed c' {
  \time 2/4
  f4 a
  b4 c'8 d'
  c'4 c
  \jump "Gavotte I D.C."
  \section
}
```

See also

Notation Reference: [Bar lines], page 106, Section 1.8.2 [Formatting text], page 289, [Rehearsal marks], page 125, [Segno repeat appearance], page 178.

Snippets: Section “Repeats” in *Snippets*.

Internals Reference: Section “CodaMark” in *Internals Reference*, Section “Jump_engraver” in *Internals Reference*, Section “JumpScript” in *Internals Reference*, Section “Mark_engraver” in *Internals Reference*, Section “SegnoMark” in *Internals Reference*, Section “SegnoRepeatedMusic” in *Internals Reference*, Section “VoltaBracket” in *Internals Reference*, Section “VoltaRepeatedMusic” in *Internals Reference*.

1.4.2 Short repeats

This section discusses how to input short repeats. Short repeats can take two forms: slashes or percent signs to represent repeats of a single note, a single measure or two measures, and tremolos otherwise.

Percent repeats

Repeated short patterns are printed once, and the repeated pattern is replaced with a special sign.

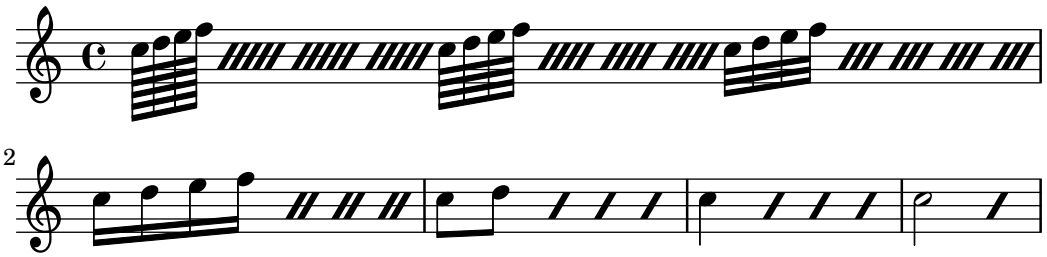
The syntax is

```
\repeat percent number musicexpr
```

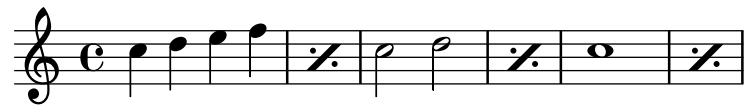
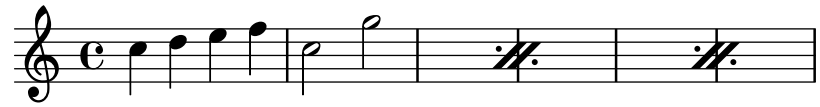
where *musicexpr* is a music expression.

Patterns that are shorter than one measure are replaced by slashes.

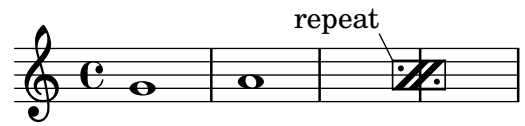
```
\relative c'' {
  \repeat percent 4 { c128 d e f }
  \repeat percent 4 { c64 d e f }
  \repeat percent 5 { c32 d e f }
  \repeat percent 4 { c16 d e f }
  \repeat percent 4 { c8 d }
  \repeat percent 4 { c4 }
  \repeat percent 2 { c2 }
}
```



Patterns of one or two measures are replaced by percent-like symbols.

```
\relative c'' {
  \repeat percent 2 { c4 d e f }
  \repeat percent 2 { c2 d }
  \repeat percent 2 { c1 }
}
```

```
\relative {
  \repeat percent 3 { c''4 d e f | c2 g' }
}
```

Note that the correct time offset to access the `DoublePercentRepeat` grob is the beginning of the repeat's second bar, which can be easily achieved with `\after`.

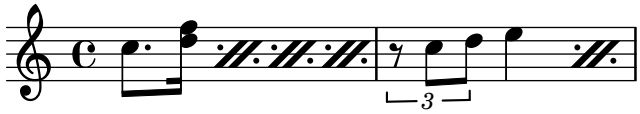
```
\new Voice \with { \consists Balloon_engraver }
  { \after 1*3
      \balloonGrobText DoublePercentRepeat #'(-1 . 2) "repeat"
    \repeat percent 2 { g'1 | a'1 } }
```



Patterns that are shorter than one measure but contain mixed durations use a double-percent symbol.

```
\relative {
  \repeat percent 4 { c''8. <d f>16 }
```

```
  \repeat percent 2 { \tuplet 3/2 { r8 c d } e4 }
}
```

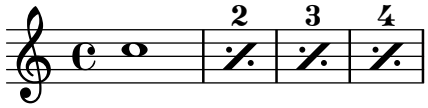


Selected Snippets

Percent repeat counter

Measure repeats of more than two repeats can get a counter when the convenient property is switched, as shown in this example:

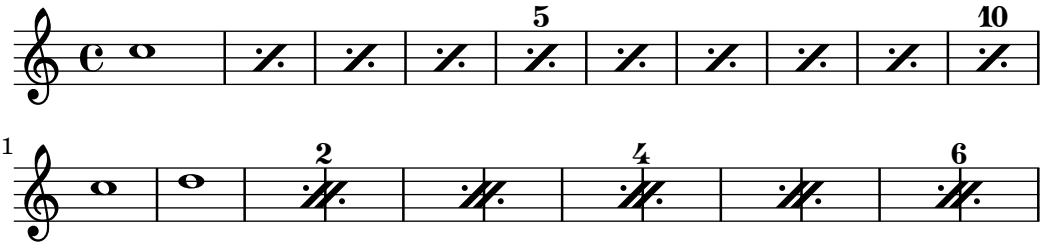
```
\relative c'' {
  \set countPercentRepeats = ##t
  \repeat percent 4 { c1 }
}
```



Percent repeat count visibility

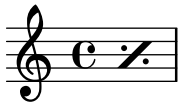
Percent repeat counters can be shown at regular intervals by setting the context property `repeatCountVisibility`.

```
\relative c'' {
  \set countPercentRepeats = ##t
  \set repeatCountVisibility = #(every-nth-repeat-count-visible 5)
  \repeat percent 10 { c1 } \break
  \set repeatCountVisibility = #(every-nth-repeat-count-visible 2)
  \repeat percent 6 { c1 d1 }
}
```



Isolated percent repeats

Isolated percents can also be printed.

```
makePercent =
#(define-music-function (note) (ly:music?)
   "Make a percent repeat the same length as NOTE."
   (make-music 'PercentEvent
               'length (ly:music-length note)))

\relative c'' {
  \makePercent s1
}
```

See also

Music Glossary: Section “percent repeat” in *Music Glossary*, Section “simile” in *Music Glossary*.

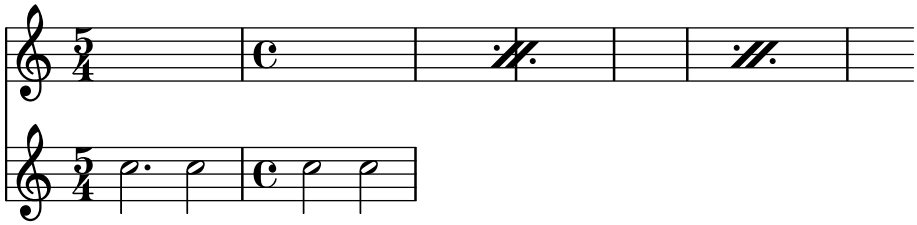
Snippets: Section “Repeats” in *Snippets*.

Internals Reference: Section “RepeatSlash” in *Internals Reference*, Section “RepeatSlashEvent” in *Internals Reference*, Section “DoubleRepeatSlash” in *Internals Reference*, Section “PercentRepeat” in *Internals Reference*, Section “PercentRepeatCounter” in *Internals Reference*, Section “PercentRepeatedMusic” in *Internals Reference*, Section “Percent_repeat_engraver” in *Internals Reference*, Section “DoublePercentEvent” in *Internals Reference*, Section “DoublePercentRepeat” in *Internals Reference*, Section “DoublePercentRepeatCounter” in *Internals Reference*, Section “Double_percent_repeat_engraver” in *Internals Reference*, Section “Slash_repeat_engraver” in *Internals Reference*.

Known issues and warnings

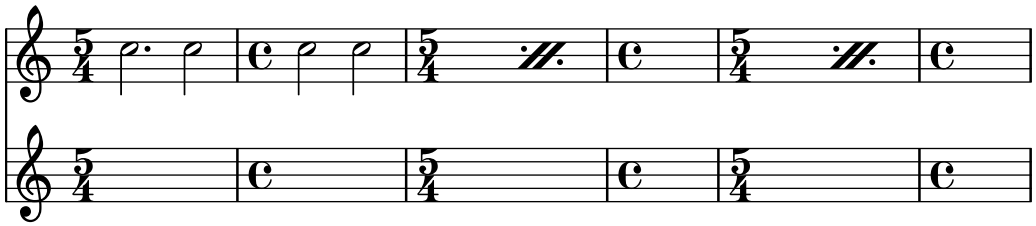
Percent repeats will not contain anything else apart from the percent sign itself; in particular, timing changes will not be repeated.

```
\repeat percent 3 { \time 5/4 c2. 2 \time 4/4 2 2 }
```



Any meter changes or \partial commands need to occur in parallel passages *outside* of any percent repeat, e.g in a separate timing track.

```
<<
  \repeat percent 3 { c2. 2 2 2 }
  \repeat unfold 3 { \time 5/4 s4*5 \time 4/4 s1 }
>>
```

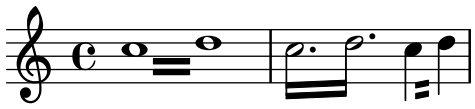


Tremolo repeats

Tremolos can take two forms: alternation between two chords or two notes, and rapid repetition of a single note or chord. Tremolos consisting of an alternation are indicated by adding beams between the notes or chords being alternated, while tremolos consisting of the rapid repetition of a single note are indicated by adding beams or slashes to a single note.

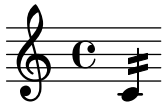
To place tremolo marks between notes, use \repeat with tremolo style:

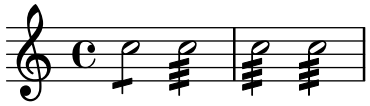
```
\relative c'' {
```

```
  \repeat tremolo 8 { c16 d }
  \repeat tremolo 6 { c16 d }
  \repeat tremolo 2 { c16 d }
}
```

The \repeat tremolo syntax expects exactly two notes within the braces, and the number of repetitions must correspond to a note value that can be expressed with plain or dotted notes. Thus, \repeat tremolo 7 is valid and produces a double dotted note, but \repeat tremolo 9 is not.

The duration of the tremolo equals the duration of the braced expression multiplied by the number of repeats: \repeat tremolo 8 { c16 d16 } gives a whole note tremolo, notated as two whole notes joined by tremolo beams.

There are two ways to put tremolo marks on a single note. The \repeat tremolo syntax is also used here, in which case the note should not be surrounded by braces:

```
\repeat tremolo 4 c'16
```

The same output can be obtained by adding :*N* after the note, where *N* indicates the duration of the subdivision (it must be at least 8). If *N* is 8, one beam is added to the note's stem. If *N* is omitted, the last value is used:

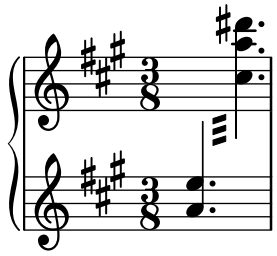
```
\relative {
  c''2:8 c:32
  c: c:
}
```

Selected Snippets

Cross-staff tremolos

Since \repeat tremolo expects exactly two musical arguments for chord tremolos, the note or chord which changes staff within a cross-staff tremolo should be placed inside curly braces together with its \change Staff command.

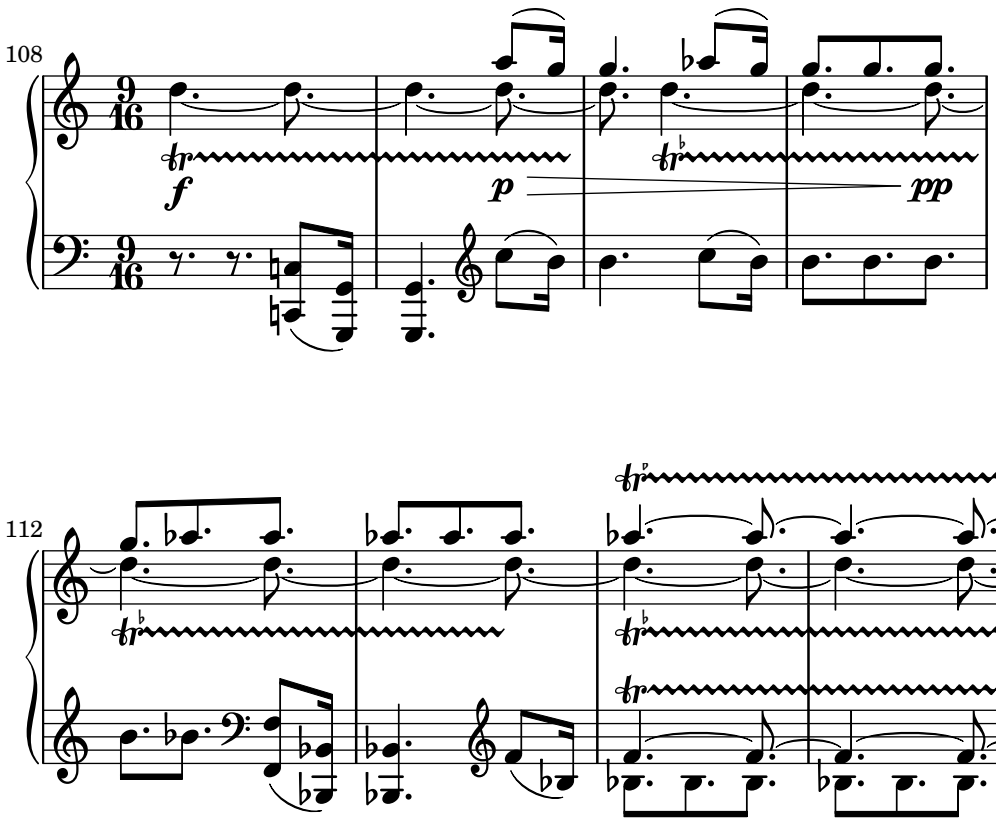
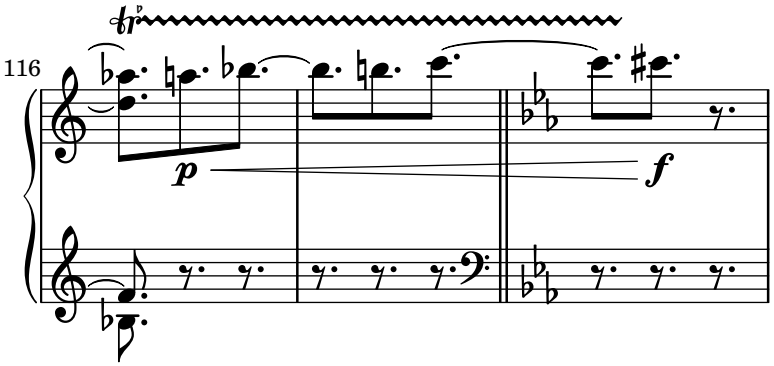
```
\new PianoStaff <<
  \new Staff = "up" \relative c'' {
    \key a \major
    \time 3/8
    s4.
  }
  \new Staff = "down" \relative c'' {
    \key a \major
    \time 3/8
    \voiceOne
```

```
    \repeat tremolo 6 {
      <a e'>32
      {
        \change Staff = "up"
        \voiceTwo
        <cis a' dis>32
      }
    }
  }
>>
```



See also

Snippets: Section “Repeats” in *Snippets*.

1.5 Simultaneous notes

Polyphony in music refers to having more than one voice occurring in a piece of music. Polyphony in LilyPond refers to having more than one voice on the same staff.

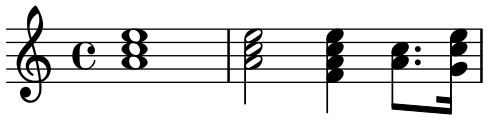
1.5.1 Single voice

This section discusses simultaneous notes inside the same voice.

Chorded notes

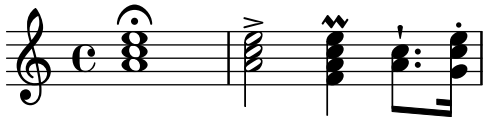
A chord is formed by enclosing a set of pitches between < and >. A chord may be followed by a duration just like simple notes.

```
\relative {
  <a' c e>1 <a c e>2 <f a c e>4 <a c>8. <g c e>16
}
```



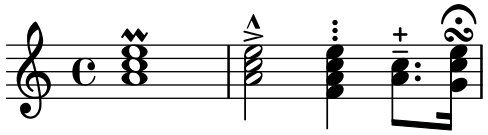
Chords may also be followed by articulations, again just like simple notes.

```
\relative {
  <a' c e>1\fermata <a c e>2-> <f a c e>4\prall <a c>8.^! <g c e>16-.
}
```



The notes within the chord themselves can also be followed by articulation and ornamentation.

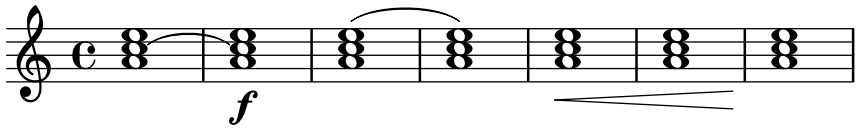
```
\relative {
  <a' c\prall e>1 <a-> c-^ e>2 <f-. a c-. e-.>4
  <a-+ c-->8. <g\fermata c e\turn>16
}
```



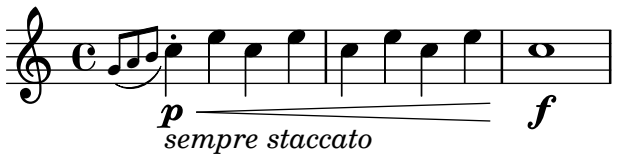
However some notation, such as dynamics and hairpins must be attached to the chord rather than to notes within the chord, otherwise they will not print. Other notation like fingerings and

slurs will get placed markedly different when attached to notes within a chord rather than to whole chords or single notes.

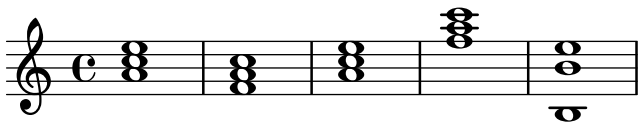
```
\relative {
  <a'\f c( e>1 <a c) e>\f <a\< c e>( <a\! c e>)
  <a c e>\< <a c e> <a c e>\!
}
```



A chord acts merely as a container for its notes, its articulations and other attached elements. Consequently, a chord without notes inside does not actually have a duration. Any attached articulations will happen at the same musical time as the next following note or chord and be combined with them (for more complex possibilities of combining such elements, see [Simultaneous expressions], page 195):

```
\relative {
  \grace { g'8( a b }
  <> ) \p \< -. -\markup \italic "sempre staccato"
  \repeat unfold 4 { c4 e }  c1\f
}
```

Relative mode can be used for pitches in chords. The first note of each chord is always relative to the first note of the chord that came before it, or in the case where no preceding chord exists, the pitch of the last note that came before the chord. All remaining notes in the chord are relative to the note that came before it *within the same chord*.

```
\relative {
  <a' c e>1 <f a c> <a c e> <f' a c> <b, e b,>
}
```



For more information about chords, see Section 2.7 [Chord notation], page 467.

See also

Music Glossary: Section “chord” in *Music Glossary*.

Learning Manual: Section “Combining notes into chords” in *Learning Manual*.

Notation Reference: Section 2.7 [Chord notation], page 467, [Articulations and ornamentations], page 138, [Relative octave entry], page 2, Section 1.5.2 [Multiple voices], page 197.

Snippets: Section “Simultaneous notes” in *Snippets*.

Known issues and warnings

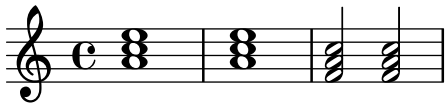
Chords containing more than two pitches within a staff space, such as '`<e f! fis!>`', create overlapping note heads. Depending on the situation, better representations might involve

- temporary use of Section 1.5.2 [Multiple voices], page 197, '`<< f! \\ <e fis!> >>`',
- enharmonic transcription of one or more pitches, '`<e f ges>`', or
- [Clusters], page 197.

Chord repetition

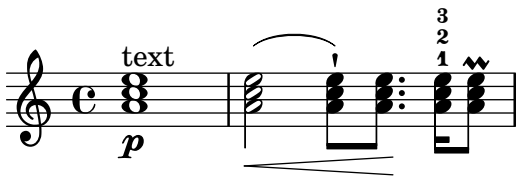
In order to save typing, a shortcut can be used to repeat the preceding chord. The chord repetition symbol is `q`:

```
\relative {
  <a' c e>1 q <f a c>2 q
}
```



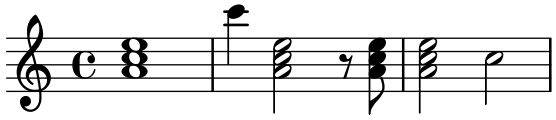
As with regular chords, the chord repetition symbol can be used with durations, articulations, markups, slurs, beams, etc., as only the pitches of the previous chord are duplicated.

```
\relative {
  <a' c e>1\p^"text" q2\<( q8)[-! q8.]\! q16-1-2-3 q8\prall
}
```

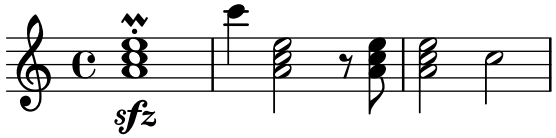


The chord repetition symbol always remembers the last instance of a chord so it is possible to repeat the most recent chord even if other non-chorded notes or rests have been added since.

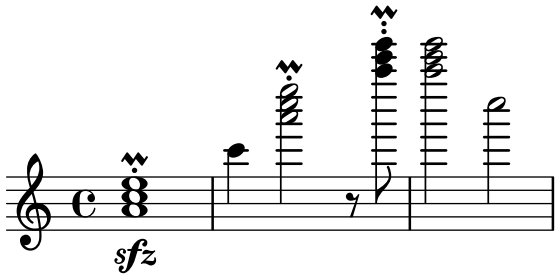
```
\relative {
  <a' c e>1 c'4 q2 r8 q8 |
  q2 c, |
}
```



However, the chord repetition symbol does not retain any dynamics, articulation or ornamentation within, or attached to, the previous chord.

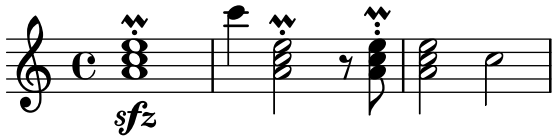
```
\relative {
  <a'-. c\prall e>1\sfz c'4 q2 r8 q8 |
  q2 c, |
}
```

To have some of them retained, the \chordRepeats function can be be called explicitly with an extra argument specifying a list of *event types* to keep unless events of that type are already present on the q chord itself.

```
\relative {
  \chordRepeats #'(articulation-event)
  { <a'-. c\prall e>1\sfz c'4 q2 r8 q8-. } |
  q2 c, |
}
```



Here using \chordRepeats inside of a \relative construction produces unexpected results: once chord events have been expanded, they are indistinguishable from having been entered as regular chords, making \relative assign an octave based based on their current context.

Since nested instances of \relative don't affect one another, another \relative inside of \chordRepeats can be used for establishing the octave relations before expanding the repeat chords. In that case, the whole content of the inner \relative does not affect the outer one; hence the different octave entry of the final note in this example.

```
\relative {
  \chordRepeats #'(articulation-event)
  \relative
  { <a'-. c\prall e>1\sfz c'4 q2 r8 q8-. } |
  q2 c'' |
}
```

Interactions with \relative occur only with explicit calls of \chordRepeats: the implicit expansion at the start of typesetting is done at a time where all instances of \relative have already been processed.

See also

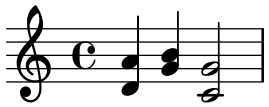
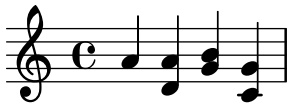
Notation Reference: Section 2.7 [Chord notation], page 467, [Articulations and ornamentations], page 138.

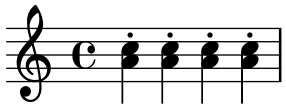
Installed Files: ly/chord-repetition-init.ly.

Simultaneous expressions

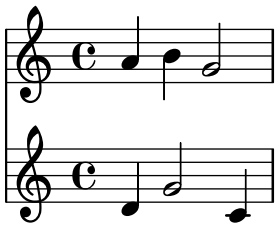
One or more music expressions enclosed in double angle brackets are taken to be simultaneous. If the first expression begins with a single note or if the whole simultaneous expression appears explicitly within a single voice, the whole expression is placed on a single staff; otherwise the elements of the simultaneous expression are placed on separate staves.

The following examples show simultaneous expressions on one staff:

```
\new Voice {  % explicit single voice
  << \relative { a'4 b g2 }
     \relative { d'4 g c,2 } >>
}
```

```
\relative {
  % single first note
  a' << \relative { a'4 b g }
        \relative { d'4 g c, } >>
}
```

This can be useful if the simultaneous sections have identical rhythms, but attempts to attach notes with different durations to the same stem will cause errors. Notes, articulations, and property changes in a *single* 'Voice' are collected and engraved in musical order:

```
\relative {
  <a' c>4-.  <>-. << c a >>  << { c-. <c a> } { a s-. } >>
}
```

Multiple stems or beams or different note durations or properties at the same musical time require the use of multiple voices.

The following example shows how simultaneous expressions can generate multiple staves implicitly:

```
% no single first note
<< \relative { a'4 b g2 }
   \relative { d'4 g2 c,4 } >>
```

Here different rhythms cause no problems because they are interpreted in different voices.

Known issues and warnings

If notes from two or more voices, with no shifts specified, have stems in the same direction, the message

```
warning: This voice needs a \voiceXx or \shiftXx setting
```

will appear during compilation. This message can be suppressed by:

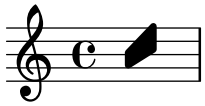
```
\override NoteColumn.ignore-collision = ##t
```

However, this not only suppresses the warning but will prevent any collision resolution whatsoever and may have other unintended effects (also see *Known Issues* in [Collision resolution], page 202).

Clusters

A cluster indicates a continuous range of pitches to be played. They can be denoted as the envelope of a set of notes. They are entered by applying the function `\makeClusters` to a sequence of chords, e.g.,

```
\relative \makeClusters { <g' b>2 <c g'> }
```



Ordinary notes and clusters can be put together in the same staff, even simultaneously. In such a case no attempt is made to automatically avoid collisions between ordinary notes and clusters.

See also

Music Glossary: Section “cluster” in *Music Glossary*.

Snippets: Section “Simultaneous notes” in *Snippets*.

Internals Reference: Section “ClusterSpanner” in *Internals Reference*, Section “ClusterSpannerBeacon” in *Internals Reference*, Section “Cluster_spanner_engraver” in *Internals Reference*.

Known issues and warnings

Clusters look good only if they span at least two chords; otherwise they appear too narrow.

Clusters do not have a stem and cannot indicate durations by themselves, but the length of the printed cluster is determined by the durations of the defining chords. Separate clusters need a separating rest between them.

Clusters do not produce MIDI output.

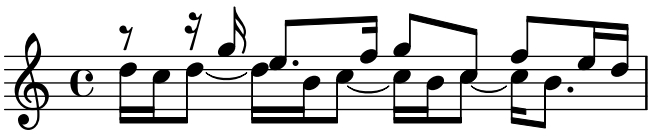
1.5.2 Multiple voices

This section discusses simultaneous notes in multiple voices or multiple staves.

Single-staff polyphony

Explicitly instantiating voices

The basic structure needed to achieve multiple independent voices in a single staff is illustrated in the following example:

```
\new Staff <<
  \new Voice = "first"
    \relative { \voiceOne r8 r16 g'' e8. f16 g8[ c,] f e16 d }
  \new Voice= "second"
    \relative { \voiceTwo d''16 c d8~ 16 b c8~ 16 b c8~ 16 b8. }
>>
```

Here, voices are instantiated explicitly and are given names. The `\voiceOne ... \voiceFour` commands set up the voices so that first and third voices get stems up, second and fourth voices get stems down, third and fourth voice note heads are horizontally shifted, and rests in the respective voices are automatically moved to avoid collisions. The `\oneVoice` command returns all the voice settings to the neutral default directions.

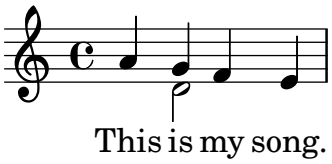
Note that `Voice` is a bottom-level context (see [Bottom-level contexts – voices], page 661). In `TabStaff` one would use `TabVoice` instead.

Temporary polyphonic passages

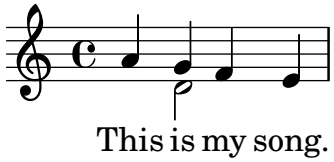
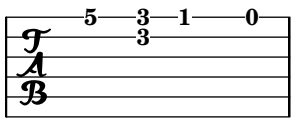
A temporary polyphonic passage can be created with the following construct:

```
<< { \voiceOne ... }
  \new Voice { \voiceTwo ... }
>> \oneVoice
```

Here, the first expression within a temporary polyphonic passage is placed into the `Voice` context which was in use immediately before the polyphonic passage, and that same `Voice` context continues after the temporary section. Other expressions within the angle brackets are assigned to distinct temporary voices. This allows lyrics to be assigned to one continuing voice before, during and after a polyphonic section:

```
\relative <<
  \new Voice = "melody" {
    a'4
    <<
      {
        \voiceOne
        g f
      }
      \new Voice {
        \voiceTwo
        d2
      }
    >>
    \oneVoice
    e4
  }
  \new Lyrics \lyricsto "melody" {
  This is my song.
  }
>>
```

Here, the `\voiceOne` and `\voiceTwo` commands are required to define the settings of each voice. In `TabStaff` one needs to use `TabVoice`.

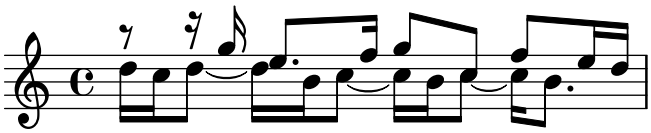
If the same music should appear in `Staff` *and* `TabStaff` the general `Bottom` context may be used (see [Bottom-level contexts – voices], page 661).

```
mus =
\relative
  \new Bottom = "melody" {
    a'4
    <<
      {
        \voiceOne
        g f
      }
      \new Bottom {
        \voiceTwo
        d2
      }
    >>
    \oneVoice
    e4
  }

<<
  \new Staff \mus
  \new Lyrics \lyricsto "melody" {
    This is my song.
  }
>>

<<
  \new TabStaff \mus
  \new Lyrics \lyricsto "melody" {
    This is my song.
  }
>>
```



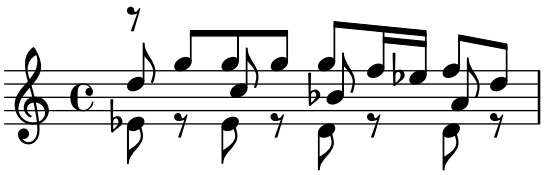
The double backslash construct

The `<< {...} \\ {...} >>` construct, where the two (or more) expressions are separated by double backslashes, behaves differently to the similar construct without the double backslashes: *all* the expressions within this construct are assigned to new `Bottom` contexts of the current type, typically `Voice` or `TabVoice` (see [Bottom-level contexts – voices], page 661). These new `Bottom` contexts are created implicitly and are given the fixed names `"1"`, `"2"`, etc.

The first example could be typeset as follows:

```
<<
  \relative { r8 r16 g'' e8. f16 g8[ c,] f e16 d }
  \\
  \relative { d''16 c d8~ 16 b c8~ 16 b c8~ 16 b8. }
>>
```

This syntax can be used where it does not matter that temporary voices are created and then discarded. These implicitly created voices are given the settings equivalent to the effect of the `\voiceOne ... \voiceFour` commands, in the order in which they appear in the code.

In the following example, the intermediate voice has stems up, therefore we enter it in the third place, so it becomes voice three, which has the stems up as desired. Spacer rests are used to avoid printing doubled rests.

```
<<
  \relative { r8 g'' g g g f16 ees f8 d }
  \\
  \relative { ees'8 r ees r d r d r }
  \\
  \relative { d''8 s c s bes s a s }
>>
```

In all but the simplest works it is advisable to create explicit `Voice` contexts as explained in Section "Contexts and engravers" in *Learning Manual* and Section "Explicitly instantiating voices" in *Learning Manual*.

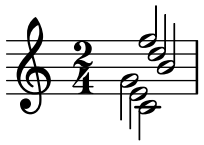
Voice order

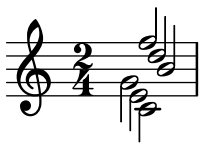
When entering multiple voices in the input file, use the following order:

```
Voice 1: highest
Voice 2: lowest
Voice 3: second highest
Voice 4: second lowest
Voice 5: third highest
Voice 6: third lowest
etc.
```

Though this may seem counterintuitive, it simplifies the automatic layout process. Note that the odd-numbered voices are given up-stems, and the even-numbered voices are given down-stems:

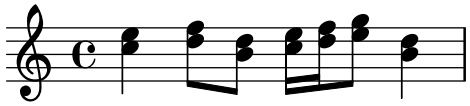
```
\new Staff <<
  \time 2/4
  { f''2 }  % 1: highest
  \\
  { c'2  }  % 2: lowest
```

```
  \\
  { d''2 }  % 3: second-highest
  \\
  { e'2  }  % 4: second-lowest
  \\
  { b'2  }  % 5: third-highest
  \\
  { g'2  }  % 6: third-lowest
>>
```

When a different voice entry order is desired, the command `\voices` may be convenient:

```
\new Staff \voices 1,3,5,6,4,2 <<
  \time 2/4
  { f''2 }  % 1: highest
  \\
  { d''2 }  % 3: second-highest
  \\
  { b'2  }  % 5: third-highest
  \\
  { g'2  }  % 6: third-lowest
  \\
  { e'2  }  % 4: second-lowest
  \\
  { c'2  }  % 2: lowest
>>
```

Note: Lyrics and spanners (such as slurs, ties, hairpins, etc.) cannot be created 'across' voices.

Identical rhythms

In the special case that we want to typeset parallel pieces of music that have the same rhythm, we can combine them into a single `Voice` context, thus forming chords. To achieve this, enclose them in a simple simultaneous music construct within an explicit voice:

```
\new Voice <<
  \relative { e''4 f8 d e16 f g8 d4 }
  \relative { c''4 d8 b c16 d e8 b4 }
>>
```

This method leads to strange beamings and warnings if the pieces of music do not have the same rhythm.

Predefined commands

`\voiceOne`, `\voiceTwo`, `\voiceThree`, `\voiceFour`, `\oneVoice`.

See also

Learning Manual: Section "Voices contain music" in *Learning Manual*, Section "Explicitly instantiating voices" in *Learning Manual*.

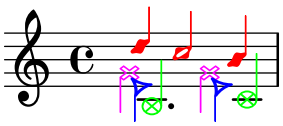
Notation Reference: [Percussion staves], page 448, [Invisible rests], page 63, [Stems], page 267.

Snippets: Section "Simultaneous notes" in *Snippets*.

Voice styles

Voices may be given distinct colors and shapes, allowing them to be easily identified:

```
<<
  \relative { \voiceOneStyle d''4 c2 b4 }
  \\
  \relative { \voiceTwoStyle e'2 e }
  \\
  \relative { \voiceThreeStyle b2. c4 }
  \\
  \relative { \voiceFourStyle g'2 g }
>>
```



The `\voiceNeutralStyle` command is used to revert to the standard presentation.

Predefined commands

`\voiceOneStyle`, `\voiceTwoStyle`, `\voiceThreeStyle`, `\voiceFourStyle`, `\voiceNeutralStyle`.

See also

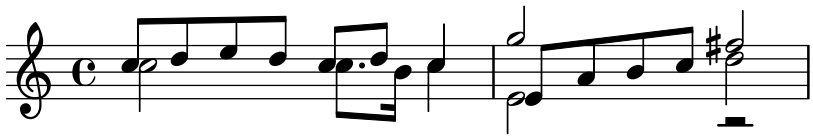
Learning Manual: Section "I'm hearing voices" in *Learning Manual*, Section "Other sources of information" in *Learning Manual*.

Snippets: Section "Simultaneous notes" in *Snippets*.

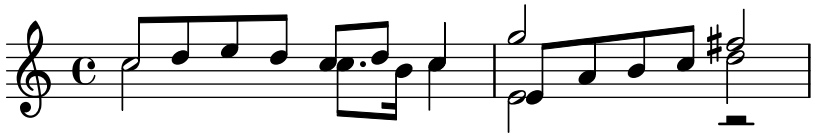
Collision resolution

The note heads of notes in different voices with the same pitch, same note head and opposite stem direction are automatically merged, but notes with different note heads or the same stem direction are not. Rests opposite a stem in a different voice are shifted vertically. The following example shows three different circumstances, on beats 1 and 3 in bar 1 and beat 1 in bar 2, where the automatic merging fails.

```
<<
  \relative {
    c''8 d e d c d c4
    g'2 fis
```

```
  } \\
  \relative {
    c''2 c8. b16 c4
    e,2 r
  } \\
  \relative {
    \oneVoice
    s1
    e'8 a b c d2
  }
>>
```

Notes with different note heads may be merged as shown below. In this example the note heads on beat 1 of bar 1 are now merged:

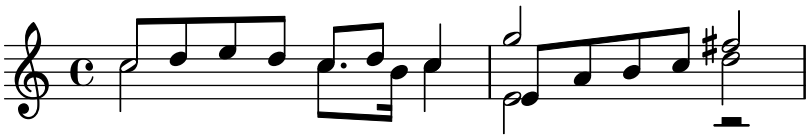
```
<<
  \relative {
    \mergeDifferentlyHeadedOn
    c''8 d e d c d c4
    g'2 fis
  } \\
  \relative {
    c''2 c8. b16 c4
    e,2 r
  } \\
  \relative {
    \oneVoice
    s1
    e'8 a b c d2
  }
>>
```

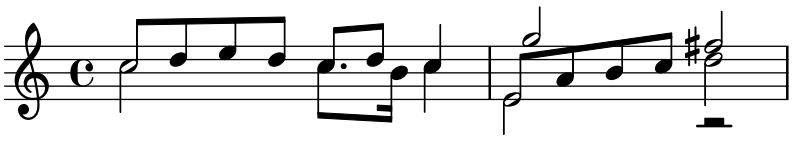


Quarter and half notes are not merged in this way, since it would be difficult to tell them apart.

Note heads with different dots as shown in beat 3 of bar 1 may be also be merged:

```
<<
  \relative {
    \mergeDifferentlyHeadedOn
    \mergeDifferentlyDottedOn
    c''8 d e d c d c4
    g'2 fis
  } \\
  \relative {
    c''2 c8. b16 c4
```

```
    e,2 r
  } \\
  \relative {
    \oneVoice
    s1
    e'8 a b c d2
  }
>>
```

The half note and eighth note at the start of the second measure are incorrectly merged because the automatic merge cannot successfully complete the merge when three or more notes line up in the same note column, and in this case the merged note head is incorrect. To allow the merge to select the correct note head a `\shift` must be applied to the note that should not be merged. Here, `\shiftOn` is applied to move the top *g* out of the column, and `\mergeDifferentlyHeadedOn` then works properly.

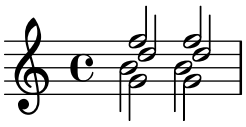
```
<<
  \relative {
    \mergeDifferentlyHeadedOn
    \mergeDifferentlyDottedOn
    c''8 d e d c d c4
    \shiftOn
    g'2 fis
  } \\
  \relative {
    c''2 c8. b16 c4
    e,2 r
  } \\
  \relative {
    \oneVoice
    s1
    e'8 a b c d2
  }
>>
```

The `\shiftOn` command allows (but does not force) the notes in a voice to be shifted. When `\shiftOn` is applied to a voice, a note or chord in that voice is shifted only if its stem would otherwise collide with a stem from another voice, and only if the colliding stems point in the same direction. The `\shiftOff` command prevents this type of shifting from occurring.

By default, the outer voices (normally voices one and two) have `\shiftOff` specified, while the inner voices (three and above) have `\shiftOn` specified. When a shift is applied, voices with up-stems (odd-numbered voices) are shifted to the right, and voices with down-stems (even-numbered voices) are shifted to the left.

Here is an example to help you visualize how an abbreviated polyphonic expression would be expanded internally.

> **Note:** Note that with three or more voices, the vertical order of voices in your input file should not be the same as the vertical order of voices on the staff!

```
\new Staff \relative {
  %% abbreviated entry
  <<
    { f''2  }  % 1: highest
    \\
    { g,2 }  % 2: lowest
    \\
    { d'2 }  % 3: upper middle
    \\
    { b2  }  % 4: lower middle
  >>
  %% internal expansion of the above
  <<
    \new Voice = "1" { \voiceOne   \shiftOff f'2 }
    \new Voice = "2" { \voiceTwo   \shiftOff g,2 }
    \new Voice = "3" { \voiceThree \shiftOn  d'2 } % shifts right
    \new Voice = "4" { \voiceFour  \shiftOn  b2  } % shifts left
  >>
}
```



Two additional commands, `\shiftOnn` and `\shiftOnnn` provide further shift levels which may be specified temporarily to resolve collisions in complex situations – see Section "Real music example" in *Learning Manual*.

Notes are only merged if they have opposing stem directions (as they have, for example, in voices one and two by default or when the stems are explicitly set in opposite directions).

Predefined commands

`\mergeDifferentlyDottedOn`, `\mergeDifferentlyDottedOff`, `\mergeDifferentlyHeadedOn`, `\mergeDifferentlyHeadedOff`.

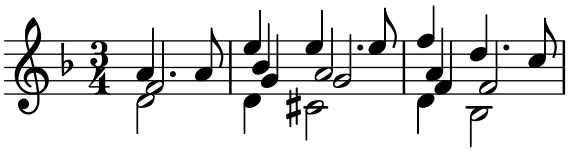
`\shiftOn`, `\shiftOnn`, `\shiftOnnn`, `\shiftOff`.

Selected Snippets

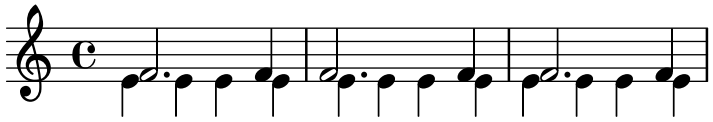
Additional voices to avoid collisions

In some instances of complex polyphonic music, additional voices are necessary to prevent collisions between notes. If more than four parallel voices are needed, additional voices can be added by defining a variable using the Scheme function `context-spec-music`.

```
voiceFive = #(context-spec-music (make-voice-props-set 4) 'Voice)

\relative c'' {
```

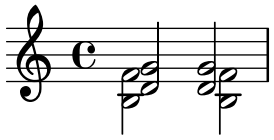
```
  \time 3/4
  \key d \minor
  \partial 2
  <<
    \new Voice  {
      \voiceOne
      a4. a8
      e'4 e4. e8
      f4 d4. c8
    }
    \new Voice {
      \voiceTwo
      d,2
      d4 cis2
      d4 bes2
    }
    \new Voice {
      \voiceThree
      f'2
      bes4 a2
      a4 s2
    }
    \new Voice {
      \voiceFive
      s2
      g4 g2
      f4 f2
    }
  >>
}
```

Moving dotted notes in polyphony

When a dotted note in the upper voice is moved to avoid a collision with a note in another voice, the default is to move the upper note to the right. This behaviour can be over-ridden by using the `prefer-dotted-right` property of `NoteCollision`.

```
\new Staff \relative c' <<
  {
    f2. f4
    \override Staff.NoteCollision.prefer-dotted-right = ##f
    f2. f4
    \override Staff.NoteCollision.prefer-dotted-right = ##t
    f2. f4
  }
  \\
  { e4 e e e e e e e e e e }
>>
```

Forcing horizontal shift of notes

When the typesetting engine cannot cope, the following syntax can be used to override typesetting decisions. The units of measure used here are staff spaces.

```
\relative c' <<
  {
    <d g>2 <d g>
  }
  \\
  {
    <b f'>2
    \once \override NoteColumn.force-hshift = #1.7
    <b f'>2
  }
>>
```



See also

Music Glossary: Section “polyphony” in *Music Glossary*.

Learning Manual: Section “Multiple notes at once” in *Learning Manual*, Section “Voices contain music” in *Learning Manual*, Section “Real music example” in *Learning Manual*.

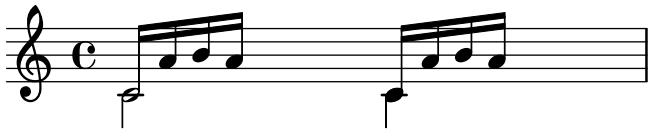
Snippets: Section “Simultaneous notes” in *Snippets*.

Internals Reference: Section “NoteColumn” in *Internals Reference*, Section “NoteCollision” in *Internals Reference*, Section “RestCollision” in *Internals Reference*.

Known issues and warnings

Using `\override NoteColumn.ignore-collision = ##t` will cause differently headed notes in different voices to merge incorrectly.

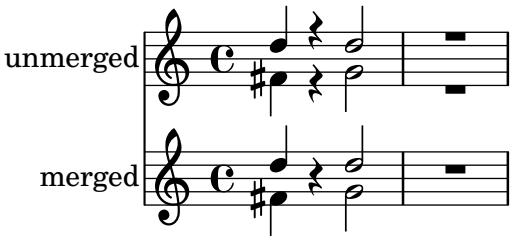
```
\mergeDifferentlyHeadedOn
<< \relative { c'16 a' b a } \\ \relative { c'2 } >>
\override NoteColumn.ignore-collision = ##t
<< \relative { c'16 a' b a } \\ \relative { c'2 } >>
```



Merging rests

When using multiple voices it is common to merge rests which occur in both parts. This can be accomplished using `Merge_rests_engraver`.

```
voiceA = \relative { d''4 r d2 | R1 | }
voiceB = \relative { fis'4 r g2 | R1 | }
```

```
\score {
  <<
    \new Staff \with {
      instrumentName = "unmerged"
    }
    <<
      \new Voice { \voiceOne \voiceA }
      \new Voice { \voiceTwo \voiceB }
    >>
    \new Staff \with {
      instrumentName = "merged"
      \consists Merge_rests_engraver
    }
    <<
      \new Voice { \voiceOne \voiceA }
      \new Voice { \voiceTwo \voiceB }
    >>
  >>
}
```

Setting the context property `suspendRestMerging` to `#t` allows for turning off rest merging temporarily.

Automatic part combining

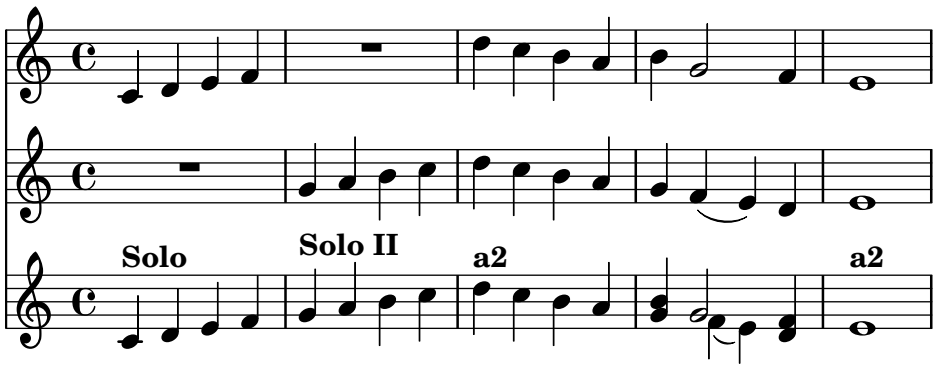
Automatic part combining is used to merge two separate parts of music onto a single staff. This can be especially helpful when typesetting orchestral scores. A single `Voice` is printed while the two parts of music are the same, but in places where they differ, a second `Voice` is printed. Stem directions are set up & down accordingly while Solo and *a due* parts are also identified and marked appropriately.

The syntax for automatic part combining is:

`\partCombine` *musicexpr1 musicexpr2*

The following example demonstrates the basic functionality, putting parts on a single staff as polyphony and setting stem directions accordingly. The same variables are used for the independent parts and the combined staff.

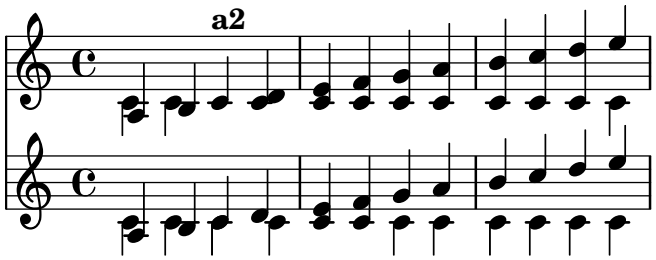
```
instrumentOne = \relative {
  c'4 d e f |
  R1 |
  d'4 c b a |
  b4 g2 f4 |
  e1 |
}

instrumentTwo = \relative {
  R1 |
```

```
  g'4 a b c |
  d4 c b a |
  g4 f( e) d |
  e1 |
}

<<
  \new Staff \instrumentOne
  \new Staff \instrumentTwo
  \new Staff \partCombine \instrumentOne \instrumentTwo
>>
```

Both parts have identical notes in the third measure, so only one instance of the notes is printed. Stem, slur, and tie directions are set automatically, depending on whether the parts are playing solo or in unison. When needed in polyphony situations, the first part (with context called `one`) gets "up" stems, while the second (called `two`) always gets "down" stems. In solo situations, the first and second parts get marked with "Solo" and "Solo II", respectively. The unison (*a due*) parts are marked with the text "a2".

By default, the part combiner merges two notes of the same pitch as an *a due* note, combines notes with the same rhythm less than a ninth apart as chords and separates notes more than a ninth apart (or when the voices cross) into separate voices. This can be overridden with an optional argument of a pair of numbers after the `\partCombine` command: the first specifies the interval where notes start to be combined (the default is zero) and the second where the notes are split into separate voices. Setting the second argument to zero means that the part combiner splits notes with an interval of a second or more, setting it to one splits notes of a third or more, and so on.

```
instrumentOne = \relative {
  a4 b c d |
  e f g a |
  b c d e |
}

instrumentTwo = \relative {
  c'4 c c c |
  c c c c |
  c c c c |
}

<<
  \new Staff \partCombine \instrumentOne \instrumentTwo
  \new Staff \partCombine #'(2 . 3) \instrumentOne \instrumentTwo
```

>>



Both arguments to \partCombine will be interpreted as separate Voice contexts, so if the music is being specified in relative mode then *both* parts must contain a \relative function, i.e.,

```
\partCombine
  \relative ... musicexpr1
  \relative ... musicexpr2
```

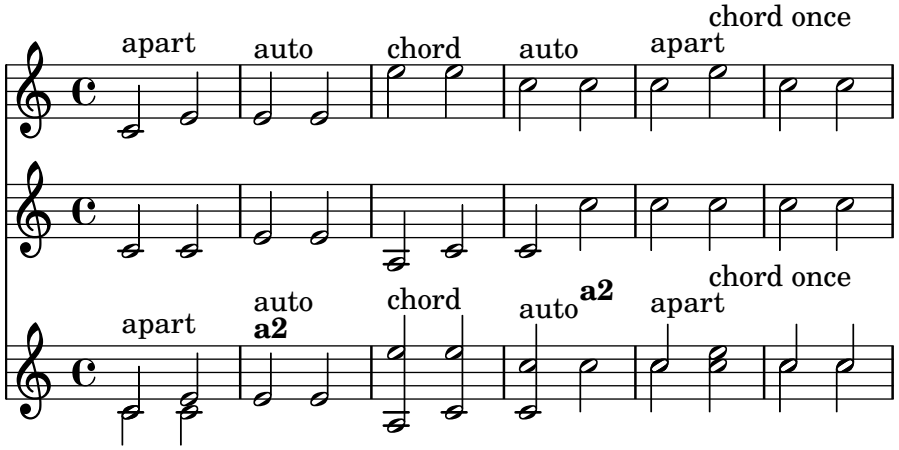
A \relative section that encloses a \partCombine has no effect on the pitches of *musicexpr1* or *musicexpr2*.

In professional scores, voices are often kept apart from each other for long passages of music even if some of the notes are the same in both voices, and could just as easily be printed as unison. Combining notes into a chord, or showing one voice as solo is, therefore, not ideal as the \partCombine function considers each note separately. In this case the \partCombine function can be overridden with one of the following commands. All of the commands may be preceded with \once in order to have them only apply to the next note in the music expression.

- \partCombineApart keeps the notes as two separate voices, even if they can be combined into a chord or unison.
- \partCombineChords combines the notes into a chord.
- \partCombineUnisono combines both voices as "unison".
- \partCombineSoloI prints only voice one, and marks it as a "Solo".
- \partCombineSoloII prints only voice two and marks it as a "Solo".
- \partCombineAutomatic ends the functions of the commands above, and reverts back to the standard \partCombine functionality.

```
instrumentOne = \relative c' {
  \partCombineApart c2^"apart" e |
  \partCombineAutomatic e2^"auto" e |
  \partCombineChords e'2^"chord" e |
  \partCombineAutomatic c2^"auto" c |
  \partCombineApart c2^"apart"
    \once \partCombineChords e^"chord once" |
  c2 c |
}
instrumentTwo = \relative {
  c'2 c |
  e2 e |
  a,2 c |
  c2 c' |
  c2 c |
  c2 c |
}
```

```
<<
  \new Staff { \instrumentOne }
  \new Staff { \instrumentTwo }
  \new Staff { \partCombine \instrumentOne \instrumentTwo }
>>
```



Using `\partCombine` *with lyrics*

The `\partCombine` command is not designed to work with lyrics; if one of the voices is explicitly named in order to attach lyrics to it, the part combiner will stop working. However, this effect can be achieved using a `NullVoice` context. See [Polyphony with shared lyrics], page 343.

Selected Snippets

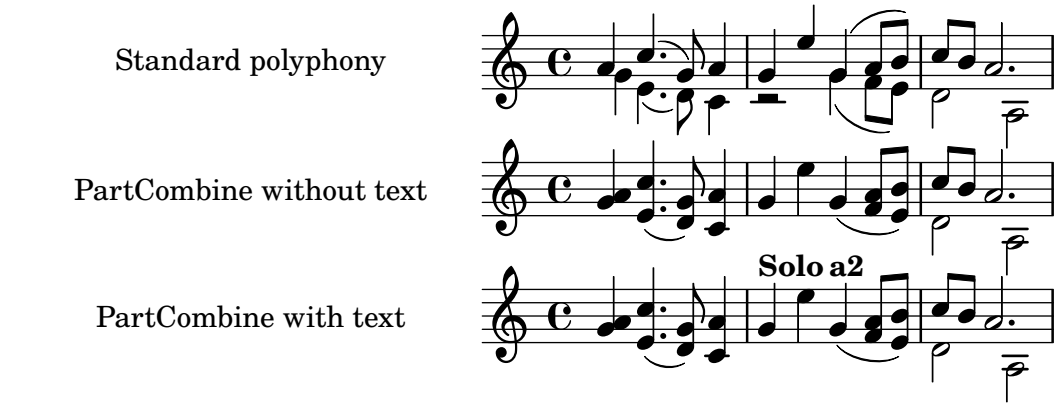
Combining two parts on the same staff

The part combiner tool (`\partCombine` command) allows the combination of several different parts on the same staff. Text directions such as "solo" or "a2" are added by default; to remove them, simply set the property `printPartCombineTexts` to `f`.

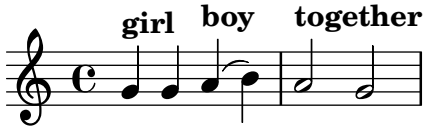
For vocal scores (hymns), there is no need to add "solo/a2" texts, so they should be switched off. However, it might be better not to use it if there are any solos, as they won't be indicated. In such cases, standard polyphonic notation may be preferable.

This snippet presents the three ways two parts can be printed on a same staff: standard polyphony, `\partCombine` without texts, and `\partCombine` with texts.

```
%% Combining pedal notes with clef changes

musicUp = \relative c'' {
  \time 4/4
  a4 c4.( g8) a4 |
  g4 e' g,( a8 b) |
  c b a2.
}

musicDown = \relative c'' {
  g4 e4.( d8) c4 |
  r2 g'4( f8 e) |
  d2 \stemDown a
}

\score {
```

```
    <<
    \new Staff \with { instrumentName = "Standard polyphony" }

      << \musicUp \\ \musicDown >>

    \new Staff \with {
      instrumentName = "PartCombine without text"
      printPartCombineTexts = ##f
    }

    \partCombine \musicUp \musicDown

    \new Staff \with { instrumentName = "PartCombine with text" }
      \partCombine \musicUp \musicDown
    >>
  \layout {
    indent = 6.0\cm
    \context {
      \Score
      \override SystemStartBar.collapse-height = #30
    }
  }
}
```

Changing partcombine texts

When using the automatic part combining feature, the printed text for the solo and unison sections may be changed:

```
\new Staff <<
  \set Staff.soloText = #"girl"
  \set Staff.soloIIText = #"boy"
  \set Staff.aDueText = #"together"
  \partCombine
    \relative c'' {
      g4 g r r
      a2 g
    }
    \relative c'' {
      r4 r a( b)
      a2 g
```

```
    }
>>
```

See also

Music Glossary: Section “a due” in *Music Glossary*, Section “part” in *Music Glossary*.

Notation Reference: Section 1.6.3 [Writing parts], page 236.

Snippets: Section “Simultaneous notes” in *Snippets*.

Internals Reference: Section “PartCombineMusic” in *Internals Reference*, Section “Voice” in *Internals Reference*.

Known issues and warnings

All `\partCombine...` functions can only accept two voices.

`\partCombine...` functions cannot be placed inside a `\tuplet` or `\relative` block.

If `printPartCombineTexts` is set and the two voices play the same notes “on and off”, in the same measure, the part combiner may typeset `a2` more than once in that measure.

`\partCombine` only knows when a note starts in a `Voice`; it cannot, for example, remember if a note in one `Voice` has already started when combining notes that have just started in the other `Voice`. This can lead to a number of unexpected issues including “Solo” or “Unison” marks being printed incorrectly.

`\partCombine` keeps all spanners (slurs, ties, hairpins, etc.) in the same `Voice` so that if any such spanners start or end in a different `Voice`, they may not be printed properly or at all.

If the `\partCombine` function cannot combine both music expressions (i.e., when both voices have different durations), it will give the voices, internally, its own custom names: `one` and `two` respectively. This means if there is any “switch” to a differently named `Voice` context, the events in that differently named `Voice` will be ignored.

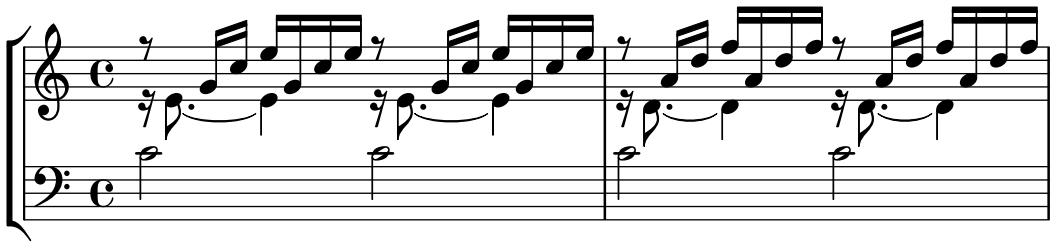
Refer also to *Known issues and warnings* when using `\partCombine` with tablature in [Default tablatures], page 395, and the *Note* in [Automatic beams], page 91, when using automatic beaming.

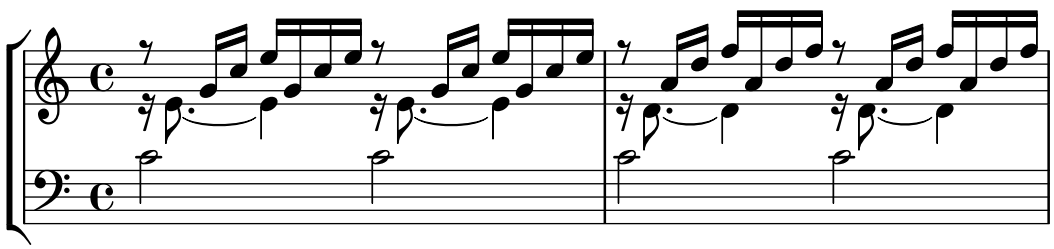
Writing music in parallel

Music for multiple parts can be interleaved in input code. The function `\parallelMusic` accepts a list with the names of a number of variables to be created, and a musical expression. The content of alternate measures from the expression become the value of the respective variables, so you can use them afterwards to print the music.

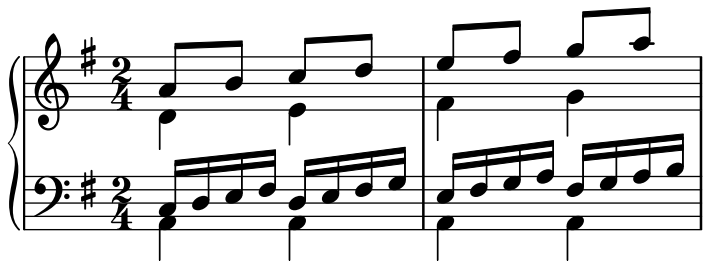
> **Note:** Bar checks `|` must be used, and the measures must be of the same length.

```
\parallelMusic voiceA,voiceB,voiceC {
  % Bar 1
  r8 g'16 c'' e'' g' c'' e'' r8 g'16 c'' e'' g' c'' e'' |
  r16 e'8.~   4             r16 e'8.~   4               |
  c'2                       c'2                         |

  % Bar 2
```

```
  r8 a'16 d'' f'' a' d'' f'' r8 a'16 d'' f'' a' d'' f'' |
  r16 d'8.~   4             r16 d'8.~   4               |
  c'2                       c'2                         |

}
\new StaffGroup <<
  \new Staff << \voiceA \\ \voiceB >>
  \new Staff { \clef bass \voiceC }
>>
```

Relative mode may be used. Note that the `\relative` command is not used inside `\parallelMusic` itself. The notes are relative to the preceding note in the voice, not to the previous note in the input – in other words, relative notes for `voiceA` ignore the notes in `voiceB`.

```
\parallelMusic voiceA,voiceB,voiceC {
  % Bar 1
  r8 g16 c e g, c e r8 g,16 c e g, c e  |
  r16 e8.~ 4        r16 e8.~  4         |
  c2                c                   |

  % Bar 2
  r8 a,16 d f a, d f r8 a,16 d f a, d f |
  r16 d8.~  4        r16 d8.~  4        |
  c2                 c                  |

 }
\new StaffGroup <<
  \new Staff << \relative c'' \voiceA \\ \relative c' \voiceB >>
  \new Staff \relative c' { \clef bass \voiceC }
>>
```

This works quite well for piano music. This example maps four consecutive measures to four variables:

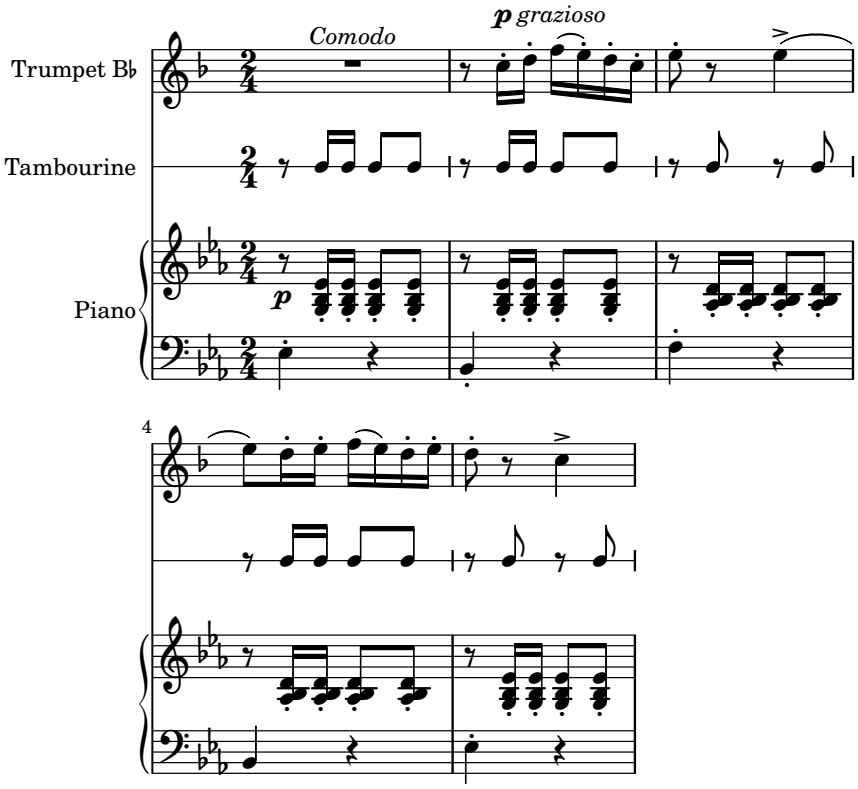
```
global = {
  \key g \major
  \time 2/4
}
```

```
\parallelMusic voiceA,voiceB,voiceC,voiceD {
  % Bar 1
  a8    b     c   d     |
  d4          e         |
  c16 d e fis d e fis g |
  a4          a         |

  % Bar 2
  e8      fis  g     a   |
  fis4         g         |
  e16 fis g  a fis g a b |
  a4           a         |

  % Bar 3 ...
}

\score {
  \new PianoStaff <<
     \new Staff {
       \global
       <<
         \relative c'' \voiceA
         \\
         \relative c'  \voiceB
       >>
     }
     \new Staff {
       \global \clef bass
       <<
         \relative c \voiceC
         \\
         \relative c \voiceD
       >>
     }
  >>
}
```

See also

Learning Manual: Section “Organizing pieces with variables” in *Learning Manual*.

Snippets: Section “Simultaneous notes” in *Snippets*.

1.6 Staff notation



This section explains how to influence the appearance of staves, how to print scores with more than one staff, and how to add tempo indications and cue notes to staves.

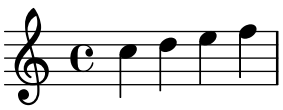
1.6.1 Displaying staves

This section describes the different methods of creating and grouping staves.

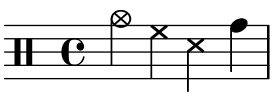
Instantiating new staves

Staves (singular: *staff*) are created with the `\new` or `\context` commands. For details, see Section 5.1.2 [Creating and referencing contexts], page 661.

The basic staff context is `Staff`:

```
\new Staff \relative { c''4 d e f }
```

The `DrumStaff` context creates a five-line staff set up for a typical drum set. Each instrument is shown with a different symbol. The instruments are entered in drum mode following a `\drummode` command, with each instrument specified by name. For details, see [Percussion staves], page 448.

```
\new DrumStaff {
  \drummode { cymc hh ss tomh }
}
```

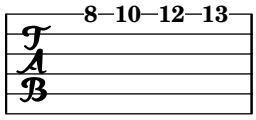


`RhythmicStaff` creates a single-line staff that only displays the rhythmic values of the input. Real durations are preserved. For details, see [Showing melody rhythms], page 88.

```
\new RhythmicStaff { c4 d e f }
```

`TabStaff` creates a tablature with six strings in standard guitar tuning. For details, see [Default tablatures], page 395.

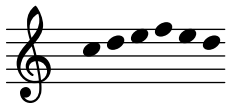
```
\new TabStaff \relative { c''4 d e f }
```



There are two staff contexts specific for the notation of ancient music: `MensuralStaff` and `VaticanaStaff`. They are described in [Predefined contexts], page 495.

The `GregorianTranscriptionStaff` context creates a staff to notate modern Gregorian chant. It engraves *divisiones* as bar lines, but it does not show measure bar lines.

```
\new GregorianTranscriptionStaff \relative { c''4 d e f e d }
```



New single staff contexts may be defined. For details, see Section 5.1.6 [Defining new contexts], page 673.

See also

Music Glossary: Section “staff” in *Music Glossary*, Section “staves” in *Music Glossary*.

Notation Reference: Section 5.1.2 [Creating and referencing contexts], page 661, [Percussion staves], page 448, [Showing melody rhythms], page 88, [Default tablatures], page 395, [Predefined contexts], page 495, [Staff symbol], page 224, [Gregorian chant contexts], page 504, [Mensural contexts], page 497, Section 5.1.6 [Defining new contexts], page 673.

Snippets: Section “Staff notation” in *Snippets*.

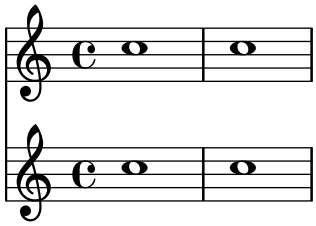
Internals Reference: Section “Staff” in *Internals Reference*, Section “DrumStaff” in *Internals Reference*, Section “GregorianTranscriptionStaff” in *Internals Reference*, Section “RhythmicStaff” in *Internals Reference*, Section “TabStaff” in *Internals Reference*, Section “MensuralStaff” in *Internals Reference*, Section “VaticanaStaff” in *Internals Reference*, Section “StaffSymbol” in *Internals Reference*.

Grouping staves

Various contexts exist to group single staves together in order to form multi-staff systems. Each grouping context sets the style of the system start delimiter and the behavior of bar lines.

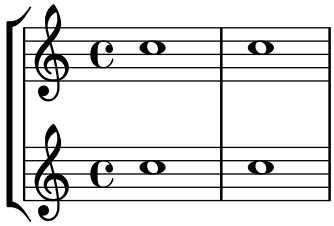
If no context is specified, the default properties will be used: the group is started with a vertical line, and the bar lines are not connected.

```
<<
  \new Staff \relative { c''1 c }
  \new Staff \relative { c''1 c }
>>
```



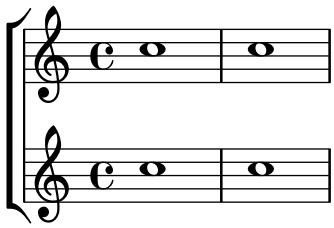
In the StaffGroup context, the group is started with a bracket and bar lines are drawn through all the staves.

```
\new StaffGroup <<
  \new Staff \relative { c''1 c }
  \new Staff \relative { c''1 c }
>>
```



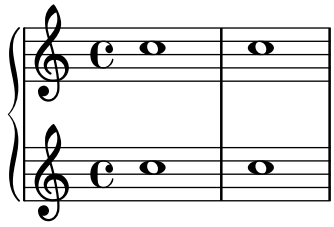
In a ChoirStaff, the group starts with a bracket, but bar lines are not connected.

```
\new ChoirStaff <<
  \new Staff \relative { c''1 c }
  \new Staff \relative { c''1 c }
>>
```



In a GrandStaff, the group begins with a brace, and bar lines are connected between the staves.

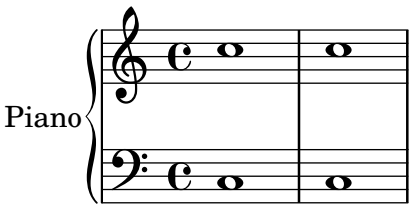
```
\new GrandStaff <<
  \new Staff \relative { c''1 c }
  \new Staff \relative { c''1 c }
>>
```



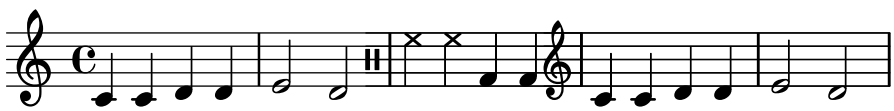
The PianoStaff is identical to a GrandStaff, except that it supports printing the instrument name directly. For details, see [Instrument names], page 236.

```
\new PianoStaff \with { instrumentName = "Piano" }
```

```
<<
  \new Staff \relative { c''1 c }
  \new Staff \relative { \clef bass c1 c }
>>
```



The OneStaff is a staff group that places separate contexts in the same vertical alignment. This example shows three staves sharing the same space. Here, the Time_signature_engraver has been moved from the staves to the OneStaff context to prevent it from being repeated for each staff.

```
\layout {
  \context {
    \OneStaff
    \consists Time_signature_engraver
  }
  \context {
    \Staff
    \remove Time_signature_engraver
  }
  \context {
    \DrumStaff
    \remove Time_signature_engraver
  }
}

\new OneStaff {
  \new Staff {
    c'4 4 d'4 4 e'2 d'
  }
  \drums {
    hihat4 hh bassdrum bd
  }
  \new Staff {
    c'4 4 d'4 4 e'2 d'
  }
}
```

Each staff group context sets the property systemStartDelimiter to one of the following values: SystemStartBar, SystemStartBrace, or SystemStartBracket. A fourth delimiter, SystemStartSquare, is also available, but it must be explicitly specified.

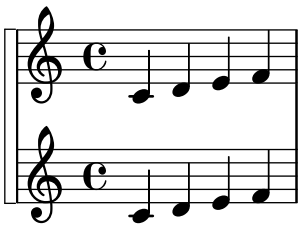
New staff group contexts may be defined. For details, see Section 5.1.6 [Defining new contexts], page 673.

Selected Snippets

Use square bracket at the start of a staff group

The system start delimiter SystemStartSquare can be used by setting it explicitly in a StaffGroup or ChoirStaff context.

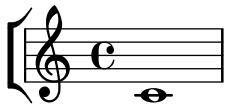
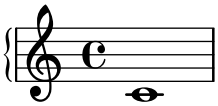
```
\score {
  \new StaffGroup { <<
  \set StaffGroup.systemStartDelimiter = #'SystemStartSquare
    \new Staff { c'4 d' e' f' }
    \new Staff { c'4 d' e' f' }
  >> }
}
```



Display bracket with only one staff in a system

If there is only one staff in one of the staff types ChoirStaff or StaffGroup, by default the bracket and the starting bar line will not be displayed. This can be changed by overriding collapse-height to set its value to be less than the number of staff lines in the staff.

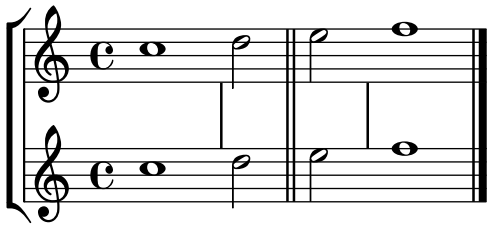
Note that in contexts such as PianoStaff and GrandStaff where the systems begin with a brace instead of a bracket, another property has to be set, as shown on the second system in the example.

```
\score {
  \new StaffGroup <<
    % Must be lower than the actual number of staff lines
    \override StaffGroup.SystemStartBracket.collapse-height = #4
    \override Score.SystemStartBar.collapse-height = #4
    \new Staff {
      c'1
    }
  >>
}
\score {
  \new PianoStaff <<
    \override PianoStaff.SystemStartBrace.collapse-height = #4
    \override Score.SystemStartBar.collapse-height = #4
    \new Staff {
      c'1
    }
  >>
}
```



Mensurstriche layout (bar lines between the staves)

The *mensurstriche* layout, where bar lines do not appear on staves but between staves only, can be achieved with a `StaffGroup` instead of a `ChoirStaff`. The bar line on staves is blanked out using `\hide`.

```
\layout {
  \context {
    \Staff
    measureBarType = "-span|"
  }
}

music = \fixed c'' {
  c1
  d2 \section e2
  f1 \fine
}

\new StaffGroup <<
  \new Staff \music
  \new Staff \music
>>
```



See also

Music Glossary: Section “brace” in *Music Glossary*, Section “bracket” in *Music Glossary*, Section “grand staff” in *Music Glossary*, Section “mensurstrich” in *Music Glossary*.

Notation Reference: [Instrument names], page 236, Section 5.1.6 [Defining new contexts], page 673.

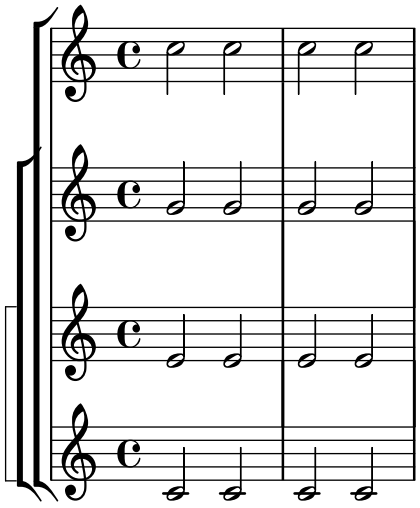
Snippets: Section “Staff notation” in *Snippets*.

Internals Reference: Section “Staff” in *Internals Reference*, Section “StaffGroup” in *Internals Reference*, Section “ChoirStaff” in *Internals Reference*, Section “GrandStaff” in *Internals Reference*, Section “PianoStaff” in *Internals Reference*, Section “OneStaff” in *Internals Reference*, Section “SystemStartBar” in *Internals Reference*, Section “SystemStartBrace” in *Internals Reference*, Section “SystemStartBracket” in *Internals Reference*, Section “SystemStartSquare” in *Internals Reference*.

Nested staff groups

Staff-group contexts can be nested to arbitrary depths. In this case, each child context creates a new bracket adjacent to the bracket of its parent group.

```
\new StaffGroup <<
```

```
  \new Staff \relative { c''2 c | c2 c }
  \new StaffGroup <<
    \new Staff \relative { g'2 g | g2 g }
    \new StaffGroup \with {
      systemStartDelimiter = #'SystemStartSquare
    }
    <<
      \new Staff \relative { e'2 e | e2 e }
      \new Staff \relative { c'2 c | c2 c }
    >>
  >>
>>
```

New nested staff group contexts can be defined. For details, see Section 5.1.6 [Defining new contexts], page 673.

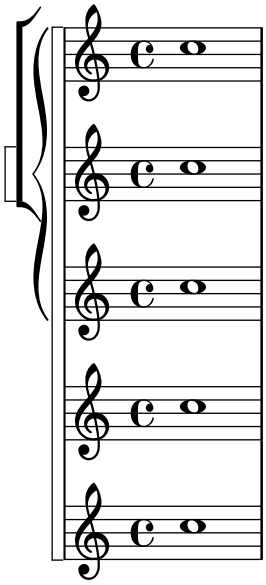
Selected Snippets

Nesting staves

The property systemStartDelimiterHierarchy can be used to make more complex nested staff groups. The command \set StaffGroup.systemStartDelimiterHierarchy takes an alphabetical list of the number of staves produced. Before each staff a system start delimiter can be given. It has to be enclosed in brackets and takes as much staves as the brackets enclose. Elements in the list can be omitted, but the first bracket takes always the complete number of staves. The possibilities are SystemStartBar, SystemStartBracket, SystemStartBrace, and SystemStartSquare.

```
\new StaffGroup
\relative c'' <<
  \override StaffGroup.SystemStartSquare.collapse-height = #4
  \set StaffGroup.systemStartDelimiterHierarchy
    = #'(SystemStartSquare (SystemStartBrace (SystemStartBracket a
                            (SystemStartSquare b)  ) c ) d)
  \new Staff { c1 }
  \new Staff { c1 }
  \new Staff { c1 }
  \new Staff { c1 }
  \new Staff { c1 }
```

>>



See also

Notation Reference: [Grouping staves], page 217, [Instrument names], page 236, Section 5.1.6 [Defining new contexts], page 673.

Snippets: Section "Staff notation" in *Snippets*.

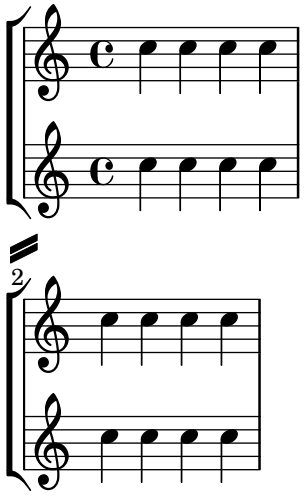
Internals Reference: Section "StaffGroup" in *Internals Reference*, Section "ChoirStaff" in *Internals Reference*, Section "SystemStartBar" in *Internals Reference*, Section "SystemStartBrace" in *Internals Reference*, Section "SystemStartBracket" in *Internals Reference*, Section "SystemStartSquare" in *Internals Reference*.

Separating systems

If the number of systems per page changes from page to page it is customary to separate the systems by placing a system separator mark between them. By default the system separator is blank, but can be turned on with a `\paper` option.

```
\book {
  \score {
    \new StaffGroup <<
      \new Staff {
        \relative {
          c''4 c c c
          \break
          c4 c c c
        }
      }
      \new Staff {
        \relative {
          c''4 c c c
          \break
          c4 c c c
        }
      }
    >>
  }
```

```
  \paper {
    system-separator-markup = \slashSeparator
    tagline = ##f
  }
}
```



See also

Notation Reference: Section 4.1 [Page layout], page 601.

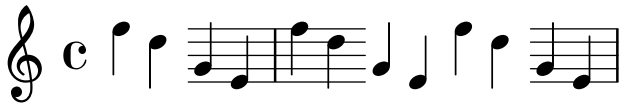
Snippets: Section "Staff notation" in *Snippets*.

1.6.2 Modifying single staves

This section explains how to change specific attributes of one staff: for example, modifying the number of staff lines or the staff size. Methods to start and stop staves and set ossia sections are also described.

Staff symbol

The `\stopStaff` and `\startStaff` commands can be used to stop or (re)start the staff lines respectively, from being printed at any point within a score.

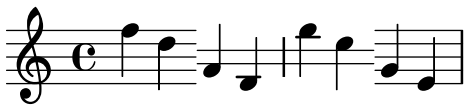
```
\relative {
  \stopStaff f''4 d \startStaff g, e
  f'4 d \stopStaff g, e
  f'4 d \startStaff g, e
}
```

Predefined commands

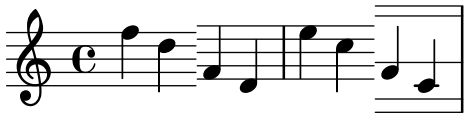
`\startStaff`, `\stopStaff`.

The lines of a staff belong to the `StaffSymbol` grob (including ledger lines) and can be modified using `StaffSymbol` properties, but these modifications must be made before the staff is (re)started.

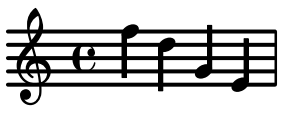
The number of staff lines can be altered:

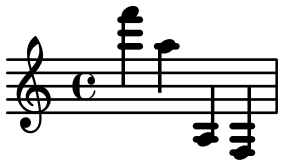
```
\relative {
  f''4 d \stopStaff
```

```
  \override Staff.StaffSymbol.line-count = #2
  \startStaff g, e |

  f'4 d \stopStaff
  \revert Staff.StaffSymbol.line-count
  \startStaff g, e |
}
```

The position of each staff line can also be altered. A list of numbers sets each line's position. `0` corresponds to the normal center line, and the normal line positions are `(-4 -2 0 2 4)`. A single staff line is printed for every value entered so that the number of staff lines, as well as their position, can be changed with a single override (thus, the `line-count` property is disregarded if `line-positions` is set).

```
\relative {
  f''4 d \stopStaff
  \override Staff.StaffSymbol.line-positions = #'(1 3 5 -1 -3)
  \startStaff g, e |
  f'4 d \stopStaff
  \override Staff.StaffSymbol.line-positions = #'(8 6.5 -6 -8 -0.5)
  \startStaff g, e |
}
```

To preserve typical stem directions (in the bottom half of the staff stems point up, in the top half they point down), align the center line (or space) of the customized staff with the position of the normal center line (0). The clef position and the position of middle C may need to be adjusted accordingly to fit the new lines. See [Clef], page 17.

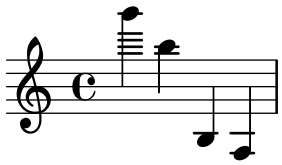
Staff line thickness can be altered. Ledger lines and note stems, by default, are also affected.

```
\new Staff \with {
  \override StaffSymbol.thickness = #3
} \relative {
  f''4 d g, e
}
```

It is also possible to set ledger line thickness independently of staff lines.

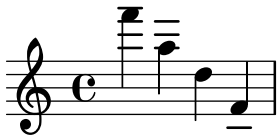
```
\new Staff \with {
  \override StaffSymbol.thickness = #2
  \override StaffSymbol.ledger-line-thickness = #'(0.5 . 0.4)
} \relative {
  f'''4 a, a,, f
}
```

The first value is multiplied by the staff line thickness, the second by the staff space and then the two values are added together to give the new thickness of the ledger line.

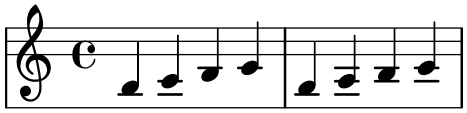
The vertical positions of ledger lines can be altered,

```
\new Staff \with {
  \override StaffSymbol.ledger-positions = #'(-3 -2 -1 2 5 6)
} \relative {
  f'''4 a, a,, f
}
```



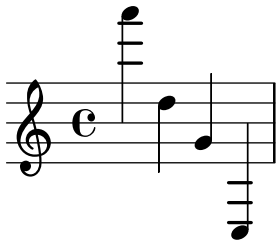
Additional ledger lines can be made to appear above or below note heads depending on the current position relative to other note heads that also have their own ledger lines.

```
\new Staff \with {
  \override StaffSymbol.ledger-extra = #4
} \relative {
  f'''4 a, d, f,
}
```

Ledger lines can also be made to appear inside the staff where custom staff lines are required. The example shows the default position of ledger lines when the explicit `ledger-position` is and is not set. The `\stopStaff` is needed in the example to revert the `\override` for the whole `StaffSymbol`.

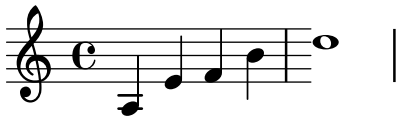
```
\relative d' {
  \override Staff.StaffSymbol.line-positions = #'(-8 0 2 4)
  d4 e f g
  \stopStaff
  \startStaff
  \override Staff.StaffSymbol.ledger-positions = #'(-8 -6 (-4 -2) 0)
  d4 e f g
}
```

The distance between staff lines can be altered. This affects ledger line spacing as well.

```
\new Staff \with {
  \override StaffSymbol.staff-space = #1.5
```

```
} \relative {
  f'''4 d, g, e,
}
```

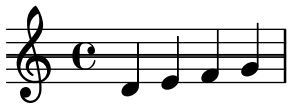


The width of a staff can be modified. The units are staff spaces. The spacing of objects inside the staff is not affected by this setting.

```
\new Staff \with {
  \override StaffSymbol.width = #23
}
\relative { a4 e' f b | d1 }
```

Selected Snippets

Making some staff lines thicker than the others

For educational purposes, a staff line can be thickened (e.g., the middle line, or to emphasize the line of the G clef). This can be achieved by adding extra lines very close to the line that should be emphasized, using the `line-positions` property of the `StaffSymbol` object.

```
{
  \override Staff.StaffSymbol.line-positions =
    #'(-4 -2 -0.2 0 0.2 2 4)
  d'4 e' f' g'
}
```

See also

Music Glossary: Section “line” in *Music Glossary*, Section “ledger line” in *Music Glossary*, Section “staff” in *Music Glossary*.

Notation Reference: [Clef], page 17.

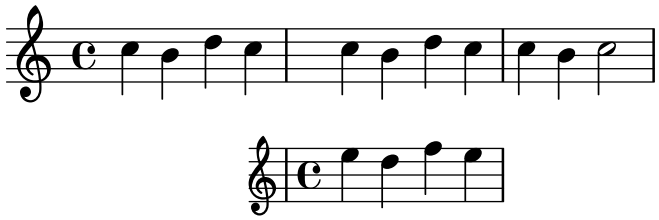
Snippets: Section “Staff notation” in *Snippets*.

Internals Reference: Section “StaffSymbol” in *Internals Reference*, Section “staff-symbol-interface” in *Internals Reference*.

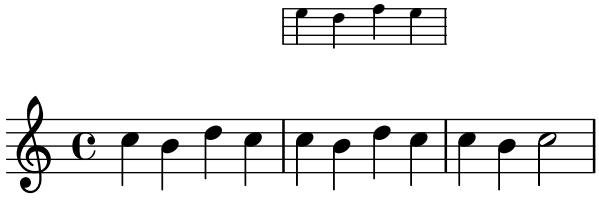
Ossia staves

Ossia staves can be set by creating a new simultaneous staff in the appropriate location:

```
\new Staff \relative {
  c''4 b d c
```

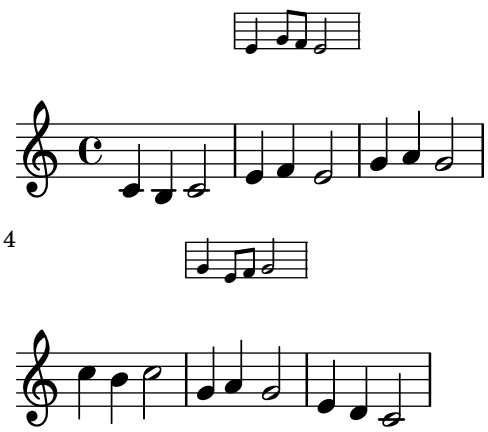
```
  <<
    { c4 b d c }
    \new Staff { e4 d f e }
  >>
  c4 b c2
}
```

However, the above example is not what is usually desired. To create ossia staves that are above the original staff, have no time signature or clef, and have a smaller font size, tweaks must be used. The Learning Manual describes a specific technique to achieve this goal, beginning with Section "Nesting music expressions" in *Learning Manual*.

The following example uses the `alignAboveContext` property to align the ossia staff. This method is most appropriate when only a few ossia staves are needed.

```
\new Staff = "main" \relative {
  c''4 b d c
  <<
    { c4 b d c }

    \new Staff \with {
      \remove Time_signature_engraver
      alignAboveContext = "main"
      \magnifyStaff #2/3
      firstClef = ##f
    }
    { e4 d f e }
  >>
  c4 b c2
}
```

If many isolated ossia staves are needed, creating an empty `Staff` context with a specific *context id* may be more appropriate; the ossia staves may then be created by *calling* this context and using `\startStaff` and `\stopStaff` at the desired locations. The benefits of this method are more apparent if the piece is longer than the following example.

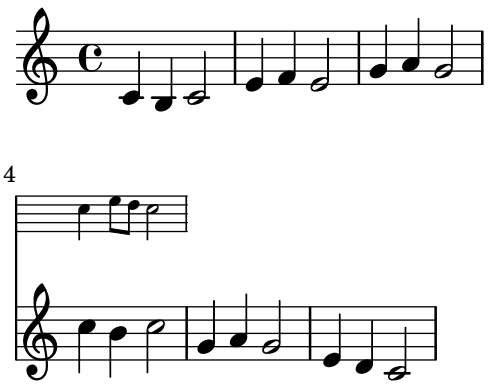
```
<<
  \new Staff = "ossia" \with {
    \remove Time_signature_engraver
    \hide Clef
    \magnifyStaff #2/3
  }
```

```
  { \stopStaff s1*6 }

  \new Staff \relative {
    c'4 b c2
    <<
      { e4 f e2 }
      \context Staff = "ossia" {
        \startStaff e4 g8 f e2 \stopStaff
      }
    >>
    g4 a g2 \break
    c4 b c2
    <<
      { g4 a g2 }
      \context Staff = "ossia" {
        \startStaff g4 e8 f g2 \stopStaff
      }
    >>
    e4 d c2
  }
>>
```



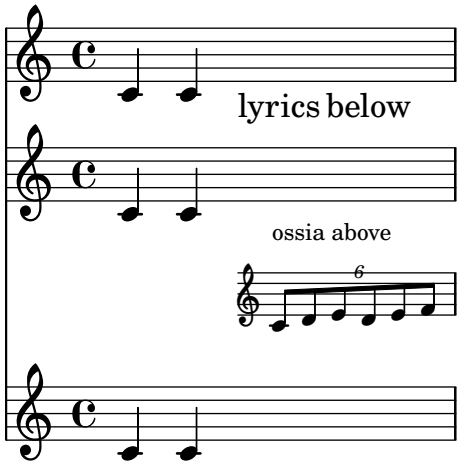
Using the `\RemoveAllEmptyStaves` command to create ossia staves may be used as an alternative. This method is most convenient when ossia staves occur immediately following a line break. For more information about `\RemoveAllEmptyStaves`, see [Hiding staves], page 231.

```
<<
  \new Staff = "ossia" \with {
    \remove Time_signature_engraver
    \hide Clef
    \magnifyStaff #2/3
    \RemoveAllEmptyStaves
  } \relative {
    R1*3
    c''4 e8 d c2
  }
  \new Staff \relative {
    c'4 b c2
    e4 f e2
    g4 a g2 \break
```

```
    c4 b c2
    g4 a g2
    e4 d c2
  }
>>
```

Selected Snippets

Vertically aligning ossias and lyrics

This snippet demonstrates the use of the context properties `alignBelowContext` and `alignAboveContext` to control the positioning of lyrics and ossias.

```
\paper {
  ragged-right = ##t
}

\relative c' <<
  \new Staff = "1" { c4 c s2 }
  \new Staff = "2" { c4 c s2 }
  \new Staff = "3" { c4 c s2 }
  { \skip 2
    <<
      \lyrics {
        \set alignBelowContext = #"1"
        lyrics4 below
      }
      \new Staff \with {
        alignAboveContext = #"3"
        fontSize = #-2
        \override StaffSymbol.staff-space = #(magstep -2)
        \remove "Time_signature_engraver"
      } {
        \tuplet 6/4 {
          \override TextScript.padding = #3
          c8[^"ossia above" d e d e f]
        }
      }
    >>
  }
>>
```

See also

Music Glossary: Section “ossia” in *Music Glossary*, Section “staff” in *Music Glossary*, Section “Frenched staff” in *Music Glossary*.

Learning Manual: Section “Nesting music expressions” in *Learning Manual*, Section “Size of objects” in *Learning Manual*, Section “Length and thickness of objects” in *Learning Manual*.

Notation Reference: [Hiding staves], page 231.

Snippets: Section “Staff notation” in *Snippets*.

Internals Reference: Section “StaffSymbol” in *Internals Reference*.

Hiding staves

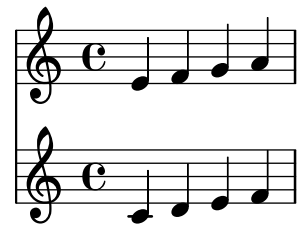
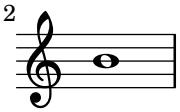
Staff lines can be hidden by removing the `Staff_symbol_engraver` from the `Staff` context. As an alternative, `\stopStaff` may be used.

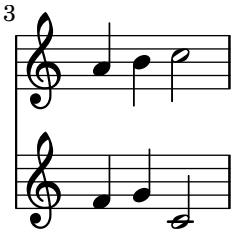
```
\new Staff \with {
  \remove Staff_symbol_engraver
}
\relative { a''8 f e16 d c b a2 }
```

Empty staves can be hidden (for a so-called ‘Frenched Score’) by applying the `\RemoveEmptyStaves` command on a context, which can be done globally (in a `\layout` block) as well as for specific staves only (in a `\with` block). This command removes all empty staves in a score except for those in the first system. If you want those in the first system to be hidden also, use `\RemoveAllEmptyStaves`.

```
\layout {
  \context {
    \Staff
    \RemoveEmptyStaves
  }
}

\relative <<
  \new Staff {
```

```
    e'4 f g a \break
    b1 \break
    a4 b c2
  }
  \new Staff {
    c,4 d e f \break
    R1 \break
    f4 g c,2
  }
>>
```





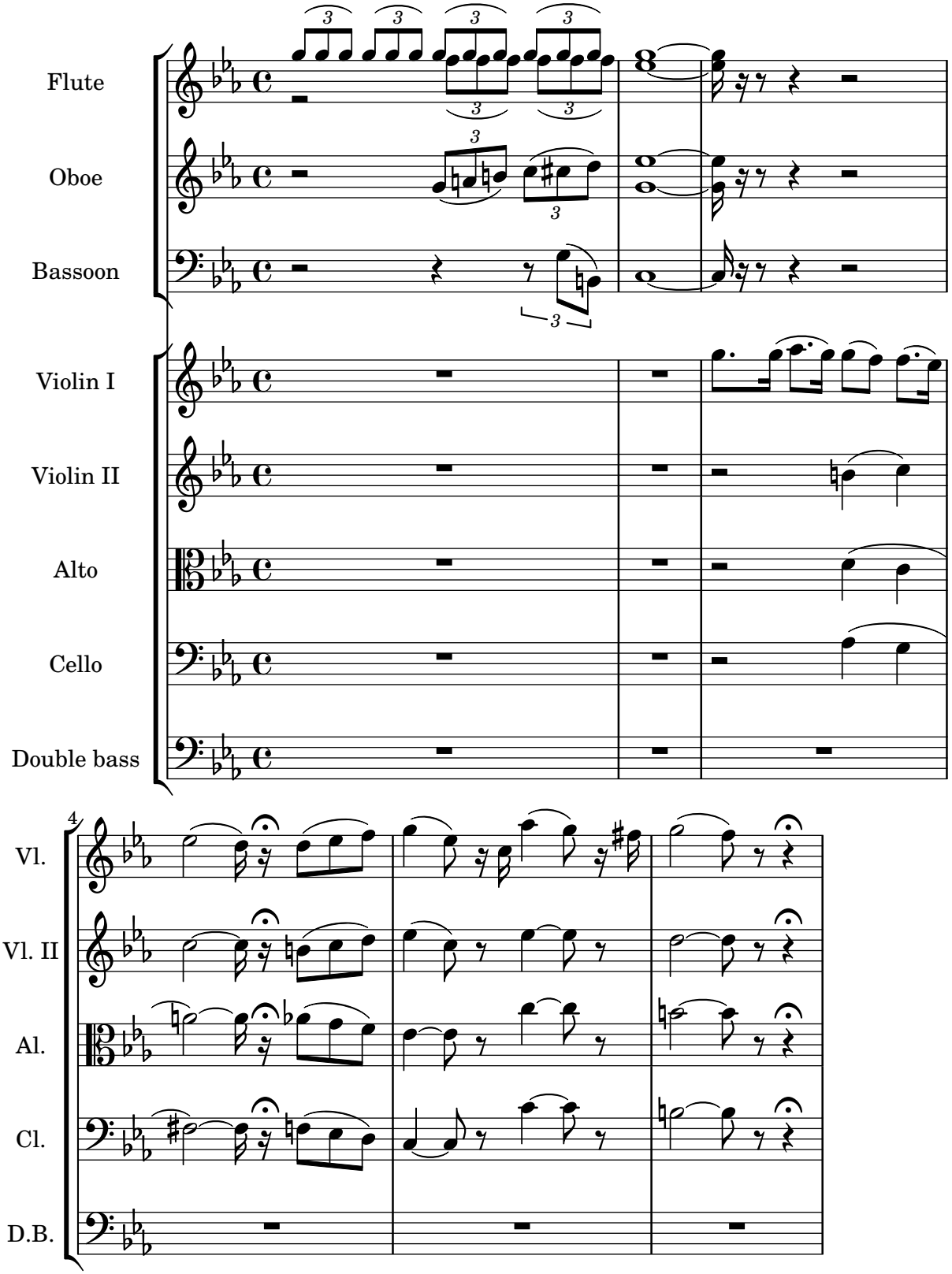
A staff is considered empty when it contains only multi-measure rests, rests, skips, or a combination of these elements. All *other* musical objects (that cause a staff not to be considered as empty) are listed in the `keepAliveInterfaces` context property, as initially set in the `ly/engraver-init.ly` file.

`\RemoveEmptyStaves` and `\RemoveAllEmptyStaves` are both predefined shortcuts that set such properties as `remove-empty` and `remove-first` for the `VerticalAxisGroup` object, as explained in Section A.22 [Context modification identifiers], page 850.

The `Keep_alive_together_engraver` allows groups of staves to only be removed together and not individually. By default, it is part of the `PianoStaff` context: a piano part will only be hidden when both of its staves are empty. Similarly, a common engraving practice in orchestral scores is to remove empty groups of staves rather than individual staves; that can be achieved by adding the `Keep_alive_together_engraver` to the relevant staff grouping context, as explained Section 5.1.4 [Modifying context plug-ins], page 667, (see [Grouping staves], page 217, for the context names).

```
\layout {
  \context {
    \StaffGroup
    \RemoveEmptyStaves
    \consists Keep_alive_together_engraver
  }
}
```

In the following example, staves devoted to wind instruments are removed in the second system; however, the double bass is not, because it is part of the larger group of fretted strings, which is playing.



The `Keep_alive_together_engraver` internally uses the `remove-layer` property of a staff's `VerticalAxisGroup` to decide whether to print it or not when it is considered empty. That

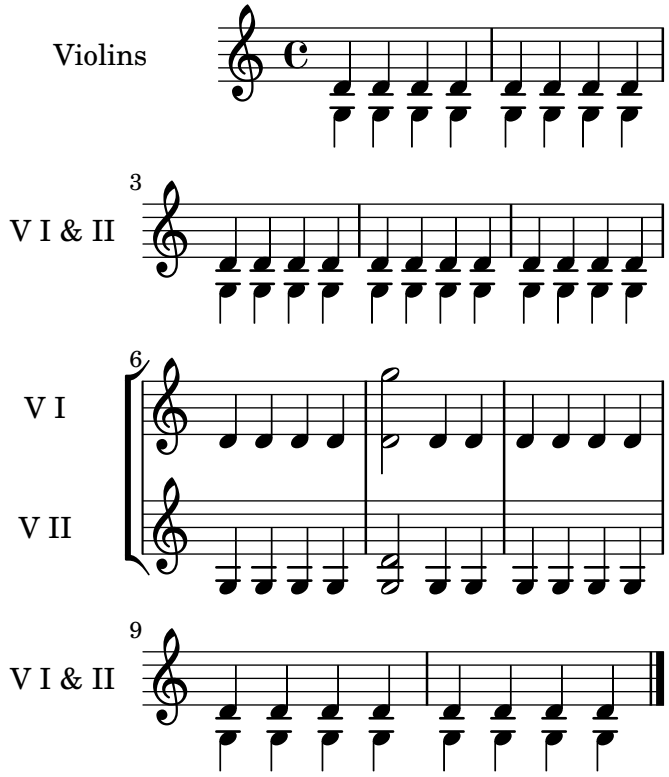
property may also be set directly, in which case it acts as a priority index: values closest to zero take precedence over higher numbers, and thus staves whose `remove-layer` is higher will be masked in favor of staves of a lower number.

This is particularly useful for 'divisi' staves, where some individual parts (see Section 1.6.3 [Writing parts], page 236) occasionally need to be expanded to more than one staff. In the following example, two parts are routed to *three* staves; however, all three staves are never printed at the same time:

- in the first systems, only a single one of them is shown, as the `keepAliveInterfaces` property has been set to an empty list – therefore the other two staves are considered empty and thus hidden, regardless of what they may contain;
- when that property gets unset (and thus reverts to its default setting), it is no longer preventing the two other staves from being printed; however, as their `remove-layer` setting is lower than the single staff's, these two staves are now printed in its place.

Such substitutions are applied not just to notes, chords and other musical events that occur immediately after the new setting, but to the whole system where it takes place.

```
\layout {
  short-indent = 2\cm
  indent = 3\cm
  \context {
    \Staff
    keepAliveInterfaces = #'()
  }
}

violI = {
  \repeat unfold 24 { d'4 }
  \once \unset Staff.keepAliveInterfaces
  <d' g''>2
  \repeat unfold 14 { d'4 }
  \bar "|."
}

violII = {
  \repeat unfold 24 { g4 }
  <g d'>2
  \repeat unfold 14 { g4 }
  \bar "|."
}

\new StaffGroup \with { \consists Keep_alive_together_engraver } <<
  \new Staff \with {
    instrumentName = "Violins"
    shortInstrumentName = "V I & II"
    \override VerticalAxisGroup.remove-layer = 2
  } <<  \violI \\ \violII  >>
  \new Staff \with {
    instrumentName = "Violin I"
    shortInstrumentName = "V I"
    \RemoveAllEmptyStaves
    \override VerticalAxisGroup.remove-layer = 1
  } \violI
```

```
  \new Staff \with {
    instrumentName = "Violin II"
    shortInstrumentName = "V II"
    \RemoveAllEmptyStaves
    \override VerticalAxisGroup.remove-layer = 1
  } \violII
>>
```

`\RemoveAllEmptyStaves` can also be used to create ossia sections for a staff. For details, see [Ossia staves], page 227.

Predefined commands

`\RemoveEmptyStaves`, `\RemoveAllEmptyStaves`.

See also

Music Glossary: Section "Frenched staff" in *Music Glossary*.

Learning Manual: Section "Visibility and color of objects" in *Learning Manual*.

Notation Reference: Section 5.1.5 [Changing context default settings], page 668, [Staff symbol], page 224, [Ossia staves], page 227, [Hidden notes], page 259, [Invisible rests], page 63, Section 5.4.7 [Visibility of objects], page 704, Section A.22 [Context modification identifiers], page 850, [Grouping staves], page 217, Section 5.1.4 [Modifying context plug-ins], page 667.

Installed Files: `ly/engraver-init.ly`.

Snippets: Section "Staff notation" in *Snippets*.

Internals Reference: Section "ChordNames" in *Internals Reference*, Section "FiguredBass" in *Internals Reference*, Section "Lyrics" in *Internals Reference*, Section "Staff" in *Internals Reference*, Section "VerticalAxisGroup" in *Internals Reference*, Section "Staff_symbol_engraver" in *Internals Reference*, Section "Axis_group_engraver" in *Internals Reference*, Section "Keep_alive_together_engraver" in *Internals Reference*.

Known issues and warnings

Removing `Staff_symbol_engraver` also hides bar lines. If bar line visibility is forced, formatting errors may occur. In this case, use the following overrides instead of removing the engraver:

```
\omit StaffSymbol
\override NoteHead.no-ledgers = ##t
```

For the Known issues and warnings associated with `\RemoveEmptyStaves` see Section 5.1.5 [Changing context default settings], page 668.

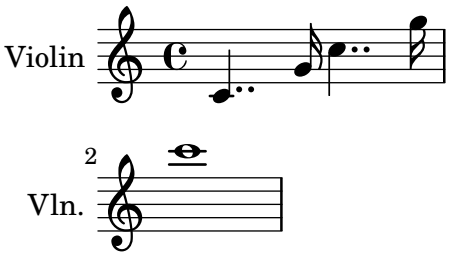
1.6.3 Writing parts

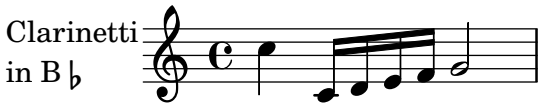
This section explains how to prepare parts for orchestral or ensemble music, which often requires to insert instrument names into the score. Methods to quote other voices and to format cue notes are also described, as well as a way to contract multiple consecutive empty measures in individual parts.

Additionally, a method for printing *divisi* staves, sometimes used in individual or desk parts, can be found in [Hiding staves], page 231.

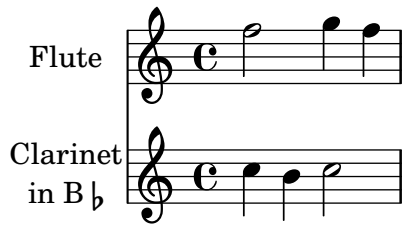
Instrument names

Instrument names can be printed on the left side of staves in the `Staff`, `PianoStaff`, `StaffGroup`, `GrandStaff` and `ChoirStaff` contexts. The value of `instrumentName` is used for the first staff, and the value of `shortInstrumentName` is used for all succeeding staves.

```
\new Staff \with {
  instrumentName = "Violin "
  shortInstrumentName = "Vln. "
} \relative {
  c'4.. g'16 c4.. g'16 \break | c1 |
}
```

`\markup` can be used to create more complex instrument names:

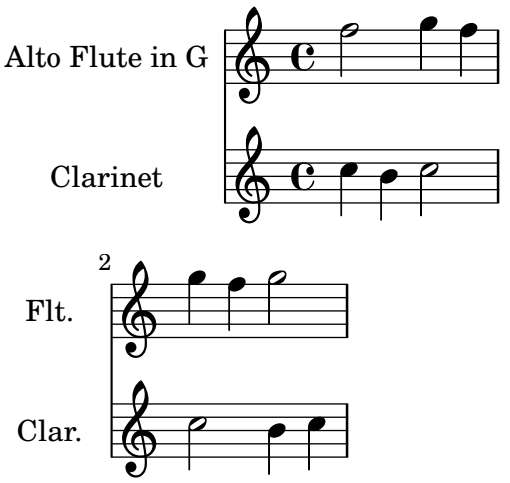
```
\new Staff \with {
  instrumentName = \markup {
    \column { "Clarinetti"
      \line { "in B" \smaller \flat }
    }
  }
} \relative {
  c''4 c,16 d e f g2
}
```

When two or more staff contexts are grouped together, the instrument names and short instrument names are centered by default. To center multi-line instrument names, `\center-column` must be used:

```
<<
  \new Staff \with {
    instrumentName = "Flute"
  } \relative {
    f''2 g4 f
}
  \new Staff \with {
    instrumentName = \markup {
      \center-column { "Clarinet"
        \line { "in B" \smaller \flat }
      }
    }
  } \relative { c''4 b c2 }
>>
```



However, if the instrument names are longer, the instrument names in a staff group may not be centered unless the `indent` and `short-indent` settings are increased. For details about these settings, see [\paper variables for shifts and indents], page 608.

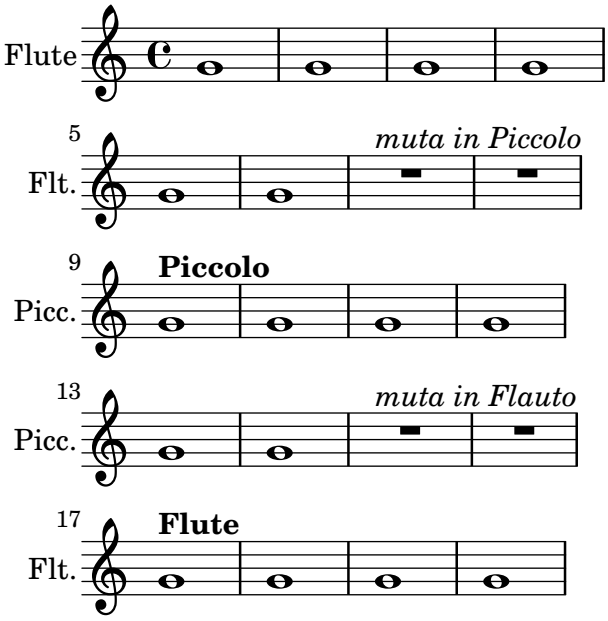
```
<<
  \new Staff \with {
    instrumentName = "Alto Flute in G"
    shortInstrumentName = "Flt."
  } \relative {
    f''2 g4 f \break
    g4 f g2
  }
  \new Staff \with {
    instrumentName = "Clarinet"
    shortInstrumentName = "Clar."
  } \relative {
    c''4 b c2 \break
    c2 b4 c
  }
>>

\layout {
  indent = 3.0\cm
  short-indent = 1.5\cm
}
```



To add instrument names to other contexts (such as `ChordNames` or `FiguredBass`), `Instrument_name_engraver` must be added to that context. For details, see Section 5.1.4 [Modifying context plug-ins], page 667.

The `shortInstrumentName` may be changed in the middle of a piece, along with other settings as needed for the new instrument. However, only the first instance of `instrumentName` will be printed and subsequent changes will be ignored:

```
prepPiccolo = <>^\markup \italic { muta in Piccolo }

prepFlute = <>^\markup \italic { muta in Flauto }

setPiccolo = {
  <>^\markup \bold { Piccolo }
  \transposition c''
}

setFlute = {
  <>^\markup \bold { Flute }
  \transposition c'
}

\new Staff \with {
  instrumentName = "Flute"
  shortInstrumentName = "Flt."
}
\relative {
  g'1 g g g \break
  g1 g \prepPiccolo R R \break
  \set Staff.instrumentName = "Piccolo"
  \set Staff.shortInstrumentName = "Picc."
  \setPiccolo
  g1 g g g \break
  g1 g \prepFlute R R \break
  \set Staff.instrumentName = "Flute"
  \set Staff.shortInstrumentName = "Flt."
  \setFlute
  g1 g g g
}
```



See also

Notation Reference: [\paper variables for shifts and indents], page 608, Section 5.1.4 [Modifying context plug-ins], page 667.

Snippets: Section "Staff notation" in *Snippets*.

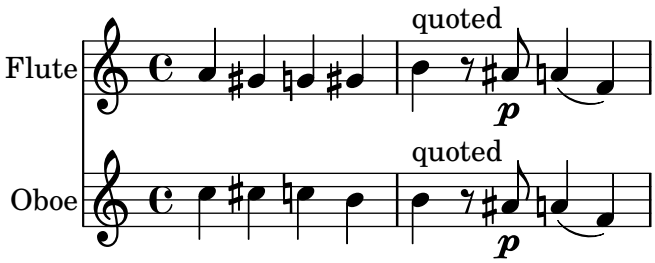
Internals Reference: Section "InstrumentName" in *Internals Reference*, Section "PianoStaff" in *Internals Reference*, Section "Staff" in *Internals Reference*.

Quoting other voices

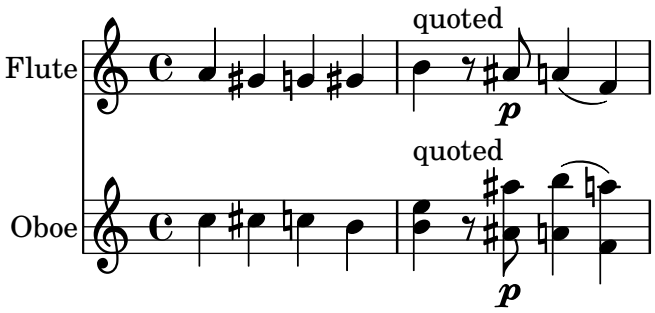
It is very common for one voice to use the same notes as those from another voice. For example, first and second violins playing the same phrase during a particular passage of the music. This is done by letting one voice *quote* the other, without having to reenter the music all over again for the second voice.

The `\addQuote` command, used in the top level scope, defines a stream of music from which fragments can be quoted.

The `\quoteDuring` command is used to indicate the point where the quotation begins. It is followed by two arguments: the name of the quoted voice, as defined with `\addQuote`, and a music expression for the duration of the quote.

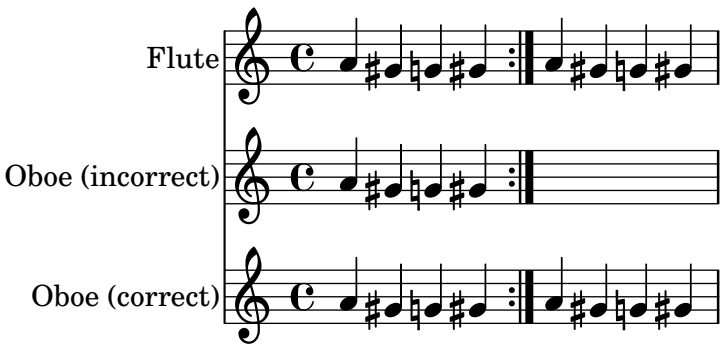
```
fluteNotes = \relative {
  a'4 gis g gis | b4^"quoted" r8 ais\p a4( f)
}

oboeNotes = \relative {
  c''4 cis c b \quoteDuring "flute" { s1 }
}

\addQuote "flute" { \fluteNotes }

\score {
  <<
    \new Staff \with { instrumentName = "Flute" } \fluteNotes
    \new Staff \with { instrumentName = "Oboe" } \oboeNotes
  >>
```

```
}
```

If the music expression used in \quoteDuring contains notes instead of spacer or multi-measure rests then the quote will appear as polyphony and may produce unexpected results.

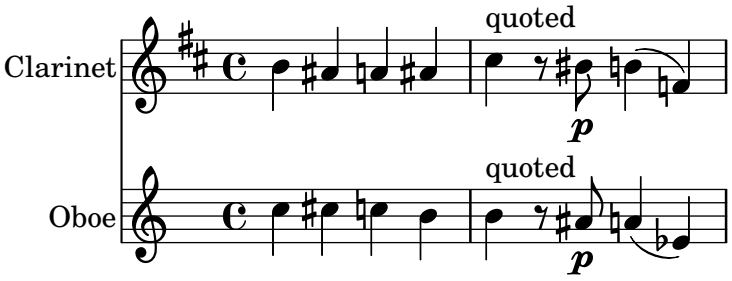
```
fluteNotes = \relative {
  a'4 gis g gis | b4^"quoted" r8 ais\p a4( f)
}

oboeNotes = \relative {
  c''4 cis c b \quoteDuring "flute" { e4 r8 ais b4 a }
}

\addQuote "flute" { \fluteNotes }

\score {
  <<
    \new Staff \with { instrumentName = "Flute" } \fluteNotes
    \new Staff \with { instrumentName = "Oboe" } \oboeNotes
  >>
}
```

If an \unfoldRepeats command in a music expression is required to be printed when using \quoteDuring, then it too must also contain its own \unfoldRepeats command;

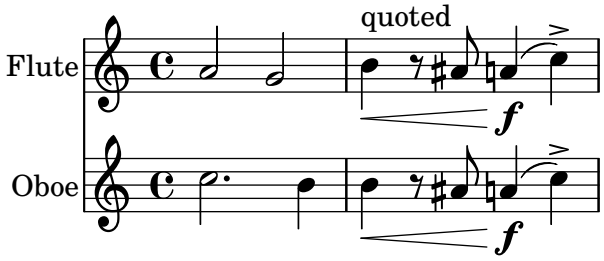
```
fluteNotes = \relative {
  \repeat volta 2 { a'4 gis g gis }
}

oboeNotesDW = \relative {
  \repeat volta 2 \quoteDuring "incorrect" { s1 }
}

oboeNotesW = \relative {
  \repeat volta 2 \quoteDuring "correct" { s1 }
}
```

```
\addQuote "incorrect" { \fluteNotes }

\addQuote "correct" { \unfoldRepeats \fluteNotes }

\score {
  \unfoldRepeats
  <<
    \new Staff \with { instrumentName = "Flute" }
    \fluteNotes
    \new Staff \with { instrumentName = "Oboe (incorrect)" }
    \oboeNotesDW
    \new Staff \with { instrumentName = "Oboe (correct)" }
    \oboeNotesW
  >>
}
```



The \quoteDuring command uses the \transposition settings of both quoted and quoting parts to produce notes for the quoting part that have the same sounding pitch as those in the quoted part.

```
clarinetNotes = \relative c'' {
  \transposition bes
  \key d \major
  b4 ais a ais | cis4^"quoted" r8 bis\p b4( f)
}

oboeNotes = \relative {
  c''4 cis c b \quoteDuring "clarinet" { s1 }
}

\addQuote "clarinet" { \clarinetNotes }


\score {
  <<
    \new Staff \with { instrumentName = "Clarinet" } \clarinetNotes
    \new Staff \with { instrumentName = "Oboe" } \oboeNotes
  >>
}
```

By default quoted music will include all articulations, dynamics, markups, etc., in the quoted expression. It is possible to choose which of these objects from the quoted music are displayed by using the quotedEventTypes context property.

```
fluteNotes = \relative {
  a'2 g2 |
  b4\<^"quoted" r8 ais a4\f( c->)
 }

oboeNotes = \relative {
  c''2. b4 |
  \quoteDuring "flute" { s1 }
}

\addQuote "flute" { \fluteNotes }

\score {
  <<
    \set Score.quotedEventTypes = #'(note-event articulation-event
                                     crescendo-event rest-event
                                     slur-event dynamic-event)
    \new Staff \with { instrumentName = "Flute" } \fluteNotes
    \new Staff \with { instrumentName = "Oboe" } \oboeNotes
  >>
 }
```

Quotes can also be tagged, see [Using tags], page 570.

See also

Notation Reference: [Instrument transpositions], page 27, [Using tags], page 570.

Installed Files: `scm/define-event-classes.scm`.

Snippets: Section “Staff notation” in *Snippets*.

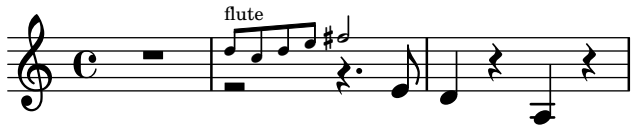
Internals Reference: Section “Music classes” in *Internals Reference*, Section “QuoteMusic” in *Internals Reference*, Section “Voice” in *Internals Reference*.

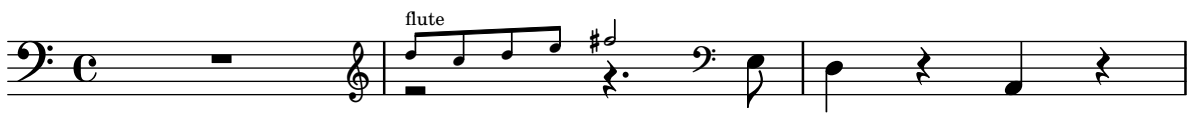
Known issues and warnings

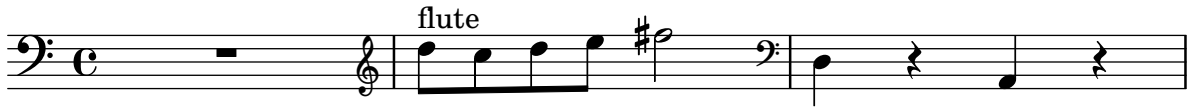
Only the contents of the first `Voice` occurring in an `\addQuote` command will be considered for quotation, so if the music expression contains `\new` or `\context Voice` statements, their contents will not be quoted. Quoting grace notes is unsupported and may cause LilyPond to crash whereas quoting nested triplets may result in poor notation.

Formatting cue notes

The simplest way to format cue notes is to explicitly create a `CueVoice` context within the part.

```
\relative {
  R1
  <<
    { e'2\rest r4. e8 }
    \new CueVoice {
      \stemUp d'8^"flute" c d e fis2
    }
  >>
  d,4 r a r
}
```

The `\cueClef` command can also be used with an explicit `CueVoice` context if a change of clef is required and will print an appropriately sized clef for the cue notes. The `\cueClefUnset` command can then be used to switch back to the original clef, again with an appropriately sized clef.

```
\relative {
  \clef "bass"
  R1
  <<
    { e'2\rest r4. \cueClefUnset e,8 }
    \new CueVoice {
      \cueClef "treble" \stemUp d''8^"flute" c d e fis2
    }
  >>
  d,,4 r a r
}
```

The `\cueClef` and `\cueClefUnset` command can also be used without a `CueVoice` if required.

```
\relative {
  \clef "bass"
  R1
  \cueClef "treble"
  d''8^"flute" c d e fis2
  \cueClefUnset
  d,,4 r a r
```

```
}
```

For more complex cue note placement, e.g including transposition, or inserting cue notes from multiple music sources the `\cueDuring` or `\cueDuringWithClef` commands can be used. These are more specialized form of `\quoteDuring`, see [Quoting other voices], page 239, in the previous section.

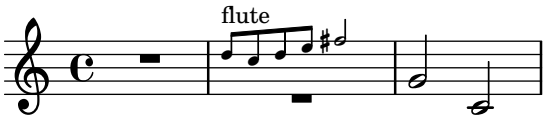
The syntax is:

```
\cueDuring quotename #direction music
```

and

```
\cueDuringWithClef quotename #direction #clef music
```

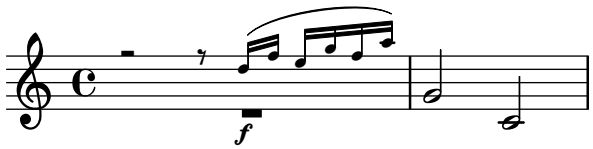
The music from the corresponding measures of the *quote name* is added as a `CueVoice` context and occurs simultaneously with the *music*, which then creates a polyphonic situation. The *direction* takes the argument `UP` or `DOWN`, and corresponds to the first and second voices respectively, determining how the cue notes are printed in relation to the other voice.

```
fluteNotes = \relative {
  r2. c''4 | d8 c d e fis2 | g2 d |
}

oboeNotes = \relative c'' {
  R1
  <>^\markup \tiny { flute }
  \cueDuring "flute" #UP { R1 }
  g2 c,
}

\addQuote "flute" { \fluteNotes }

\new Staff {
  \oboeNotes
}
```

It is possible to adjust which aspects of the music are quoted with `\cueDuring` by setting the `quotedCueEventTypes` property. Its default value is `'(note-event rest-event tie-event beam-event tuplet-span-event)`, which means that only notes, rests, ties, beams and tuplets are quoted, but not articulations, dynamic marks, markup, etc.

> **Note:** When a `Voice` starts with `\cueDuring`, as in the following example, the `Voice` context must be explicitly declared, or else the entire music expression would belong to the `CueVoice` context.

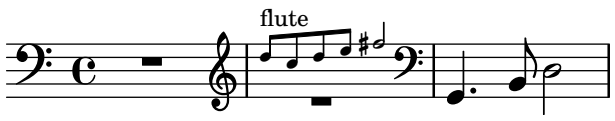
```
oboeNotes = \relative {
  r2 r8 d''16(\f f e g f a)
  g8 g16 g g2.
```

```
}
\addQuote "oboe" { \oboeNotes }

\new Voice \relative c'' {
  \set Score.quotedCueEventTypes = #'(note-event rest-event tie-event
                                      beam-event tuplet-span-event
                                      dynamic-event slur-event)
  \cueDuring "oboe" #UP { R1 }
  g2 c,
}
```



Markup can be used to show the name of the quoted instrument. If the cue notes require a change in clef, this can be done manually but the original clef should also be restored manually at the end of the cue notes.

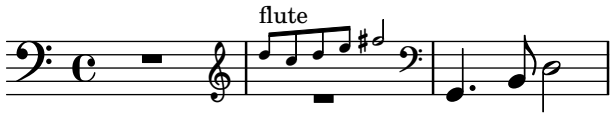
```
fluteNotes = \relative {
  r2. c''4 d8 c d e fis2 g2 d2
}

bassoonNotes = \relative c {
  \clef bass
  R1
  \clef treble
  <>^\markup \tiny { flute }
  \cueDuring "flute" #UP { R1 }
  \clef bass
  g4. b8 d2
}

\addQuote "flute" { \fluteNotes }

\new Staff {
  \bassoonNotes
}
```



Alternatively, the \cueDuringWithClef function can be used instead. This command takes an extra argument to specify the change of clef that needs to be printed for the cue notes but will automatically print the original clef once the cue notes have finished.

```
fluteNotes = \relative {
  r2. c''4 d8 c d e fis2 g2 d2
}

bassoonNotes = \relative c {
  \clef bass
```

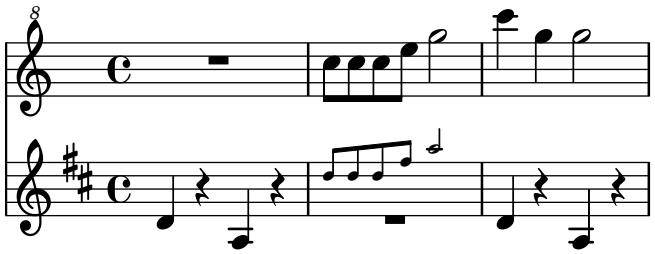
```
  R1
  <>^\markup { \tiny "flute" }
  \cueDuringWithClef "flute" #UP "treble" { R1 }
  g4. b8 d2
}

\addQuote "flute" { \fluteNotes }

\new Staff {
  \bassoonNotes
}
```



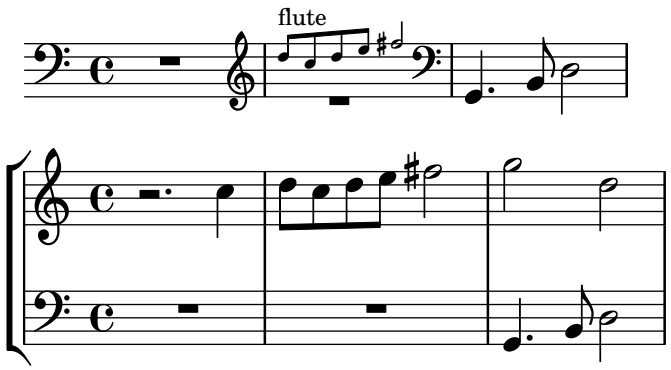
Like \quoteDuring, \cueDuring takes instrument transpositions into account. Cue notes are produced at the pitches that would be written for the instrument receiving the cue to produce the sounding pitches of the source instrument.

To transpose cue notes differently, use \transposedCueDuring. This command takes an extra argument to specify (in absolute mode) the printed pitch that you want to represent the sound of a concert middle C. This is useful for taking cues from an instrument in a completely different register.

```
piccoloNotes = \relative {
  \clef "treble^8"
  R1
  c'''8 c c e g2
  c4 g g2
}

bassClarinetNotes = \relative c' {
  \key d \major
  \transposition bes,
  d4 r a r
  \transposedCueDuring "piccolo" #UP d { R1 }
  d4 r a r
}

\addQuote "piccolo" { \piccoloNotes }

<<
  \new Staff \piccoloNotes
  \new Staff \bassClarinetNotes
>>
```



The \killCues command removes cue notes from a music expression, so the same music expression can be used to produce the instrument part with cues and the score. The \killCues command removes only the notes and events that were quoted by \cueDuring. Other markup associated with cues, such as clef changes and a label identifying the source instrument, can be tagged for selective inclusion in the score; see [Using tags], page 570.

```
fluteNotes = \relative {
  r2. c''4 d8 c d e fis2 g2 d2
}

bassoonNotes = \relative c {
  \clef bass
  R1
  \tag #'part {
    \clef treble
    <>^\markup \tiny { flute }
  }
  \cueDuring "flute" #UP { R1 }
  \tag #'part \clef bass
  g4. b8 d2
}

\addQuote "flute" { \fluteNotes }

\new Staff {
  \bassoonNotes
}

\new StaffGroup <<
  \new Staff {
    \fluteNotes
  }
  \new Staff {
    \removeWithTag #'part { \killCues { \bassoonNotes } }
  }
>>
```

See also

Notation Reference: [Quoting other voices], page 239, [Instrument transpositions], page 27, [Instrument names], page 236, [Clef], page 17, [Musical cues], page 360, [Using tags], page 570.

Snippets: Section “Staff notation” in *Snippets*.

Internals Reference: Section “CueVoice” in *Internals Reference*, Section “Voice” in *Internals Reference*.

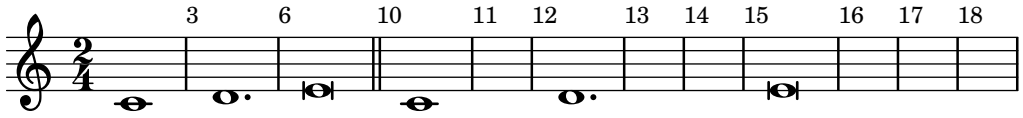
Known issues and warnings

Collisions can occur with rests, when using `\cueDuring`, between `Voice` and `CueVoice` contexts. When using `\cueDuringWithClef` or `\transposedCueDuring` the extra argument required for each case must come after the quote and the direction.

Compressing empty measures

By default, all measures are printed even if they are empty – which can happen if a rhythmic event (such as notes, rests or invisible rests) is so long as to span several measures. This behavior can be changed by contracting all empty measures into a single one, as illustrated here (the second part of this example, with expanded measures, actually reverts back to the default behavior):

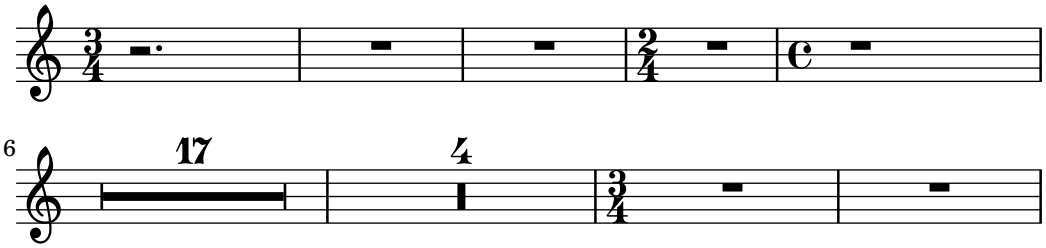
```
\override Score.BarNumber.break-visibility = ##(#f #t #t)
\time 2/4
\compressEmptyMeasures
c'1 d'1. e'\breve
\bar "||"
\expandEmptyMeasures
c'1 d'1. e'\breve
```



Although that notation is syntactically correct, it may be confusing from a musical point of view, as illustrated in the previous example; hence the need for measure numbers to be explicitly printed, using the syntax described in [Using `break-visibility`], page 706.

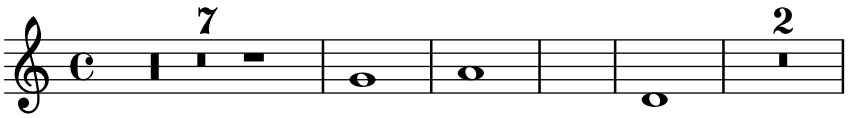
Where such a notation may become more useful is when applied to [Full measure rests], page 66. A multi-measure rest will then be shown as a single measure containing a multi-measure rest symbol, with the number of measures of rest printed above the measure:

```
% Default behavior
\time 3/4 r2. | R2.*2 |
\time 2/4 R2 |
\time 4/4
% Rest measures contracted to single measure
\compressEmptyMeasures
r1 | R1*17 | R1*4 |
\expandEmptyMeasures
% Rest measures expanded again
\time 3/4
R2.*2 |
```



Unlike \compressEmptyMeasures, the music function \compressMMRests will only apply to rests, leaving any other events uncompressed. As a function rather than a property setting, its syntax differs slightly in that it must be followed by a music expression:

```
\compressMMRests {
  % Rests are compressed...
  R1*7
  % ... but notes can still span multiple measures.
  g'1 a'1*2 d'1
  R1*2
}
```



All of the commands described in this section actually rely on the skipBars internal property, which is set in the Score context as explained in Section 5.3.2 [The \set command], page 681.

Predefined commands

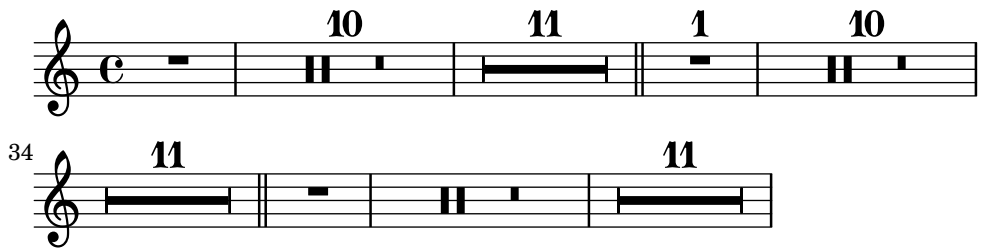
\compressEmptyMeasures, \expandEmptyMeasures, \compressMMRests.

Selected Snippets

Numbering single measure rests

Multi measure rests show their length by a number except for single measures. This can be changed by setting restNumberThreshold.

```
{
  \compressEmptyMeasures
  R1 R1*10 R1*11 \bar "||"
  \set restNumberThreshold = 0
  R1 R1*10 R1*11 \bar "||"
  \set restNumberThreshold = 10
  R1 R1*10 R1*11
}
```

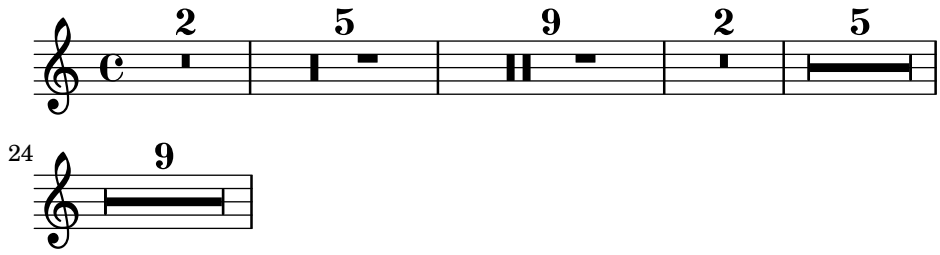


Changing form of multi-measure rests

If there are ten or fewer measures of rests, a series of longa and breve rests (called in German "Kirchenpausen" - church rests) is printed within the staff; otherwise a simple line is shown. This default number of ten may be changed by overriding the expand-limit property.

```
\relative c'' {
  \compressMMRests {
    R1*2 | R1*5 | R1*9
    \override MultiMeasureRest.expand-limit = #3
    R1*2 | R1*5 | R1*9
```

```
  }
}
```

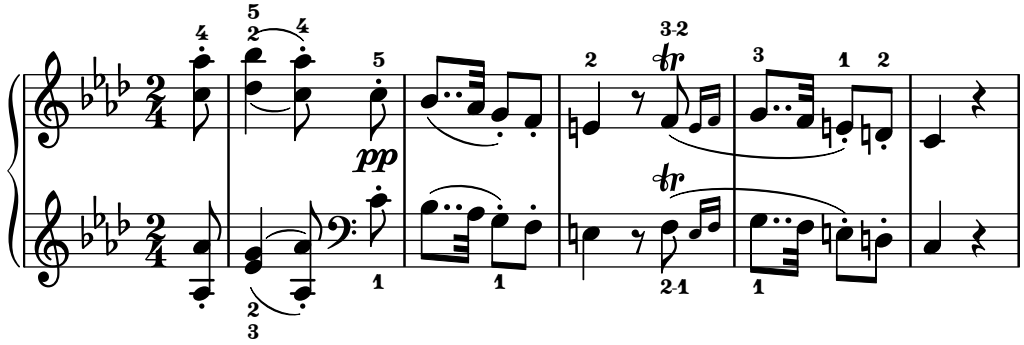


See also

Notation Reference: [Using `break-visibility`], page 706, [Full measure rests], page 66, Section 5.3.2 [The `\set` command], page 681.

Internals Reference: Section "MultiMeasureRest" in *Internals Reference*, Section "MultiMeasureRestNumber" in *Internals Reference*, Section "MultiMeasureRestScript" in *Internals Reference*, Section "MultiMeasureRestText" in *Internals Reference*.

1.7 Editorial annotations



This section discusses the various ways to change the appearance of notes and add analysis or educational emphasis.

1.7.1 Inside the staff

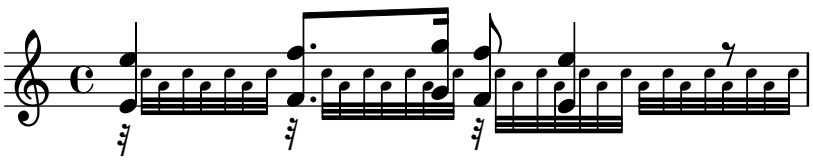
This section discusses how to add emphasis to elements that are inside the staff.

Selecting notation font size

> **Note:**
> For font sizes of text, see [Selecting font and font size], page 293.
> For staff size, see Section 4.2.2 [Setting the staff size], page 614.
> For cue notes, see [Formatting cue notes], page 243.
> For ossia staves, see [Ossia staves], page 227.

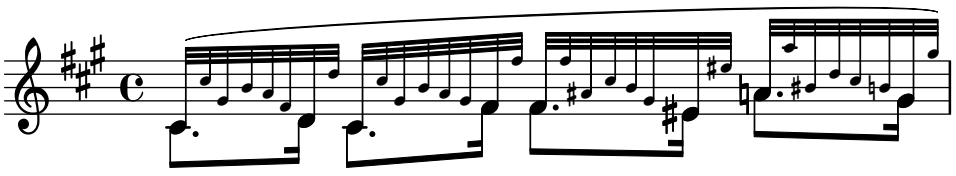
To change the size of the notation without changing the staff size, specify a magnification factor with the `\magnifyMusic` command:

```
\new Staff <<
  \new Voice \relative {
    \voiceOne
    <e' e'>4 <f f'>8. <g g'>16 <f f'>8 <e e'>4 r8
```

```
  }
  \new Voice \relative {
    \voiceTwo
    \magnifyMusic 0.63 {
      \override Score.SpacingSpanner.spacing-increment = #(* 1.2 0.63)
      r32 c'' a c a c a c r c a c a c a c
      r c a c a c a c a c a c a c a c
    }
  }
>>
```

The \override in the example above is a bug workaround. See the "Known issues and warnings" at the end of this section.

If a normal sized note head is merged with a smaller one, the size of the smaller note may need to be reset (with '\once \normalsize') so that the stems and accidentals align properly:

```
\new Staff <<
  \key fis \minor
  \mergeDifferentlyDottedOn
  \new Voice \relative {
    \voiceOne
    \magnifyMusic 0.63 {
      \override Score.SpacingSpanner.spacing-increment =
        #(* 1.2 0.63)

      \once \normalsize cis'32( cis' gis b a fis
        \once \normalsize d d'
      \once \normalsize cis, cis' gis b a gis
        \once \normalsize fis fis'
      \once \normalsize fis, fis' ais, cis b gis
        \once \normalsize eis eis'
      \once \normalsize a, a' bis, d cis b
        \once \normalsize gis gis')
    }
  }
  \new Voice \relative {
    \voiceTwo
    cis'8. d16 cis8. fis16 fis8. eis16 a8. gis16
  }
>>
```



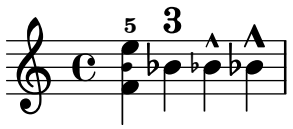
The \magnifyMusic command is not intended for cue notes, grace notes, or ossia staves—there are more appropriate methods of entering each of those constructs. Instead, it is useful

when the notation size changes in a single instrumental part on one staff, and where grace notes are not appropriate, such as in cadenza-like passages or in cases such as the above examples. Setting the `\magnifyMusic` value to 0.63 duplicates the dimensions of the `CueVoice` context.

> **Note:** The `\magnifyMusic` command should *not* be used when also resizing the staff. See Section 4.2.2 [Setting the staff size], page 614.

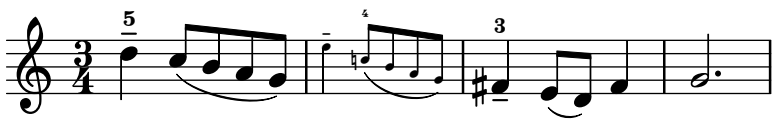
Resizing individual layout objects

An individual layout object can be resized by using the `\tweak` or `\override` commands to adjust its `font-size` property:

```
\relative {
  % resize a note head
  <f' \tweak font-size -4 b e>-5
  % resize a fingering
  bes-\tweak font-size 0 -3
  % resize an accidental
  \once \override Accidental.font-size = -4 bes!-^
  % resize an articulation
  \once \override Script.font-size = 4 bes!-^
}
```

The default `font-size` value for each layout object is listed in the Internals Reference. The `font-size` property can only be set for layout objects that support the `font-interface` layout interface. If `font-size` is not specified in the object's 'Standard settings' list, its value is 0. See Section "All layout objects" in *Internals Reference*.

Understanding the `fontSize` *property*

The `fontSize` context property adjusts the relative size of all glyph-based notational elements in a context:

```
\relative {
  \time 3/4
  d''4---5 c8( b a g) |
  \set fontSize = -6
  e'4-- c!8-4( b a g) |
  \set fontSize = 0
  fis4---3 e8( d) fis4 |
  g2.
}
```

The `fontSize` value is a number indicating the size relative to the standard size for the current staff height. The default `fontSize` is 0; adding 6 to any `fontSize` value doubles the printed size of the glyphs, and subtracting 6 halves the size. Each step increases the size by approximately 12%.

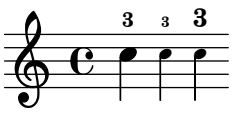
The scheme function `magnification->font-size` is provided for convenience since the logarithmic units of the `font-size` property are not entirely intuitive. For example, to adjust the musical notation to 75% of the default size, use:

```
\set fontSize = #(magnification->font-size 0.75)
```

The scheme function `magstep` does the opposite: it converts a `font-size` value into a magnification factor.

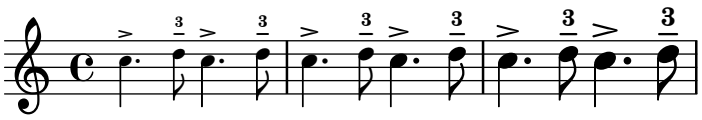
The `fontSize` property will only affect notational elements that are drawn with glyphs, such as note heads, accidentals, scripts, etc. It will not affect the size of the staff itself, nor will it scale stems, beams, or horizontal spacing. To scale stems, beams, and horizontal spacing along with the notation size (without changing the staff size), use the `\magnifyMusic` command discussed above. To scale everything, including the staff size, see Section 4.2.2 [Setting the staff size], page 614.

Whenever the `fontSize` *context property* is set, its value is added to the value of the `font-size` *grob property* for individual layout objects, before any glyphs are printed. This can cause confusion when setting individual `font-size` properties while `fontSize` is already set:

```
% the default font-size for NoteHead is 0
% the default font-size for Fingering is -5
c''4-3

\set fontSize = -3
% the effective font size for NoteHead is now -3
% the effective font size for Fingering is now -8
c''4-3

\override Fingering.font-size = 0
% the effective font size for Fingering is now -3
c''4-3
```

The following shorthand commands are also available:

Command	Equivalent to	Relative size
`\teeny`	`\set fontSize = -3`	71%
`\tiny`	`\set fontSize = -2`	79%
`\small`	`\set fontSize = -1`	89%
`\normalsize`	`\set fontSize = 0`	100%
`\large`	`\set fontSize = 1`	112%
`\huge`	`\set fontSize = 2`	126%

```
\relative c'' {
  \teeny
  c4.-> d8---3
  \tiny
  c4.-> d8---3
  \small
  c4.-> d8---3
  \normalsize
  c4.-> d8---3
  \large
```

```
  c4.-> d8---3
  \huge
  c4.-> d8---3
}
```

Font size changes are achieved by scaling the design size that is closest to the desired size. The standard font size (for `font-size = 0`) depends on the standard staff height. For a 20 pt staff, an 11 pt font is selected.

Predefined commands

`\magnifyMusic`, `\teeny`, `\tiny`, `\small`, `\normalsize`, `\large`, `\huge`.

See also

Notation Reference: [Selecting font and font size], page 293, Section 4.2.2 [Setting the staff size], page 614, [Formatting cue notes], page 243, [Ossia staves], page 227.

Installed Files: `ly/music-functions-init.ly`, `ly/property-init.ly`.

Snippets: Section "Editorial annotations" in *Snippets*.

Internals Reference: Section "font-interface" in *Internals Reference*.

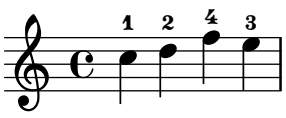
Known issues and warnings

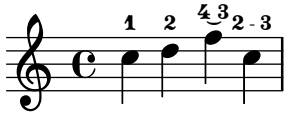
There are currently two bugs that are preventing proper horizontal spacing when using `\magnifyMusic`. There is only one available workaround, and it is not guaranteed to work in every case. In the example below, replace the *mag* variable with your own value. You may also try removing one or both of the `\newSpacingSection` commands, and/or the `\override` and `\revert` commands:

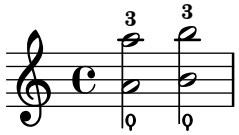
```
\magnifyMusic mag {
  \newSpacingSection
  \override Score.SpacingSpanner.spacing-increment = #(* 1.2 mag)
  [music]
  \newSpacingSection
  \revert Score.SpacingSpanner.spacing-increment
}
```

Fingering instructions

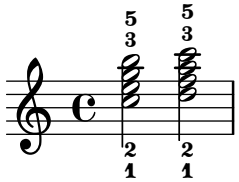
Fingering instructions can be entered using '*note-digit*':

```
\relative { c''4-1 d-2 f-4 e-3 }
```

Markup texts or strings may be used for finger changes.

```
\relative {
  c''4-1 d-2 f\finger \markup \tied-lyric "4~3" c\finger "2 - 3"
}
```

A thumb fingering can be added (e.g., cello music) to indicate that a note should be played with the thumb.

```
\relative { <a'_\thumb a'-3>2 <b_\thumb b'-3> }
```

Fingerings for chords can also be added to individual notes by adding them after the pitches.

```
\relative {
  <c''-1 e-2 g-3 b-5>2 <d-1 f-2 a-3 c-5>
}
```



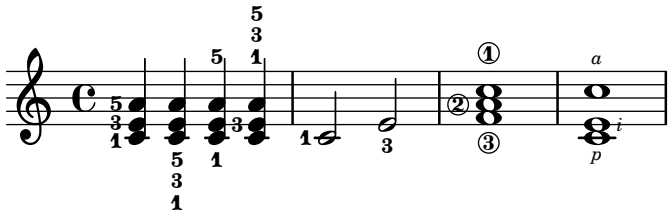
Fingering instructions may be manually placed above or below the staff, see Section 5.4.1 [Direction and placement], page 694.

Selected Snippets

Controlling the placement of chord fingerings

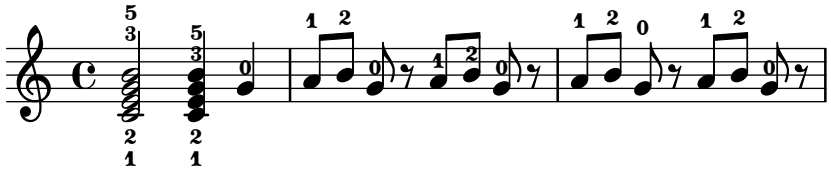
The placement of fingering numbers can be controlled precisely. For fingering orientation to apply, it must be used within a chord construct <>, even for single notes. Orientation for string numbers and right-hand fingerings may be set in a similar way.

```
\relative c' {
  \set fingeringOrientations = #'(left)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(down)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(down right up)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(up)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(left)
  <c-1>2
  \set fingeringOrientations = #'(down)
  <e-3>2
  \set stringNumberOrientations = #'(up left down)
  <f\3 a\2 c\1>1
  \set strokeFingerOrientations = #'(down right up)
  <c\rightHandFinger #1 e\rightHandFinger #2 c'\rightHandFinger #4 >
}
```



Allowing fingerings to be printed inside the staff

By default, vertically oriented fingerings are positioned outside the staff; that behavior, however, may be disabled. Attention needs to be paid to situations where fingerings and stems are in the same direction: by default, fingerings will avoid only beamed stems. That setting can be changed to avoid no stems or all stems; the following example demonstrates these two options, as well as how to go back to the default behavior.

```
\relative c' {
  <c-1 e-2 g-3 b-5>2
  \override Fingering.staff-padding = #'()
  <c-1 e-2 g-3 b-5>4 g'-0
  a8[-1 b]-2 g-0 r
  \override Fingering.add-stem-support = ##f
  a[-1 b]-2 g-0 r
  \override Fingering.add-stem-support = ##t
  a[-1 b]-2 g-0 r
  \override Fingering.add-stem-support = #only-if-beamed
  a[-1 b]-2 g-0 r
}
```

See also

Notation Reference: Section 5.4.1 [Direction and placement], page 694.

Snippets: Section “Editorial annotations” in *Snippets*.

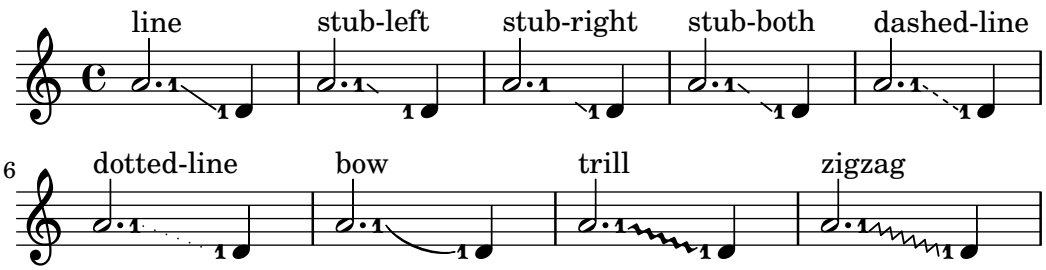
Internals Reference: Section “FingeringEvent” in *Internals Reference*, Section “fingering-event” in *Internals Reference*, Section “Fingering_engraver” in *Internals Reference*, Section “New_fingering_engraver” in *Internals Reference*, Section “Fingering” in *Internals Reference*.

Gliding fingers

For stringed instruments a gliding finger is often indicated by a line connecting the same finger to be used for notes played at different positions on the same string. This line is initiated with `\glide` entered before a `Fingering` and ends with the next occurrence of the same finger. The line may be printed in various styles.

```
mus = {
  \set fingeringOrientations = #'(right)
  <a'\glide-1>2.
  \set fingeringOrientations = #'(left)
  <d'-1>4
}
```

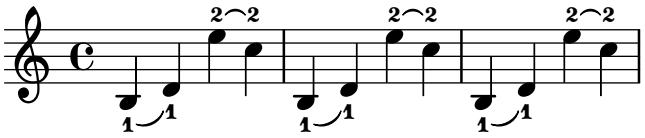
```
{
  <>^"line"
  \mus
  <>^"stub-left"
  \override FingerGlideSpanner.style = #'stub-left
  \mus
  <>^"stub-right"
  \override FingerGlideSpanner.style = #'stub-right
  \mus
  <>^"stub-both"
  \override FingerGlideSpanner.style = #'stub-both
  \mus
  <>^"dashed-line"
  \override FingerGlideSpanner.style = #'dashed-line
  \mus
  \break
  <>^"dotted-line"
  \override FingerGlideSpanner.style = #'dotted-line
  \mus
  <>^"bow"
  \override FingerGlideSpanner.style = #'bow
  \mus
  <>^"trill"
  \override FingerGlideSpanner.style = #'trill
  \mus
  <>^"zigzag"
  \override FingerGlideSpanner.style = #'zigzag
  \mus
}
```



If `style` is set to `'bow` the direction of the bow may be adjusted using direction modifiers.

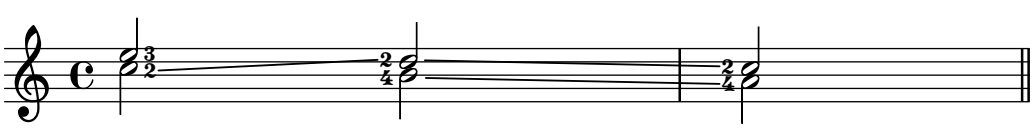
```
{
  \override FingerGlideSpanner.style = #'bow
  \set fingeringOrientations = #'(down)
  <b\glide-1>4 <d'-1>
  \set fingeringOrientations = #'(up)
  <e''\glide-2> <c''-2>

  \set fingeringOrientations = #'(down)
  <b^\glide-1>4 <d'-1>
  \set fingeringOrientations = #'(up)
  <e''^\glide-2> <c''-2>

  \set fingeringOrientations = #'(down)
```

```
  <b_\glide-1>4 <d'-1>
  \set fingeringOrientations = #'(up)
  <e''_\glide-2> <c''-2>
}
```



If the Finger_glide_engraver is moved to Staff context Fingering grobs from different Voice contexts may be connected.

```
\score {
  \new Staff <<
    \new Voice {
      \voiceOne
      \set fingeringOrientations = #'(right)
      <e''-3>2
      \set fingeringOrientations = #'(left)
      <d''-\tweak bound-details.left.padding #2.5 \glide-2>
      <c''-2>
      \bar "||"
    }
    \new Voice {
      \voiceTwo
      \set fingeringOrientations = #'(right)
      <c''\glide-2>
      \set fingeringOrientations = #'(left)
      <b'-\tweak bound-details.left.padding #2.5 \glide-4>
      <a'-4>
    }
  >>
  \layout {
    ragged-right = ##f
    \context {
      \Voice
      \remove Finger_glide_engraver
    }
    \context {
      \Staff
      \consists Finger_glide_engraver
    }
  }
}
```



See also

Notation Reference: Section 5.4.1 [Direction and placement], page 694.

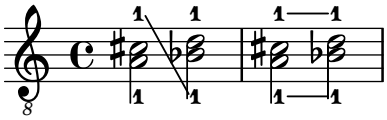
Internals Reference: Section “FingeringGlideEvent” in *Internals Reference*, Section “fingering-glide-event” in *Internals Reference*, Section “Finger_glide_engraver” in *Internals Ref-*

erence, Section “finger-glide-interface” in *Internals Reference*, Section “FingerGlideSpanner” in *Internals Reference*.

Known issues and warnings

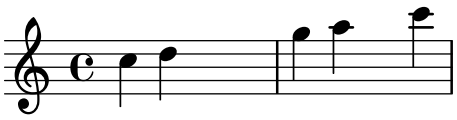
Multiple glides with the same finger are not supported and lead to unexpected results. A workaround is to use different fingers and to use `\tweak text`.

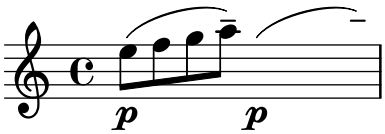
```
{
    \clef "G_8"
    <a\glide-1 cis'\glide-1>2 <bes-1 d'-1>
    <a\glide-1 cis'\glide-\tweak text "1"-2>2
    <bes-1 d'-\tweak text "1"-2>
}
```



Hidden notes

Hidden (or invisible or transparent) notes can be useful in preparing theory or composition exercises.

```
\relative {
  c''4 d
  \hideNotes
  e4 f
  \unHideNotes
  g a
  \hideNotes
  b
  \unHideNotes
  c
}
```

Note heads, stems, and flags, and rests are invisible. Beams are invisible if they start on a hidden note. Objects that are attached to invisible notes are still visible.

```
\relative c'' {
  e8(\p f g a)--
  \hideNotes
  e8(\p f g a)--
}
```

Predefined commands

`\hideNotes`, `\unHideNotes`.

See also

Learning Manual: Section “Visibility and color of objects” in *Learning Manual*.

Notation Reference: [Invisible rests], page 63, Section 5.4.7 [Visibility of objects], page 704, [Hiding staves], page 231.

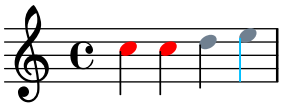
Snippets: Section “Editorial annotations” in *Snippets*.

Internals Reference: Section “Note_spacing_engraver” in *Internals Reference*, Section “NoteSpacing” in *Internals Reference*.

Coloring objects

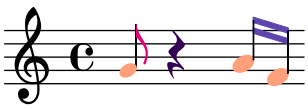
Individual objects may be assigned colors. Valid color names are listed in the Section A.7 [List of colors], page 734.

```
\override NoteHead.color = #red
c''4 c''
\override NoteHead.color = #(x11-color 'SlateGrey)
d''
\override Stem.color = "deepskyblue"
e''
```



In addition to a limited set of simple colors available as predefined variables (see ‘Normal colors’ in Section A.7 [List of colors], page 734), any color may be entered as a string. That string may be either a CSS (`https://www.w3.org/Style/CSS/`)-style predefined color name, or a hexadecimal color code prefixed by the `#` character (*inside* the double quotes):

```
\override NoteHead.color = "lightsalmon"
\override Flag.color = "#E30074"
\override Beam.color = "#5e45ad"
\override Rest.color = "#3058"
g'8 \huge r4 a'16 f'
```

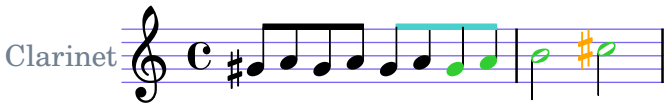


If that color code includes an alpha channel for semi-transparency, by using an eight-character code "*#RRGGBBAA*" or its shorthand form "*#RGBA*", it will be used in SVG output but not in PostScript/PDF output. In the previous example, the rest can be seen through only if the code is compiled with the SVG backend, as explained in Section 3.5.3 [Alternative output formats], page 584.

In a different way, the full range of colors defined for X11 (`https://en.wikipedia.org/wiki/X11_color_names`) can be accessed by using the Scheme function `x11-color`. That function takes one argument, which can be a symbol, such as `'DarkSeaGreen4`, or a string, such as `"DarkSeaGreen4"`. The first form is quicker to write and slightly more efficient; however, the second form also makes it possible to specify X11 colors as multiple words: in this instance, `"dark sea green 4"`.

If `x11-color` cannot make sense of the parameter, then the color returned defaults to black.

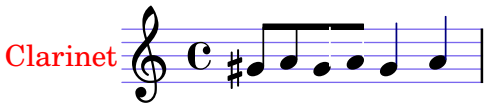
```
\new Staff \with {
  instrumentName = \markup {
    \with-color #(x11-color 'SlateGrey) "Clarinet"
```

```
    }
  }
  \relative c'' {
  \override Staff.StaffSymbol.color = #(x11-color 'SlateBlue2)
  gis8 a
  \override Beam.color = #(x11-color "medium turquoise")
  gis a
  \override Accidental.color = #(x11-color 'orange)
  gis a
  \override NoteHead.color = #(x11-color "LimeGreen")
  gis a
  % this is deliberate nonsense; note that the stems remain black
  \override Stem.color = #(x11-color 'Boggle)
  b2 cis
}
```

LilyPond also supports a set of eight color names (`https://jfly.uni-koeln.de/color`) that is unambiguous to both color-blind and non-color-blind people. Use `universal-color` to access them.

```
\markup \with-color #(universal-color 'vermillion) vermillion
```

vermillion

Exact RGB colors can be specified using the Scheme function `rgb-color`. This function takes three arguments used respectively for the *red*, *green* and *blue* channels, and an optional *alpha* number for semi-transparency. (All values must be numbers from 0 to 1.) Again, transparency is only supported in SVG output; for example, in the following fragment the staff's clef can be seen through when rendered in SVG.

```
\new Staff \with {
    instrumentName = \markup {
      \with-color #(x11-color 'red) "Clarinet"
      }
    \override Clef.color = #(rgb-color 0 0 0 0.5)
  }
\relative c'' {
  \override Staff.StaffSymbol.color = #(x11-color 'SlateBlue2)
  \override Stem.color = #(rgb-color 0 0 0)
  gis8 a
  \override Stem.color = #(rgb-color 1 1 1)
  gis8 a
  \override Stem.color = #(rgb-color 0 0 0.5)
  gis4 a
}
```

See also

Notation Reference: Section A.7 [List of colors], page 734, Section 5.3.4 [The `\tweak` command], page 685.

Snippets: Section "Editorial annotations" in *Snippets*.

Known issues and warnings

An X11 color is not necessarily exactly the same shade as a similarly named normal color.

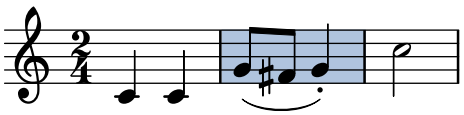
Not all X11 colors are distinguishable in a web browser, i.e., a web browser might not display a difference between `LimeGreen` and `ForestGreen`. For web use CSS colors are recommended, as detailed in Section A.7 [List of colors], page 734.

Notes in a chord cannot be separately colored with `\override`; use `\tweak` or the equivalent `\single\override` before the respective note instead, see Section 5.3.4 [The `\tweak` command], page 685.

Staff highlights

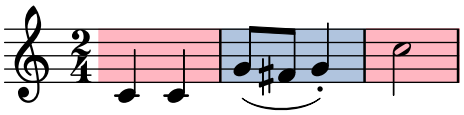
For analytical or pedagogical purposes, it may be useful to "highlight" musical passages, for example in order to show local tonality. This can be done using the `\staffHighlight` command, which expects a color. For all ways to enter colors, see [Coloring objects], page 260. The highlight is terminated using `\stopStaffHighlight`.

```
\relative {
  \time 2/4
  c'4 4
  \staffHighlight "lightsteelblue"
  g'8( fis g4)-.
  \stopStaffHighlight
  c2
}
```



If there are consecutive highlights, it is not necessary to write `\stopStaffHighlight`, as `\staffHighlight` also implicitly terminates the current highlight, if any. Similarly, it is not necessary to add `\stopStaffHighlight` at the end of the piece. This is particularly handy if every measure is to be highlighted.

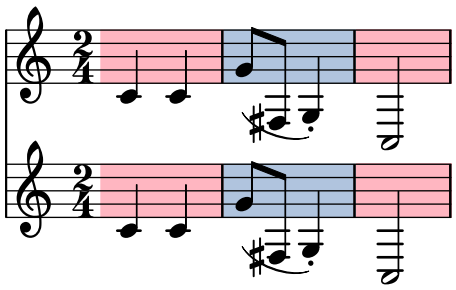
```
\relative {
  \time 2/4
  \staffHighlight "lightpink"
  c'4 4
  \staffHighlight "lightsteelblue"
  g'8( fis g4)-.
  \staffHighlight "lightpink"
  c2
}
```



By default, staves are highlighted separately.

```
music = {
```

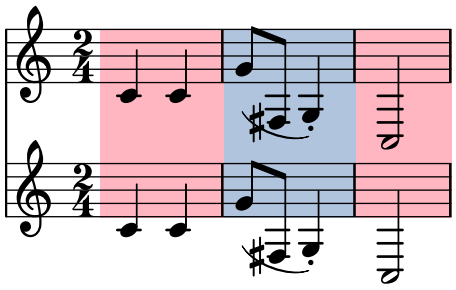
```
  \time 2/4
  \staffHighlight "lightpink"
  c'4 4
  \staffHighlight "lightsteelblue"
  g'8( fis g4)-.
  \staffHighlight "lightpink"
  c2
}

<<
  \new Staff \music
  \new Staff \music
>>
```



However, several staves can be highlighted together by moving `Staff_highlight_engraver` to a higher context than `Staff` (or `RhythmicStaff`, or similar). This is done using the `\consists` and `\remove` commands; See Section 5.1.4 [Modifying context plug-ins], page 667, for more information. For example, if the engraver is moved to `Score`, the highlights are shared by all staves.

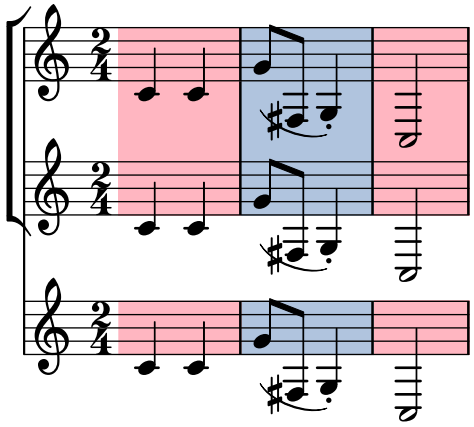
```
\layout {
  \context {
    \Staff
    \remove Staff_highlight_engraver
  }
  \context {
    \Score
    \consists Staff_highlight_engraver
  }
}

music = {
  \time 2/4
  \staffHighlight "lightpink"
  c'4 4
  \staffHighlight "lightsteelblue"
  g'8( fis g4)-.
  \staffHighlight "lightpink"
  c2
}

<<
  \new Staff \music
  \new Staff \music
```

```
>>
```



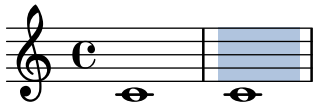
Staff_highlight_engraver may also be moved to intermediate contexts such as StaffGroup.

```
music = {
  \time 2/4
  \staffHighlight "lightpink"
  c'4 4
  \staffHighlight "lightsteelblue"
  g'8( fis g4)-.
  \staffHighlight "lightpink"
  c2
}

<<
  \new StaffGroup \with { \consists Staff_highlight_engraver } <<
    \new Staff \with { \remove Staff_highlight_engraver } \music
    \new Staff \with { \remove Staff_highlight_engraver } \music
  >>
  \new Staff \music
>>
```



The StaffHighlight.shorten-pair property may be used to tweak the horizontal start and end of the highlight span.

```
{
  c'1
  \once \override Staff.StaffHighlight.shorten-pair = #'(1.0 . 1.0)
  \staffHighlight lightsteelblue
  c'1
}
```



Predefined commands

`\staffHighlight`, `\stopStaffHighlight`.

See also

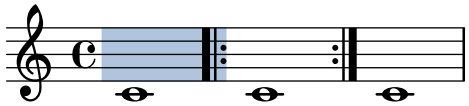
Notation Reference: [Coloring objects], page 260, Section 5.1.4 [Modifying context plug-ins], page 667.

Internals Reference: Section “StaffHighlight” in *Internals Reference*, Section “staff-highlight-interface” in *Internals Reference*, Section “Staff_highlight_engraver” in *Internals Reference*, Section “StaffHighlightEvent” in *Internals Reference*, Section “staff-highlight-event” in *Internals Reference*.

Known issues and warnings

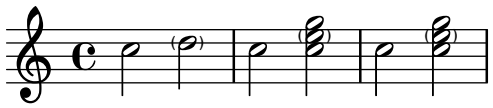
The behavior of highlights may not be what is expected at start repeat bar lines. The `shorten-pair` property demonstrated above can be used to work around this issue.

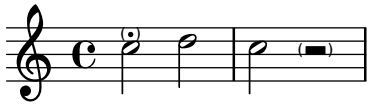
```
{
  \staffHighlight "lightsteelblue"
  c'1
  \stopStaffHighlight
  \repeat volta 2 { c'1 }
  c'1
}
```



Parentheses

Objects may be parenthesized by prefixing `\parenthesize` to the music event. When prefixed to a chord, it parenthesizes every note. Individual notes inside a chord may also be parenthesized.

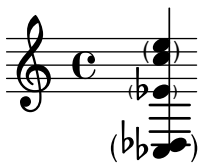
```
\relative {
  c''2 \parenthesize d
  c2 \parenthesize <c e g>
  c2 <c \parenthesize e g>
}
```

Non-note objects may be parenthesized as well. For articulations, a hyphen is needed before the `\parenthesize` command.

```
\relative {
  c''2-\parenthesize -. d
  c2 \parenthesize r
}
```

When \parenthesize applies to a chord, all of its notes are enclosed in the parentheses.

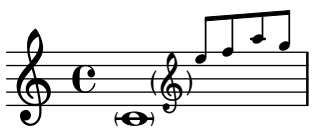
```
\relative c' {
  \parenthesize <e f>
}
```

To parenthesize only certain notes in a chord, use a parallel music construct << ... >>.

```
\new Voice \relative c {
  <<
    { \tweak Parentheses.font-size 0 \parenthesize <ces des> }
    { \parenthesize ees' }
    { \tweak Parentheses.font-size -2 \parenthesize <c' e> }
  >>
}
```



A second form of the \parenthesize command involves a grob path: either \parenthesize *ContextName.GrobName* or just \parenthesize *GrobName* (the latter implying the bottommost context, typically Voice). This should be added before the musical moment, like a \once \override. This form makes it possible to parenthesize grobs that are only caused indirectly by events.

```
\new Staff \relative <<
  {
    \parenthesize NoteHead
    c'1
  }
  \new CueVoice {
    s2
    \voiceOne
    \once \override Staff.Parentheses.font-size = 3
    \parenthesize Staff.CueClef
    \cueClef treble
    e'8 f a g
  }
>>
```

See also

Snippets: Section “Editorial annotations” in *Snippets*.

Internals Reference: Section “Parenthesis_engraver” in *Internals Reference*, Section “Parentheses” in *Internals Reference*, Section “parentheses-interface” in *Internals Reference*.

Known issues and warnings

Currently, the font-size property of the Parentheses grob has to be adjusted manually to obtain correctly sized parentheses on chords and some other objects.

Stems

Whenever a note is found, a Stem object is created automatically. For whole notes and rests, they are also created but made invisible.

Stems may be manually placed to point up or down; see Section 5.4.1 [Direction and placement], page 694.

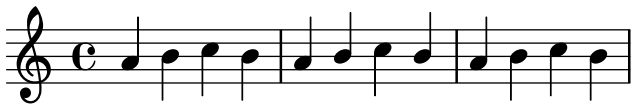
Predefined commands

\stemUp, \stemDown, \stemNeutral.

Selected Snippets

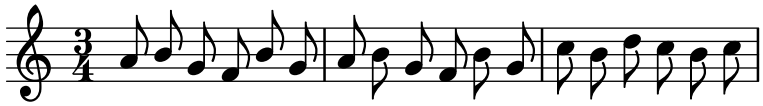
Default direction of stems on the center line of the staff

The default direction of stems on the center line of the staff is set by the Stem property neutral-direction.

```
\relative c'' {
  a4 b c b
  \override Stem.neutral-direction = #up
  a4 b c b
  \override Stem.neutral-direction = #down
  a4 b c b
}
```

Automatically changing the stem direction of the middle note based on the melody

LilyPond can alter the stem direction of the middle note on a staff so that it follows the melody, by adding the Melody_engraver to the Voice context.

The context property suspendMelodyDecisions may be used to turn off this behavior locally.

```
\relative c'' {
  \time 3/4
  a8 b g f b g |
  \set suspendMelodyDecisions = ##t
  a  b g f b g |
  \unset suspendMelodyDecisions
  c  b d c b c |
}

\layout {
  \context {
    \Voice
    \consists "Melody_engraver"
    \autoBeamOff
  }
```

```
}
```

See also

Notation Reference: Section 5.4.1 [Direction and placement], page 694.

Snippets: Section "Editorial annotations" in *Snippets*.

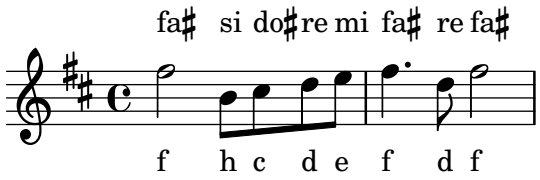
Internals Reference: Section "Stem_engraver" in *Internals Reference*, Section "Stem" in *Internals Reference*, Section "stem-interface" in *Internals Reference*.

1.7.2 Outside the staff

This section discusses how to add emphasis to elements in the staff from outside of the staff.

Note names

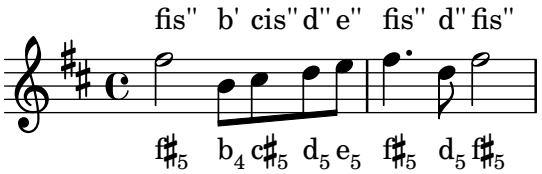
Note names can be printed as text, by using the `NoteNames` context. When used simultaneously with a regular staff, that makes it possible to synchronize each note with its name, printed above or below the Staff.

```
\language "italiano"
melody = \relative do'' {
  fad2 si,8 dod re mi fad4. re8 fad2
}

<<
  \new NoteNames { \melody }
  \new Staff { \key si \minor \melody }
  \new NoteNames {
    \set printNotesLanguage = "deutsch"
    \set printAccidentalNames = ##f
    \melody
  }
>>
```

By default, note names are printed in the same language used for music entry; however, the `printNotesLanguage` property allows to select any other language available (see [Note names in other languages], page 8). Whether accidentals should be printed or not is determined through the `printAccidentalNames` property.

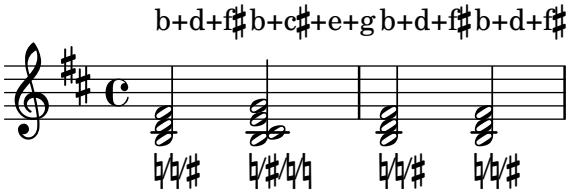
By setting both that property to a symbol and `printOctaveNames` to `#t`, note names can be obtained that closely resemble LilyPond entry syntax. If a more general result is desired, 'scientific' octave names may also be obtained.

```
melody = \relative c'' {
  fis2 b,8 cis d e fis4. d8 fis2
}
```

```
<<
  \new NoteNames {
    \set printOctaveNames = ##t
    \set printAccidentalNames = #'lily
    \melody
  }
  \new Staff { \key b \minor \melody }
  \new NoteNames {
    \set printOctaveNames = #'scientific
    \melody
  }
>>
```



The noteNameSeparator property defines how chords will be printed. Other formatting functions may be defined as noteNameFunction; such a function must expect a pitch and a context argument, even if one of these can then be ignored.

```
somechords = \relative c' {
  <b d fis>2 <b cis e g> <b d fis> q
}

<<
  \new NoteNames {
    \set noteNameSeparator = "+"
    \somechords
  }
  \new Staff { \key b \minor \somechords }
  \new NoteNames {
    \set noteNameFunction =
      #(lambda (pitch ctx)
         (alteration->text-accidental-markup
          (ly:pitch-alteration pitch)))
    \somechords
  }
>>
```

See also

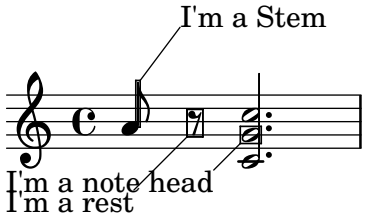
Notation Reference: [Note names in other languages], page 8.

Internals Reference: Section “NoteName” in *Internals Reference*, Section “NoteNames” in *Internals Reference*, Section “Note_name_engraver” in *Internals Reference*.

Balloon help

Elements of notation can be marked and named with the help of a square balloon. The primary purpose of this feature is to explain notation.

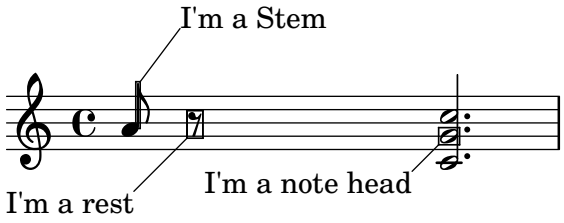
```
\new Voice \with { \consists Balloon_engraver }
\relative c'' {
  \balloonGrobText #'Stem #'(3 . 4) \markup { "I'm a Stem" }
  a8
  \balloonGrobText #'Rest #'(-4 . -4) \markup { "I'm a rest" }
  r
  <c, g'-\balloonText #'(-2 . -2) \markup { "I'm a note head" } c>2.
}
```

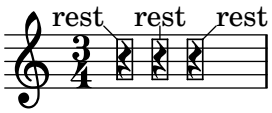


There are two music functions, `balloonGrobText` and `balloonText`; the former is used like `\once \override` to attach text to any grob, and the latter is used like `\tweak`, typically within chords, to attach text to an individual note.

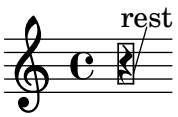
Balloon text does not influence note spacing, but this can be altered:

```
\new Voice \with { \consists Balloon_engraver }
\relative c'' {
  \balloonGrobText #'Stem #'(3 . 4) \markup { "I'm a Stem" }
  a8
  \balloonGrobText #'Rest #'(-4 . -4) \markup { "I'm a rest" }
  r
  \balloonLengthOn
  <c, g'-\balloonText #'(-2 . -2) \markup { "I'm a note head" } c>2.
}
```



The default behavior for the attachment point of the line on the frame and the alignment of the balloon text is demonstrated below.

The default calculation of the attachment point can be overruled using the `X-attachment` and `Y-attachment` properties, which take values between -1 and 1, with the limits corresponding to the left (resp. bottom) and right (resp. top) of the frame. Alignment of the text is controlled by `text-alignment-X` and `text-alignment-Y`, which have a similar form.

```
\new Voice \with {
```

```
  \consists Balloon_engraver
}
{
  \once \override BalloonText.Y-attachment = -0.5
  \once \override BalloonText.text-alignment-X = 0.0
  \balloonGrobText Rest #'(1 . 3.5) "rest"
  r4
}
```

Predefined commands

`\balloonLengthOn`, `\balloonLengthOff`.

See also

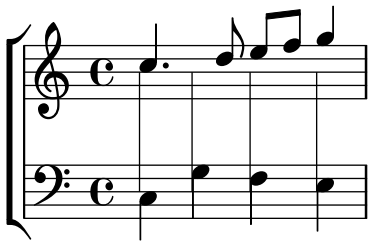
Snippets: Section "Editorial annotations" in *Snippets*.

Internals Reference: Section "AnnotateOutputEvent" in *Internals Reference*, Section "Balloon_engraver" in *Internals Reference*, Section "BalloonText" in *Internals Reference*, Section "balloon-interface" in *Internals Reference*.

Grid lines

Vertical lines can be drawn between staves synchronized with the notes.

The `Grid_point_engraver` must be used to create the end points of the lines, while the `Grid_line_span_engraver` must be used to actually draw the lines. By default this centers grid lines horizontally below and to the left side of each note head. Grid lines extend from the middle lines of each staff. The `gridInterval` must specify the duration between the grid lines.

```
\layout {
  \context {
    \Staff
    \consists Grid_point_engraver
    gridInterval = \musicLength 4
  }
  \context {
    \Score
    \consists Grid_line_span_engraver
  }
}

\score {
  \new ChoirStaff <<
    \new Staff \relative {
      \stemUp
      c''4. d8 e8 f g4
    }
    \new Staff \relative {
      \clef bass
      \stemDown
      c4 g' f e
    }
```

```
  >>
}
```

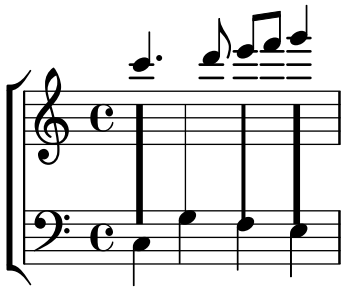
Selected Snippets

Grid lines: changing their appearance

The appearance of grid lines can be changed by overriding some of their properties.

```
\score {
  \new ChoirStaff <<
    \new Staff {
      \relative c'' {
        \stemUp
        c'4. d8 e8 f g4
      }
    }
    \new Staff {
      \relative c {
        % this moves them up one staff space from the default position
        \override Score.GridLine.extra-offset = #'(0.0 . 1.0)
        \stemDown
        \clef bass
        \once \override Score.GridLine.thickness = #5.0
        c4
        \once \override Score.GridLine.thickness = #1.0
        g'4
        \once \override Score.GridLine.thickness = #3.0
        f4
        \once \override Score.GridLine.thickness = #5.0
        e4
      }
    }
  >>
  \layout {
    \context {
      \Staff
      % set up grids
      \consists "Grid_point_engraver"
      % set the grid interval to one quarter note
      gridInterval = \musicLength 4
    }
    \context {
      \Score
      \consists "Grid_line_span_engraver"
      % this moves them to the right half a staff space
```

```
      \override NoteColumn.X-offset = #-0.5
    }
  }
}
```



See also

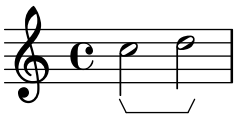
Snippets: Section “Editorial annotations” in *Snippets*.

Internals Reference: Section “Grid_line_span_engraver” in *Internals Reference*, Section “Grid_point_engraver” in *Internals Reference*, Section “GridLine” in *Internals Reference*, Section “GridPoint” in *Internals Reference*, Section “grid-line-interface” in *Internals Reference*, Section “grid-point-interface” in *Internals Reference*.

Analysis brackets

Brackets are used in musical analysis to indicate structure in musical pieces. Simple horizontal brackets are supported.

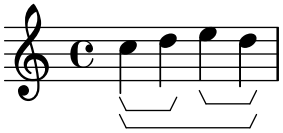
```
\layout {
  \context {
    \Voice
    \consists Horizontal_bracket_engraver
  }
}
\relative {
  c''2\startGroup
  d\stopGroup
}
```



Analysis brackets may be nested.

```
\layout {
  \context {
    \Voice
    \consists Horizontal_bracket_engraver
  }
}
\relative {
  c''4\startGroup\startGroup
  d4\stopGroup
  e4\startGroup
  d4\stopGroup\stopGroup
```

```
}
```



Selected Snippets

Analysis brackets above the staff

Simple horizontal analysis brackets are added below the staff by default. The following example shows a way to place them above the staff instead.

```
\layout {
  \context {
    \Voice
    \consists "Horizontal_bracket_engraver"
  }
}

\relative c'' {
  \once \override HorizontalBracket.direction = #UP
  c2\startGroup
  d2\stopGroup
}
```

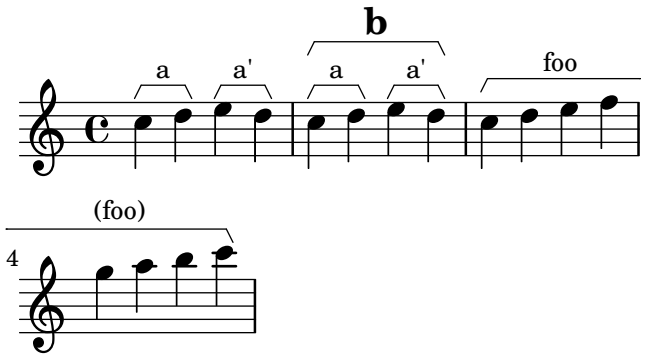
Analysis brackets with labels

Text markup may be added to analysis brackets through the `text` property of the `HorizontalBracketText` grob. Adding different texts to brackets beginning at the same time requires the `\tweak` command.

Bracket text will be parenthesized after a line break.

```
\paper { tagline = ##f }

\layout {
  \context {
    \Voice
    \consists "Horizontal_bracket_engraver"
    \override HorizontalBracket.direction = #UP
  }
}

{
  \once\override HorizontalBracketText.text = "a"
    c''\startGroup d''\stopGroup
    \once\override HorizontalBracketText.text = "a'"
    e''\startGroup d''\stopGroup |
  c''-\tweak HorizontalBracketText.text
        \markup \bold \huge "b" \startGroup
     -\tweak HorizontalBracketText.text "a" \startGroup
```

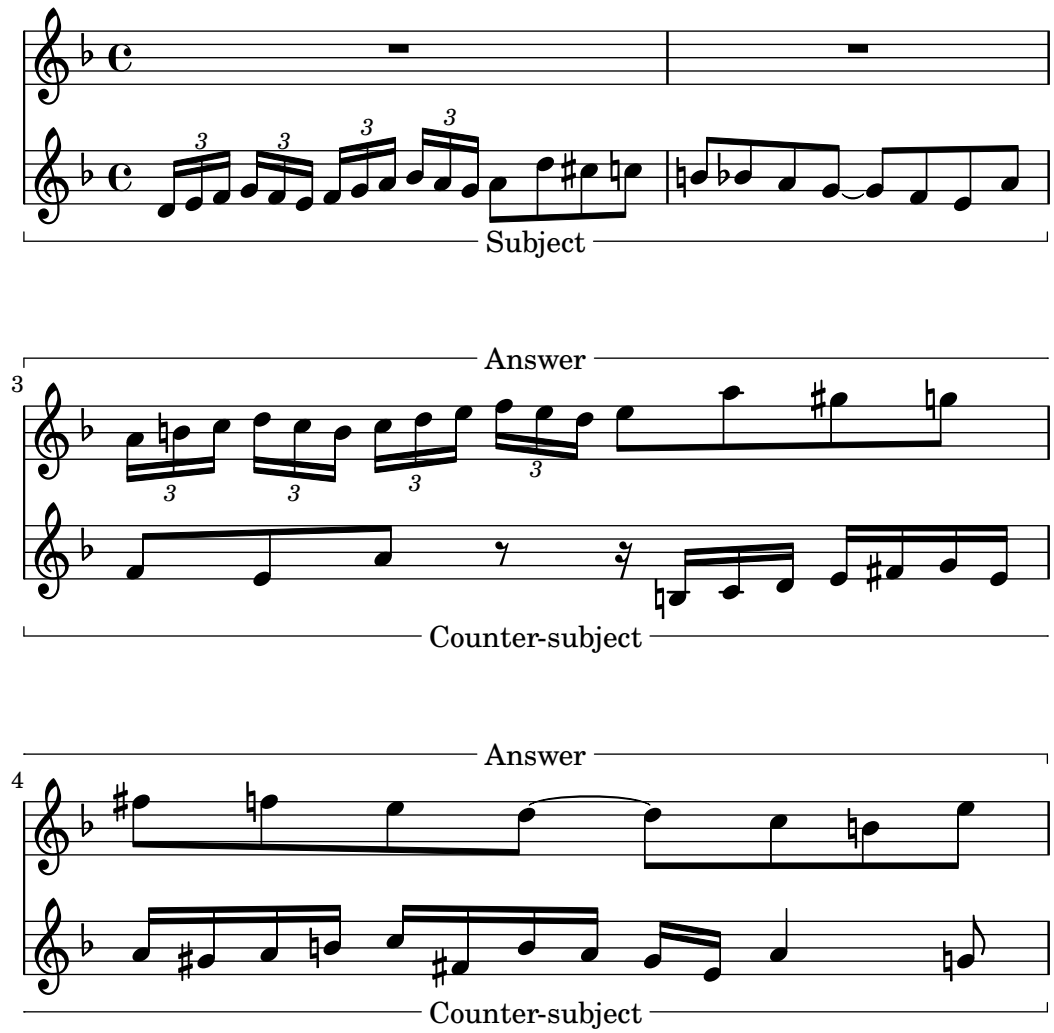
```
    d''\stopGroup
    e''-\tweak HorizontalBracketText.text "a'" \startGroup
    d''\stopGroup\stopGroup |
  c''-\tweak HorizontalBracketText.text foo \startGroup
    d'' e'' f'' | \break
  g'' a'' b'' c'''\stopGroup
}
```



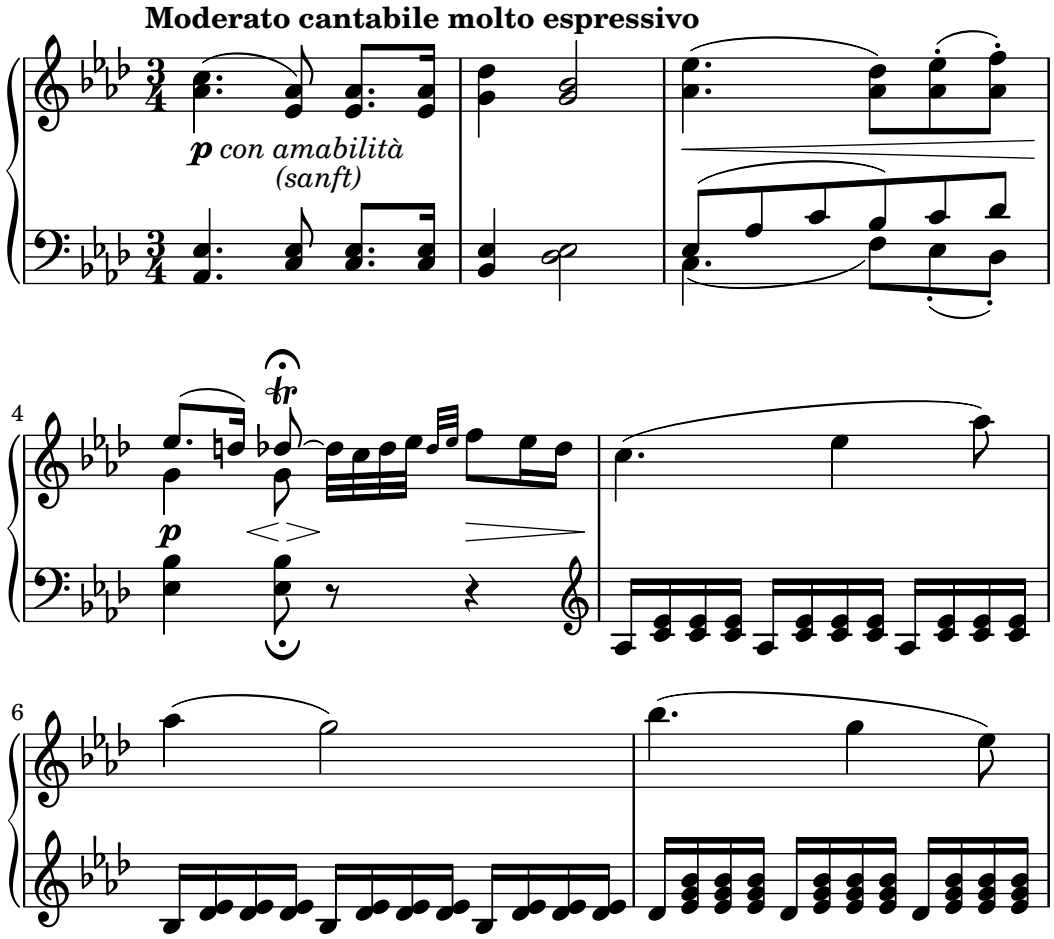
Measure spanner

Measure spanners are an alternate way to print annotated brackets. As opposed to horizontal brackets, they extend between two bar lines rather than two notes. The text is displayed in the center of the bracket.

```
\paper { tagline = ##f }

\layout {
  \context {
    \Staff
    \consists Measure_spanner_engraver
  }
}

<<
  \new Staff \relative c'' {
    \key d \minor
    R1*2
    \tweak text "Answer"
    \startMeasureSpanner
    \tuplet 3/2 8 {
      a16[ b c] d[ c b]  c[ d e] f[ e d]
    }
    e8 a gis g
    fis f e d~ d c b e
    \stopMeasureSpanner
  }
  \new Staff \relative c' {
    \key d \minor
    \tweak text "Subject"
    \tweak direction #DOWN
    \startMeasureSpanner
    \tuplet 3/2 8 {
      d16[ e f] g[ f e] f[ g a] bes[ a g]
```

```
    }
    a8 d cis c
    b bes a g~ g f e a
    \stopMeasureSpanner
    \tweak text "Counter-subject"
    \tweak direction #DOWN
    \startMeasureSpanner
    f8 e a r r16 b, c d e fis g e
    a gis a b c fis, b a gis e a4 g8
    \stopMeasureSpanner
  }
>>
```

See also

Internals Reference: Section “Horizontal_bracket_engraver” in *Internals Reference*, Section “HorizontalBracket” in *Internals Reference*, Section “horizontal-bracket-interface” in *Internals Reference*, Section “HorizontalBracketText” in *Internals Reference*, Section “horizontal-bracket-text-interface” in *Internals Reference*, Section “Measure_spanner_engraver” in *Internals Reference*, Section “MeasureSpanner” in *Internals Reference*, Section “measure-spanner-interface” in *Internals Reference*, Section “Staff” in *Internals Reference*.

1.8 Text

This section explains how to include text (with various formatting) in music scores.

1.8.1 Writing text

This section introduces different ways of adding text to a score.

> **Note:** To write accented and special text (such as characters from other languages), simply insert the characters directly into the LilyPond file. The file must be saved as UTF-8. For more information, see [Text encoding], page 580.

Text objects overview

Simple text objects are entered as strings between double quotes (these are optional for a single word). The markup mode is a richer tool that can accept a variety of advanced text formatting and graphical enhancements, as detailed in Section 1.8.2 [Formatting text], page 289.

As such, markup blocks may be used:

- in any `TextScript` object (attached to notes with `-`, `^` or `_`); see [Text scripts], page 279;
- as 'spanners', when some indications are prolonged over several beats or bars; see [Text spanners], page 280;
- in any mark printed above the score, such as `RehearsalMark` or `MetronomeMark` objects respectively introduced with the `\mark` or `\tempo` keywords; see [Text marks], page 283;

- as stand-alone text blocks, entered at the top level outside of any `\score` block (in this specific case the `\markup` or `\markuplist` command is mandatory, and cannot be omitted in favor of a simple text string between double quotes); see [Separate text], page 287;
- in any definition inside the `\header` block (e.g., `title`, `subtitle`, `composer`), or in specific elements defined inside the `\paper` block such as `evenHeaderMarkup` for page numbers. This is explained in Section 3.3 [Titles and headers], page 541.

Many other text-based objects may be entered as markup blocks, even if that is not their primary use.

- Fingerings may easily be replaced with markup blocks, if introduced with the `\finger` command; see [Fingering instructions], page 254.
- Lyric syllables may be formatted through the `\markup` command; see Section 2.1.1 [Common notation for vocal music], page 313.
- Chord names are in fact defined as markup blocks, and therefore may be redefined in the same way for customizing chord modifiers or chord exceptions; see Section 2.7.2 [Displaying chords], page 472.
- Dynamics are usually entered in a simple way; however it is possible to define [New dynamic marks], page 149, as markup objects. Some dynamics such as *crescendo* are printed as spanners and may be redefined through properties such as `crescendoText`; see [Dynamics], page 141.
- Less common objects are also made of markup blocks, such as [Balloon help], page 270, indications.

In fact, it is possible to use `\markup` to customize the appearance of virtually any graphical object (or 'grob'), by overriding either its `text` property if it has one, or its `stencil` property. Some of the logic that makes this a possibility is explained in Section "Flexible architecture" in *Essay*.

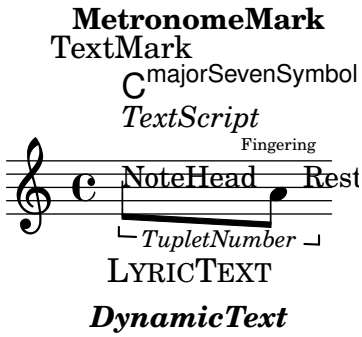
The following example illustrates the ubiquity of markup blocks, not only as some of the objects listed above, but also by replacing musical objects with text objects through various methods.

```
\header { title = \markup "Header" }

dyn =
#(make-dynamic-script #{ \markup \text "DynamicText" #})

\markup \box "Top-level markup"

\score {
  <<
    \new ChordNames
    \with {
      majorSevenSymbol = \markup "majorSevenSymbol"
    }
    \chordmode { c1:maj7 }
    \new Staff {
      \tempo \markup "MetronomeMark"
      \textMark "TextMark"
      \once \override TupletNumber.text =
        \markup "TupletNumber"
      \tuplet 3/2 {
        \once \override NoteHead.stencil =
```

```
        #ly:text-interface::print
      \once \override NoteHead.text =
        \markup \lower #0.5 "NoteHead"
      c''8^\markup \italic "TextScript"
      a'\finger \markup \text "Fingering"
      \once \override Rest.stencil =
        #(lambda (grob)
           (grob-interpret-markup grob #{
             \markup  "Rest"
             #}))
      r
    }
  }
  \new Lyrics \lyricmode {
    \markup \smallCaps "LyricText" 1
  }
  \new Dynamics { s1\dyn }
 >>
}
```

Header

Top-level markup



See also

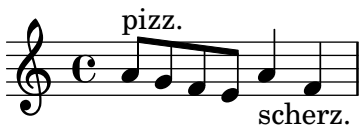
Notation Reference: Section 1.8.2 [Formatting text], page 289, [Text scripts], page 279, [Text spanners], page 280, [Text marks], page 283, [Separate text], page 287, [Fingering instructions], page 254, Section 2.1.1 [Common notation for vocal music], page 313, Section 2.7.2 [Displaying chords], page 472, [New dynamic marks], page 149, [Dynamics], page 141, [Balloon help], page 270.

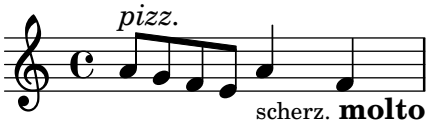
Essay on automated music engraving: Section “Flexible architecture” in *Essay*.

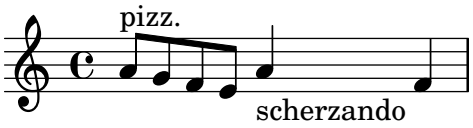
Snippets: Section “Text” in *Snippets*.

Text scripts

Simple “quoted text” indications may be added to a score, as demonstrated in the following example. Such indications may be manually placed above or below the staff, using the syntax described in Section 5.4.1 [Direction and placement], page 694.

```
\relative { a'8^"pizz." g f e a4-"scherz." f }
```

This syntax is actually a shorthand; more complex text formatting may be added to a note by explicitly using a `\markup` block, as described in Section 1.8.2 [Formatting text], page 289.

```
\relative {
  a'8^\markup { \italic pizz. } g f e
  a4_\markup { \tiny scherz. \bold molto } f }
```

By default, text indications do not influence the note spacing. However, their widths can be taken into account: in the following example, the first text string does not affect spacing, whereas the second one does.

```
\relative {
  a'8^"pizz." g f e
  \textLengthOn
  a4_"scherzando" f
}
```

In addition to text scripts, articulations can be attached to notes. For more information, see [Articulations and ornamentations], page 138.

For more information about the relative ordering of text scripts and articulations, see Section "Placement of objects" in *Learning Manual*.

Predefined commands

`\textLengthOn`, `\textLengthOff`.

See also

Learning Manual: Section "Placement of objects" in *Learning Manual*.

Notation Reference: Section 1.8.2 [Formatting text], page 289, Section 5.4.1 [Direction and placement], page 694, [Articulations and ornamentations], page 138.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "TextScript" in *Internals Reference*.

Known issues and warnings

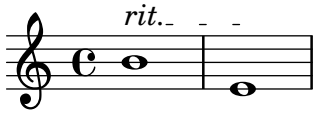
Checking to make sure that text scripts and lyrics are within the margins requires additional calculations. In cases where slightly faster performance is desired, use

```
\override Score.PaperColumn.keep-inside-line = ##f
```

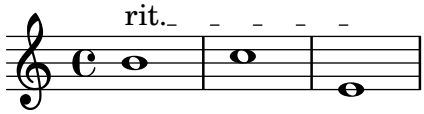
Text spanners

Some performance indications, e.g., *rallentando* or *accelerando*, are written as text and are extended over multiple notes with dotted lines. Such objects, called "spanners", may be created from one note to another using the following syntax:

```
\relative {
  \override TextSpanner.bound-details.left.text = "rit."
  b'1\startTextSpan
```

```
  e,\stopTextSpan
}
```

The string to be printed is set through object properties. By default it is printed in italic characters, but different formatting can be obtained using \markup blocks, as described in Section 1.8.2 [Formatting text], page 289.

```
\relative {
  \override TextSpanner.bound-details.left.text =
    \markup { \upright "rit." }
  b'1\startTextSpan c
  e,\stopTextSpan
}
```



The line style, as well as the text string, can be defined as an object property. This syntax is described in Section 5.4.5 [Line styles], page 702.

Predefined commands

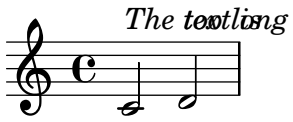
\textSpannerUp, \textSpannerDown, \textSpannerNeutral.

Known issues and warnings

LilyPond is only able to handle one text spanner per voice.

The texts at the bounds of a text spanner may collide.

```
{
  \once \override TextSpanner.bound-details.left.text = "The text is"
  \once \override TextSpanner.bound-details.right.text = "too long"
  c'2\startTextSpan d'2\stopTextSpan
}
```



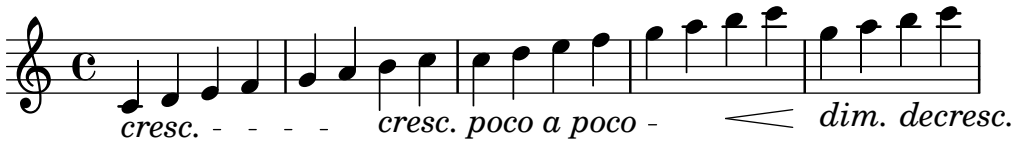
Workarounds can be found in Section 4.5 [Horizontal spacing], page 640.

Selected Snippets

Dynamics text spanner postfix

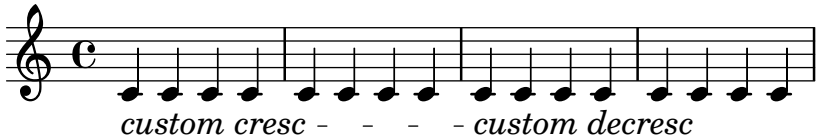
Custom text spanners can be defined and used with hairpin and text crescendos. \< and \> produce hairpins by default, \cresc etc. produce text spanners by default.

```
% Some sample text dynamic spanners, to be used as postfix operators
crpoco =
#(make-music 'CrescendoEvent
             'span-direction START
             'span-type 'text
```

```
              'span-text "cresc. poco a poco")

\relative c' {
  c4\cresc d4 e4 f4 |
  g4 a4\! b4\crpoco c4 |
  c4 d4 e4 f4 |
  g4 a4\! b4\< c4 |
  g4\dim a4 b4\decresc c4\!
}
```

Dynamics custom text spanner postfix

Postfix functions for custom crescendo text spanners. The spanners should start on the first note of the measure. One has to use -\mycresc, otherwise the spanner start will rather be assigned to the next note.

```
% Two functions for (de)crescendo spanners where you can explicitly
% give the spanner text.
mycresc =
#(define-music-function (mymarkup) (markup?)
   (make-music 'CrescendoEvent
               'span-direction START
               'span-type 'text
               'span-text mymarkup))
mydecresc =
#(define-music-function (mymarkup) (markup?)
   (make-music 'DecrescendoEvent
               'span-direction START
               'span-type 'text
               'span-text mymarkup))

\relative c' {
  c4-\mycresc "custom cresc" c4 c4 c4 |
  c4 c4 c4 c4 |
  c4-\mydecresc "custom decresc" c4 c4 c4 |
  c4 c4\! c4 c4
}
```



See also

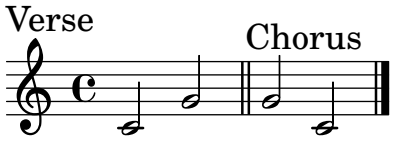
Notation Reference: Section 5.4.5 [Line styles], page 702, [Dynamics], page 141, Section 1.8.2 [Formatting text], page 289.

Snippets: Section “Text” in *Snippets*, Section “Expressive marks” in *Snippets*.

Internals Reference: Section “TextSpanner” in *Internals Reference*.

Section labels

The \sectionLabel command marks the beginning of a named passage. It is well suited for use at a section division created with \section, but it does not imply \section and may be used alone.

```
\fixed c' {
  \sectionLabel "Verse"
  c2 g
  \section
  \sectionLabel "Chorus"
  g2 c
  \bar "|."
}
```

See also

Notation Reference: Section 1.8.2 [Formatting text], page 289, [Rehearsal marks], page 125, [Section divisions], page 129.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "SectionLabel" in *Internals Reference*, Section "SectionLabelEvent" in *Internals Reference*.

Text marks

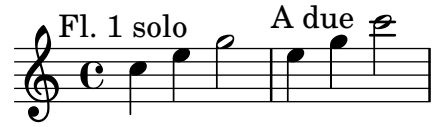
Text marks are textual objects that, unlike text scripts (see [Text scripts], page 279), are not printed over notes but between notes, often aligned to a bar line.

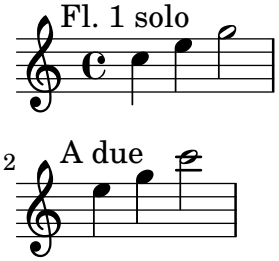
> **Note:** Older LilyPond versions used the \mark command for text marks, even though it is primarily intended for rehearsal marks (see [Rehearsal marks], page 125). The \textMark and \textEndMark commands are better suited for text marks with regard to their default settings as well as the ability to have several text marks at the same moment. It is therefore recommended to use \textMark and \textEndMark instead of \mark "Text" or \mark \markup .... Note that if converting code that uses \mark for text marks, overrides using RehearsalMark should be changed to TextMark.

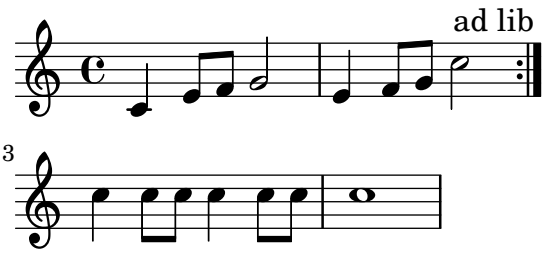
Before using text marks, it is recommended to seek a more specific command, if available. For text that identifies a section, use \sectionLabel (see [Section labels], page 283). For jump instructions, use \jump (see [Manual repeat marks], page 183). These commands have different default layout settings, and they create separate objects which can be styled differently from generic text marks in style sheets.

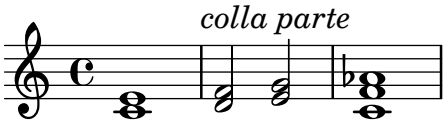
A text mark is entered using either \textMark or \textEndMark. The \textMark command draws a left-aligned mark.

```
\fixed c'' {
  \textMark "Fl. 1 solo"
  c4 e g2
  \textMark "A due"
```

```
  e4 g c'2
}
```

If a line break occurs at the point \textMark is used, the text appears on the next system.

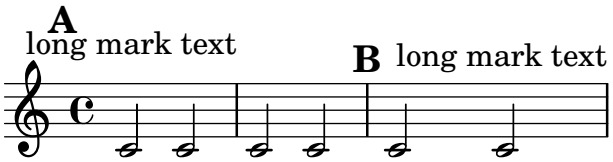
```
\fixed c'' {
  \textMark "Fl. 1 solo"
  c4 e g2
  \break
  \textMark "A due"
  e4 g c'2
}
```

Unlike \textMark, \textEndMark creates a right-aligned mark. If it occurs on a line break, it is printed on the preceding system.

```
\fixed c' {
  \repeat volta 2 {
    c4 e8 f g2
    e4 f8 g c'2
    \textEndMark "ad lib"
  }
  \break
  c'4 8 8 4 8 8
  c'1
}
```

Complex text formatting may be added using a \markup block (see Section 1.8.2 [Formatting text], page 289).

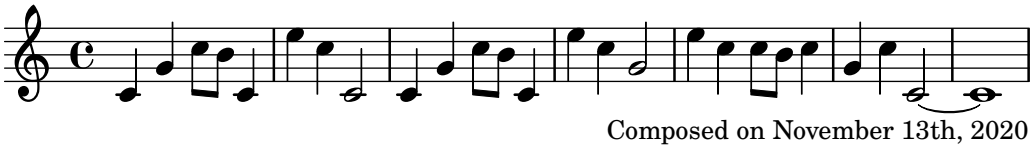
```
\relative {
  <c' e>1
  \textMark \markup { \italic { colla parte } }
  <d f>2 <e g>
  <c f aes>1
```

```
}
```

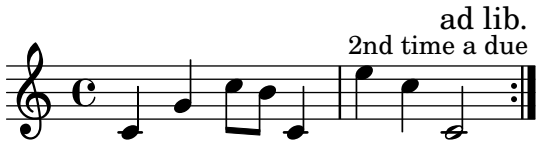
The \markLengthOn and \markLengthOff commands (see [Metronome marks], page 76) can also be used on text marks.

```
{
  \mark \default
  c'2 2
  \textEndMark "long mark text"
  \markLengthOn
  2 2
  \mark \default
  2 2
  \textEndMark "long mark text"
}
```



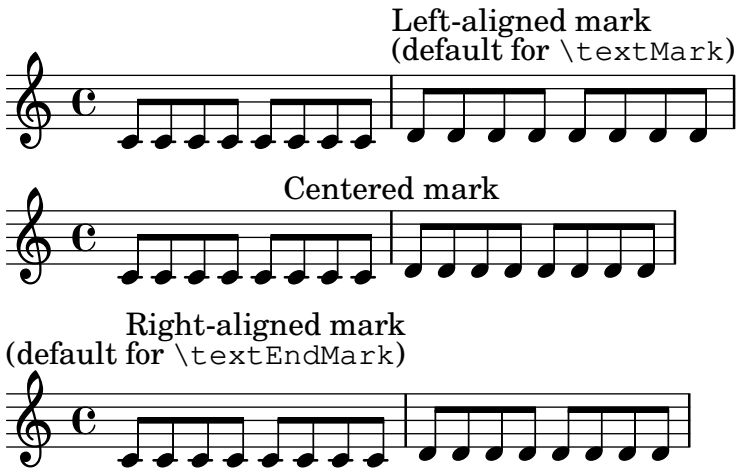
Text marks may be printed below the staff.

```
\fixed c' {
  c4 g c'8 b c4 e' c' c2
  c4 g c'8 b c4 e' c' g2
  e'4 c' c'8 b c'4
  g4 c' c2~ c1
  \tweak direction #DOWN
    \tweak font-size #-1
      \textEndMark "Composed on November 13th, 2020"
}
```

There can be several text marks at the same moment. Their stacking order can be overridden using the outside-staff-priority property (see Section 4.4.3 [Vertical collision avoidance], page 639). Alternatively, a single text mark with \markup \column { ... } can achieve the same effect.

```
\fixed c' {
  \repeat volta 2 {
    c4 g c'8 b c4 e' c' c2
    \textEndMark "ad lib."
    \tweak outside-staff-priority 1200
      \tweak font-size -1
        \textEndMark "2nd time a due"
  }
```

```
}
```

The alignment of a text mark can be changed.

```
{
  c'8 8 8 8 8 8 8 8
  \textMark \markup \column {
    \line { Left-aligned mark }
    \line { (default for \concat { \typewriter "\\textMark" ) } }
  }
  d'8 8 8 8 8 8 8 8
}

{
  c'8 8 8 8 8 8 8 8
  \tweak self-alignment-X #CENTER
    \textMark "Centered mark"
  d'8 8 8 8 8 8 8 8
}

{
  c'8 8 8 8 8 8 8 8
  \tweak self-alignment-X #RIGHT
    \textMark \markup \right-column {
      \line { Right-aligned mark }
      \line { (default for \concat { \typewriter "\\textEndMark" ) } }
    }
  d'8 8 8 8 8 8 8 8
}
```



Predefined commands

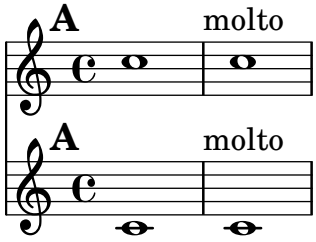
\textMark, \textEndMark, \markLengthOn, \markLengthOff.

Selected Snippets

Printing marks on every staff

Although text marks are normally only printed above the topmost staff, they may also be printed on every staff.

```
\score {
  <<
    \new Staff { \mark \default c''1 \textMark "molto" c'' }
    \new Staff { \mark \default c'1 \textMark "molto" c' }
  >>
  \layout {
    \context {
      \Score
      \remove Mark_engraver
      \remove Text_mark_engraver
      \remove Staff_collecting_engraver
    }
    \context {
      \Staff
      \consists Mark_engraver
      \consists Text_mark_engraver
      \consists Staff_collecting_engraver
    }
  }
}
```



See also

Notation Reference: [Metronome marks], page 76, [Rehearsal marks], page 125, [Section labels], page 283, Section 1.8.2 [Formatting text], page 289, [Music notation inside markup], page 302, Section A.8 [The Emmentaler font], page 739.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "TextMarkEvent" in *Internals Reference*, Section "Text_mark_engraver" in *Internals Reference*, Section "TextMark" in *Internals Reference*.

Separate text

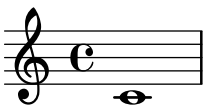
A `\markup` or `\markuplist` block can exist by itself, outside of any `\score` block, as a "top-level expression". This syntax is described in Section 3.2.5 [File structure], page 539.

```
\markup {
  Tomorrow, and tomorrow, and tomorrow...
}
```

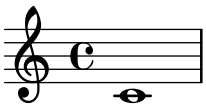
Tomorrow, and tomorrow, and tomorrow...

This allows printing text separately from the music, which is particularly useful when the input file contains several music pieces, as described in Section 3.2.2 [Multiple scores in a book], page 536.

```
\score {
  c'1
}
\markup {
  Tomorrow, and tomorrow, and tomorrow...
}
\score {
  c'1
}
```



Tomorrow, and tomorrow, and tomorrow...



Using \markuplist, separate text blocks can be spread over multiple pages, making it possible to print text documents or books entirely within LilyPond. For a description of this feature and the specific syntax it requires, see [Text markup introduction], page 289.

Predefined commands

\markup, \markuplist.

Selected Snippets

Stand-alone two-column markup

Stand-alone text may be arranged in several columns using \markup commands:

```
\markup {
  \fill-line {
    \hspace #1
    \column {
      \line { O sacrum convivium }
      \line { in quo Christus sumitur, }
      \line { recolitur memoria passionis ejus, }
      \line { mens impletur gratia, }
      \line { futurae gloriae nobis pignus datur. }
      \line { Amen. }
    }
    \hspace #2
    \column \italic {
      \line { O sacred feast }
      \line { in which Christ is received, }
      \line { the memory of His Passion is renewed, }
      \line { the mind is filled with grace, }
      \line { and a pledge of future glory is given to us. }
      \line { Amen. }
    }
    \hspace #1
```

```
  }
}
```

O sacrum convivium	*O sacred feast*
in quo Christus sumitur,	*in which Christ is received,*
recolitur memoria passionis ejus,	*the memory of His Passion is renewed,*
mens impletur gratia,	*the mind is filled with grace,*
futurae gloriae nobis pignus datur.	*and a pledge of future glory is given to us.*
Amen.	*Amen.*

See also

Notation Reference: Section 1.8.2 [Formatting text], page 289, Section 3.2.5 [File structure], page 539, Section 3.2.2 [Multiple scores in a book], page 536.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "TextScript" in *Internals Reference*.

1.8.2 Formatting text

This section presents basic and advanced text formatting, using the markup mode specific syntax.

Text markup introduction

A `\markup` or `\markuplist` block is used to typeset text with an extensible syntax called "markup mode". Such blocks can be used in many contexts (see [Text objects overview], page 277).

In markup mode, words are written as-is. A single word does not need any quotes.

```
\markup intenso
```

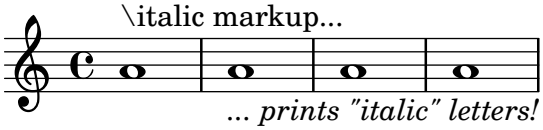
intenso

Several words can be grouped together by enclosing them in quotes.

```
\markup "molto intenso"
```

molto intenso

Apart from grouping, quoting also allows writing special characters such as '\' and '#' without affecting the formatting of the text. Double quotation marks themselves may be printed by preceding them with backslashes.

```
\relative {
  a'1^"\italic markup..."
  a_\markup { \italic "... prints \"italic\" letters!" }
  a a
}
```

Formatting is achieved through markup commands. Their name is written preceded by a backslash. They expect a number of arguments specific to the command. For an exhaustive list of `\markup`-specific commands, see Section A.12 [Text markup commands], page 758.

```
\markup \italic "string. assai"
```

```
\markup \with-color "red" intenso
```

string. assai

intenso

Markup commands can be nested. The markup block ends when all commands have received their arguments.

```
\markup \with-color "red" \italic intenso
```

intenso

Several markup expressions can be grouped together within braces to form a so-called *markup list*. Without further formatting, the elements of a markup list are typeset in a row.

```
\markup { molto \italic intenso }
```

molto *intenso*

Some commands do not expect a markup but a markup list, allowing for more complex text arrangements than printing in a row.

```
\markup \center-column {
  \bold "Des Simplicius Simplicissimus Jugend"
  "Karl Amadeus Hartmann"
}
```

Des Simplicius Simplicissimus Jugend
Karl Amadeus Hartmann

Also, some commands do not return a markup but a markup list. The result can then be used where a markup list is expected. For a list of these commands, see Section A.13 [Text markup list commands], page 820.

```
\markup \string-lines
    "Twinkle, twinkle, little star,
     How I wonder what you are!"
```

Twinkle, twinkle, little star, How I wonder what you are!

```
\markup \center-column \string-lines
    "Twinkle, twinkle, little star,
     How I wonder what you are!"
```

Twinkle, twinkle, little star,
How I wonder what you are!

Elements of a nested markup list are simply treated as elements of the main markup list.

```
\markup \center-column {
  \bold "Des Simplicius Simplicissimus Jugend"
  { Karl Amadeus \smallCaps Hartmann }
}
```

Des Simplicius Simplicissimus Jugend
Karl
Amadeus
HARTMANN

To group elements of a nested markup list in a row, apply the \line command to the markup list. This stacks elements from the markup list horizontally into a single markup.

```
\markup \center-column {
  \bold "Des Simplicius Simplicissimus Jugend"
  \line { Karl Amadeus \smallCaps Hartmann }
}
```

Des Simplicius Simplicissimus Jugend
Karl Amadeus HARTMANN

A special feature is the handling of commands taking markups when applied to markup lists. When a command expects a markup as its last argument, and a markup list is given for this argument, the markup command is applied to each of the individual markups in the list.

```
\markup \box { Karl Amadeus \smallCaps Hartmann }
```

Karl Amadeus HARTMANN

In this case, the result is in turn a markup list, which can be passed to a command expecting a markup list, or to one expecting a markup, with again the mapping behavior described above in the latter case.

```
\markup \center-column \box { Karl Amadeus \smallCaps Hartmann }
\markup \rotate #30 \box { Karl Amadeus \smallCaps Hartmann }
```

Karl
Amadeus
HARTMANN

Karl Amadeus HARTMANN

Apply \line to a markup list in order to make it treated as a single markup argument.

```
\markup \box { Karl Amadeus \smallCaps Hartmann }
\markup \box \line { Karl Amadeus \smallCaps Hartmann }
```

Karl Amadeus HARTMANN

Karl Amadeus HARTMANN

When the entire content of a \markup expression is a markup list, it is implicitly typeset using the \line command. Thus, elements are stacked horizontally and grouped as a single, unbreakable text block. The \markuplist command acts differently: it expects a markup list, and prints the individual markups on the page, stacking them vertically, and allowing page breaks. The following example illustrates this difference.

```
\markup \box \wordwrap {
  Lorem ipsum dolor sit amet, consectetur
  adipisicing elit, sed do eiusmod tempor incididunt
  ut labore et dolore magna aliqua.  Ut enim ad minim
  veniam, quis nostrud exercitation ullamco laboris
  nisi ut aliquip ex ea commodo consequat.
}

\markuplist \box \wordwrap-lines {
```

```
  Lorem ipsum dolor sit amet, consectetur
  adipisicing elit, sed do eiusmod tempor incididunt
  ut labore et dolore magna aliqua.  Ut enim ad minim
  veniam, quis nostrud exercitation ullamco laboris
  nisi ut aliquip ex ea commodo consequat.
}
```

Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

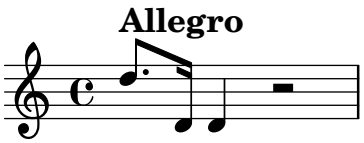
Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod

tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim

veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea

commodo consequat.

Markups can be stored in variables, to be reused in any context where a markup is accepted. For example, such a variable can be directly attached to notes:

```
allegro = \markup \bold \large Allegro

{
  d''8.^\allegro
  d'16 d'4 r2
}
```

The \etc syntax allows to define custom shorthands usable as markup commands.

```
\markup reddish = \markup \with-color "tomato" \etc

\markup { molto \reddish intenso }
```

molto intenso

The inner workings of markup commands and how to implement more complex ones is explained in Section “Markup functions” in *Extending*.

See also

Notation Reference: [Text objects overview], page 277, Section A.12 [Text markup commands], page 758, Section A.13 [Text markup list commands], page 820.

Extending LilyPond: Section “Markup functions” in *Extending*.

Installed Files: `scm/markup.scm`, `scm/define-markup-commands.scm`.

Snippets: Section “Text” in *Snippets*.

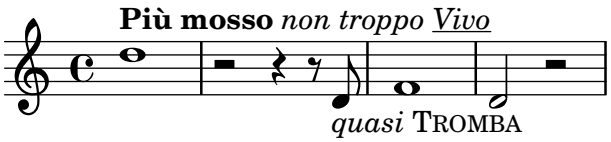
Internals Reference: Section “TextScript” in *Internals Reference*.

Known issues and warnings

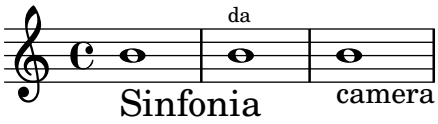
Syntax error messages for markup mode can be confusing.

Selecting font and font size

Basic font switching is supported in markup mode:

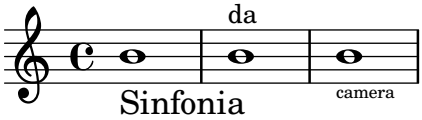
```
\relative {
  d''1^\markup {
    \bold { Più mosso }
    \italic { non troppo \underline Vivo }
  }
  r2 r4 r8
  d,_\markup { \italic quasi \smallCaps Tromba }
  f1 d2 r
}
```

The font size can be altered, relative to the global staff size, in a number of different ways. It can be set to predefined size.

```
\relative b' {
  b1_\markup { \huge Sinfonia }
  b1^\markup { \teeny da }
  b1-\markup { \normalsize camera }
}
```



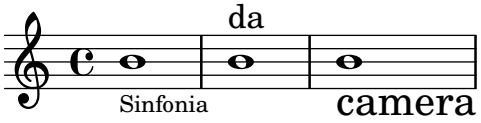
It can be set relative to its previous value.

```
\relative b' {
  b1_\markup { \larger Sinfonia }
  b1^\markup { \smaller da }
  b1-\markup { \magnify #0.6 camera }
}
```



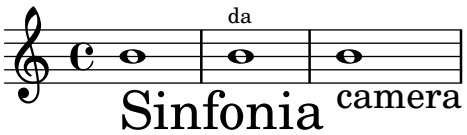
It can be increased or decreased relative to the value set by the global staff size.

```
\relative b' {
  b1_\markup { \fontsize #-2 Sinfonia }
  b1^\markup { \fontsize #1 da }
  b1-\markup { \fontsize #3 camera }
}
```



It can also be set to a fixed point size, regardless of the global staff size.

```
\relative b' {
  b1_\markup { \abs-fontsize #20 Sinfonia }
  b1^\markup { \abs-fontsize #8 da }
  b1-\markup { \abs-fontsize #14 camera }
}
```



If the text includes spaces, then it is best to put it all inside quote marks, so that the size of each space is appropriate for the size of the other characters.

```
\markup \fontsize #6 \bold { Sinfonia da camera }
\markup \fontsize #6 \bold { "Sinfonia da camera" }
```

Sinfonia da camera

Sinfonia da camera

Text may be printed as subscript or superscript. By default these are printed in a smaller size, but a normal size can be used as well:

```
\markup {
  \column {
    \line { 1 \super st movement }
    \line { 1 \normal-size-super st movement
      \sub { (part two) }  }
  }
}
```

1 st movement
1 st movement (part two)

The markup mode provides an easy way to select alternate font families. The default serif font, of roman type, is automatically selected unless specified otherwise; on the last line of the following example, there is no difference between the first and the second word.

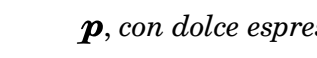
```
\markup {
  \column {
    \line { Act \number 1 }
    \line { \sans { Scene I. } }
    \line { \typewriter { Verona. An open place. } }
    \line { Enter \roman Valentine and Proteus. }
  }
}
```

Act 1
Scene I.
Verona. An open place.
Enter Valentine and Proteus.

Some of these font families, used for specific items such as numbers or dynamics, do not provide all characters, as mentioned in [New dynamic marks], page 149, and [Manual repeat marks], page 183.

When used inside a word, some font-switching or formatting commands may produce an unwanted blank space. This can easily be solved by concatenating the text elements together:

```
\markup {
  \column {
    \line {
      \concat { 1 \super st }
      movement
    }
    \line {
      \concat { \dynamic p , }
      \italic { con dolce espressione }
    }
  }
}
```



An exhaustive list of font switching commands and custom font usage commands can be found in Section A.12.1 [Font markup], page 759.

Defining custom font sets is also possible, as explained in Section 1.8.3 [Fonts], page 305.

Predefined commands

`\teeny`, `\tiny`, `\small`, `\normalsize`, `\large`, `\huge`, `\smaller`, `\larger`.

See also

Notation Reference: Section A.12.1 [Font markup], page 759, [New dynamic marks], page 149, [Manual repeat marks], page 183, Section 1.8.3 [Fonts], page 305.

Installed Files: `scm/define-markup-commands.scm`.

Snippets: Section “Text” in *Snippets*.

Internals Reference: Section “TextScript” in *Internals Reference*.

Known issues and warnings

Using the font sizing commands `\teeny`, `\tiny`, `\small`, `\normalsize`, `\large`, and `\huge` will lead to inconsistent line spacing compared to using `\fontsize`.

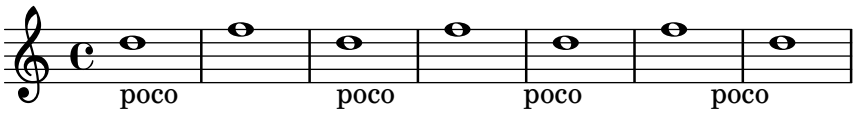
Text alignment

This subsection discusses how to place text in markup mode. Markup objects can also be moved as a whole, using the syntax described in Section “Moving objects” in *Learning Manual*.

Markup objects may be aligned in different ways. By default, a text indication is aligned on its left edge: in the following example, there is no difference between the first and the second markup. That example also demonstrates various syntactically correct ways of placing the alignment commands:

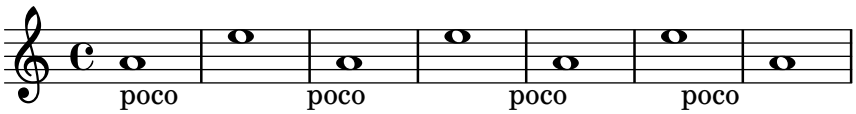
```
\relative {
  d''1-\markup { poco }
  f
  d-\markup { \left-align poco }
```

```
  f
  d-\markup { \center-align { poco } }
  f
  d-\markup \right-align { poco }
}
```



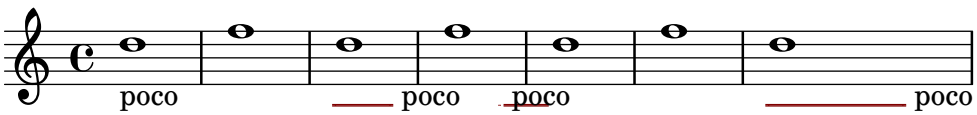
Horizontal alignment may be fine-tuned using a numeric value:

```
\relative {
  a'1-\markup { \halign #-1 poco }
  e'
  a,-\markup { \halign #0 poco }
  e'
  a,-\markup { \halign #0.5 poco }
  e'
  a,-\markup { \halign #2 poco }
}
```



Lastly, words and any other objects may be moved by preceding them with padding. Negative padding is also supported, and will move any objects that follow in the opposite direction. Although padding is normally invisible, in the following example some commands have been added to make it appear more clearly:

```
\relative {
  d''1-\markup { poco }
  f
  d-\markup { \with-color #darkred \box \hspace #4 poco }
  f
  d-\markup { \with-color #darkred \box \hspace #-4 poco }
  f
  d-\markup { \with-color #darkred \box \hspace #10 poco }
}
```

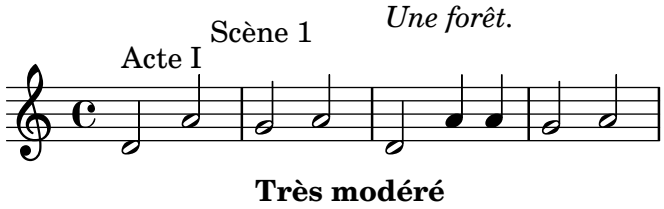


Some objects may have alignment procedures of their own, and therefore are not affected by these commands. It is possible to move such markup objects as a whole, as shown for instance in [Text marks], page 283.

Vertical alignment can be set in a similar way. As stated above, markup objects can be moved as a whole; however, it is also possible to move specific elements inside a markup block.

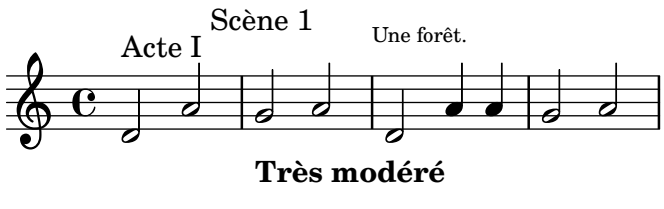
```
\relative {
  d'2^\markup {
    Acte I
    \raise #2 { Scène 1 }
```

```
  }
  a'
  g_\markup {
    \lower #4 \bold { Très modéré }
  }
  a
  d,^\markup \raise #4 \italic {
    Une forêt.
  }
  a'4 a g2 a
}
```



Some commands can affect both the horizontal and vertical alignment of text objects in markup mode:

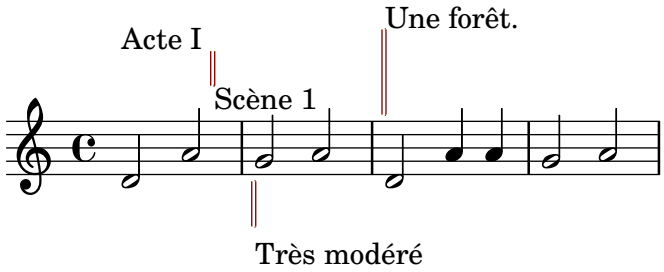
```
\relative {
  d'2^\markup {
    Acte I
    \translate #'(-1 . 2) "Scène 1"
  }
  a'
  g_\markup {
    \general-align #Y #3.2 \bold "Très modéré"
  }
  a
  d,^\markup \translate-scaled #'(-1 . 2) \teeny {
   "Une forêt."
  }
  a'4 a g2 a
}
```



Here again, padding (either positive or negative) is a convenient way of positioning objects vertically, when inserted into markup columns:

```
\relative {
  d'2^\markup {
    Acte I
    \column {
      \with-color #darkred \box \vspace #-1
      "Scène 1"
    }
  }
```

```
  a'
  g_\markup \column {
    \with-color #darkred \box \vspace #1
    "Très modéré"
  }
  a
  d,^\markup \column {
   "Une forêt."
    \with-color #darkred \box \vspace #2
  }
  a'4 a g2 a
}
```



A markup object may include several lines of text. In the following example, each element or expression is placed on its own line, either left-aligned or centered:

```
\markup {
  \column {
    a
    "b c"
    \line { d e f }
  }
  \hspace #10
  \center-column {
    a
    "b c"
    \line { d e f }
  }
}
```

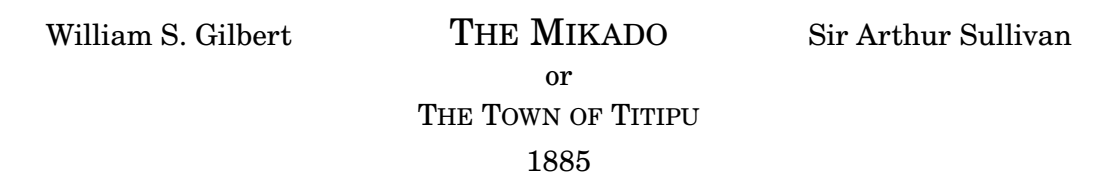
a
b c
d e f

a
b c
d e f

Similarly, a list of elements or expressions may be spread to fill the entire horizontal line width (if there is only one element, it will be centered on the page). These expressions can, in turn, include multi-line text or any other markup expression:

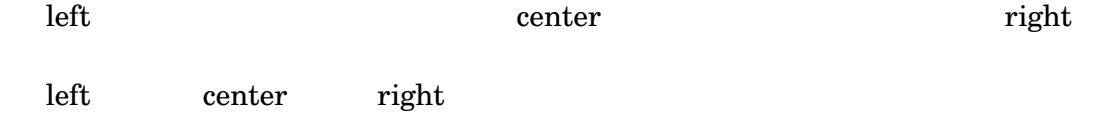
```
\markup {
  \fill-line {
    \line { William S. Gilbert }
    \center-column {
      \huge \smallCaps "The Mikado"
      or
      \smallCaps "The Town of Titipu"
    }
```

```
    \line { Sir Arthur Sullivan }
  }
}
\markup {
  \fill-line { 1885 }
}
```



Elements may be spread to fill any specified width by overriding the `line-width` property. By default it is set to `#f` which indicates the entire line:

```
\markup {
  \column {
    \fill-line { left center right }
    \null
    \override #'(line-width . 30)
    \fill-line { left center right }
  }
}
```



Long text indications can also be automatically wrapped accordingly to the given line width. These will be either left-aligned or justified, as shown in the following example.

```
\markup {
  \column {
    \line  \smallCaps { La vida breve }
    \line \bold { Acto I }
    \wordwrap \italic {
      (La escena representa el corral de una casa de
      gitanos en el Albaicín de Granada.  Al fondo una
      puerta por la que se ve el negro interior de
      una Fragua, iluminado por los rojos resplandores
      del fuego.)
    }
    \hspace #0

    \line \bold { Acto II }
    \override #'(line-width . 50)
    \justify \italic {
      (Calle de Granada.  Fachada de la casa de Carmela
      y su hermano Manuel con grandes ventanas abiertas
      a través de las que se ve el patio
      donde se celebra una alegre fiesta)
    }
  }
}
```

La vida breve

Acto I

(La escena representa el corral de una casa de gitanos en el Albaicín de Granada. Al fondo una puerta por la que se ve el negro interior de una Fragua, iluminado por los rojos resplandores del fuego.)

Acto II

(Calle de Granada. Fachada de la casa de Carmela y su hermano Manuel con grandes ventanas abiertas a través de las que se ve el patio donde se celebra una alegre fiesta)

An exhaustive list of text alignment commands can be found in Section A.12.2 [Markup for text alignment], page 770.

See also

Learning Manual: Section "Moving objects" in *Learning Manual*.

Notation Reference: Section A.12.2 [Markup for text alignment], page 770, [Text marks], page 283.

Installed Files: `scm/define-markup-commands.scm`.

Snippets: Section "Text" in *Snippets*.

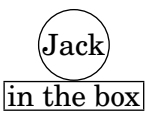
Internals Reference: Section "TextScript" in *Internals Reference*.

Graphic notation inside markup

Various graphic objects may be added to a score, using markup commands.

Some markup commands allow decoration of text elements with graphics, as demonstrated in the following example.

```
\markup \fill-line {
  \center-column {
    \circle Jack
    \box "in the box"
    \null
    \line {
      Erik Satie
      \hspace #3
      \bracket "1866 - 1925"
    }
    \null
    \rounded-box \bold Prelude
  }
}
```

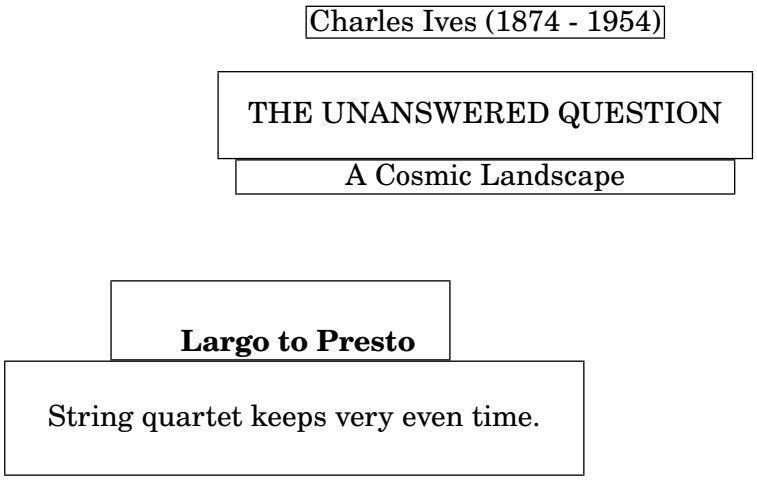


Erik Satie [1866 - 1925]

Prelude

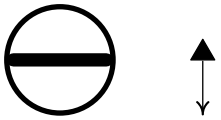
Some commands may require an increase in the padding around the text; this is achieved with some markup commands exhaustively described in Section A.12.2 [Markup for text alignment], page 770.

```
\markup \fill-line {
  \center-column {
    \box "Charles Ives (1874 - 1954)"
    \null
    \box \pad-markup #2 "THE UNANSWERED QUESTION"
    \box \pad-x #8 "A Cosmic Landscape"
    \null
  }
}
\markup \column {
  \line {
    \hspace #10
    \box \pad-to-box #'(-5 . 20) #'(0 . 5)
      \bold "Largo to Presto"
  }
  \box \pad-around #3 "String quartet keeps very even time."
}
```



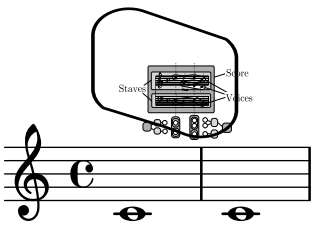
Other graphic elements or symbols may be printed without requiring any text. As with any markup expression, such objects can be combined.

```
\markup {
  \combine
    \draw-circle #4 #0.4 ##f
    \filled-box #'(-4 . 4) #'(-0.5 . 0.5) #1
  \hspace #5

  \center-column {
    \triangle ##t
    \combine
      \draw-line #'(0 . 4)
      \arrow-head #Y #DOWN ##f
  }
}
```



Advanced graphic features include the ability to include external image files converted to the Encapsulated PostScript format (*eps*), or to directly embed graphics into the input file, using native PostScript code. In such a case, it may be useful to explicitly specify the size of the drawing, as demonstrated below:

```
c'1^\markup {
  \combine
    \epsfile #X #10 "./context-example.eps"
    \with-dimensions #'(0 . 6) #'(0 . 10)
    \postscript "
      -2 3 translate
      2.7 2 scale
      newpath
      2 -1 moveto
      4 -2 4 1 1 arct
      4 2 3 3 1 arct
      0 4 0 3 1 arct
      0 0 1 -1 1 arct
      closepath
      stroke"
  }
c'
```



An exhaustive list of graphics-specific commands can be found in Section A.12.3 [Graphical markup], page 785.

See also

Notation Reference: Section A.12.2 [Markup for text alignment], page 770, Section 5.4.3 [Dimensions], page 696, Section 1.7 [Editorial annotations], page 250, Section A.12.3 [Graphical markup], page 785.

Installed Files: `scm/define-markup-commands.scm`, `scm/stencil.scm`.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "TextScript" in *Internals Reference*.

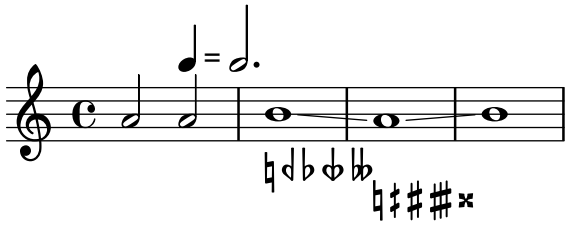
Music notation inside markup

Various musical notation elements may be added to a score, inside a markup object.

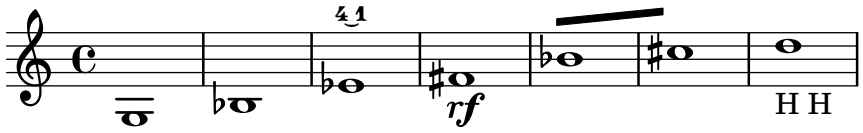
Notes and accidentals can be entered using markup commands:

```
a'2 a'^\markup {
  \note {4} #1
  =
  \note-by-number #1 #1 #1.5
```

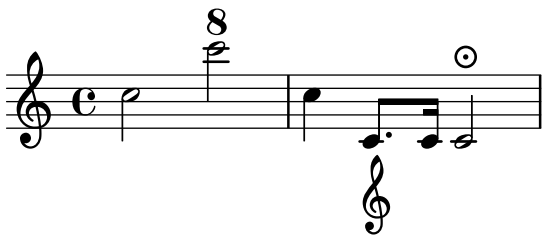
```
}
b'1_\markup {
  \natural \semiflat \flat
  \sesquiflat \doubleflat
}
\glissando
a'1_\markup {
  \natural \semisharp \sharp
  \sesquisharp \doublesharp
}
\glissando b'
```



Other notation objects may also be printed in markup mode:

```
\relative {
  g1 bes
  ees\finger \markup \tied-lyric "4~1"
  fis_\markup { \dynamic rf }
  bes^\markup {
    \beam #8 #0.1 #0.5
  }
  cis
  d-\markup {
    \markalphabet #8
    \markletter #8
  }
}
```

More generally, any available musical symbol may be included separately in a markup object, as demonstrated below; an exhaustive list of these symbols and their names can be found in Section A.8 [The Emmentaler font], page 739.

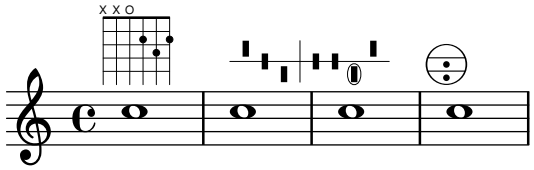
```
\relative {
  c''2
  c'^\markup { \musicglyph "eight" }
  c,4
  c,8._\markup { \musicglyph "clefs.G_change" }
  c16
  c2^\markup { \musicglyph "timesig.neomensural94" }
}
```



Another way of printing non-text glyphs is described in [Music fonts], page 311. This is useful for printing braces of various sizes.

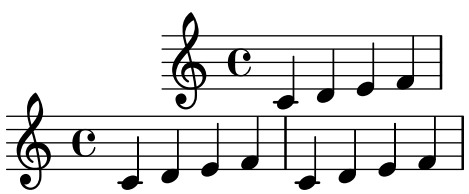
The markup mode also supports diagrams for specific instruments:

```
\relative {
  c''1^\markup {
    \fret-diagram-terse "x;x;o;2;3;2;"
  }
  c^\markup {
    \harp-pedal "^-v|--ov^"
  }
  c
  c^\markup {
    \combine
      \musicglyph "accordion.discant"
      \combine

\raise #0.5 \musicglyph "accordion.dot"

\raise #1.5 \musicglyph "accordion.dot"
  }
}
```



Such diagrams are documented in Section A.12.6 [Instrument-specific markup], page 802.

A whole score can even be nested inside a markup object:

```
\relative {
  c'4 d^\markup {
    \score {
      \relative { c'4 d e f }
    }
  }
  e f |
  c d e f
}
```

An exhaustive list of music notation related commands can be found in Section A.12.4 [Markup for music and musical symbols], page 794.

See also

Notation Reference: Section A.12.4 [Markup for music and musical symbols], page 794, Section A.8 [The Emmentaler font], page 739, [Music fonts], page 311.

Installed Files: `scm/define-markup-commands.scm`, `scm/fret-diagrams.scm`, `scm/harp-pedals.scm`.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "TextScript" in *Internals Reference*.

Known issues and warnings

Vertical spacing of a `\score` inside a markup object is controlled by `baseline-skip`. Any `\paper` settings are ignored.

1.8.3 Fonts

Fonts in LilyPond are handled by several libraries; two of them are of relevance to the user: *FontConfig* (`https://fontconfig.org`) is used to detect available fonts, and selected fonts are then rendered by *Pango* (`https://pango.org`) to display text strings.

This section shows how to access fonts in LilyPond, and how to change them in scores.

Finding fonts

In addition to any font already installed on the operating system, more fonts may be added to the ones detected by FontConfig (and thus available in LilyPond scores) by the following commands:

```
#(ly:font-config-add-font "path/to/font-file")
#(ly:font-config-add-directory "path/to/directory/")
```

Both commands accept either absolute or relative paths, which makes it possible to compile a score on any system by simply distributing the relevant font files together with the LilyPond input files.

To verify that the desired fonts are found by FontConfig, use the command `#(ly:font-config-display-fonts)`, which prints the complete list of available fonts to the console log. It also shows the actual font names to be used with LilyPond; these may differ from the file names themselves.

See [Single entry fonts], page 308, and [Entire document fonts], page 309, how to access fonts in general.

Font families

Three generic aliases for text font families[1] are available: 'roman' (serif), 'sans', and 'typewriter'. Depending on the backend, these families get mapped to different font family aliases.

For the `svg` backend:

generic family	SVG font family
roman	serif
sans	sans-serif
typewriter	monospace

'serif', 'sans-serif', and 'monospace' are 'generic-family' in SVG and CSS specifications.

For other backends:

[1] In its simplest form, a *font family* usually contains fonts in roman, italic, bold, and bold italic styles.

generic family	default font family alias	font families contained in alias
roman	LilyPond Serif	C059, Century SchoolBook URW, Century Schoolbook L, TeX Gyre Schola, DejaVu Serif, ..., serif
sans	LilyPond Sans Serif	Nimbus Sans, Nimbus Sans L, TeX Gyre Heros, DejaVu Sans, ..., sans-serif
typewriter	LilyPond Monospace	Nimbus Mono PS, Nimbus Mono, Nimbus Mono L, TeX Gyre Cursor, DejaVu Sans Mono, ..., monospace

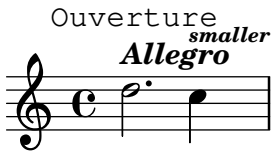
If a character does not exist in the appropriate font of the first listed family, the appropriate font of the next listed family gets used instead for that character.

Note that the URW font families distributed with LilyPond ('C059', 'Nimbus Sans', and 'Nimbus Mono PS') have a peculiarity: By default, in addition to the standard ligatures like 'fl' or 'ffi', they substitute the string 'Nr.' with the Numero Sign (U+2116) if the 'latn' script is selected. To circumvent this locally, insert a *zero-width non-joiner character* (ZWNJ, U+200C) between the 'N' and 'r' characters. To circumvent this globally, use the following code to make LilyPond always insert a ZWNJ character.

```
\paper {
  #(add-text-replacements!
      `(("Nr." . ,(format #f "N~ar." (ly:wide-char->utf-8 #x200C)))))
}
```

'LilyPond Serif', 'LilyPond Sans Serif', and 'LilyPond Monospace' are font family aliases defined in the additional FontConfig configuration file `00-lilypond-fonts.conf`, which can be usually found in directory `/usr/local/share/lilypond/2.25.3/fonts`, and which is used exclusively by LilyPond.

Each font family may include different shapes and series. The following example demonstrates that, including code to also change the size. The value supplied to `font-size` is taken relative to the default font size.

```
\override Score.TextMark.font-family = #'typewriter
\textMark "Ouverture"
\override Voice.TextScript.font-shape = #'italic
\override Voice.TextScript.font-series = #'bold
d''2.^\markup "Allegro"
\override Voice.TextScript.font-size = #-3
c''4^"smaller"
```

A similar syntax may be used in markup mode; however, in most cases it is preferable to use the simpler syntax explained in [Selecting font and font size], page 293:

```
\markup {
  \column {
    \line {
      \override #'((font-shape . italic) (font-size . 4))
      Idomeneo,
    }
    \line {
```

```
      \override #'(font-family . typewriter) {
        \override #'(font-series . bold) re
        di
      }
      \override #'(font-family . sans) Creta
    }
  }
}
```

Idomeneo,
re di Creta

Font features

When using OpenType fonts, font features can be used.[2] Note that not all OpenType fonts have all features. If you request a feature that does not exist in the chosen font, the feature is simply ignored. The example below uses the font 'TeX Gyre Schola' (this is, the roman style of the family).

```
\markup { \override #'(font-name . "TeX Gyre Schola")
          normal style: Hello HELLO }
\markup { \override #'(font-name . "TeX Gyre Schola")
          \caps { small caps: Hello } }
\markup { \override #'(font-name . "TeX Gyre Schola")
          \override #'(font-features . ("smcp"))
          { true small caps: Hello } }

\markup { \override #'(font-name . "TeX Gyre Schola")
          normal number style: 0123456789 }
\markup { \override #'(font-name . "TeX Gyre Schola")
          \override #'(font-features . ("onum"))
          { old number style: 0123456789 } }

\markup { \override #'(font-name . "TeX Gyre Schola")
          \override #'(font-features . ("salt 0"))
          { stylistic alternate 0: epsilon phi pi rho theta } }
\markup { \override #'(font-name . "TeX Gyre Schola")
          \override #'(font-features . ("salt 1"))
          { stylistic alternate 1: epsilon phi pi rho theta } }

\markup { \override #'(font-name . "TeX Gyre Schola")
          \override #'(font-features . ("onum" "smcp" "salt 1"))
          { multiple features: Hello 0123456789 epsilon phi pi rho theta } }
```

normal style: Hello HELLO

SMALL CAPS: HELLO

TRUE SMALL CAPS: HELLO

normal number style: 0123456789

[2] Selecting OpenType font scripts and languages is not supported yet.

old number style: 0123456789

stylistic alternate 0: εφπρθ

stylistic alternate 1: ϵϕϖϱϑ

multiple features: Hello 0123456789 ϵϕϖϱϑ

For the full OpenType font feature list see `https://www.microsoft.com/typography/otspec/featurelist.htm`; for identifying features of OpenType fonts see `https://lists.gnu.org/archive/html/lilypond-devel/2017-08/msg00004.html`.

Although it is easy to switch between preconfigured fonts, it is also possible to use other fonts. For more information, see [Single entry fonts], page 308, and [Entire document fonts], page 309.

See also

Notation Reference: Section A.8 [The Emmentaler font], page 739, [Music notation inside markup], page 302, Section 5.4.8 [Rotating objects], page 711, [Selecting font and font size], page 293, Section A.12.1 [Font markup], page 759.

Single entry fonts

Almost all outline fonts installed on the operating system and recognized by FontConfig may be used in a score, with the exception of bitmap fonts (which are not supported by design) and OpenType Variation Fonts (which are not supported yet).

LilyPond calls function `pango_font_description_from_string` from the Pango library to access fonts; it uses the following syntax form for font names.[3]

`[`*family-list*`]` `[`*style-options*`]`

where *family-list* is a comma-separated list of families optionally terminated by a comma, and *style-options* a whitespace-separated list of words where each word describes one of style, variant, weight, stretch, or gravity.

The following words are understood as styles: `Normal` (the default), `Roman`, `Oblique`, `Italic`.

The following words are understood as variants: `Small-Caps`. Default is no variant.

The following words are understood as weights: `Thin`, `Ultra-Light`, `Extra-Light`, `Light`, `Semi-Light`, `Demi-Light`, `Book`, `Regular` (the default), `Medium`, `Semi-Bold`, `Demi-Bold`, `Bold`, `Ultra-Bold`, `Extra-Bold`, `Heavy`, `Black`, `Ultra-Black`, `Extra-Black`.

The following words are understood as stretch values: `Ultra-Condensed`, `Extra-Condensed`, `Condensed`, `Semi-Condensed`, `Semi-Expanded`, `Expanded`, `Extra-Expanded`, `Ultra-Expanded`. Default is no stretch.

The following words are understood as gravity values: `Not-Rotated`, `South`, `Upside-Down`, `North`, `Rotated-Left`, `East`, `Rotated-Right`, `West`. Default is no gravity.

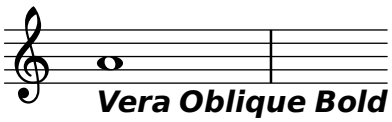
Assuming the syntax is correct, setting a font name never fails. If none of the font families are known (or no font family is given), FontConfig returns a default font depending on the operating system. If none of the style options are known (or no style option is given), default values are used.

In the following example, the font for the time signature is set to 'Bitstream Charter'. Since no style option is given, FontConfig uses default values as specified above. For the markup string, the list of font families is set to 'Bitstream Vera Sans' and 'sans-serif', which tells FontConfig to

[3] The data is taken from the Pango reference for version 1.46.1; the syntax supported by LilyPond is actually a subset of what Pango provides.

try 'Bitstream Vera Sans' first; if it is not available, it tries the generic font family 'sans-serif' as described in [Font families], page 305. The style for the markup is set to 'Oblique Bold', which makes FontConfig try to find a font that is both oblique and bold. If that fails, it tries to find an oblique or bold font. If that fails again, it tries to match a font with default style options.

Note that FontConfig also checks whether the requested glyph is actually present in the font. In case it is missing, another font gets tried (following the above algorithm) until the glyph is eventually found. Only if FontConfig fails to find any font with the appropriate glyph a symbol for a missing glyph is shown (which is normally a rectangular box or simply some whitespace).

```
\override Staff.TimeSignature.font-name = "Bitstream Charter"
\override Staff.TimeSignature.font-size = #2
\time 3/4

a'1_\markup {
  \override #'(font-name .
               "Bitstream Vera Sans, sans-serif, Oblique Bold")
    { Vera Oblique Bold }
}
```

> **Note:** If any of the above style options is part of the font (family) name you *must* use a trailing comma after the name even if you do not select a style option. A typical example is 'Times New Roman': If specified as `"Times New Roman"`, FontConfig searches for a font 'Times New' in roman style. Only if you say `"Times New Roman,"` this font is really accessed.

Running `lilypond` on the command line with the following option displays a list of all available fonts on the operating system:

```
lilypond -dshow-available-fonts
```

See also

Notation Reference: [Finding fonts], page 305, [Font families], page 305, [Entire document fonts], page 309.

Snippets: Section "Text" in *Snippets*.

Entire document fonts

It is possible to change the fonts used in LilyPond's default font families by calling the function `make-pango-font-tree`. The arguments are substitutions for the 'roman', 'sans' and 'typewriter' font families (in that order), followed by a scaling factor. Similar to single fonts (see [Single entry fonts], page 308), font families are set up by using comma-separated lists of font family names, but without style options.[4]

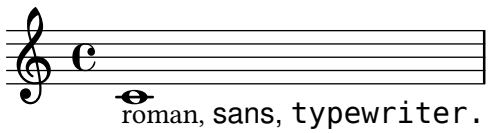
Note that `make-pango-font-tree` resets the notation fonts to 'Emmentaler' as the default.

The example below adjusts the font size in relation to the global staff size.

```
\paper {
```

[4] This implies that, contrary to single fonts, a trailing comma is never necessary.

```
  #(define fonts
    (make-pango-font-tree "Linux Libertine O"
                          "Nimbus Sans, Nimbus Sans L"
                          "DejaVu Sans Mono"
                          (/ staff-height pt 20)))
}

\relative c'{
  c1-\markup {
    roman,
    \sans sans,
    \typewriter typewriter. }
}
```



LilyPond provides an alternative, more flexible interface to set global font families. It allows you to change only specific font family names, leaving others set to default values. The following example has the same effect as the above `make-pango-font-tree` example; the syntax for font family names is identical. If you do not change the staff size from the default of 20 pt, the line containing the `#:factor` keyword is unnecessary.

```
\paper {
  #(define fonts
    (set-global-fonts
     #:roman "Linux Libertine O"
     #:sans "Nimbus Sans, Nimbus Sans L"
     #:typewriter "DejaVu Sans Mono"
     ; unnecessary if the staff size is default
     #:factor (/ staff-height pt 20)
    ))
}
```

Additionally, `set-global-fonts` can also set the music notation fonts. The following example has the same effect as the previous examples, because it uses the default notation fonts. For more information, see Section 3.5.4 [Replacing the notation font], page 585.

```
\paper {
  #(define fonts
    (set-global-fonts
     #:music "emmentaler"            ; default
     #:brace "emmentaler"            ; default
     #:roman "Linux Libertine O"
     #:sans "Nimbus Sans, Nimbus Sans L"
     #:typewriter "DejaVu Sans Mono"
     ; unnecessary if the staff size is default
     #:factor (/ staff-height pt 20)
    ))
}
```

Note that each call to `set-global-fonts` completely resets both the main notation and text fonts.[5] If any font category is left unspecified, the respective default font (family) gets used for that category. Each call of `set-global-fonts` affects all `\book` blocks that follow it. If there are multiple `\book` blocks and you want to use different fonts for each, simply call `set-global-fonts` again, like this:

```
\paper {
  #(define fonts
    (set-global-fonts
     ...
    ))
}
\book {
  ...
}

\paper {
  #(define fonts
    (set-global-fonts
     ...
    ))
}
\book {
  ...
}
```

See also

Notation Reference: [Finding fonts], page 305, [Font families], page 305, [Single entry fonts], page 308, [Selecting font and font size], page 293, Section A.12.1 [Font markup], page 759, Section 3.5.4 [Replacing the notation font], page 585.

Music fonts

LilyPond neither uses FontConfig nor Pango for accessing music notation fonts but handles them by itself. As a consequence, the interface is different. This section describes how to insert music symbols into markup strings.

Music notation fonts are a collection of specific glyphs that can be accessed with several *encodings*. The following syntax allows LilyPond's various Emmentaler glyphs[6] to be used directly in markup mode:

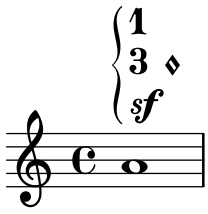
```
a'1^\markup {
  \vcenter {
    \override #'(font-encoding . fetaBraces)
    \lookup "brace120"
    \override #'(font-encoding . fetaText)
    \column { 1 3 sf }
```

[5] To be more precise, 'emmentaler' (with a lowercase 'e', which is mandatory in the argument to `#:music` and `#:brace`) is a set of fonts (but not a font family in the FontConfig sense) that LilyPond accesses and manages directly. Instead of various styles, however, it comes with different design sizes, see [Music fonts], page 311, and Section 3.5.4 [Replacing the notation font], page 585. The corresponding FontConfig font names are 'Emmentaler-*size*', where *size* is one of the numbers 11, 13, 14, 16, 18, 20, 23, and 26.

For braces, the FontConfig font name is 'Emmentaler-Brace'.

[6] LilyPond's Emmentaler fonts contain three glyph sets: *Feta* (for modern notation), *Parmesan* (for ancient notation), and braces. Both Feta and Parmesan are accessed with the 'fetaMusic' encoding.

```
      \override #'(font-encoding . fetaMusic)
      \lookup "noteheads.s0petrucci"
    }
  }
```



However, all these glyphs except the braces of various sizes are available using the simpler syntax described in [Music notation inside markup], page 302.

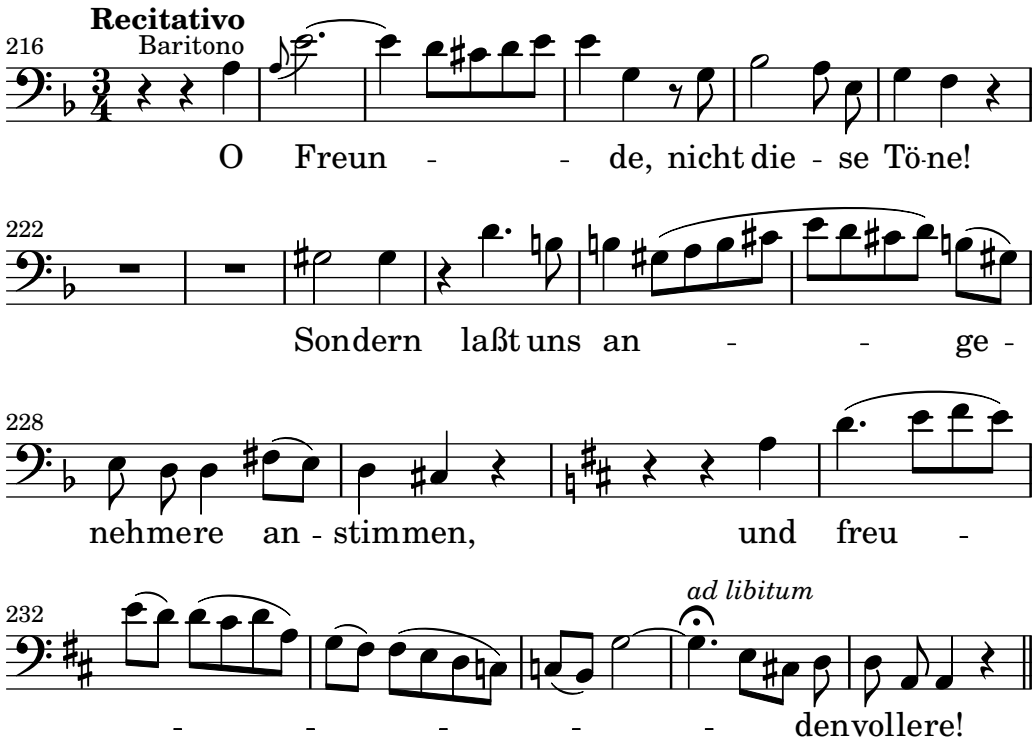
When accessing braces with the 'fetaBraces' encoding, the size of the brace is specified by the numerical part of the glyph name, in arbitrary units. Any integer from 0 to 575 inclusive may be specified, with 0 giving the smallest brace. The optimum value must be determined by trial and error. These glyphs are all left braces; right braces may be obtained by rotation, see Section 5.4.8 [Rotating objects], page 711.

2 Specialist notation

This chapter explains how to create musical notation for specific types of instrument or in specific styles.

Orchestral and ensemble music is not addressed in a separate section; however, several notions commonly useful in orchestral scores are found in [References for opera and stage musicals], page 357.

2.1 Vocal music



This section explains how to typeset vocal music, and make sure that the lyrics will be aligned with the notes of their melody.

2.1.1 Common notation for vocal music

This section discusses issues common to most types of vocal music.

References for vocal music

This section indicates where to find details of notation issues that may arise in any type of vocal music.

- Most styles of vocal music use written text as lyrics. An introduction to this notation is to be found in Section “Setting simple songs” in *Learning Manual*.
- Vocal music is likely to require the use of `markup` mode, either for lyrics or for other text elements (characters’ names, etc.). This syntax is described in [Text markup introduction], page 289.
- *Ambitus* may be added at the beginning of vocal staves, as explained in [Ambitus], page 37.
- Dynamic markings by default are placed below the staff, but in choral music they are usually placed above the staff in order to avoid the lyrics, as explained in [Score layouts for choral], page 355.

See also

Music Glossary: Section “ambitus” in *Music Glossary*.

Learning Manual: Section “Setting simple songs” in *Learning Manual*.

Notation Reference: [Text markup introduction], page 289, [Ambitus], page 37, [Score layouts for choral], page 355.

Snippets: Section “Vocal music” in *Snippets*.

Entering lyrics

Lyrics are entered in a special input mode, which can be introduced by the keyword `\lyricmode`, or by using `\addlyrics` or `\lyricsto`. In this special input mode, the input `d` is not parsed as the pitch *D*, but rather as a one-letter syllable of text. In other words, syllables are entered like notes but with pitches replaced by text.

For example:

```
\lyricmode { Three4 blind mice,2 three4 blind mice2 }
```

There are two main methods for specifying the horizontal placement of the syllables, either by specifying the duration of each syllable explicitly, as in the example above, or by leaving the lyrics to be aligned automatically to a melody or other voice of music, using `\addlyrics` or `\lyricsto`. The former method is described below in [Manual syllable durations], page 319. The latter method is described in [Automatic syllable durations], page 317.

A word or syllable of lyrics begins with an alphabetic character (plus some other characters, see below) and is terminated by any white space or a digit. Later characters in the syllable can be any character that is not a digit or white space.

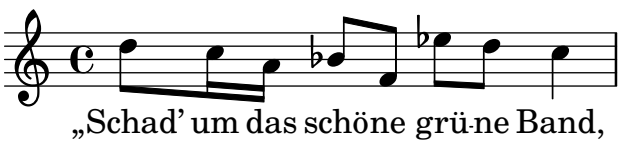
Because any character that is not a digit or white space is regarded as part of the syllable, a word is valid even if it ends with `}`, which often leads to the following mistake:

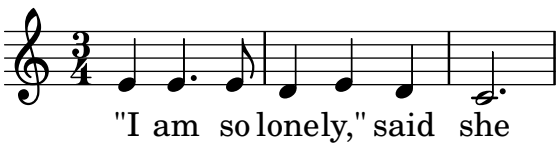
```
\lyricmode { lah lah lah}
```

In this example, the `}` is included in the final syllable, so the opening brace is not balanced and the input file will probably not compile. Instead, braces should always be surrounded with white space:

```
\lyricmode { lah lah lah }
```

Punctuation, lyrics with accented characters, characters from non-English languages, or special characters (such as the heart symbol or slanted quotes), may simply be inserted directly into the input file, providing it is saved with UTF-8 encoding. For more information, see Section 3.4.4 [Special characters], page 580.

```
\relative { d''8 c16 a bes8 f ees' d c4 }
\addlyrics { „Schad’ um das schö -- ne grü -- ne Band, }
```

Normal quotes may be used in lyrics, but they have to be preceded with a backslash character and the whole syllable has to be enclosed between additional quotes. For example,

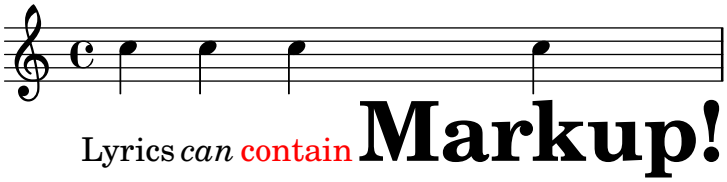
```
\relative { \time 3/4 e'4 e4. e8 d4 e d c2. }
\addlyrics { "\"I" am so lone -- "ly,\"" said she }
```

The full definition of a word start in lyrics mode is somewhat more complex. A word in lyrics mode is one that begins with an alphabetic character, _, ?, !, :, ', the control characters ^A through ^F, ^Q through ^W, ^Y, ^^, any 8-bit character with an ASCII code over 127, or a two-character combination of a backslash followed by one of `, ', ", or ^.

Great control over the appearance of lyrics comes from using \markup inside the lyrics themselves. For explanation of many options, see Section 1.8.2 [Formatting text], page 289.

Selected Snippets

Formatting lyrics syllables

Markup mode may be used to format individual syllables in lyrics.

```
mel = \relative c'' { c4 c c c }
lyr = \lyricmode {
  Lyrics \markup { \italic can } \markup { \with-color #red contain }
  \markup { \fontsize #8 \bold Markup! }
}

<<
  \new Voice = melody \mel
  \new Lyrics \lyricsto melody \lyr
>>
```

See also

Learning Manual: Section “Songs” in *Learning Manual*.

Notation Reference: [Automatic syllable durations], page 317, Section 1.8.3 [Fonts], page 305, Section 1.8.2 [Formatting text], page 289, Section 3.1 [Input modes], page 534, [Manual syllable durations], page 319, Section 3.4.4 [Special characters], page 580.

Internals Reference: Section “LyricText” in *Internals Reference*.

Snippets: Section “Text” in *Snippets*.

Aligning lyrics to a melody

Lyrics are interpreted in \lyricmode and printed in a Lyrics context, see Section 5.1.1 [Contexts explained], page 659.

```
\new Lyrics \lyricmode { ... }
```

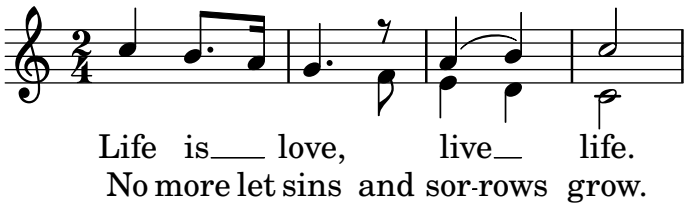
Two variants of \lyricmode additionally set an associated context used to synchronize the lyric syllables to music. The more convenient \addlyrics immediately follows the musical content of the Voice context with which it should be synchronized, implicitly creating a Lyrics context of its own. The more versatile \lyricsto requires both specifying the associated Voice context by name and explicitly creating a containing Lyrics context. For details see [Automatic syllable durations], page 317.

Lyrics can be aligned with melodies in two main ways:

- Lyrics can be aligned automatically, with the durations of the syllables being taken from another voice of music or (in special circumstances) an associated melody, using \addlyrics,

\lyricsto, or by setting the associatedVoice property. For more details, see [Automatic syllable durations], page 317.

```
<<
  \new Staff <<
    \time 2/4
    \new Voice = "one" \relative {
      \voiceOne
      c''4 b8. a16 g4. r8 a4 ( b ) c2
    }
    \new Voice = "two" \relative {
      \voiceTwo
       s2 s4. f'8 e4 d c2
    }
  >>

% takes durations and alignment from notes in "one"
  \new Lyrics \lyricsto "one" {
    Life is __ _ love, live __ life.
  }

% takes durations and alignment from notes in "one" initially
% then switches to "two"
  \new Lyrics \lyricsto "one" {
    No more let
    \set associatedVoice = "two"  % must be set one syllable early
    sins and sor -- rows grow.
  }
>>
```



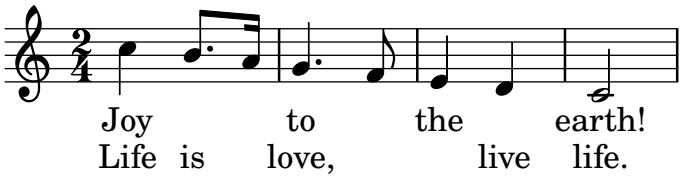
The first stanza shows the normal way of entering lyrics.

The second stanza shows how the voice from which the lyric durations are taken can be changed. This is useful if the words to different stanzas fit the notes in different ways and all the durations are available in Voice contexts. For more details, see Section 2.1.3 [Stanzas], page 345.

- Lyrics can be aligned independently of the duration of any notes if the durations of the syllables are specified explicitly, and entered with \lyricmode.

```
<<
  \new Voice = "one" \relative {
    \time 2/4
    c''4 b8. a16 g4. f8 e4 d c2
  }

% uses previous explicit duration of 2;
  \new Lyrics \lyricmode {
    Joy to the earth!
```

```
  }

% explicit durations, set to a different rhythm
  \new Lyrics \lyricmode {
    Life4 is love,2. live4 life.2
  }
>>
```



The first stanza is not aligned with the notes because the durations were not specified, and the previous value of 2 is used for each word.

The second stanza shows how the words can be aligned quite independently from the notes. This is useful if the words to different stanzas fit the notes in different ways and the required durations are not available in a music context. For more details see [Manual syllable durations], page 319. This technique is also useful when setting dialogue over music; for examples showing this, see [Dialogue over music], page 363.

See also

Learning Manual: Section "Aligning lyrics to a melody" in *Learning Manual*.

Notation Reference: Section 5.1.1 [Contexts explained], page 659, [Automatic syllable durations], page 317, Section 2.1.3 [Stanzas], page 345, [Manual syllable durations], page 319, [Dialogue over music], page 363, [Manual syllable durations], page 319.

Internals Reference: Section "Lyrics" in *Internals Reference*.

Automatic syllable durations

Lyrics can be automatically aligned to the notes of a melody in three ways:

- by specifying the named Voice context containing the melody with `\lyricsto`,
- by introducing the lyrics with `\addlyrics` and placing them immediately after the Voice context containing the melody,
- by setting the `associatedVoice` property, the alignment of the lyrics may be switched to a different named Voice context at any musical moment.

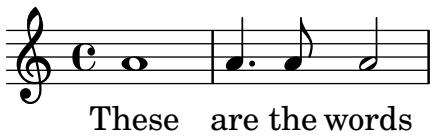
In all three methods hyphens can be drawn between the syllables of a word and extender lines can be drawn beyond the end of a word. For details, see [Extenders and hyphens], page 325.

The `Voice` context containing the melody to which the lyrics are being aligned must not have "died", or the lyrics after that point will be lost. This can happen if there are periods when that voice has nothing to do. For methods of keeping contexts alive, see Section 5.1.3 [Keeping contexts alive], page 664.

Using `\lyricsto`

Lyrics can be aligned under a melody automatically by specifying the named Voice context containing the melody with `\lyricsto`:

```
<<
  \new Voice = "melody" \relative {
    a'1 a4. a8 a2
  }
```

```
  \new Lyrics \lyricsto "melody" {
    These are the words
  }
>>
```

This aligns the lyrics to the notes of the named `Voice` context, which must already exist. Therefore normally the `Voice` context is specified first, followed by the `Lyrics` context. The lyrics themselves follow the `\lyricsto` command. The `\lyricsto` command invokes lyric mode automatically. By default, the lyrics are placed underneath the notes. For other placements, see [Placing lyrics vertically], page 327.

Using `\addlyrics`

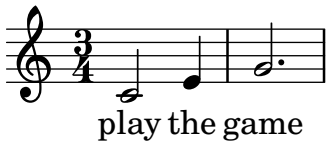
The `\addlyrics` command is just a convenient shortcut that can sometimes be used instead of having to set up the lyrics through a more complicated LilyPond structure.

```
{ MUSIC }
\addlyrics { LYRICS }
```

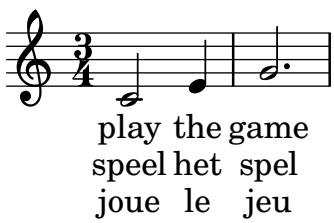
is the same as

```
\new Voice = "blah" { MUSIC }
\new Lyrics \lyricsto "blah" { LYRICS }
```

Here is an example,

```
{
  \time 3/4
  \relative { c'2 e4 g2. }
  \addlyrics { play the game }
}
```

More stanzas can be added by adding more `\addlyrics` sections:

```
{
  \time 3/4
  \relative { c'2 e4 g2. }
  \addlyrics { play the game }
  \addlyrics { speel het spel }
  \addlyrics { joue le jeu }
}
```



The command `\addlyrics` cannot handle polyphonic settings. Also, it cannot be used to associate lyrics to a `TabVoice`. For these cases one should use `\lyricsto`.

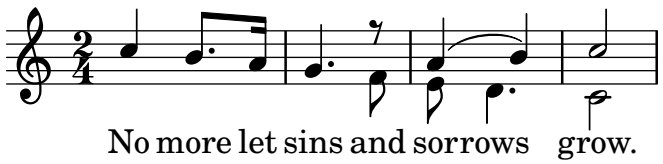
Using associatedVoice

The melody to which the lyrics are being aligned can be changed by setting the `associatedVoice` property,

```
\set associatedVoice = "lala"
```

The value of the property (here: `"lala"`) should be the name of a `Voice` context. For technical reasons, the `\set` command must be placed one syllable before the one to which the change in voice is to apply.

Here is an example demonstrating its use:

```
<<
  \new Staff <<
    \time 2/4
    \new Voice = "one" \relative {
      \voiceOne
      c''4 b8. a16 g4. r8 a4 ( b ) c2
    }
    \new Voice = "two" \relative {
      \voiceTwo
       s2 s4. f'8 e8 d4. c2
    }
  >>
% takes durations and alignment from notes in "one" initially
% then switches to "two"
  \new Lyrics \lyricsto "one" {
    No more let
    \set associatedVoice = "two"  % must be set one syllable early
    sins and sor -- rows grow.
  }
>>
```

See also

Notation Reference: [Extenders and hyphens], page 325, Section 5.1.3 [Keeping contexts alive], page 664, [Placing lyrics vertically], page 327.

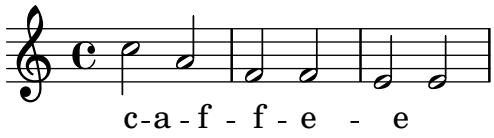
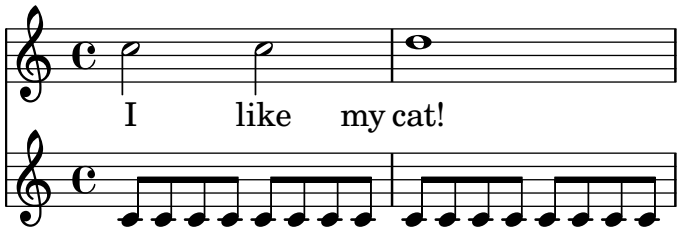
Manual syllable durations

In some complex vocal music, it may be desirable to place lyrics completely independently of notes. In this case do not use `\lyricsto` or `\addlyrics` and do not set `associatedVoice`. Syllables are entered like notes – but with pitches replaced by text – and the duration of each syllable is entered explicitly after the syllable.

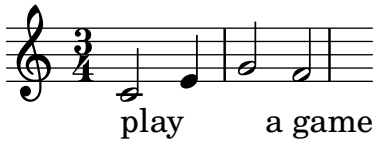
Hyphenated lines may be drawn between syllables as usual, but extender lines cannot be drawn when there is no associated voice.

Here are two examples:

```
<<
  \new Voice = "melody" \relative {
    c''2 a f f e e
```

```
  }
  \new Lyrics \lyricmode {
    c4. -- a -- f -- f -- e2. -- e
  }
>>
```

```
<<
  \new Staff {
    \relative {
      c''2 c2
      d1
    }
  }
  \new Lyrics {
    \lyricmode {
      I2 like4. my8 cat!1
    }
  }
  \new Staff {
    \relative {
      c'8 c c c c c c c
      c8 c c c c c c c
    }
  }
>>
```

This technique is useful when writing dialogue over music, see [Dialogue over music], page 363.

To change syllable alignment, simply override the `self-alignment-X` property:

```
<<
  \new Voice = "melody" \relative {
    \time 3/4
    c'2 e4 g2 f
  }
  \new Lyrics \lyricmode {
    \override LyricText.self-alignment-X = #LEFT
    play1 a4 game4
  }
>>
```

See also

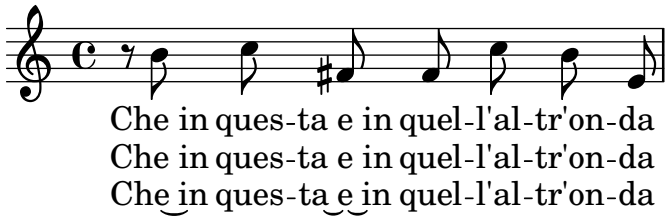
Notation Reference: [Dialogue over music], page 363.

Internals Reference: Section “Lyrics” in *Internals Reference*, Section “Voice” in *Internals Reference*.

Multiple syllables to one note

In order to assign more than one syllable to a single note with spaces between the syllables, you can surround the phrase with quotes or use a _ character. Alternatively, you can use the tilde symbol (~) to get a lyric tie.

```
{
  \relative {
    \autoBeamOff
    r8 b' c fis, fis c' b e,
  }
  \addlyrics
  {
    % Ensure hyphens are visible
    \override LyricHyphen.minimum-distance = #1.0
    Che_in ques -- ta_e_in quel -- l'al -- tr'on -- da
  }
  \addlyrics { "Che in" ques -- "ta e in" quel -- l'al -- tr'on -- da }
  \addlyrics { Che~in ques -- ta~e~in quel -- l'al -- tr'on -- da }
}
```



See also

Internals Reference: Section “LyricCombineMusic” in *Internals Reference*.

Multiple notes to one syllable

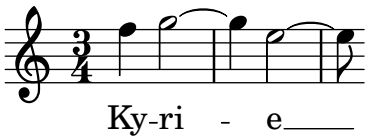
Sometimes, particularly in Medieval and baroque music, several notes are sung on one syllable; this is called melisma, see Section “melisma” in *Music Glossary*. The syllable to a melisma is usually left-aligned with the first note of the melisma.

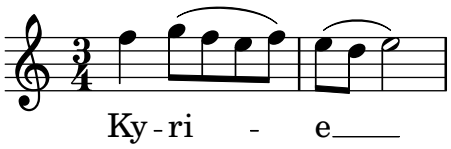
When a melisma occurs on a syllable other than the last one in a word, that syllable is usually joined to the following one with a hyphenated line. This is indicated by placing a double hyphen, --, immediately after the syllable.

Alternatively, when a melisma occurs on the last or only syllable in a word an extender line is usually drawn from the end of the syllable to the last note of the melisma. This is indicated by placing a double underscore, __, immediately after the word.

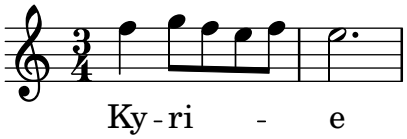
There are five ways in which melismata can be indicated:

- Melismata are created automatically over notes which are tied together:

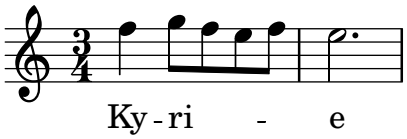
```
<<
  \new Voice = "melody" \relative {
    \time 3/4
    f''4 g2 ~ |
    4 e2 ~ |
    8
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- e __
  }
>>
```

- Melismata can be created automatically from the music by placing slurs over the notes of each melisma. This is the usual way of entering lyrics:

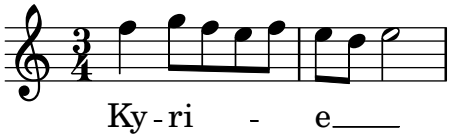
```
<<
  \new Voice = "melody" \relative {
    \time 3/4
    f''4 g8 ( f e f )
    e8 ( d e2 )
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- e __
  }
>>
```

Note that phrasing slurs do not affect the creation of melismata.

- Notes are considered a melisma if they are manually beamed, providing automatic beaming is switched off. See [Setting automatic beam behavior], page 94.

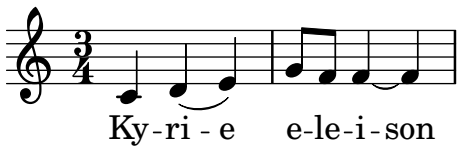
```
<<
  \new Voice = "melody" \relative {
    \time 3/4
    \autoBeamOff
    f''4 g8[ f e f]
    e2.
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- e
  }
>>
```

Clearly this is not suited to melismata over notes which are longer than eighth notes.

- An unslurred group of notes will be treated as a melisma if they are bracketed between `\melisma` and `\melismaEnd`.

```
<<
  \new Voice = "melody" \relative {
    \time 3/4
    f''4 g8
    \melisma
    f e f
    \melismaEnd
    e2.
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- e
  }
>>
```

- A melisma can be defined entirely in the lyrics by entering a single underscore character, _, for every extra note that has to be added to the melisma.

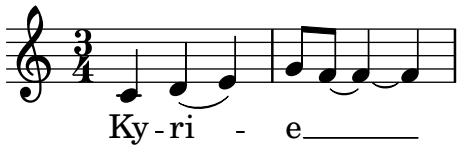
```
<<
  \new Voice = "melody" \relative {
    \time 3/4
    f''4 g8 f e f
    e8 d e2
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- _ _ _ e __ _ _
  }
>>
```

It is possible to have ties, slurs and manual beams in the melody without their indicating melismata. To do this, set `melismaBusyProperties`:

```
<<
  \new Voice = "melody" \relative {
    \time 3/4
    \set melismaBusyProperties = #'()
    c'4 d ( e )
    g8 [ f ] f4 ~ 4
```

```
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- e e -- le -- i -- son
  }
>>
```

Other settings for `melismaBusyProperties` can be used to selectively include or exclude ties, slurs, and beams from the automatic detection of melismata; see `melismaBusyProperties` in Section "Tunable context properties" in *Internals Reference*.

Alternatively, if all melismata indications are to be ignored, `ignoreMelismata` may be set true; see [Stanzas with different rhythms], page 347.

If a melisma is required during a passage in which `melismaBusyProperties` is active, it may be indicated by placing a single underscore in the lyrics for each note which should be included in the melisma:

```
<<
  \new Voice = "melody" \relative {
    \time 3/4
    \set melismaBusyProperties = #'()
    c'4 d ( e )
    g8 [ f ] ~ 4 ~ f
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- _ e __ _ _ _
  }
>>
```

Predefined commands

`\autoBeamOff`, `\autoBeamOn`, `\melisma`, `\melismaEnd`.

See also

Musical Glossary: Section "melisma" in *Music Glossary*.

Learning Manual: Section "Aligning lyrics to a melody" in *Learning Manual*.

Notation Reference: [Aligning lyrics to a melody], page 315, [Automatic syllable durations], page 317, [Setting automatic beam behavior], page 94, [Stanzas with different rhythms], page 347.

Internals Reference: Section "Tunable context properties" in *Internals Reference*.

Known issues and warnings

Extender lines under melismata are not created automatically; they must be inserted manually with a double underscore.

Extenders and hyphens

In the last syllable of a word, melismata are sometimes indicated with a long horizontal line starting in the melisma syllable, and ending in the next one. Such a line is called an extender line, and it is entered as ' __ ' (note the spaces before and after the two underscore characters).

> **Note:** Melismata are indicated in the score with extender lines, which are entered as one double underscore; but short melismata can also be entered by skipping individual notes, which are entered as single underscore characters; these do not make an extender line to be typeset by default.

Centered hyphens are entered as ' -- ' between syllables of a same word (note the spaces before and after the two hyphen characters). The hyphen will be centered between the syllables, and its length will be adjusted depending on the space between the syllables.

In tightly engraved music, hyphens can be removed. Whether this happens can be controlled with the `minimum-distance` (minimum distance between two syllables) and the `minimum-length` (threshold below which hyphens are removed) properties of `LyricHyphen`.

By default a hyphen is not repeated after a system break when the next line begins with a new syllable. Setting the `after-line-breaking` property to `#t` allows hyphens to be drawn in such situations.

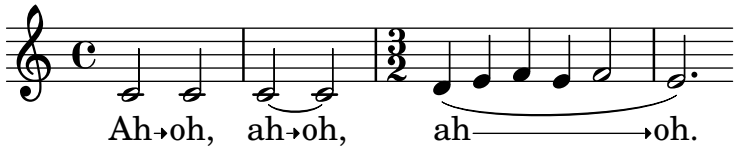
See also

Internals Reference: Section "LyricExtender" in *Internals Reference*, Section "LyricHyphen" in *Internals Reference*.

Gradual changes of vowel

Vowel transitions (gradual changes of vowel or sustained consonant), which may be indicated by arrows between syllables, are entered with the command `\vowelTransition` (see Gould pp. 452–453). The arrow shows the length of the transition, and it is by default always drawn (space is added if necessary in tightly engraved music). Ties between notes of unchanged pitch or slurs show that there is no new articulation, despite a change of vowel. The minimum length of the arrows may be adjusted with the `minimum-length` property of `VowelTransition`.

```
{
  c'2 c'
  \set melismaBusyProperties = #'()
  c'2 ~ c'
  \time 3/2
  d'4( e' f' e' f'2
  e'2.)
}
\addlyrics
{
  Ah \vowelTransition oh,
  ah \vowelTransition oh,
  ah \vowelTransition _ _ _ _
  oh.
}
```



See also

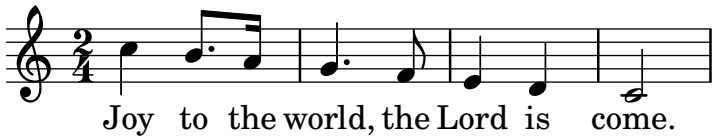
Musical Glossary: Section “vowel transition” in *Music Glossary*.

Internals Reference: Section “VowelTransition” in *Internals Reference*.

2.1.2 Techniques specific to lyrics

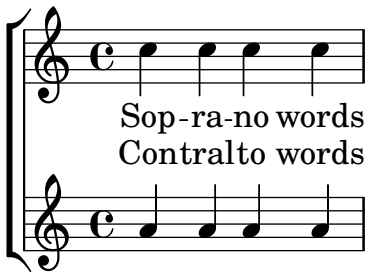
Working with lyrics and variables

Variables containing lyrics can be created, but the lyrics must be entered in lyric mode:

```
musicOne = \relative {
  c''4 b8. a16 g4. f8 e4 d c2
}
verseOne = \lyricmode {
  Joy to the world, the Lord is come.
}
\score {
  <<
    \new Voice = "one" {
      \time 2/4
      \musicOne
    }
    \new Lyrics \lyricsto "one" {
      \verseOne
    }
  >>
}
```

Durations do not need to be added if the variable is to be invoked with `\addlyrics` or `\lyricsto`.

For different or more complex orderings, the best way is to define the music and lyric variables first, then set up the hierarchy of staves and lyrics, omitting the lyrics themselves, and then add the lyrics using `\context` underneath. This ensures that the voices referenced by `\lyricsto` have always been defined earlier. For example:

```
sopranoMusic = \relative { c''4 c c c }
contraltoMusic = \relative { a'4 a a a }
sopranoWords = \lyricmode { Sop -- ra -- no words }
contraltoWords = \lyricmode { Con -- tral -- to words }

\score {
  \new ChoirStaff <<
    \new Staff {
      \new Voice = "sopranos" {
```

```
        \sopranoMusic
      }
    }
    \new Lyrics = "sopranos"
    \new Lyrics = "contraltos"
    \new Staff {
      \new Voice = "contraltos" {
        \contraltoMusic
      }
    }
    \context Lyrics = "sopranos" {
      \lyricsto "sopranos" {
        \sopranoWords
      }
    }
    \context Lyrics = "contraltos" {
      \lyricsto "contraltos" {
        \contraltoWords
      }
    }
  >>
}
```

See also

Notation Reference: [Placing lyrics vertically], page 327.

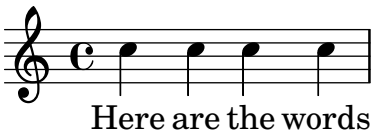
Internals Reference: Section “LyricCombineMusic” in *Internals Reference*, Section “Lyrics” in *Internals Reference*.

Placing lyrics vertically

Depending on the type of music, lyrics may be positioned above the staff, below the staff, or between staves. Placing lyrics below the associated staff is the easiest, and can be achieved by simply defining the Lyrics context below the Staff context:

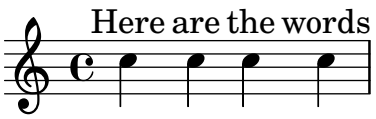
```
\score {
  <<
    \new Staff {
      \new Voice = "melody" {
        \relative { c''4 c c c }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Here are the words
      }
```

```
    }
  >>
}
```



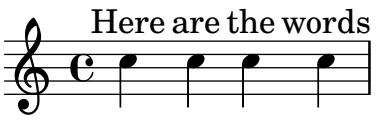
Lyrics may be positioned above the staff using one of two methods. The simplest (and preferred) method is to use the same syntax as above and explicitly specify the position of the lyrics:

```
\score {
  <<
    \new Staff = "staff" {
      \new Voice = "melody" {
        \relative { c''4 c c c }
      }
    }
    \new Lyrics \with { alignAboveContext = "staff" } {
      \lyricsto "melody" {
        Here are the words
      }
    }
  >>
}
```



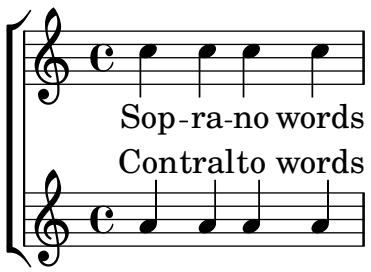
Alternatively, a two-step process may be used. First the Lyrics context is declared (without any content) before the Staff and Voice contexts, then the `\lyricsto` command is placed after the Voice declaration it references by using `\context`, as follows:

```
\score {
  <<
    \new Lyrics = "lyrics" \with {
      % lyrics above a staff should have this override
      \override VerticalAxisGroup.staff-affinity = #DOWN
    }
    \new Staff {
      \new Voice = "melody" {
        \relative { c''4 c c c }
      }
    }
    \context Lyrics = "lyrics" {
      \lyricsto "melody" {
        Here are the words
      }
    }
  >>
}
```



When there are two voices on separate staves the lyrics may be placed between the staves using either of these methods. Here is an example of the second method:

```
\score {
  \new ChoirStaff <<
    \new Staff {
      \new Voice = "sopranos" {
        \relative { c''4 c c c }
      }
    }
    \new Lyrics = "sopranos"
    \new Lyrics = "contraltos" \with {
      % lyrics above a staff should have this override
      \override VerticalAxisGroup.staff-affinity = #DOWN
    }
    \new Staff {
      \new Voice = "contraltos" {
        \relative { a'4 a a a }
      }
    }
    \context Lyrics = "sopranos" {
      \lyricsto "sopranos" {
        Sop -- ra -- no words
      }
    }
    \context Lyrics = "contraltos" {
      \lyricsto "contraltos" {
        Con -- tral -- to words
      }
    }
  >>
}
```



Other combinations of lyrics and staves may be generated by elaborating these examples, or by examining the templates in the Learning Manual, see Section “Vocal ensembles templates” in *Learning Manual*.

Selected Snippets

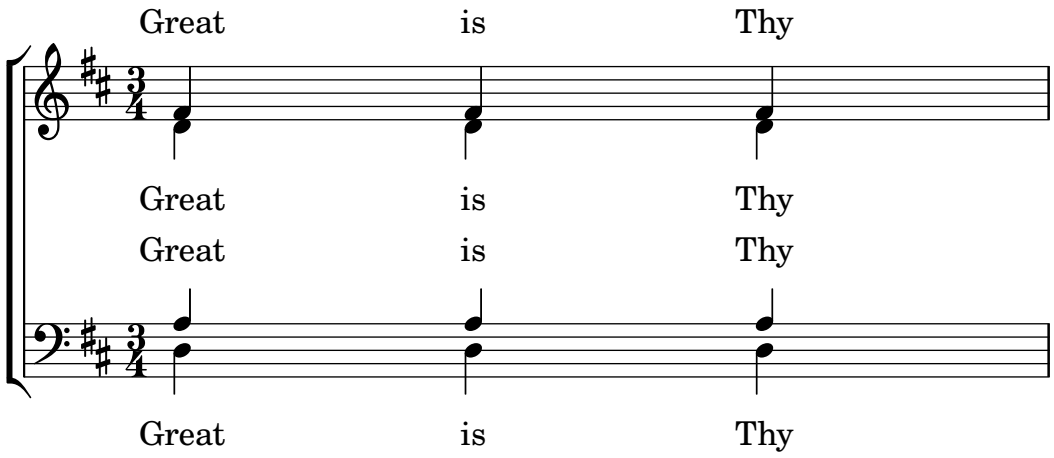
Obtaining 2.12 lyrics spacing in newer versions

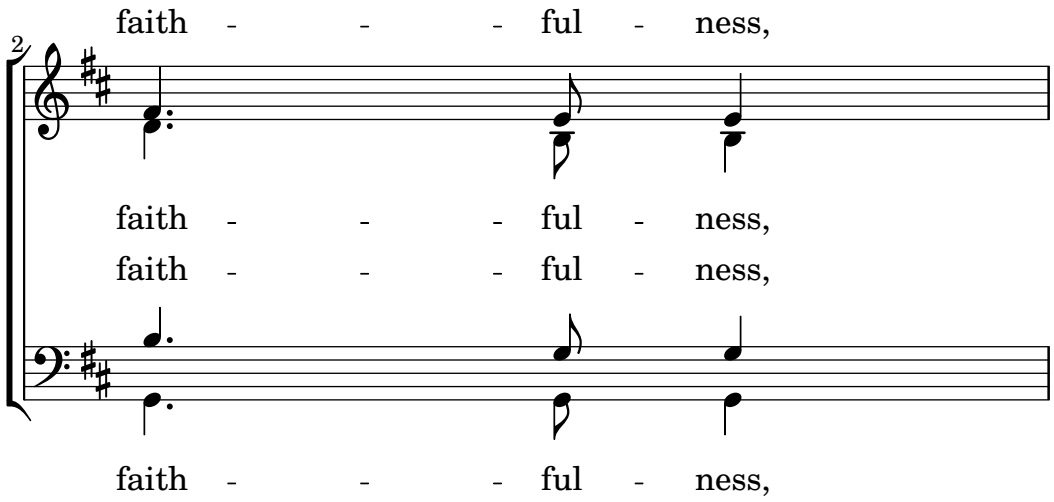
The vertical spacing engine changed since version 2.14. This can cause lyrics to be spaced differently.

It is possible to set properties for `Lyric` and `Staff` contexts to get the spacing engine to behave as it did in version 2.12.

```
global = {
  \key d \major
  \time 3/4
}

sopMusic = \relative c' {
  % VERSE ONE
  fis4 fis fis | \break
  fis4. e8 e4
}

altoMusic = \relative c' {
  % VERSE ONE
  d4 d d |
  d4. b8 b4 |
}

tenorMusic = \relative c' {
  a4 a a |
  b4. g8 g4 |
}

bassMusic = \relative c {
  d4 d d |
  g,4. g8 g4 |
}

words = \lyricmode {
  Great is Thy faith -- ful -- ness,
}

\score {
  \new ChoirStaff <<
    \new Lyrics = sopranos
    \new Staff = women <<
      \new Voice = "sopranos" {
        \voiceOne
        \global \sopMusic
      }
      \new Voice = "altos" {
        \voiceTwo
        \global \altoMusic
      }
    >>
    \new Lyrics = "altos"
    \new Lyrics = "tenors"
```

```
    \new Staff = men <<
      \clef bass
      \new Voice = "tenors" {
        \voiceOne
        \global \tenorMusic
      }
      \new Voice = "basses" {
        \voiceTwo  \global \bassMusic
      }
    >>
    \new Lyrics = basses
    \context Lyrics = sopranos \lyricsto sopranos \words
    \context Lyrics = altos \lyricsto altos \words
    \context Lyrics = tenors \lyricsto tenors \words
    \context Lyrics = basses \lyricsto basses \words
  >>
  \layout {
    \context {
      \Lyrics
      \override VerticalAxisGroup.staff-affinity = ##f
      \override VerticalAxisGroup.staff-staff-spacing =
        #'((basic-distance . 0)
   (minimum-distance . 2)
   (padding . 2))
    }
    \context {
      \Staff
      \override VerticalAxisGroup.staff-staff-spacing =
        #'((basic-distance . 0)
   (minimum-distance . 2)
   (padding . 2))
    }
  }
}
```





See also

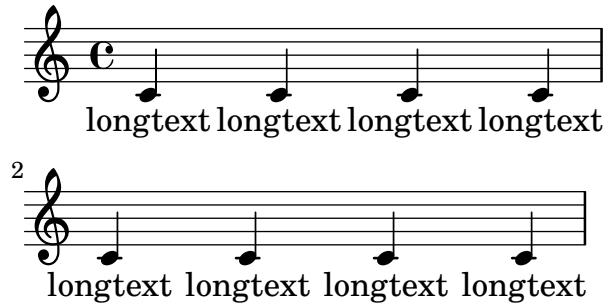
Learning Manual: Section “Vocal ensembles templates” in *Learning Manual*.

Notation Reference: Section 5.1.7 [Context layout order], page 676, Section 5.1.2 [Creating and referencing contexts], page 661.

Placing syllables horizontally

To increase the spacing between lyrics, set the `minimum-distance` property of `LyricSpace`.

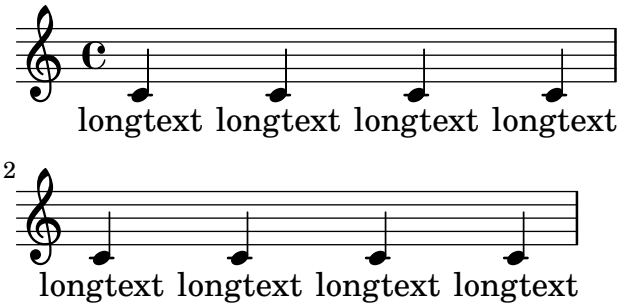
```
\relative c' {
  c c c c
  \override Lyrics.LyricSpace.minimum-distance = #1.0
  c c c c
}
\addlyrics {
  longtext longtext longtext longtext
  longtext longtext longtext longtext
}
```



To make this change for all lyrics in the score, set the property in the `\layout` block.

```
\score {
  \relative {
  c' c c c
  c c c c
  }
  \addlyrics {
  longtext longtext longtext longtext
  longtext longtext longtext longtext
  }
```

```
  \layout {
    \context {
      \Lyrics
      \override LyricSpace.minimum-distance = #1.0
    }
  }
}
```

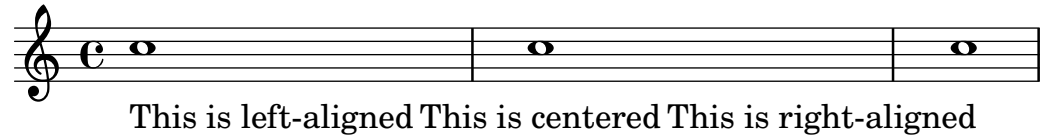


Selected Snippets

Lyrics alignment

Horizontal alignment for lyrics can be set by overriding the `self-alignment-X` property of the `LyricText` object. `#-1` is left, `#0` is center and `#1` is right; however, you can use `#LEFT`, `#CENTER` and `#RIGHT` as well.

```
\layout { ragged-right = ##f }

\relative c'' {
  c1
  c1
  c1
}
\addlyrics {
  \once \override LyricText.self-alignment-X = #LEFT
  "This is left-aligned"
  \once \override LyricText.self-alignment-X = #CENTER
  "This is centered"
  \once \override LyricText.self-alignment-X = #1
  "This is right-aligned"
}
```



Known issues and warnings

Checking to make sure that text scripts and lyrics are within the margins requires additional calculations. To speed up processing slightly, this feature can be disabled:

```
\override Score.PaperColumn.keep-inside-line = ##f
```

To make lyrics avoid bar lines as well, use

```
\layout {
  \context {
```

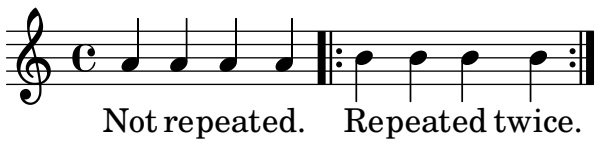
```
    \Lyrics
      \consists Bar_engraver
      \consists Separating_line_group_engraver
      \hide BarLine
  }
}
```

Lyrics and repeats

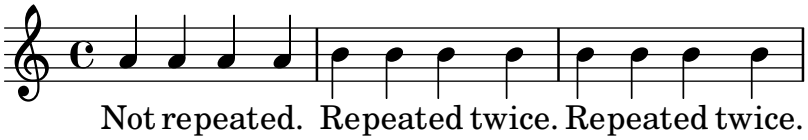
Simple repeats

Repeats in *music* are fully described elsewhere; see Section 1.4 [Repeats], page 168. This section explains how to add lyrics to repeated sections of music.

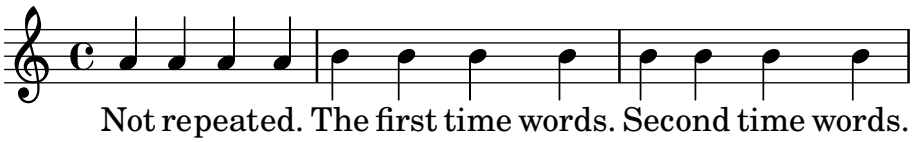
Lyrics to a section of music that is repeated should be surrounded by exactly the same repeat construct as the music, if the words are unchanged.

```
\score {
  <<
    \new Staff {
      \new Voice = "melody" {
        \relative {
          a'4 a a a
          \repeat volta 2 { b4 b b b }
        }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Not re -- peat -- ed.
        \repeat volta 2 { Re -- peat -- ed twice. }
      }
    }
  >>
}
```

The words will then be correctly expanded if the repeats are unfolded.

```
\score {
  \unfoldRepeats {
    <<
      \new Staff {
        \new Voice = "melody" {
          \relative {
            a'4 a a a
            \repeat volta 2 { b4 b b b }
          }
        }
      }
      \new Lyrics {
        \lyricsto "melody" {
```

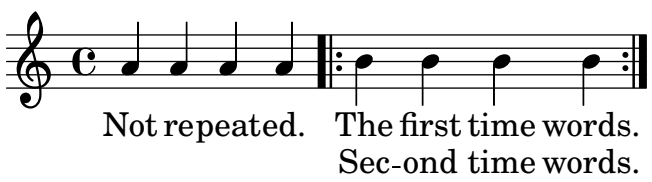
```
          Not re -- peat -- ed.
          \repeat volta 2 { Re -- peat -- ed twice. }
        }
      }
    >>
  }
}
```

If the repeated section is to be unfolded and has different words, simply enter all the words:

```
\score {
  <<
    \new Staff {
      \new Voice = "melody" {
        \relative {
          a'4 a a a
          \repeat unfold 2 { b4 b b b }
        }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Not re -- peat -- ed.
        The first time words.
        Sec -- ond time words.
      }
    }
  >>
}
```



When the words to a repeated volta section are different, the words to each repeat must be entered in separate `Lyrics` contexts, correctly nested in parallel sections:

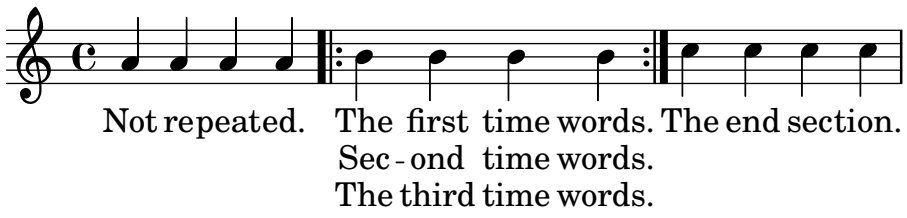
```
\score {
  <<
    \new Staff {
      \new Voice = "melody" {
        \relative {
          a'4 a a a
          \repeat volta 2 { b4 b b b }
        }
      }
    }
    \new Lyrics \lyricsto "melody" {
      Not re -- peat -- ed.
```

```
      <<

{ The first time words. }

\new Lyrics {
  \set associatedVoice = "melody"
  Sec -- ond time words.

}
      >>
    }
  >>
}
```

More verses may be added in a similar way:

```
\score {
  <<
    \new Staff {
      \new Voice = "singleVoice" {
        \relative {
  a'4 a a a
  \repeat volta 3 { b4 b b b }
          c4 c c c

}
      }
    }
    \new Lyrics \lyricsto "singleVoice" {
      Not re -- peat -- ed.
      <<
        { The first time words. }

\new Lyrics {
  \set associatedVoice = "singleVoice"
  Sec -- ond time words.

}

\new Lyrics {
  \set associatedVoice = "singleVoice"
  The third time words.

}
      >>
      The end sec -- tion.
    }
```

```
  >>
}
```

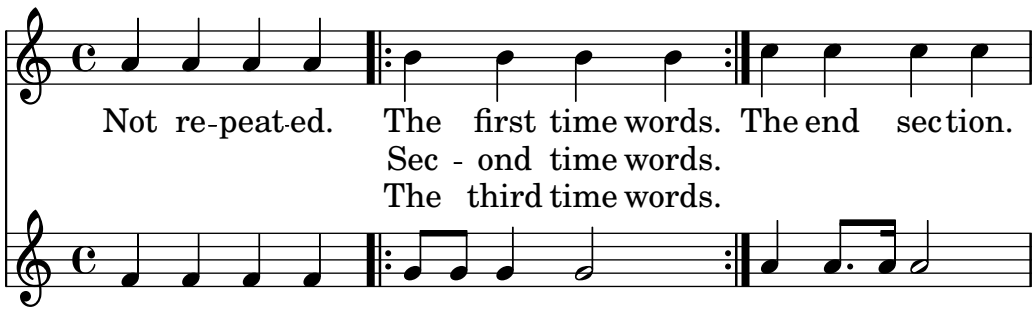


However, if this construct is embedded within a multi-staff context such as a `ChoirStaff` the lyrics of the second and third verses will appear beneath the bottom staff.

To position them correctly use `alignBelowContext`:

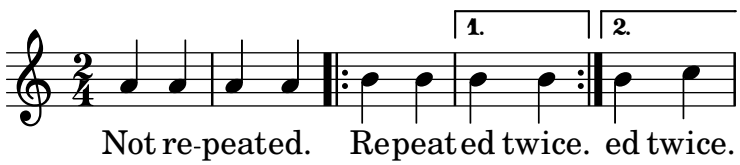
```
\score {
  <<
    \new Staff {
      \new Voice = "melody" {
        \relative {
  a'4 a a a
  \repeat volta 3 { b4 b b b }
          c4 c c c

}
      }
    }
    \new Lyrics = "firstVerse" \lyricsto "melody" {
      Not re -- peat -- ed.
      <<
        { The first time words. }

\new Lyrics = "secondVerse"
        \with { alignBelowContext = "firstVerse" } {
  \set associatedVoice = "melody"
  Sec -- ond time words.

}

\new Lyrics = "thirdVerse"
        \with { alignBelowContext = "secondVerse" } {
  \set associatedVoice = "melody"
  The third time words.

}
      >>
      The end sec -- tion.
    }
    \new Voice = "harmony" {
      \relative {
        f'4 f f f \repeat volta 2 { g8 g g4 g2 } a4 a8. a16 a2
      }
    }
  >>
```

```
}
```



Repeats with alternative endings

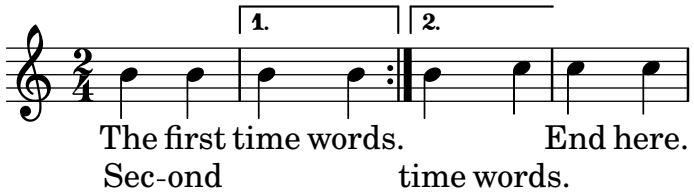
If the words of the repeated section are the same, and none of the `\alternative` blocks start with a rest, exactly the same structure can be used for both the lyrics and music. This has the advantage that `\unfoldRepeats` will expand both music and lyrics correctly.

```
\score {
  <<
    \new Staff {
      \time 2/4
      \new Voice = "melody" {
        \relative {
          a'4 a a a
          \repeat volta 2 { b4 b }
          \alternative {
            \volta 1 { b b }
            \volta 2 { b c }
          }
        }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Not re -- peat -- ed.
        \repeat volta 2 { Re -- peat -- }
        \alternative {
          \volta 1 { ed twice. }
          \volta 2 { ed twice. }
        }
      }
    }
  >>
}
```

But when the repeated section has different words, or when one of the `\alternative` blocks starts with a rest, a repeat construct cannot be used around the words and `\skip` commands have to be inserted manually to skip over the notes in the alternative sections which do not apply.

Note: do not use an underscore, _, to skip notes – an underscore indicates a melisma, causing the preceding syllable to be left-aligned.

> **Note:** The \skip command must be followed by a number, but this number is ignored in lyrics which derive their durations from the notes in an associated melody through \addlyrics or \lyricsto. Each \skip skips a single note of any value, irrespective of the value of the following number.

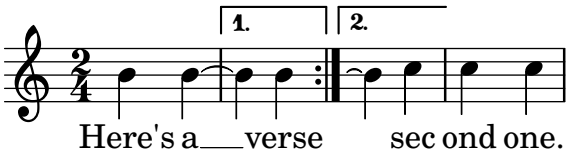
```
\score {
  <<
    \new Staff {
      \time 2/4
      \new Voice = "melody" {
        \relative {
          \repeat volta 2 { b'4 b }
          \alternative {
            \volta 1 { b b }
            \volta 2 { b c }
          }
          c4 c
        }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        The first time words.
        \repeat unfold 2 { \skip 1 }
        End here.
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Sec -- ond
        \repeat unfold 2 { \skip 1 }
        time words.
      }
    }
  >>
}
```



When a note is tied over into two or more alternative endings a tie is used to carry the note into the first alternative ending and a \repeatTie is used in the second and subsequent endings. This structure causes difficult alignment problems when lyrics are involved and increasing the length of the alternative sections so the tied notes are contained wholly within them may give a more acceptable result.

The tie creates a melisma into the first alternative, but not into the second and subsequent alternatives, so to align the lyrics correctly it is necessary to disable the automatic creation of melismata over the volta section and insert manual skips.

```
\score {
  <<
    \new Staff {
      \time 2/4
      \new Voice = "melody" {
        \relative {
          \set melismaBusyProperties = #'()
          \repeat volta 2 { b'4 b ~}
          \alternative {
            \volta 1 { b b }
            \volta 2 { b \repeatTie c }
          }
          \unset melismaBusyProperties
          c4 c
        }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        \repeat volta 2 { Here's a __ }
        \alternative {
          \volta 1 { \skip 1 verse }
          \volta 2 { \skip 1 sec }
        }
        ond one.
      }
    }
  >>
}
```

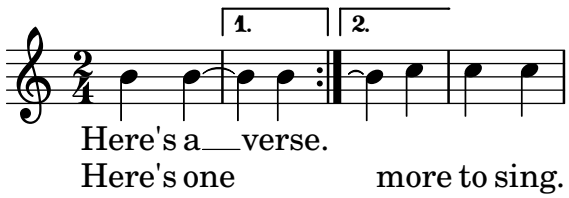


Note that if \unfoldRepeats is used around a section containing \repeatTie, the \repeatTie should be removed to avoid both types of tie being printed.

When the repeated section has different words a \repeat cannot be used around the lyrics and \skip commands need to be inserted manually, as before.

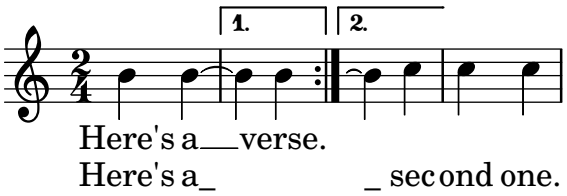
```
\score {
  <<
    \new Staff {
      \time 2/4
      \new Voice = "melody" {
        \relative {
          \repeat volta 2 { b'4 b ~}
          \alternative {
            \volta 1 { b b }
            \volta 2 { b \repeatTie c }
```

```
            }
            c4 c
          }
        }
      }
      \new Lyrics {
        \lyricsto "melody" {
          Here's a __ verse.
          \repeat unfold 2 { \skip 1 }
        }
      }
      \new Lyrics {
        \lyricsto "melody" {
          Here's one
          \repeat unfold 2 { \skip 1 }
          more to sing.
        }
      }
    >>
}
```



If you wish to show extenders and hyphens into and out of alternative sections these must be inserted manually.

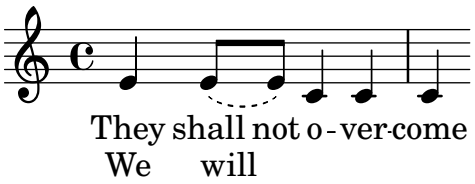
```
\score {
  <<
    \new Staff {
      \time 2/4
      \new Voice = "melody" {
        \relative {
          \repeat volta 2 { b'4 b ~}
          \alternative {
            \volta 1 { b b }
            \volta 2 { b \repeatTie c }
          }
          c4 c
        }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Here's a __ verse.
        \repeat unfold 2 { \skip 1 }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
```

```
        Here's "a_"
        \skip 1
        "_" sec -- ond one.
      }
    }
  >>
}
```

See also

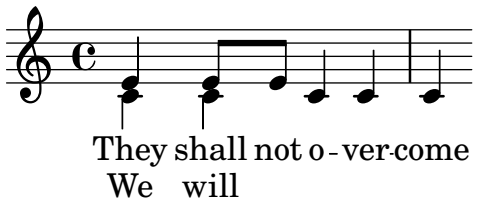
Notation Reference: Section 5.1.3 [Keeping contexts alive], page 664, Section 1.4 [Repeats], page 168.

Divisi lyrics

When just the words and rhythms of the two parts differ with the pitches remaining the same, temporarily turning off the automatic detection of melismata and indicating the melisma in the lyrics may be the appropriate method to use:

```
\score {
  <<
    \new Voice = "melody" {
      \relative c' {
        \set melismaBusyProperties = #'()
        \slurDown
        \slurDashed
        e4 e8 ( e ) c4 c |
        \unset melismaBusyProperties
        c
      }
    }
    \new Lyrics \lyricsto "melody" {
      They shall not o -- ver -- come
    }
    \new Lyrics \lyricsto "melody" {
      We will _
    }
  >>
}
```

When both music and words differ it may be better to display the differing music and lyrics by naming voice contexts and attaching lyrics to those specific contexts:

```
\score {
```

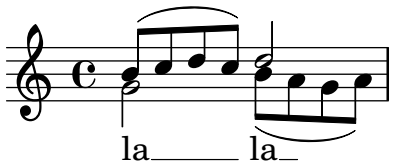
```
<<
  \new Voice = "melody" {
    \relative {
      <<
        {
          \voiceOne
          e'4 e8 e
        }
        \new Voice = "splitpart" {
          \voiceTwo
          c4 c
        }
      >>
      \oneVoice
      c4 c |
      c
    }
  }
  \new Lyrics \lyricsto "melody" {
    They shall not o -- ver -- come
  }
  \new Lyrics \lyricsto "splitpart" {
    We will
  }
>>
}
```

It is common in choral music to have a voice part split for several measures. The << {...} \\ {...} >> construct, where the two (or more) musical expressions are separated by double backslashes, might seem the proper way to set the split voices. This construct, however, will assign **all** the expressions within it to **NEW Voice contexts** which will result in *no lyrics* being set for them since the lyrics will be set to the original voice context – not, typically, what one wants. The temporary polyphonic passage is the proper construct to use, see section *Temporary polyphonic passages* in [Single-staff polyphony], page 197.

Polyphony with shared lyrics

When two voices with different rhythms share the same lyrics, aligning the lyrics to one of the voices may lead to problems in the other voice. For example, the second lyric extender below is too short, since the lyrics are aligned only to the top voice:

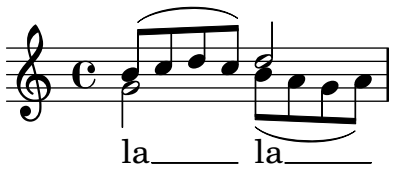
```
soprano = \relative { b'8( c d c) d2 }
alto = \relative { g'2 b8( a g a) }
words = \lyricmode { la __ la __ }

\new Staff <<
  \new Voice = "sopranoVoice" { \voiceOne \soprano }
```

```
  \new Voice { \voiceTwo \alto }
  \new Lyrics \lyricsto "sopranoVoice" \words
>>
```



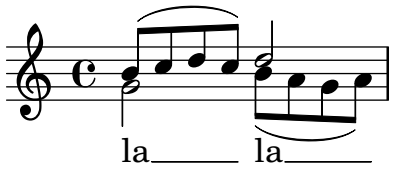
To get the desired result, align the lyrics to a new NullVoice context containing a suitable combination of the two voices. The notes of the NullVoice context do not appear on the printed page, but can be used to align the lyrics appropriately:

```
soprano = \relative { b'8( c d c) d2 }
alto = \relative { g'2 b8( a g a) }
aligner = \relative { b'8( c d c) b( a g a) }
words = \lyricmode { la __ la __ }

\new Staff <<
  \new Voice { \voiceOne \soprano }
  \new Voice { \voiceTwo \alto }
  \new NullVoice = "aligner" \aligner
  \new Lyrics \lyricsto "aligner" \words
>>
```



This method also can be used with the \partCombine function, which does not allow lyrics on its own:

```
soprano = \relative { b'8( c d c) d2 }
alto = \relative { g'2 b8( a g a) }
aligner = \relative { b'8( c d c) b( a g a) }
words = \lyricmode { la __ la __ }

\new Staff <<
  \new Voice \partCombine \soprano \alto
  \new NullVoice = "aligner" \aligner
  \new Lyrics \lyricsto "aligner" \words
>>
```



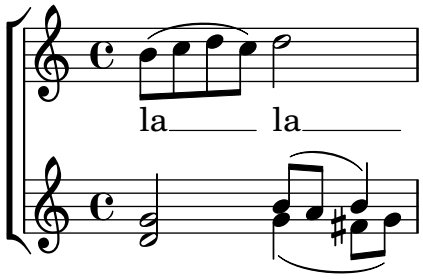
Known issues and warnings

The \addlyrics function only works with Voice lyrics and so cannot be used with NullVoice.

The \partCombine function is described in [Automatic part combining], page 208.

Lastly, this method can be used even when the voices are in different staves, and is not limited to only two voices:

```
soprano = \relative { b'8( c d c) d2 }
altoOne = \relative { g'2 b8( a b4) }
altoTwo = \relative { d'2 g4( fis8 g) }
aligner = \relative { b'8( c d c) d( d d d) }
words = \lyricmode { la __ la __ }

\new ChoirStaff \with {\accepts NullVoice } <<
  \new Staff \soprano
  \new NullVoice = "aligner" \aligner
  \new Lyrics \lyricsto "aligner" \words
  \new Staff \partCombine \altoOne \altoTwo
>>
```

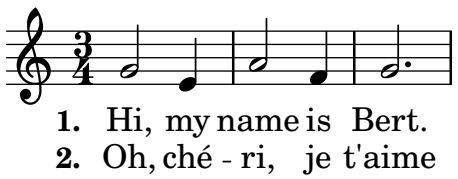


2.1.3 Stanzas

Adding stanza numbers

Stanza numbers can be added by setting stanza, e.g.,

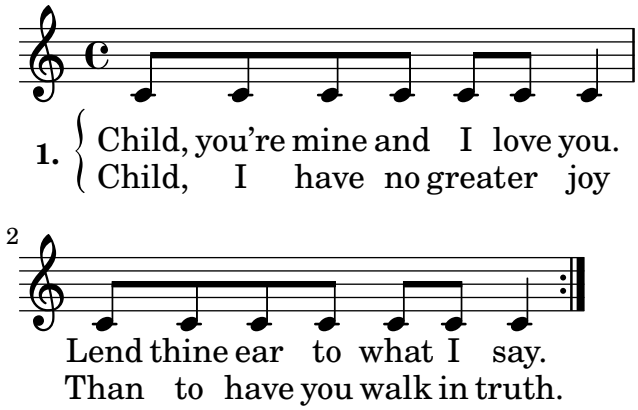
```
\new Voice \relative {
  \time 3/4 g'2 e4 a2 f4 g2.
} \addlyrics {
  \set stanza = "1. "
  Hi, my name is Bert.
} \addlyrics {
  \set stanza = "2. "
  Oh, ché -- ri, je t'aime
}
```



These numbers are put just before the start of the first syllable. Two lines of a stanza can also be grouped together, for example in case of a repeat with different lyrics:

```
leftbrace = \markup {
  \override #'(font-encoding . fetaBraces)
  \lookup "brace80"
}

stanzaOneOne = \lyricmode {
```

```
  \set stanza = \markup {
    \column { \vspace #.33 "1. "}
    \leftbrace
  }
  Child, you're mine and I love you.
  Lend thine ear to what I say.
}

stanzaOneThree = \lyricmode {
  Child, I have no great -- er joy
  Than to have you walk in truth.
}

\new Voice {
  \repeat volta 2 {
    c'8 c' c' c' c' c' c'4
    c'8 c' c' c' c' c' c'4
  }
}
\addlyrics { \stanzaOneOne }
\addlyrics { \stanzaOneThree }
```

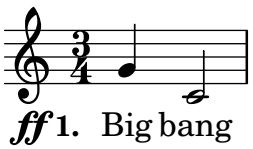


Adding dynamics marks to stanzas

Stanzas differing in loudness may be indicated by putting a dynamics mark before each stanza. In LilyPond, everything coming in front of a stanza goes into the `StanzaNumber` object; dynamics marks are no different. For technical reasons, you have to set the stanza outside `\lyricmode`:

```
text = {
  \set stanza = \markup { \dynamic "ff" "1. " }
  \lyricmode {
    Big bang
  }
}

<<
  \new Voice = "tune" {
    \time 3/4
    g'4 c'2
  }
\new Lyrics \lyricsto "tune" \text
```

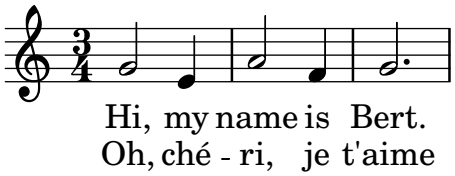
```
>>
```



Adding singers' names to stanzas

Names of singers can also be added. They are printed at the start of the line, just like instrument names. They are created by setting `vocalName`. A short version may be entered as `shortVocalName`.

```
\new Voice \relative {
  \time 3/4 g'2 e4 a2 f4 g2.
} \addlyrics {
  \set vocalName = "Bert "
  Hi, my name is Bert.
} \addlyrics {
  \set vocalName = "Ernie "
  Oh, ché -- ri, je t'aime
}
```



Stanzas with different rhythms

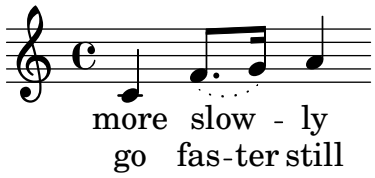
Often, different stanzas of one song are put to one melody in slightly differing ways. Such variations can still be captured with `\lyricsto`.

Ignoring melismata

One possibility is that the text has a melisma in one stanza, but multiple syllables in another. One solution is to make the faster voice ignore the melisma. This is done by setting `ignoreMelismata` in the Lyrics context.

```
<<
  \relative \new Voice = "lahlah" {
    \set Staff.autoBeaming = ##f
    c'4
    \slurDotted
    f8.[( g16])
    a4
  }
  \new Lyrics \lyricsto "lahlah" {
    more slow -- ly
  }
  \new Lyrics \lyricsto "lahlah" {
    go
    \set ignoreMelismata = ##t
    fas -- ter
    \unset ignoreMelismata
```

```
    still
  }
>>
```

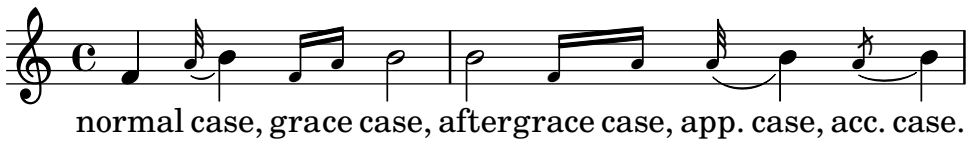


Known issues and warnings

Unlike most \set commands, \set ignoreMelismata does not work if prefixed with \once. It is necessary to use \set and \unset to bracket the lyrics where melismata are to be ignored.

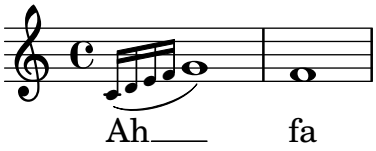
Adding syllables to grace notes

By default, grace notes (e.g., via \grace) do not get assigned syllables when using \lyricsto, but this behavior can be changed:

```
<<
  \new Voice = melody \relative {
    f'4 \appoggiatura a32 b4
    \grace { f16 a16 } b2
    \afterGrace b2 { f16[ a16] }
    \appoggiatura a32 b4
    \acciaccatura a8 b4
  }
  \new Lyrics
  \lyricsto melody {
    normal
    \set includeGraceNotes = ##t
    case,
    gra -- ce case,
    after -- grace case,
    \set ignoreMelismata = ##t
    app. case,
    acc. case.
  }
>>
```

Known issues and warnings

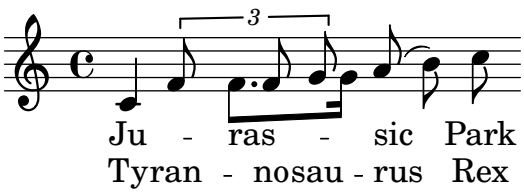
Like associatedVoice, includeGraceNotes needs to be set at latest one syllable before the one which is to be put under a grace note. In the case of a grace note at the very beginning of a piece of music, using a \with, or a \context block within \layout, is recommended:

```
<<
  \new Voice = melody \relative c' {
    \grace { c16( d e f }
    g1) f
  }
```

```
  \new Lyrics \with { includeGraceNotes = ##t }
  \lyricsto melody {
    Ah __ fa
  }
>>
```

Switching to an alternative melody

More complex variations in setting lyrics to music are possible. The melody to which the lyrics are being set can be changed from within the lyrics by setting the `associatedVoice` property:

```
<<
  \relative \new Voice = "lahlah" {
    \set Staff.autoBeaming = ##f
    c'4
    <<
      \new Voice = "alternative" {
        \voiceOne
        \tuplet 3/2 {
          % show associations clearly.
          \override NoteColumn.force-hshift = #-3
          f8 f g
        }
      }
      {
        \voiceTwo
        f8.[ g16]
        \oneVoice
      } >>
    a8( b) c
  }
  \new Lyrics \lyricsto "lahlah" {
    Ju -- ras -- sic Park
  }
  \new Lyrics \lyricsto "lahlah" {
    % Tricky: need to set associatedVoice
    % one syllable too soon!
    \set associatedVoice = "alternative" % applies to "ran"
    Ty --
    ran --
    no --
    \set associatedVoice = "lahlah" % applies to "rus"
    sau -- rus Rex
  } >>
```



The text for the first stanza is set to the melody called 'lahlah' in the usual way, but the second stanza is set initially to the `lahlah` context and is then switched to the `alternative` melody for the syllables 'ran' to 'sau' by the lines:

```
\set associatedVoice = "alternative" % applies to "ran"
Ty --
ran --
no --
\set associatedVoice = "lahlah" % applies to "rus"
sau -- rus Rex
```

Here, `alternative` is the name of the `Voice` context containing the triplet.

Note the placement of the `\set associatedVoice` command – it appears to be one syllable too early, but this is correct.

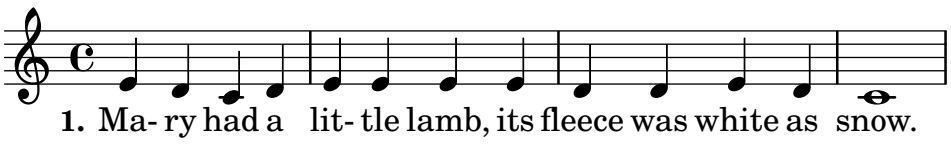
> **Note:** The `\set associatedVoice` command must be placed one syllable *before* the one at which the switch to the new voice is to occur. In other words, changing the associated Voice happens one syllable later than expected. This is for technical reasons, and it is not a bug.

Printing stanzas at the end

Sometimes it is appropriate to have one stanza set to the music, and the rest added in verse form at the end of the piece. This can be accomplished by adding the extra verses into a `\markup` section outside of the main score block. Notice that there are several different ways to force line breaks when using `\markup`. For inputting a whole string you may use `\string-lines` with manually inserted `\n` or automatic line breaks as entered or `\wordwrap-string`. If inner formatting code is used a combination of `\line` and `\column` is recommended.

```
melody = \relative {
  e' d c d | e e e e |
  d d e d | c1 | }

text = \lyricmode {
  \set stanza = "1."
  Ma- ry had a lit- tle lamb,
  its fleece was white as snow. }

\score {
  <<
    \new Voice = "one" { \melody }
    \new Lyrics \lyricsto "one" \text
  >>
}

\markup \column \string-lines
  "Verse 2. \n Everywhere that Mary went \n The lamb was sure to go."
```

```
\markup \column \string-lines
  "Verse 3.
   All the children laughed and played,
   To see a lamb at school."

\markup \column {
  \line \italic { Verse 4. }
  \line { And so the teacher turned it out, }
  \line { But still it lingered near. } }

\markup \wordwrap-string "
  Verse 5.

  Mary took it home again,

  It was against the rule."
```



Verse 2.
Everywhere that Mary went
The lamb was sure to go.

Verse 3.
All the children laughed and played,
To see a lamb at school.

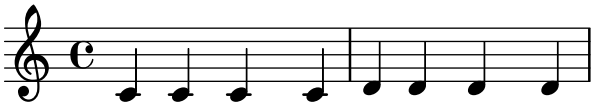
Verse 4.
And so the teacher turned it out,
But still it lingered near.

Verse 5.
Mary took it home again,
It was against the rule.

Printing stanzas at the end in multiple columns

When a piece of music has many verses, they are often printed in multiple columns across the page. An outdented verse number often introduces each verse. The following example shows how to produce such output in LilyPond.

```
melody = \relative {
  c'4 c c c | d d d d
}

text = \lyricmode {
  \set stanza = "1." This is verse one.
  It has two lines.
}

\score {
  <<
```

```
    \new Voice = "one" { \melody }
    \new Lyrics \lyricsto "one" \text
  >>
  \layout { }
}

\markup {
  \fill-line {
    % moves the column off the left margin;
    % can be removed if space on the page is tight
    \hspace #0.1
    \column {
      \line { \bold "2."
        \column {
          "This is verse two."
          "It has two lines."
        }
      }
      % adds vertical spacing between verses
      \combine \null \vspace #0.1
      \line { \bold "3."
        \column {
          "This is verse three."
          "It has two lines."
        }
      }
    }
    % adds horizontal spacing between columns
    \hspace #0.1
    \column {
      \line { \bold "4."
        \column {
          "This is verse four."
          "It has two lines."
        }
      }
      % adds vertical spacing between verses
      \combine \null \vspace #0.1
      \line { \bold "5."
        \column {
          "This is verse five."
          "It has two lines."
        }
      }
    }
    % gives some extra space on the right margin;
    % can be removed if page space is tight
    \hspace #0.1
  }
}
```

1. This is verse one. It has two lines.

2. This is verse two.
It has two lines.

3. This is verse three.
It has two lines.

4. This is verse four.
It has two lines.

5. This is verse five.
It has two lines.

See also

Internals Reference: Section "LyricText" in *Internals Reference*, Section "StanzaNumber" in *Internals Reference*.

2.1.4 Songs

References for songs

Songs are usually written on three staves with the melody for the singer on the top staff and two staves of piano accompaniment at the bottom. The lyrics of the first stanza are printed immediately underneath the top staff. If there are just a small number of further stanzas these can be printed immediately under the first one, but if there are more stanzas than can be easily accommodated there the second and subsequent stanzas are printed after the music as stand-alone text.

All the notational elements needed to write songs are fully described elsewhere:

- For constructing the staff layout, see Section 1.6.1 [Displaying staves], page 216.
- For writing piano music, see Section 2.2 [Keyboard and other multi-staff instruments], page 377.
- For writing the lyrics to a melody line, see Section 2.1.1 [Common notation for vocal music], page 313.
- For placing the lyrics, see [Placing lyrics vertically], page 327.
- For entering stanzas, see Section 2.1.3 [Stanzas], page 345.
- Songs are frequently printed with the chording indicated by chord names above the staves. This is described in Section 2.7.2 [Displaying chords], page 472.
- To print fret diagrams of the chords for guitar accompaniment or accompaniment by other fretted instruments, see "Fret diagram markups" in Section 2.4.1 [Common notation for fretted strings], page 393.

See also

Learning Manual: Section "Songs" in *Learning Manual*.

Notation Reference: Section 2.1.1 [Common notation for vocal music], page 313, Section 2.7.2 [Displaying chords], page 472, Section 1.6.1 [Displaying staves], page 216, Section 2.2 [Keyboard and other multi-staff instruments], page 377, [Placing lyrics vertically], page 327, Section 2.1.3 [Stanzas], page 345.

Snippets: Section "Vocal music" in *Snippets*.

Lead sheets

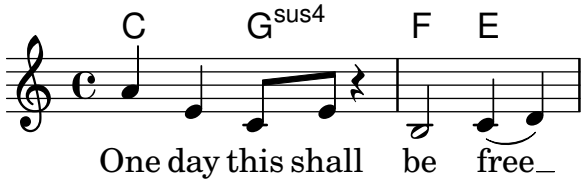
Lead sheets may be printed by combining vocal parts and 'chord mode'; this syntax is explained in Section 2.7 [Chord notation], page 467.

Selected Snippets

Simple lead sheet

When put together, chord names, a melody, and lyrics form a lead sheet:

```
<<
  \chords { c2 g:sus4 f e }
  \new Staff \relative c'' {
    a4 e c8 e r4
    b2 c4( d)
  }
  \addlyrics { One day this shall be free __ }
>>
```



See also

Notation Reference: Section 2.7 [Chord notation], page 467.

2.1.5 Choral

This section discusses notation issues that relate most directly to choral music. This includes anthems, part songs, oratorio, etc.

References for choral

Choral music is usually notated on two, three or four staves within a `ChoirStaff` group. Accompaniment, if required, is placed beneath in a `PianoStaff` group, which is usually reduced in size for rehearsal of *a cappella* choral works. The notes for each vocal part are placed in a `Voice` context, with each staff being given either a single vocal part (i.e., one `Voice`) or a pair of vocal parts (i.e., two `Voices`).

Words are placed in `Lyrics` contexts, either underneath each corresponding music staff, or one above and one below the music staff if this contains the music for two parts.

Several common topics in choral music are described fully elsewhere:

- An introduction to creating an SATB vocal score can be found in the Learning Manual, see Section "Four-part SATB vocal score" in *Learning Manual*. There is also a built-in template which simplifies the entry of SATB vocal music, see Section "Built-in templates" in *Learning Manual*.
- Several templates suitable for various styles of choral music can also be found in the Learning Manual, see Section "Vocal ensembles templates" in *Learning Manual*.
- For information about `ChoirStaff` and `PianoStaff` see [Grouping staves], page 217.
- Shape note heads, as used in Sacred Harp and similar notation, are described in [Shape note heads], page 43.
- When two vocal parts share a staff the stems, ties, slurs, etc., of the higher part will be directed up and those of the lower part down. To do this, use `\voiceOne` and `\voiceTwo`. See [Single-staff polyphony], page 197.
- When a vocal part temporarily splits, you should use *Temporary polyphonic passages* (see [Single-staff polyphony], page 197).

Predefined commands

`\oneVoice`, `\voiceOne`, `\voiceTwo`.

See also

Learning Manual: Section "Four-part SATB vocal score" in *Learning Manual*, Section "Vocal ensembles templates" in *Learning Manual*.

Notation Reference: Section 5.1.7 [Context layout order], page 676, [Grouping staves], page 217, [Shape note heads], page 43, [Single-staff polyphony], page 197.

Snippets: Section "Vocal music" in *Snippets*.

Internals Reference: Section "ChoirStaff" in *Internals Reference*, Section "Lyrics" in *Internals Reference*, Section "PianoStaff" in *Internals Reference*.

Score layouts for choral

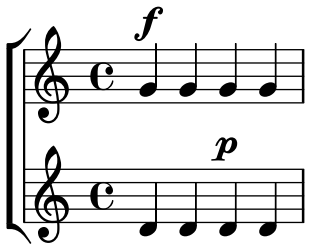
Choral music containing four staves, with or without piano accompaniment, is usually laid out with two systems per page. Depending on the page size, achieving this may require changes to several default settings. The following settings should be considered:

- The global staff size can be modified to change the overall size of the elements of the score. See Section 4.2.2 [Setting the staff size], page 614.
- The distances between the systems, the staves and the lyrics can all be adjusted independently. See Section 4.4 [Vertical spacing], page 624.
- The dimensions of the vertical layout variables can be displayed as an aid to adjusting the vertical spacing. This and other possibilities for fitting the music onto fewer pages are described in Section 4.6 [Fitting music onto fewer pages], page 655.
- If the number of systems per page changes from one to two it is customary to indicate this with a system separator mark between the two systems. See [Separating systems], page 223.
- For details of other page formatting properties, see Section 4.1 [Page layout], page 601.

Dynamic markings by default are placed below the staff, but in choral music they are usually placed above the staff in order to avoid the lyrics. The predefined command `\dynamicUp` does this for the dynamic markings in a single `Voice` context. If there are many `Voice` contexts this predefined command would have to be placed in every one. Alternatively its expanded form can be used to place all dynamic markings in the entire score above their respective staves, as shown here:

```
\score {
  \new ChoirStaff <<
    \new Staff {
      \new Voice {
        \relative { g'4\f g g g }
      }
    }
    \new Staff {
      \new Voice {
        \relative { d'4 d d\p d }
      }
    }
  >>
  \layout {
    \context {
      \Score
      \override DynamicText.direction = #UP
      \override DynamicLineSpanner.direction = #UP
    }
  }
```

```
}
```



Predefined commands

`\dynamicUp`, `\dynamicDown`, `\dynamicNeutral`.

See also

Notation Reference: Section 4.6.2 [Changing spacing], page 656, Section 4.6.1 [Displaying spacing], page 655, Section 4.6 [Fitting music onto fewer pages], page 655, Section 4.1 [Page layout], page 601, Section 4.2 [Score layout], page 612, [Separating systems], page 223, Section 4.2.2 [Setting the staff size], page 614, Section 4.3 [Breaks], page 617, Section 4.4 [Vertical spacing], page 624.

Internals Reference: Section "VerticalAxisGroup" in *Internals Reference*, Section "StaffGrouper" in *Internals Reference*.

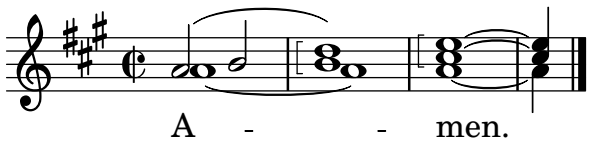
Selected Snippets

Using arpeggioBracket to make divisi more visible

The `arpeggioBracket` can be used to indicate the division of voices where there are no stems to provide the information. This is often seen in choral music.

```
\include "english.ly"

\score {
  \relative c'' {
    \key a \major
    \time 2/2
    <<
      \new Voice = "upper"
      <<
        { \voiceOne \arpeggioBracket
          a2( b2
          <b d>1\arpeggio)
          <cs e>\arpeggio ~
          <cs e>4
        }
        \addlyrics { \lyricmode { A -- men. } }
      >>
      \new Voice = "lower"
      { \voiceTwo
        a1 ~
        a
        a ~
        a4 \bar "|."
      }
```

```
    >>
  }
  \layout { ragged-right = ##t }
}
```



See also

Notation Reference: Section 1.3.3 [Expressive marks as lines], page 158.

2.1.6 Opera and stage musicals

The music, lyrics and dialogue to opera and stage musicals are usually set out in one or more of the following forms:

- A *Conductors' Score* containing the full orchestral and vocal parts, together with libretto cues if there are spoken passages.
- *Orchestral Parts* containing the music for the individual instruments of the orchestra or band.
- A *Vocal Score* containing all vocal parts with piano accompaniment. The accompaniment is usually an orchestral reduction, and if so the name of the original orchestral instrument is often indicated. Vocal scores sometimes includes stage directions and libretto cues.
- A *Vocal Book* containing just the vocal parts (no accompaniment), sometimes combined with the libretto.
- A *Libretto* containing the extended passages of spoken dialogue usually found in musicals, together with the words to the sung parts. Stage directions are usually included. LilyPond can be used to typeset libretti but as they contain no music alternative methods may be preferable.

The sections in the LilyPond documentation which cover the topics needed to create scores in the styles commonly found in opera and musicals are indicated in the References below. This is followed by sections covering those techniques which are peculiar to typesetting opera and musical scores.

References for opera and stage musicals

In addition to vocal and stage ensembles, most of the following notions may apply to nearly any orchestral and ensemble music:

- A conductors' score contains many grouped staves and lyrics. Ways of grouping staves is shown in [Grouping staves], page 217. To nest groups of staves see [Nested staff groups], page 221.
- The printing of empty staves in conductors' scores and vocal scores is often suppressed. To create such a "Frenched score" see [Hiding staves], page 231.
- Writing orchestral parts is covered in Section 1.6.3 [Writing parts], page 236. Other sections in the Specialist notation chapter may be relevant, depending on the orchestration used. Many instruments are transposing instruments, see [Instrument transpositions], page 27.
- If the number of systems per page changes from page to page it is customary to separate the systems with a system separator mark. See [Separating systems], page 223.
- For details of other page formatting properties, see Section 4.1 [Page layout], page 601.

- Dialogue cues, stage directions and footnotes can be inserted, see Section 3.3.4 [Creating footnotes], page 555, and Section 1.8 [Text], page 277. Extensive stage directions can also be added with a section of stand-alone markups between two `\score` blocks, see [Separate text], page 287.

See also

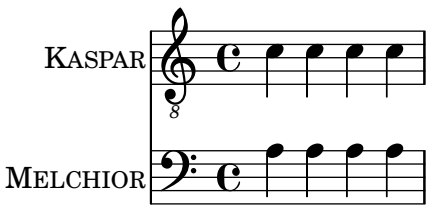
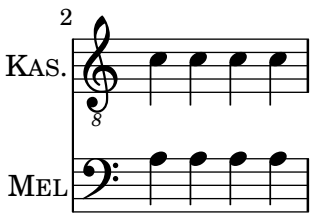
Musical Glossary: Section “Frenched score” in *Music Glossary*, Section “Frenched staves” in *Music Glossary*, Section “transposing instrument” in *Music Glossary*.

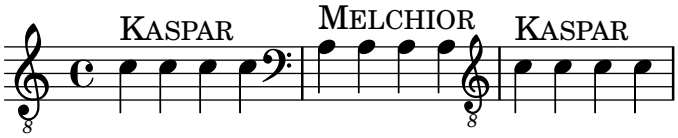
Notation Reference: Section 3.3.4 [Creating footnotes], page 555, [Grouping staves], page 217, [Hiding staves], page 231, [Instrument transpositions], page 27, [Nested staff groups], page 221, Section 4.1 [Page layout], page 601, [Separating systems], page 223, [Transpose], page 11, Section 1.6.3 [Writing parts], page 236, Section 1.8.1 [Writing text], page 277.

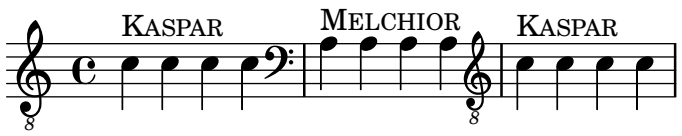
Snippets: Section “Vocal music” in *Snippets*.

Character names

Character names are usually shown to the left of the staff when the staff is dedicated to that character alone:

```
\score {
  <<
    \new Staff {
      \set Staff.vocalName = \markup \smallCaps Kaspar
      \set Staff.shortVocalName = \markup \smallCaps Kas.
      \relative {
        \clef "G_8"
        c'4 c c c
        \break
        c4 c c c
      }
    }
    \new Staff {
      \set Staff.vocalName = \markup \smallCaps Melchior
      \set Staff.shortVocalName = \markup \smallCaps Mel
      \clef "bass"
      \relative {
        a4 a a a
        a4 a a a
      }
    }
  >>
}
```

When two or more characters share a staff the character's name is usually printed above the staff at the start of every section applying to that character. This can be done with markup. Often a specific font is used for this purpose.

```
\relative c' {
  \clef "G_8"
  c4^\markup \fontsize #1 \smallCaps Kaspar
  c c c
  \clef "bass"
  a4^\markup \fontsize #1 \smallCaps Melchior
  a a a
  \clef "G_8"
  c4^\markup \fontsize #1 \smallCaps Kaspar
  c c c
}
```

Alternatively, if there are many character changes, it may be easier to set up variables to hold the definitions for each character so that the switch of characters can be indicated easily and concisely.

```
kaspar = {
  \clef "G_8"
  \set Staff.shortVocalName = "Kas."
  \set Staff.midiInstrument = "voice oohs"
  <>^\markup \smallCaps "Kaspar"
}

melchior = {
  \clef "bass"
  \set Staff.shortVocalName = "Mel."
  \set Staff.midiInstrument = "choir aahs"
  <>^\markup \smallCaps "Melchior"
}

\relative c' {
  \kaspar
  c4 c c c
  \melchior
  a4 a a a
  \kaspar
  c4 c c c
}
```

See also

Learning Manual: Section “Organizing pieces with variables” in *Learning Manual*.

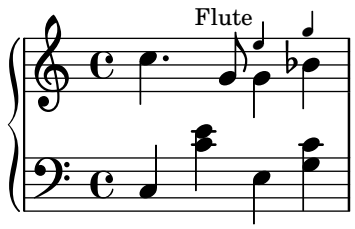
Notation Reference: Section 1.8 [Text], page 277, Section A.12 [Text markup commands], page 758.

Musical cues

Musical cues can be inserted in Vocal Scores, Vocal Books and Orchestral Parts to indicate what music in another part immediately precedes an entry. Also, cues are often inserted in the piano reduction in Vocal Scores to indicate what each orchestral instrument is playing. This aids the conductor when a full Conductors' Score is not available.

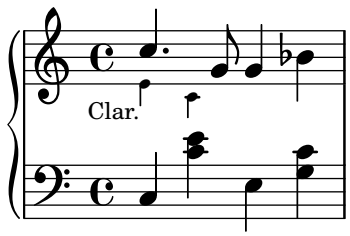
The basic mechanism for inserting cues is fully explained in the main text, see [Quoting other voices], page 239, and [Formatting cue notes], page 243. But when many cues have to be inserted, for example, as an aid to a conductor in a vocal score, the instrument name must be positioned carefully just before and close to the start of the cue notes. The following example shows how this is done.

```
flute = \relative {
  s4 s4 e'' g
}
\addQuote "flute" { \flute }

pianoRH = \relative {
  c''4. g8
  % position name of cue-ing instrument just before the cue notes,
  % and above the staff
  <>^\markup { \right-align { \tiny "Flute" } }
  \cueDuring "flute" #UP { g4 bes4 }
}
pianoLH = \relative { c4 <c' e> e, <g c> }

\score {
  \new PianoStaff <<
    \new Staff {
      \pianoRH
    }
    \new Staff {
      \clef "bass"
      \pianoLH
    }
  >>
}
```



If a transposing instrument is being quoted the instrument part should specify its key so the conversion of its cue notes will be done automatically. The example below shows this transposition for a B-flat clarinet. The notes in this example are low on the staff so DOWN is specified in \cueDuring (so the stems are down) and the instrument name is positioned below the staff.

```
clarinet = \relative c' {
  \transposition bes
  fis4 d d c
}
\addQuote "clarinet" { \clarinet }

pianoRH = \relative c'' {
  \transposition c'
  % position name of cue-ing instrument below the staff
  <>_\markup { \right-align { \tiny "Clar." } }
  \cueDuring "clarinet" #DOWN { c4. g8 }
  g4 bes4
}
pianoLH = \relative { c4 <c' e> e, <g c> }

\score {
  <<
    \new PianoStaff <<
      \new Staff {
        \new Voice {
          \pianoRH
        }
      }
      \new Staff {
        \clef "bass"
        \pianoLH
      }
    >>
  >>
}
```



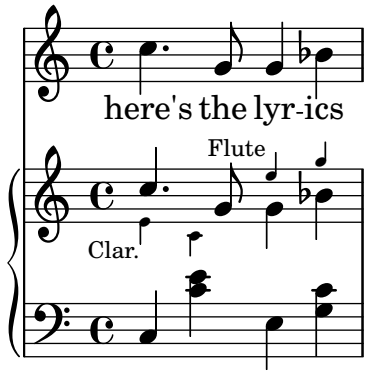
From these two examples it is clear that inserting many cues in a Vocal Score would be tedious, and the notes of the piano part would become obscured. However, as the following snippet shows, it is possible to define a music function to reduce the amount of typing and to make the piano notes clearer.

Selected Snippets

Adding orchestral cues to a vocal score

This shows one approach to simplify adding many orchestral cues to the piano reduction in a vocal score. The music function \cueWhile takes four arguments: the music from which the cue is to be taken, as defined by \addQuote, the name to be inserted before the cue notes, then either #UP or #DOWN to specify either \voiceOne with the name above the staff or \voiceTwo with the name below the staff, and finally the piano music in parallel with which the cue notes are to appear. The name of the cued instrument is positioned to the left of the cued notes. Many passages can be cued, but they cannot overlap each other in time.

```
cueWhile =
#(define-music-function
   (instrument name dir music)
   (string? string? ly:dir? ly:music?)
   #{
     \cueDuring $instrument #dir {
       \once \override TextScript.self-alignment-X = #RIGHT
       \once \override TextScript.direction = $dir
       <>-\markup { \tiny #name }
       $music
     }
   #})

flute = \relative c'' {
  \transposition c'
  s4 s4 e g
}
\addQuote "flute" { \flute }

clarinet = \relative c' {
  \transposition bes
  fis4 d d c
}
\addQuote "clarinet" { \clarinet }

singer = \relative c'' { c4. g8 g4 bes4 }
words = \lyricmode { here's the lyr -- ics }

pianoRH = \relative c'' {
  \transposition c'
  \cueWhile "clarinet" "Clar." #DOWN { c4. g8 }
  \cueWhile "flute" "Flute" #UP { g4 bes4 }
}
pianoLH = \relative c { c4 <c' e> e, <g c> }

\score {
  <<
    \new Staff {
      \new Voice = "singer" {
        \singer
      }
    }
    \new Lyrics {
```

```
      \lyricsto "singer"
      \words
    }
    \new PianoStaff <<
      \new Staff {
        \new Voice {
          \pianoRH
        }
      }
      \new Staff {
        \clef "bass"
        \pianoLH
      }
    >>
  >>
}
```

See also

Musical Glossary: Section “cue-notes” in *Music Glossary*.

Notation Reference: Section 5.4.9 [Aligning objects], page 711, Section 5.4.1 [Direction and placement], page 694, [Formatting cue notes], page 243, [Quoting other voices], page 239, Section 3.4.3 [Using music functions], page 575.

Snippets: Section “Vocal music” in *Snippets*.

Internals Reference: Section “CueVoice” in *Internals Reference*.

Known issues and warnings

`\cueDuring` automatically inserts a `CueVoice` context and all cue notes are placed in that context. This means it is not possible to have two overlapping sequences of cue notes by this technique. Overlapping sequences could be entered by explicitly declaring separate `CueVoice` contexts and using `\quoteDuring` to extract and insert the cue notes.

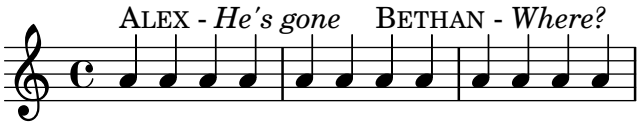
Spoken music

Such effects as ‘parlato’ or ‘Sprechgesang’ require performers to speak without pitch but still with rhythm; these are notated by cross note heads, as demonstrated in [Special note heads], page 40.

Dialogue over music

Dialogue over music is usually printed over the staves in an italic font, with the start of each phrase keyed in to a particular music moment.

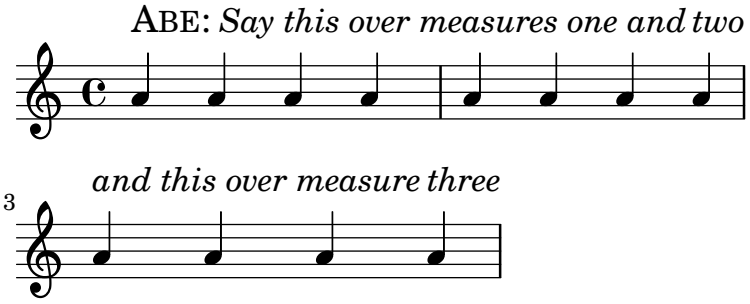
For short interjections a simple markup suffices.

```
\relative {
  a'4^\markup { \smallCaps { Alex - } \italic { He's gone } } a a a
  a4 a a^\markup { \smallCaps { Bethan - } \italic Where? } a
  a4 a a a
}
```

For longer phrases it may be necessary to expand the music to make the words fit neatly. There is no provision in LilyPond to do this fully automatically, and some manual intervention to layout the page will be necessary.

For long phrases or for passages with a lot of closely packed dialogue, using a Lyrics context will give better results. The Lyrics context should not be associated with a music Voice; instead each section of dialogue should be given an explicit duration. If there is a gap in the dialogue, the final word should be separated from the rest and the duration split between them so that the underlying music spaces out smoothly.

If the dialogue extends for more than one line it will be necessary to manually insert `\breaks` and adjust the placing of the dialogue to avoid running into the right margin. The final word of the last measure on a line should also be separated out, as above.

Here is an example illustrating how this might be done.

```
music = \relative {
  \repeat unfold 3 { a'4 a a a }
}

dialogue = \lyricmode {
  \markup {
    \fontsize #1 \upright \smallCaps Abe:
    "Say this over measures one and"
  }4*7
  "two"4 |
  \break
  "and this over measure"4*3
  "three"4 |
}

\score {
  <<
    \new Lyrics \with {
      \override LyricText.font-shape = #'italic
      \override LyricText.self-alignment-X = #LEFT
    }
    { \dialogue }
    \new Staff {
      \new Voice { \music }
    }
  >>
}
```

See also

Notation Reference: [Manual syllable durations], page 319, Section 1.8 [Text], page 277.

Internal Reference: Section "LyricText" in *Internals Reference*.

2.1.7 Chants psalms and hymns

The music and words for chants, psalms and hymns usually follow a well-established format in any particular church. Although the formats may differ from church to church the typesetting problems which arise are broadly similar, and are covered in this section.

References for chants and psalms

Typesetting Gregorian chant in various styles of ancient notation is described in Section 2.9 [Ancient notation], page 493.

See also

Notation reference: Section 2.9 [Ancient notation], page 493.

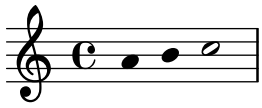
Snippets: Section "Vocal music" in *Snippets*.

Setting a chant

Modern chant settings use modern notation with varying numbers of elements taken from ancient notation. Some of the elements and methods to consider are shown here.

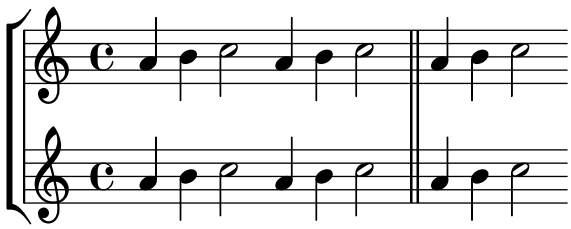
Chants often use quarter notes without stems to indicate the pitch, with the rhythm being taken from the spoken rhythm of the words.

```
stemOff = { \hide Staff.Stem }

\relative c' {
  \stemOff
  a'4 b c2 |
}
```

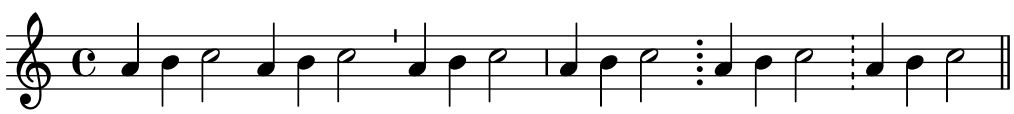


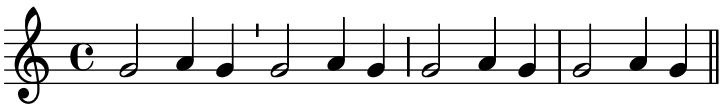
Chants often omit measure bar lines or use shortened or dotted bar lines to indicate pauses in the music. To set a chant with no musical meter, see [Unmetered music], page 81. To retain all the effects of a time signature but disable automatic measure bar lines, set `measureBarType` to `'()`. Without regular bar lines, you might need to take steps to control horizontal spacing; see Section 4.3.1 [Line breaking], page 617.

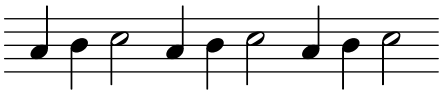
```
\score {
  \new StaffGroup <<
    \new Staff {
```

```
      \relative {
        a'4 b c2 |
        a4 b c2 | \section
        a4 b c2 |
      }
    }
    \new Staff {
      \relative {
        a'4 b c2 |
        a4 b c2 | \section
        a4 b c2 |
      }
    }
  >>
  \layout {
    \context {
      \Staff
      measureBarType = #'()
      forbidBreakBetweenBarLines = ##f
    }
  }
}
```

Measure bar lines can also be modified on a staff-by-staff basis; see Section 5.1.4 [Modifying context plug-ins], page 667.

Rests or pauses in chants can be indicated by modified bar lines.

```
\relative a' {
  a4
  \cadenzaOn
  b c2
  a4 b c2
  \bar "'"
  a4 b c2
  \bar ","
  a4 b c2
  \bar ";"
  a4 b c2
  \bar "!"
  a4 b c2
  \bar "||"
}
```

Alternatively, the notation used in Gregorian chant for pauses or rests is sometimes used even though the rest of the notation is modern.

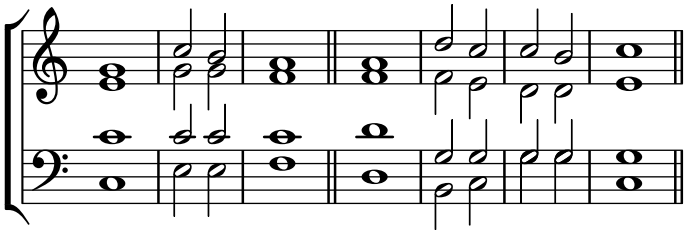
```
divisioMinima = \caesura
divisioMaior = { \caesura \shortfermata }
divisioMaxima = { \caesura \fermata }
finalis = \section

\score {
  \relative {
    g'2 a4 g
    \divisioMinima
    g2 a4 g
    \divisioMaior
    g2 a4 g
    \divisioMaxima
    g2 a4 g
    \finalis
  }
  \layout {
    \context {
      \Staff
      \remove Caesura_engraver
      \consists Divisio_engraver
      \EnableGregorianDivisiones
      caesuraType = #'((breath . chantquarterbar))
      measureBarType = #'()
      forbidBreakBetweenBarLines = ##f
    }
  }
}
```

Chants usually omit the time signature and often omit the clef too.

```
\score {
  \new Staff {
    \relative {
      a'4 b c2 |
      a4 b c2 |
      a4 b c2 |
    }
  }
  \layout {
    \context {
      \Staff
      \remove Time_signature_engraver
      \remove Clef_engraver
      measureBarType = #'()
      forbidBreakBetweenBarLines = ##f
    }
```

```
  }
}
```

Chants for psalms in the Anglican tradition are usually either *single*, with 7 bars of music, or *double*, with two lots of 7 bars. Each group of 7 bars is divided into two halves, corresponding to the two halves of each verse, usually separated by a double bar line. Only whole and half notes are used. The 1st bar in each half always contains a single chord of whole notes. This is the "reciting note". Chants are usually centered on the page.

```
SopranoMusic = \relative {
  g'1 | c2 b | a1 |
  a1 | d2 c | c b | c1 |
}

AltoMusic = \relative {
  e'1 | g2 g | f1 |
  f1 | f2 e | d d | e1 |
}

TenorMusic = \relative {
  c'1 | c2 c | c1 |
  d1 | g,2 g | g g | g1 |
}

BassMusic =  \relative {
  c1 | e2 e | f1 |
  d1 | b2 c | g' g | c,1 |
}

global = {
  \time 2/2
  \skip 1*3 \section
  \skip 1*4 \fine
}

% Use markup to center the chant on the page
\markup {
  \fill-line {
    \score {  % centered
      <<
        \new ChoirStaff <<
          \new Staff <<
            \global
            \clef "treble"
            \new Voice = "Soprano" <<
              \voiceOne
              \SopranoMusic
            >>
            \new Voice = "Alto" <<
              \voiceTwo
```

```
            \AltoMusic
          >>
        >>
        \new Staff <<
          \clef "bass"
          \global
          \new Voice = "Tenor" <<
            \voiceOne
            \TenorMusic
          >>
          \new Voice = "Bass" <<
            \voiceTwo
            \BassMusic
          >>
        >>
      >>
      \layout {
        \context {
          \Score
          \override SpacingSpanner.base-shortest-duration =
            \musicLength 2
          fineBarType = "||"
        }
        \context {
          \Staff
          \remove Time_signature_engraver
        }
      }
    }  % End score
  }
}  % End markup
```



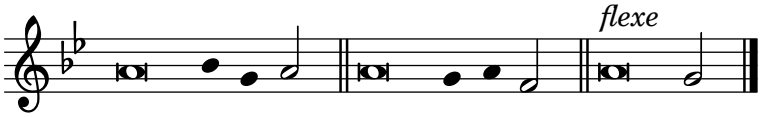
Some other approaches to setting such a chant are shown in the first of the following snippets.

Selected Snippets

Chant or psalms notation

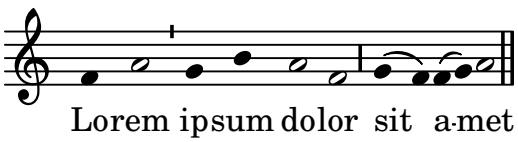
This form of notation is used for Psalm chant, where verses aren't always the same length.

```
stemOff = \hide Staff.Stem
stemOn  = \undo \stemOff

\score {
  \new Staff \with { \remove "Time_signature_engraver" }
  {
```

```
    \key g \minor
    \cadenzaOn
    \stemOff a'\breve bes'4 g'4
    \stemOn a'2 \section
    \stemOff a'\breve g'4 a'4
    \stemOn f'2 \section
    \stemOff a'\breve^\markup { \italic flexe }
    \stemOn g'2 \fine
  }
}
```

Canticles and other liturgical texts may be set more freely, and may use notational elements from ancient music. Often the words are shown underneath and aligned with the notes. If so, the notes are spaced in accordance with the syllables rather than the notes' durations.

Ancient notation template – modern transcription of gregorian music

This example demonstrates how to do modern transcription of Gregorian music. Gregorian music has no measure, no stems; it uses only half and quarter note heads, and special marks, indicating rests of different length.

```
\include "gregorian.ly"

chant = \relative c' {
  \set Score.timing = ##f
  f4 a2 \divisioMinima
  g4 b a2 f2 \divisioMaior
  g4( f) f( g) a2 \finalis
}

verba = \lyricmode {
  Lo -- rem ip -- sum do -- lor sit a -- met
}

\score {
  \new GregorianTranscriptionStaff <<
    \new GregorianTranscriptionVoice = "melody" \chant
    \new GregorianTranscriptionLyrics = "one" \lyricsto melody \verba
  >>
}
```

See also

Learning Manual: Section "Visibility and color of objects" in *Learning Manual*, Section "Vocal ensembles templates" in *Learning Manual*.

Notation Reference: Section 2.9 [Ancient notation], page 493, [Bar lines], page 106, Section 5.1.4 [Modifying context plug-ins], page 667, Section 2.9.4 [Typesetting Gregorian chant], page 503, [Unmetered music], page 81, Section 5.4.7 [Visibility of objects], page 704.

Pointing a psalm

The words to an Anglican psalm are usually printed in separate verses centered underneath the chant.

Single chants (with 7 bars) are repeated for every verse. Double chants (with 14 bars) are repeated for every pair of verses. Marks are inserted in the words to show how they should be fitted to the chant. Each verse is divided into two halves. A colon is usually used to indicate this division. This corresponds to the double bar line in the music. The words before the colon are sung to the first three bars of music; the words after the colon are sung to the last four bars.

Single bar lines (or in some psalters an inverted comma or similar symbol) are inserted between words to indicate where the bar lines in the music fall. In markup mode a single bar line can be entered with the bar check symbol, `|`.

```
\markup {
  \fill-line {
    \column {
      \left-align {
        \line { O come let us sing | unto the | Lord : let }
        \line { us heartily rejoice in the | strength of | our }
        \line { sal- | -vation. }
      }
    }
  }
}
```

O come let us sing | unto the | Lord : let
us heartily rejoice in the | strength of | our
sal- | -vation.

Other symbols may require glyphs from the `fetaMusic` fonts. For details, see Section 1.8.3 [Fonts], page 305.

```
tick = \markup {
  \raise #1 \fontsize #-5 \musicglyph "scripts.rvarcomma"
}
\markup {
  \fill-line {
    \column {
      \left-align {
        \line { O come let us sing \tick unto the \tick Lord : let }
        \line {
          us heartily rejoice in the \tick strength of \tick our
        }
        \line { sal \tick vation. }
      }
    }
  }
}
```

O come let us sing ′ unto the ′ Lord : let
us heartily rejoice in the ′ strength of ′ our
sal ′ vation.

Where there is one whole note in a bar all the words corresponding to that bar are recited on that one note in speech rhythm. Where there are two notes in a bar there will usually be only one or two corresponding syllables. If there are more that two syllables a dot is usually inserted to indicate where the change in note occurs.

```
dot = \markup {
  \raise #0.7 \musicglyph "dots.dot"
}
tick = \markup {
  \raise #1 \fontsize #-5 \musicglyph "scripts.rvarcomma"
}
\markup {
  \fill-line {
    \column {
      \left-align {
        \line {
          O come let us sing \tick unto \dot the \tick Lord : let
        }
        \line {
          us heartily rejoice in the \tick strength of \tick our
        }
        \line { sal \tick vation. }
      }
    }
  }
}
```

O come let us sing ′ unto • the ′ Lord : let
us heartily rejoice in the ′ strength of ′ our
sal ′ vation.

In some psalters an asterisk is used to indicate a break in a recited section instead of a comma, and stressed or slightly lengthened syllables are indicated in bold text.

```
dot = \markup {
  \raise #0.7 \musicglyph "dots.dot"
}
tick = \markup {
  \raise #1 \fontsize #-5 \musicglyph "scripts.rvarcomma"
}
\markup {
  \fill-line {
    \column {
      \left-align {
        \line { Today if ye will hear his voice * }
        \line {
          \concat { \bold hard en }
          | not your | hearts : as in the pro-
        }
        \line { vocation * and as in the \bold day of tempt- | }
```

```
        \line { -ation | in the | wilderness. }
      }
    }
  }
}
```

Today if ye will hear his voice *
harden | not your | hearts : as in the provocation * and as in the **day** of tempt- |
-ation | in the | wilderness.

In other psalters an accent is placed over the syllable to indicate stress.

```
tick = \markup {
  \raise #2 \fontsize #-5 \musicglyph "scripts.rvarcomma"
}
\markup {
  \fill-line {
    \column {
      \left-align {
        \line {
          O come let us \concat {
            si \combine \tick ng
          }
          | unto the | Lord : let
        }
        \line {
          us heartily \concat {
            rejo \combine \tick ice
          }
          in the | strength of | our
        }
        \line { sal- | -vation. }
      }
    }
  }
}
```

O come let us sing′ | unto the | Lord : let
us heartily rejoice′ in the | strength of | our
sal- | -vation.

The use of markup to center text, and arrange lines in columns is described in Section 1.8.2 [Formatting text], page 289.

Most of these elements are shown in one or other of the two verses in the template, see Section "Psalms" in *Learning Manual*.

See also

Learning Manual: Section "Psalms" in *Learning Manual*, Section "Vocal ensembles templates" in *Learning Manual*.

Notation Reference: Section 1.8.3 [Fonts], page 305, Section 1.8.2 [Formatting text], page 289.

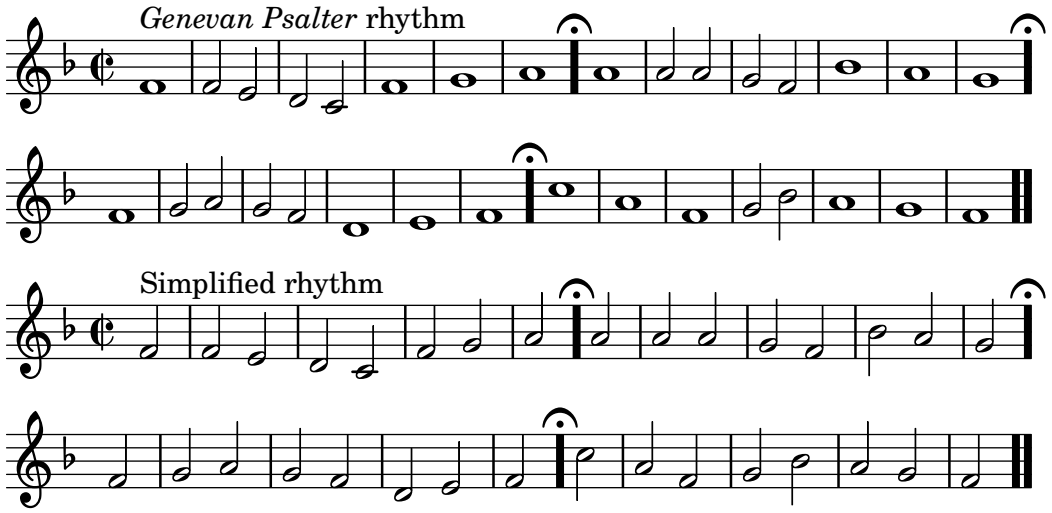
Phrase bar lines in hymn tunes

The `\caesura` command can be configured to create phrase bar lines that interact well with other automatic bar lines (see [Automatic bar lines], page 115).

In the following examples, the source code for the tune in `old-hundredth-example.ly` uses `\caesura` between poetic lines and `\fine` at the end. There are no `\fermata` or `\bar` commands; those symbols appear in the output because of the caesura configuration.

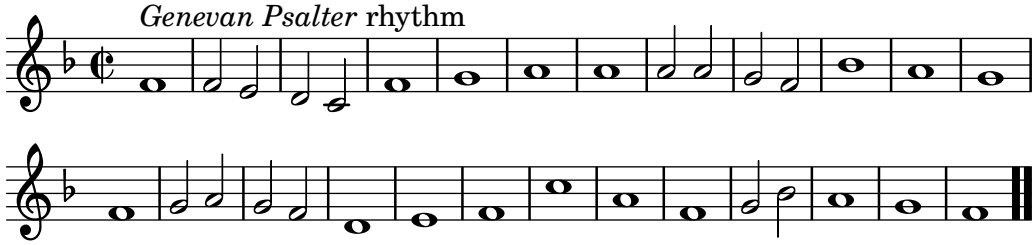
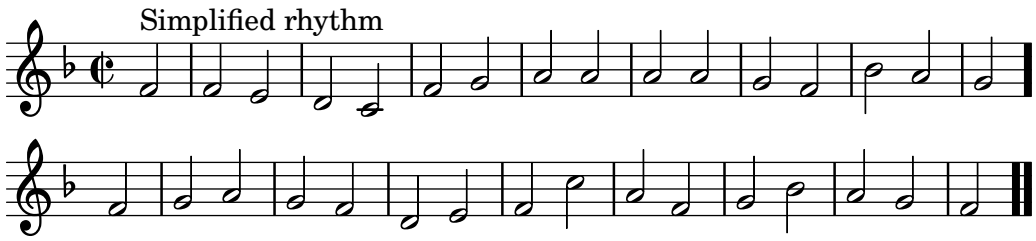
The Boston Handel and Haydn Society Collection of Church Music (1830) has a thick bar after each phrase. For this tune, it also has fermatas over the bar lines:

```
\layout {
  \context {
    \Score
    caesuraType = #'((bar-line . ".")
                     (scripts . (fermata)))
    fineBarType = ".."
  }
}
\include "old-hundredth-example.ly"
```



J.S. James' *Original Sacred Harp* (1911) has a thick bar when a line is broken in mid-measure at the end of a phrase.

```
\layout {
  \context {
    \Score
    caesuraType = #'((underlying-bar-line . "x-."))
    fineBarType = ".."
  }
}
\include "old-hundredth-example.ly"
```



Partial measures in hymn tunes

Hymn tunes frequently start and end every line of music with partial measures so that each line of music corresponds exactly with a line of text. This requires a `\partial` command at the start of the music and a bar line at the end of each line.

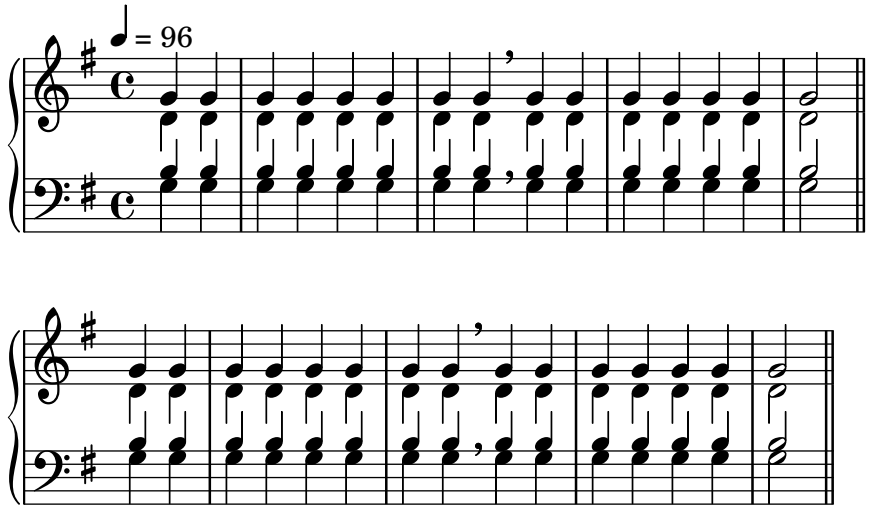
Hymn template

This code shows one way of setting out a hymn tune when each line starts and ends with a partial measure. It also shows how to add the verses as stand-alone text under the music.

```
Timeline = {
  \time 4/4
  \tempo 4=96
  \partial 2
  s2 | s1 | s2 \breathe s2 | s1 | s2 \caesura \break
  s2 | s1 | s2 \breathe s2 | s1 | s2 \fine
}

SopranoMusic = \relative g' {
  g4 g | g g g g | g g g g | g g g g | g2
  g4 g | g g g g | g g g g | g g g g | g2
}

AltoMusic = \relative c' {
  d4 d | d d d d | d d d d | d d d d | d2
  d4 d | d d d d | d d d d | d d d d | d2
}

TenorMusic = \relative a {
  b4 b | b b b b | b b b b | b b b b | b2
  b4 b | b b b b | b b b b | b b b b | b2
}

BassMusic =  \relative g {
  g4 g | g g g g | g g g g | g g g g | g2
  g4 g | g g g g | g g g g | g g g g | g2
}

global = {
 \key g \major
}

\score {  % Start score
  <<
    \new PianoStaff <<  % Start pianostaff
      \new Staff <<  % Start Staff = RH
```

```
        \global
        \clef "treble"
        \new Voice = "Soprano" <<  % Start Voice = "Soprano"
          \Timeline
          \voiceOne
          \SopranoMusic
        >>  % End Voice = "Soprano"
        \new Voice = "Alto" <<  % Start Voice = "Alto"
          \Timeline
          \voiceTwo
          \AltoMusic
        >>  % End Voice = "Alto"
      >>  % End Staff = RH
      \new Staff <<  % Start Staff = LH
        \global
        \clef "bass"
        \new Voice = "Tenor" <<  % Start Voice = "Tenor"
          \Timeline
          \voiceOne
          \TenorMusic
        >>  % End Voice = "Tenor"
        \new Voice = "Bass" <<  % Start Voice = "Bass"
          \Timeline
          \voiceTwo
          \BassMusic
        >>  % End Voice = "Bass"
      >>  % End Staff = LH
    >>  % End pianostaff
  >>
}  % End score

\markup {
  \fill-line {
    ""
    {
      \column {
        \left-align {
          "This is line one of the first verse"
          "This is line two of the same"
          "And here's line three of the first verse"
          "And the last line of the same"
        }
      }
    }
    ""
  }
}

\layout {
  \context {
    \Score
    caesuraType = #'((bar-line . "||"))
```

```
    fineBarType = "||"
  }
}

\paper {  % Start paper block
  indent = 0     % don't indent first system
  line-width = 130   % shorten line length to suit music
}  % End paper block
```



This is line one of the first verse
This is line two of the same
And here's line three of the first verse
And the last line of the same

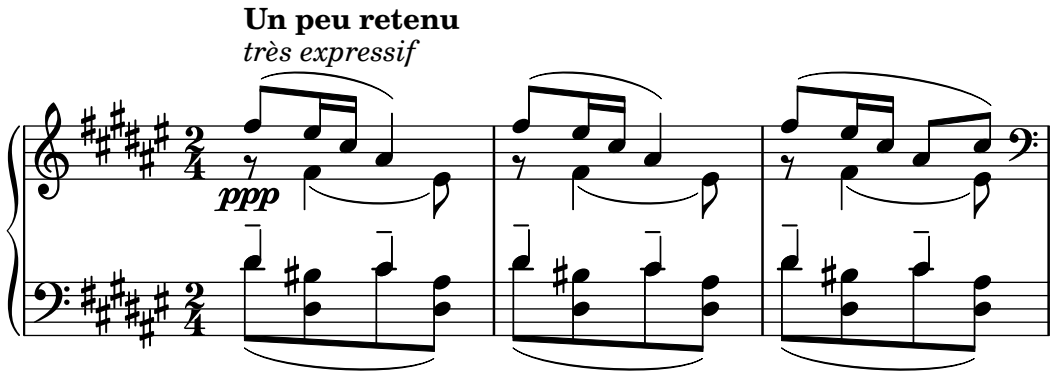
2.1.8 Ancient vocal music

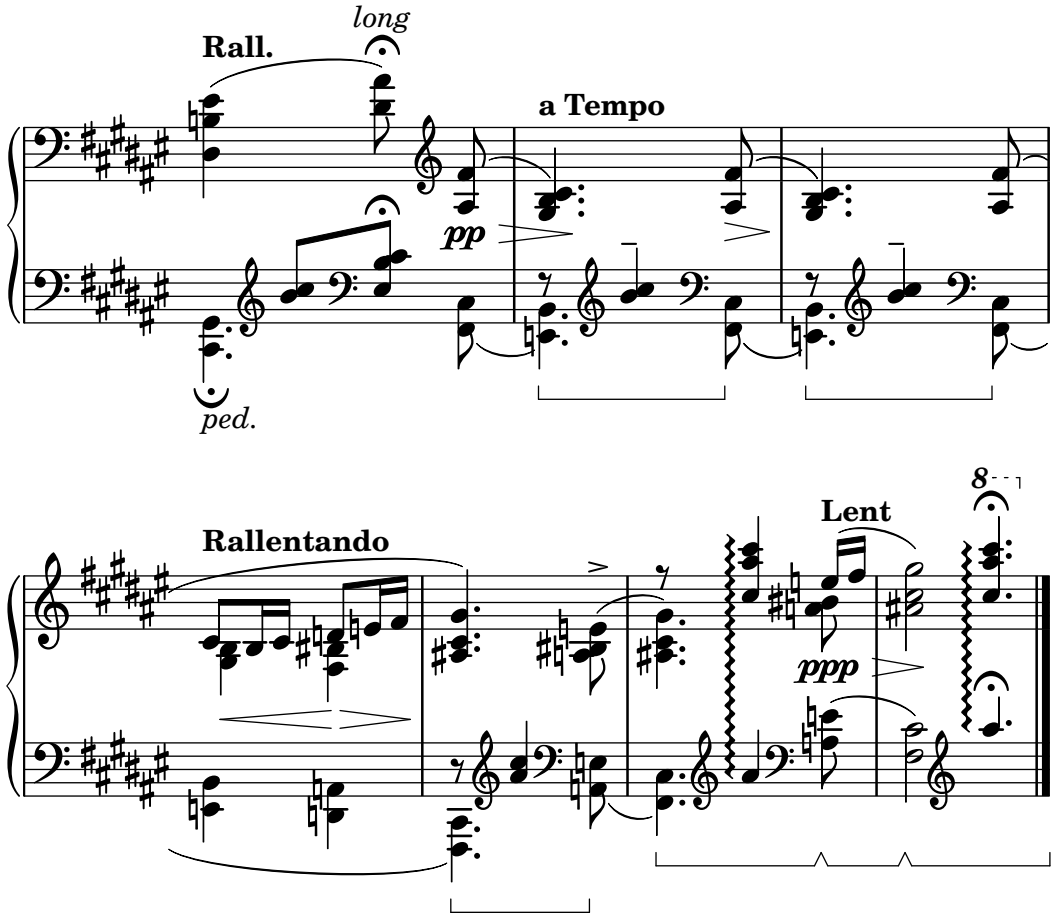
Ancient vocal music is supported, as explained in Section 2.9 [Ancient notation], page 493.

See also

Notation Reference: Section 2.9 [Ancient notation], page 493.

2.2 Keyboard and other multi-staff instruments





This section discusses several aspects of music notation that are unique to keyboard instruments and other instruments notated on many staves, such as harps and vibraphones. For the purposes of this section this entire group of multi-staff instruments is called "keyboards" for short, even though some of them do not have a keyboard.

2.2.1 Common notation for keyboards

This section discusses notation issues that may arise for most keyboard instruments.

References for keyboards

Keyboard instruments are usually notated with Piano staves. These are two or more normal staves coupled with a brace. The same notation is also used for other keyed instruments. Organ music is normally written with two staves inside a `PianoStaff` group and third, normal staff for the pedals.

The staves in keyboard music are largely independent, but sometimes voices can cross between the two staves. This section discusses notation techniques particular to keyboard music.

Several common issues in keyboard music are covered elsewhere:

- Keyboard music usually contains multiple voices and the number of voices may change regularly; this is described in [Collision resolution], page 202.
- Keyboard music can be written in parallel, as described in [Writing music in parallel], page 213.
- Dynamics may be placed in a `Dynamics` context, between the two `Staff` contexts to align the dynamic marks on a horizontal line centered between the staves; see [Dynamics], page 141.
- Fingerings are indicated with [Fingering instructions], page 254.

- Organ pedal indications are inserted as articulations, see Section A.15 [List of articulations], page 824.
- Vertical grid lines can be shown with [Grid lines], page 271.
- Keyboard music often contains *Laissez vibrer* ties as well as ties on arpeggios and tremolos, described in [Ties], page 58.
- Placing arpeggios across multiple voices and staves is covered in [Arpeggio], page 162.
- Tremolo marks are described in [Tremolo repeats], page 189.
- Several of the tweaks that can occur in keyboard music are demonstrated in Section "Real music example" in *Learning Manual*.
- Hidden notes can be used to produce ties that cross voices, as shown in Section "Other uses for tweaks" in *Learning Manual*.

See also

Learning Manual: Section "Real music example" in *Learning Manual*, Section "Other uses for tweaks" in *Learning Manual*.

Notation Reference: [Grouping staves], page 217, [Instrument names], page 236, [Collision resolution], page 202, [Writing music in parallel], page 213, [Fingering instructions], page 254, Section A.15 [List of articulations], page 824, [Grid lines], page 271, [Ties], page 58, [Arpeggio], page 162, [Tremolo repeats], page 189.

Internals Reference: Section "PianoStaff" in *Internals Reference*.

Snippets: Section "Keyboards" in *Snippets*.

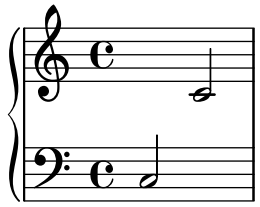
Changing staff manually

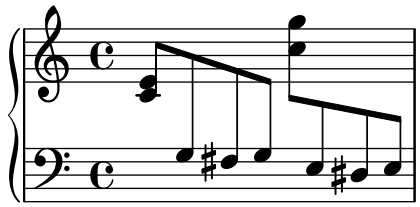
Voices can be switched between staves manually, using the command

```
\change Staff = staffname
```

The string *staffname* is the name of the staff. It switches the current voice from its current staff to the staff called *staffname*. Typical values for *staffname* are `"up"` and `"down"`, or `"RH"` and `"LH"`.

The staff to which the voice is being switched must exist at the time of the switch. If necessary, staves should be "kept alive", see Section 5.1.3 [Keeping contexts alive], page 664, or explicitly instantiated, for example by using the empty chord, <>, see [Chorded notes], page 192.

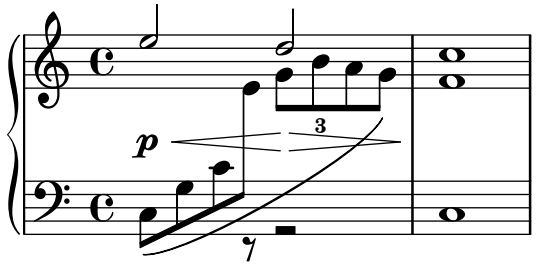
```
\new PianoStaff <<
  \new Staff = "up" {
    % enforce creation of all contexts at this point of time
    <>
    \change Staff = "down" c2
    \change Staff = "up" c'2
  }
  \new Staff = "down" {
    \clef bass
    % keep staff alive
    s1
  }
>>
```

Cross-staff notes are beamed automatically:

```
\new PianoStaff <<
  \new Staff = "up" {
    <e' c'>8
    \change Staff = "down"
    g8 fis g
    \change Staff = "up"
    <g'' c''>8
    \change Staff = "down"
    e8 dis e
    \change Staff = "up"
  }
  \new Staff = "down" {
    \clef bass
    % keep staff alive
    s1
  }
>>
```

If the beaming needs to be tweaked, make any changes to the stem directions first. The beam positions are then measured from the center of the staff that is closest to the beam. For a simple example of beam tweaking, see Section “Fixing overlapping notation” in *Learning Manual*.

Overlapping notation can result when voices cross staves:

```
\new PianoStaff <<
  \new Staff = "up" {
    \voiceOne
    % Make space for fingering in the cross-staff voice
    \once\override DynamicLineSpanner.staff-padding = #4
    e''2\p\< d''\>
    c''1\!
  }
  \new Staff = "down" <<
    {
      \clef bass
      s4. e,8\rest g,2\rest
      c1
    } \\ {
      c8\( g c'
```

```
      \change Staff = "up"
      e' g' b'-3 a' g'\)
      f'1
    }
  >>
>>
```



The stem and slur overlap the intervening line of dynamics because automatic collision resolution is suspended for beams, slurs and other spanners that connect notes on different staves, as well as for stems and articulations if their placement is affected by a cross-staff spanner. The resulting collisions must be resolved manually, where necessary, using the methods in Section "Fixing overlapping notation" in *Learning Manual*.

See also

Learning Manual: Section "Fixing overlapping notation" in *Learning Manual*.

Notation Reference: [Stems], page 267, [Automatic beams], page 91, Section 5.1.3 [Keeping contexts alive], page 664.

Snippets: Section "Keyboards" in *Snippets*.

Internals Reference: Section "Beam" in *Internals Reference*, Section "ContextChange" in *Internals Reference*.

Known issues and warnings

Beam collision avoidance does not work for automatic beams that end right before a change in staff. In this case use manual beams.

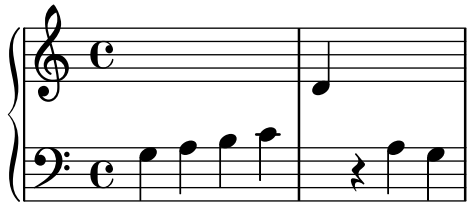
Changing staff automatically

Voices can be made to switch automatically between the top and the bottom staff. The syntax for this is

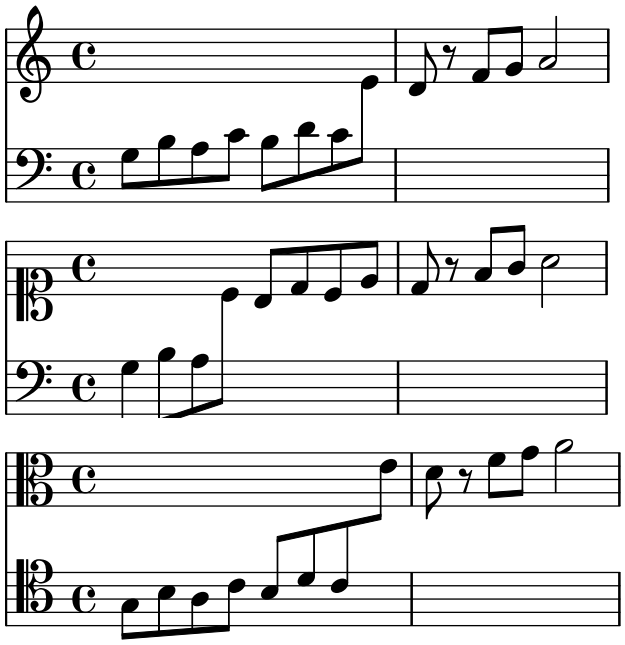
```
\autoChange ...music...
```

This will create two staves inside the current staff group (usually a `PianoStaff`), called `"up"` and `"down"`. The lower staff will be in the bass clef by default. The auto-changer switches on the basis of the pitch (middle C is the turning point), and it looks ahead skipping over rests to switch in advance.

```
\new PianoStaff {
  \autoChange {
    g4 a b c'
    d'4 r a g
  }
}
```



It is possible to specify other pitches for the turning point. If the staves are not instantiated explicitly, other clefs may be used.

```
music = {
  g8 b a c' b8 d' c'8 e'
  d'8 r f' g' a'2
}

\autoChange d' \music
\autoChange b \with { \clef soprano } \music
\autoChange d' \with { \clef alto } \with { \clef tenor } \music
```

A \relative section that is outside of \autoChange has no effect on the pitches of the music, so if necessary, put \relative inside \autoChange.

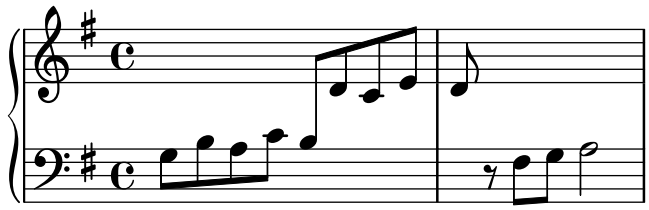
If additional control is needed over the individual staves, they can be created manually with the names "up" and "down". The \autoChange command will then switch its voice between the existing staves.

> **Note:** If staves are created manually, they *must* be named "up" and "down".

For example, staves must be created manually in order to place a key signature in the lower staff:

```
\new PianoStaff <<
  \new Staff = "up" {
    \new Voice = "melOne" {
      \key g \major
```

```
      \autoChange \relative {
        g8 b a c b d c e
        d8 r fis, g a2
      }
    }
  }
  \new Staff = "down" {
    \key g \major
    \clef bass
  }
>>
```



See also

Notation Reference: [Changing staff manually], page 379.

Snippets: Section “Keyboards” in *Snippets*.

Internals Reference: Section “AutoChangeMusic” in *Internals Reference*.

Known issues and warnings

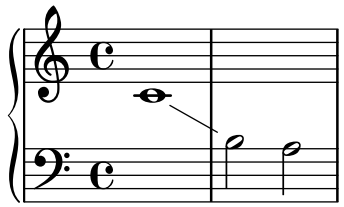
The staff switches may not end up in optimal places. For high quality output, staff switches should be specified manually.

Chords will not be split across the staves; they will be assigned to a staff based on the first note named in the chord construct.

Staff-change lines

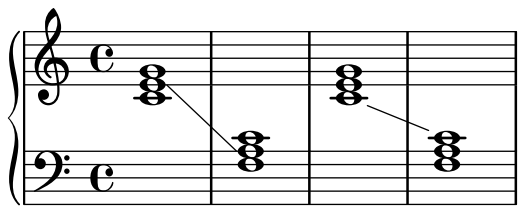
Whenever a voice switches to another staff, a line connecting the notes can be printed automatically:

```
\new PianoStaff <<
  \new Staff = "one" {
    \showStaffSwitch
    c'1
    \change Staff = "two"
    b2 a
  }
  \new Staff = "two" {
    \clef bass
    s1*2
  }
>>
```



A staff-change line between chords connects the chords' "last notes" as written in the source file; this can be used to quickly adjust the line's vertical start and end positions.

```
\new PianoStaff <<
  \new Staff = "one" {
    <c' e' g'>1
    \showStaffSwitch
    \change Staff = "two"
    <a c' f>1
    \hideStaffSwitch
    \change Staff = "one"
    <e' g' c'>1
    \showStaffSwitch
    \change Staff = "two"
    <f a c'>1
  }
  \new Staff = "two" {
    \clef bass
    s1*4
  }
>>
```



Predefined commands

`\showStaffSwitch`, `\hideStaffSwitch`.

See also

Snippets: Section "Keyboards" in *Snippets*.

Internals Reference: Section "Note_head_line_engraver" in *Internals Reference*, Section "VoiceFollower" in *Internals Reference*.

Selected Snippets

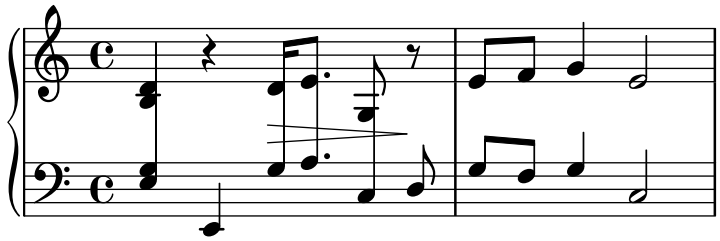
Cross staff stems

This snippet shows the use of the `Span_stem_engraver` and `\crossStaff` to connect stems across staves automatically.

The stem length need not be specified, as the variable distance between noteheads and staves is calculated automatically.

```
\layout {
  \context {
    \PianoStaff
    \consists "Span_stem_engraver"
  }
}

{
```

```
  \new PianoStaff <<
    \new Staff {
      <b d'>4 r d'16\> e'8. g8 r\!
      e'8 f' g'4 e'2
    }
    \new Staff {
      \clef bass
      \voiceOne
      \autoBeamOff
      \crossStaff { <e g>4 e, g16 a8. c8} d
      \autoBeamOn
      g8 f g4 c2
    }
  >>
}
```



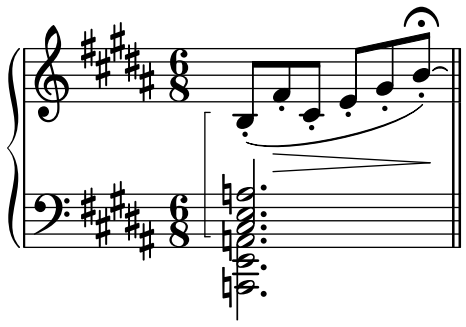
Indicating cross-staff chords with arpeggio bracket

An arpeggio bracket can indicate that notes on two different staves are to be played with the same hand. In order to do this, the PianoStaff must be set to accept cross-staff arpeggios and the arpeggios must be set to the bracket shape in the PianoStaff context.

(Debussy, *Les collines d'Anacapri,* m. 65)

```
\new PianoStaff <<
  \set PianoStaff.connectArpeggios = ##t
  \override PianoStaff.Arpeggio.stencil =
    #ly:arpeggio::brew-chord-bracket
  \new Staff {
    \relative c' {
      \key b \major
      \time 6/8
      b8-.(\arpeggio fis'-.\> cis-.
        e-. gis-. b-.)\!\fermata^\laissezVibrer \bar "||"
    }
  }
  \new Staff {
    \relative c' {
      \clef bass
      \key b \major
      <<
        {
          <a e cis>2.\arpeggio
        }
        \\
        {
          <a, e a,>2.
```

```
        }
      >>
    }
  }
>>
```



See also

Snippets: Section “Keyboards” in *Snippets*.

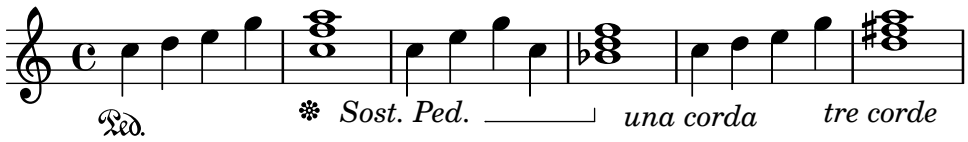
Internals Reference: Section “Stem” in *Internals Reference*.

2.2.2 Piano

This section discusses notation issues that relate most directly to the piano.

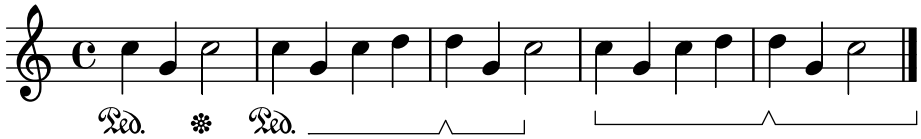
Piano pedals

Pianos generally have three pedals that alter the way sound is produced: *sustain*, *sostenuto* (*sos.*), and *una corda* (*U.C.*). Sustain pedals are also found on vibraphones and celestas.

```
\relative {
  c''4\sustainOn d e g
  <c, f a>1\sustainOff
  c4\sostenutoOn e g c,
  <bes d f>1\sostenutoOff
  c4\unaCorda d e g
  <d fis a>1\treCorde
}
```

There are three styles of pedal indications: text, bracket, and mixed. The sustain pedal and the una corda pedal use the text style by default while the sostenuto pedal uses mixed by default.

```
\relative {
  c''4\sustainOn g c2\sustainOff
  \set Staff.pedalSustainStyle = #'mixed
  c4\sustainOn g c d
  d\sustainOff\sustainOn g, c2\sustainOff
  \set Staff.pedalSustainStyle = #'bracket
  c4\sustainOn g c d
  d\sustainOff\sustainOn g, c2
  \bar "|."
```

```
}
```



The placement of the pedal commands matches the physical movement of the sustain pedal during piano performance. Pedaling to the final bar line is indicated by omitting the final pedal off command.

Pedal indications may be placed in a `Dynamics` context, which aligns them on a horizontal line.

See also

Notation Reference: [Ties], page 58.

Snippets: Section "Keyboards" in *Snippets*.

Internals Reference: Section "SustainPedal" in *Internals Reference*, Section "SustainPedalLineSpanner" in *Internals Reference*, Section "SustainEvent" in *Internals Reference*, Section "SostenutoPedal" in *Internals Reference*, Section "SostenutoPedalLineSpanner" in *Internals Reference*, Section "SostenutoEvent" in *Internals Reference*, Section "UnaCordaPedal" in *Internals Reference*, Section "UnaCordaPedalLineSpanner" in *Internals Reference*, Section "UnaCordaEvent" in *Internals Reference*, Section "PianoPedalBracket" in *Internals Reference*, Section "Piano_pedal_engraver" in *Internals Reference*.

2.2.3 Accordion

This section discusses notation that is unique to the accordion.

Discant symbols

Accordions are often built with more than one set of reeds that may be in unison with, an octave above, or an octave below the written pitch. Each accordion maker has different names for the *shifts* that select the various reed combinations, such as *oboe*, *musette*, or *bandonium*, so a system of symbols has come into use to simplify the performance instructions.

A complete list of all available accordion registers can be found in Section A.12.7 [Accordion registers], page 806.

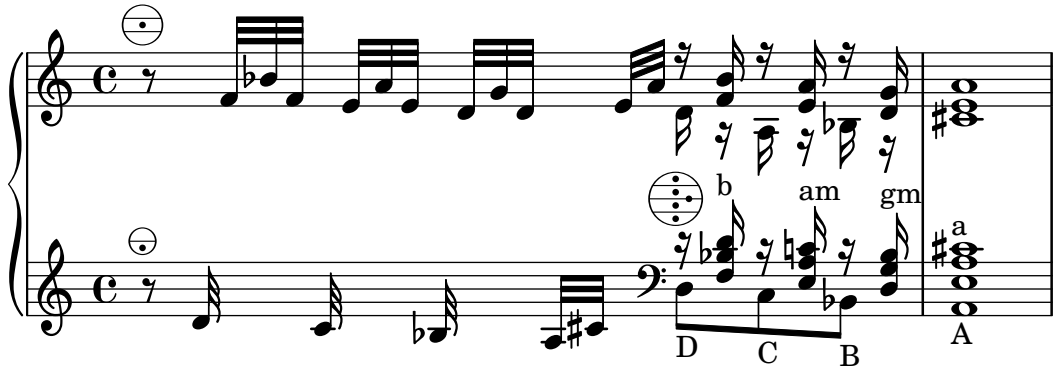
Selected Snippets

Accordion register symbols

Accordion register symbols are available as `\markup` as well as as standalone music events (as register changes tend to occur between actual music events). Bass registers are not overly standardized. The available commands can be found in 'Discant symbols' in the Notation Reference.

```
#(use-modules (lily accreg))

\new PianoStaff
<<
  \new Staff \relative {
    \clef treble
    \discant "10"
    r8 s32 f'[ bes f] s e[ a e] s d[ g d] s16 e32[ a]
    <<
```

```
        { r16 <f bes> r <e a> r <d g> }
        \\
        { d r a r bes r }
      >> |
      <cis e a>1
    }

    \new Staff \relative {
      \clef treble
      \freeBass "1"
      r8 d'32 s16. c32 s16. bes32 s16. a32[ cis] s16
      \clef bass \stdBass "Master"
      <<
        { r16 <f, bes d>^"b" r <e a c>^"am" r <d g bes>^"gm" |
        <e a cis>1^"a" }
        \\
        { d8_"D" c_"C" bes_"B" | a1_"A" }
      >>
    }
  >>
```



See also

Snippets: Section “Keyboards” in *Snippets*.

2.2.4 Harp

This section discusses notation issues that are unique to the harp.

References for harps

Some common characteristics of harp music are covered elsewhere:

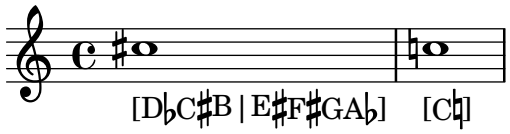
- The glissando is the most characteristic harp technique, [Glissando], page 158.
- A *bisbigliando* is written as a tremolo [Tremolo repeats], page 189.
- Natural harmonics are covered under [Harmonics], page 391.
- For directional arpeggios and non-arpeggios, see [Arpeggio], page 162.

See also

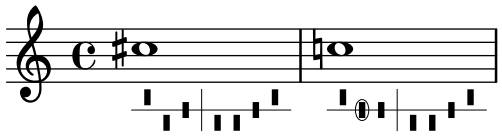
Notation Reference: [Tremolo repeats], page 189, [Glissando], page 158, [Arpeggio], page 162, [Harmonics], page 391.

Harp pedals

Harps have seven strings per octave that may be sounded at the natural, flattened, or sharpened pitch. In lever harps, each string is adjusted individually, but in pedal harps every string with the same pitch name is controlled by a single pedal. From the player's left to right, the pedals are D, C, and B on the left and E, F, G, and A on the right. The position of the pedals may be indicated with text marks:

```
\textLengthOn
cis''1_\markup \concat \vcenter {
  [D \flat C \sharp B|E \sharp F \sharp G A \flat] }
c''!1_\markup \concat \vcenter {
  [ C \natural ] }
```

or pedal diagrams:

```
\textLengthOn
cis''1_\markup { \harp-pedal "^v-|vv-^" }
c''!1_\markup { \harp-pedal "^o--|vv-^" }
```

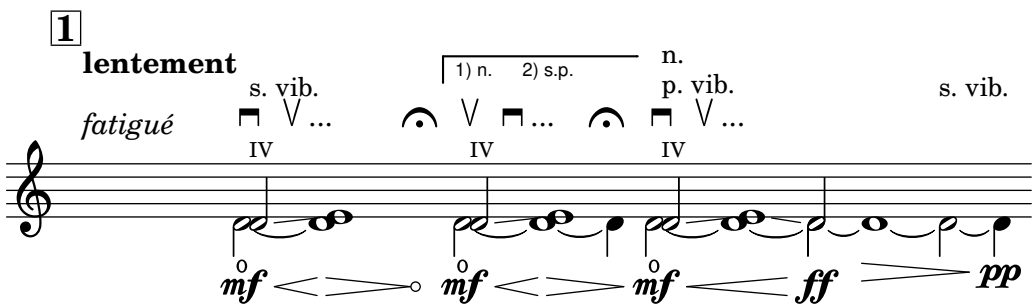


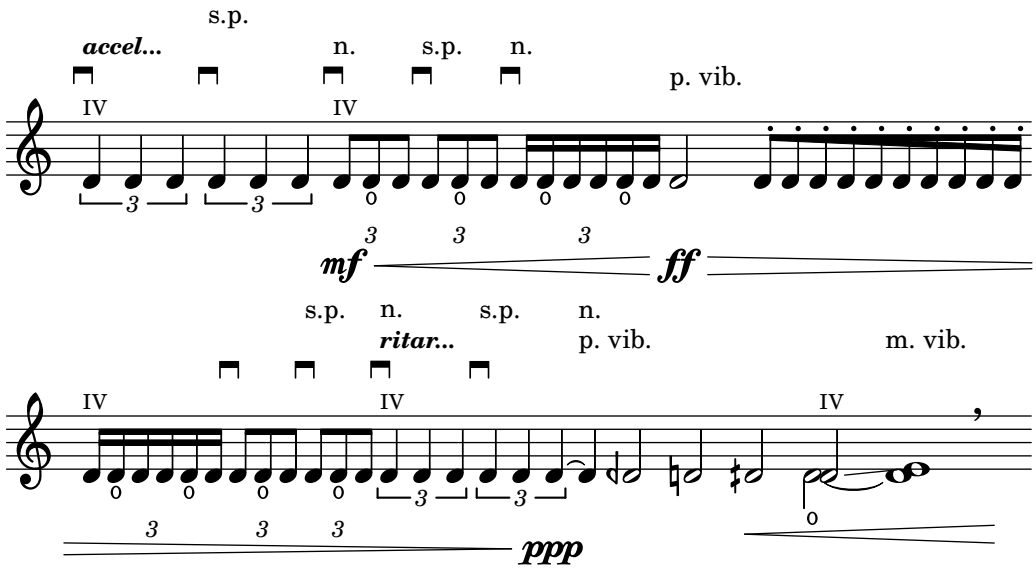
The `\harp-pedal` command accepts a string of characters, where `^` is the highest pedal position (flattened pitch), `-` is the middle pedal position (natural pitch), `v` is the lowest pedal position (sharpened pitch), and `|` is the divider. A prefixed `o` will circle the following pedal symbol.

See also

Notation Reference: [Text scripts], page 279, Section A.12.6 [Instrument-specific markup], page 802.

2.3 Unfretted string instruments





This section provides information and references which are helpful when writing for unfretted string instruments, principally orchestral strings.

2.3.1 Common notation for unfretted strings

There is little specialist notation for unfretted string instruments. The music is notated on a single staff, and usually only a single voice is required. Two voices might be required for some double-stopped or divisi passages.

References for unfretted strings

Most of the notation which is useful for orchestral strings and other bowed instruments is covered elsewhere:

- Textual indications such as "pizz." and "arco" are added as simple text – see [Text scripts], page 279.
- Fingerings, including the thumb indication, are described in [Fingering instructions], page 254.
- String numbers may be added (generally in roman numbers for bowed instruments) as explained in [String number indications], page 394.
- Double stopping is normally indicated by writing a chord, see [Chorded notes], page 192. Directives for playing chords may be added, see [Arpeggio], page 162.
- Templates for string quartets can be found in Section "String quartet templates" in *Learning Manual*. Others are shown in the snippets.

See also

Learning Manual: Section "String quartet templates" in *Learning Manual*.

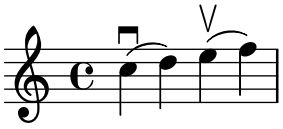
Notation Reference: [Text scripts], page 279, [Fingering instructions], page 254, [Chorded notes], page 192, [Arpeggio], page 162.

Snippets: Section "Unfretted strings" in *Snippets*.

Bowing indications

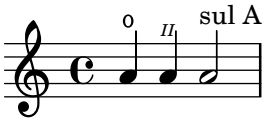
Bowing indications are created as articulations, which are described in [Articulations and ornamentations], page 138.

The bowing commands, `\upbow` and `\downbow`, are used with slurs as follows:

```
\relative { c''4(\downbow d) e(\upbow f) }
```

Roman numerals can be used for string numbers (rather than the default circled Arabic numbers), as explained in [String number indications], page 394.

Alternatively, string indications may be printed using markup commands; articulation scripts may also indicate open strings.

```
a'4 \open
\romanStringNumbers
a'\2
a'2^\markup { \small "sul A" }
```



Predefined commands

`\downbow`, `\upbow`, `\open`, `\romanStringNumbers`.

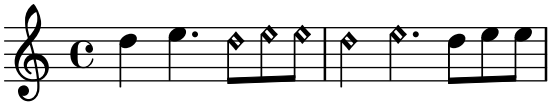
See also

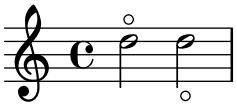
Notation Reference: [Articulations and ornamentations], page 138, [String number indications], page 394, [Slurs], page 151.

Harmonics

Natural harmonics

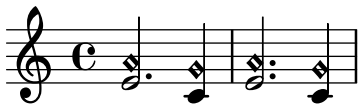
Natural harmonics can be notated in several ways. A diamond-shaped note head generally means to touch the string where you would stop the note if it were not a diamond.

```
\relative d'' {
  d4 e4.
  \harmonicsOn
  d8 e e
  d4 e4.
  \harmonicsOff
  d8 e e
}
```

Alternatively a normal note head is shown at the pitch to be sounded together with a small circle to indicate it should be played as a harmonic:

```
d''2^\flageolet d''_\flageolet
```

Artificial harmonics

Artificial harmonics are notated with two notes, one with a normal note head indicating the stopped position and one with an open diamond note head to indicate the harmonic position.

Artificial harmonics indicated with `\harmonic` do not show the dots. The context property `harmonicDots` should be set if dots are required.

```
\relative e' {
  <e a\harmonic>2.  <c g'\harmonic>4
  \set harmonicDots = ##t
  <e a\harmonic>2.  <c g'\harmonic>4
}
```

See also

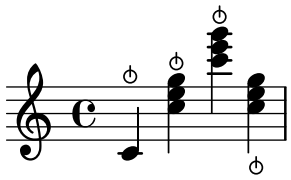
Music Glossary: Section “harmonics” in *Music Glossary*.

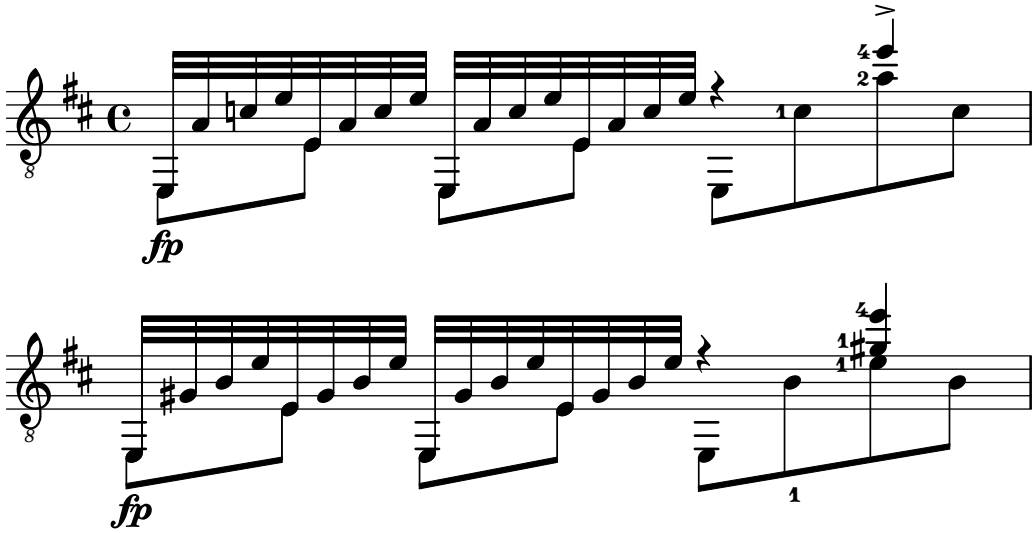
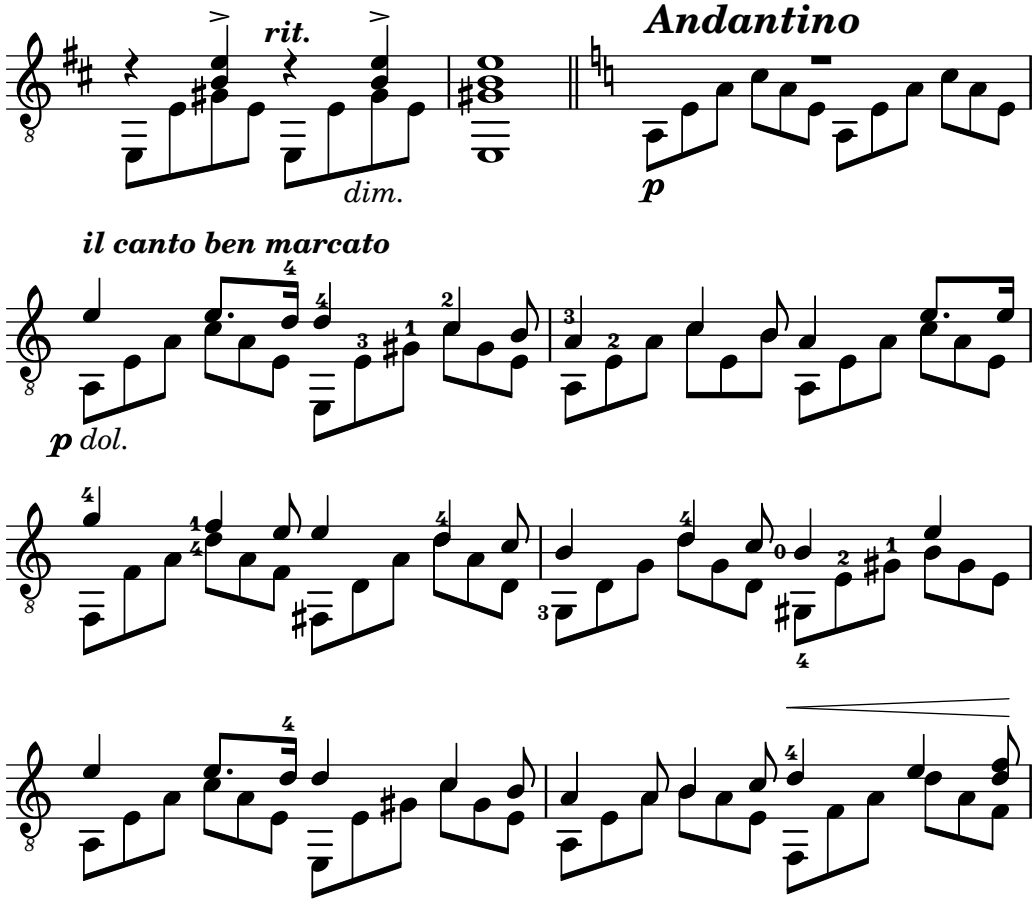
Notation Reference: [Special note heads], page 40, [References for unfretted strings], page 390.

Snap (Bartók) pizzicato

A *snap pizzicato* (also known as “Bartok pizz”) is a type of pizzicato where the string is deliberately plucked upwards (rather than sideways) such that it hits the fingerboard.

```
\relative {
  c'4\snappizzicato
  <c' e g>4\snappizzicato
  <c' e g>4^\snappizzicato
  <c, e g>4_\snappizzicato
}
```



2.4 Fretted string instruments



This section discusses several aspects of music notation that are unique to fretted string instruments.

2.4.1 Common notation for fretted strings

This section discusses common notation that is unique to fretted string instruments.

References for fretted strings

Music for fretted string instruments is normally notated on a single staff, either in traditional music notation or in tablature. Sometimes the two types are combined, and it is especially common in popular music to use chord diagrams above a staff of traditional notation. The guitar and the banjo are transposing instruments, sounding an octave lower than written. Scores for these instruments should use the `"treble_8"` clef (or `\transposition c` to get correct MIDI output). Some other elements pertinent to fretted string instruments are covered elsewhere:

- Fingerings are indicated as shown in [Fingering instructions], page 254.
- Instructions for *Laissez vibrer* ties as well as ties on arpeggios and tremolos can be found in [Ties], page 58.
- Instructions for handling multiple voices can be found in [Collision resolution], page 202.
- Instructions for indicating harmonics can be found in [Harmonics], page 391.

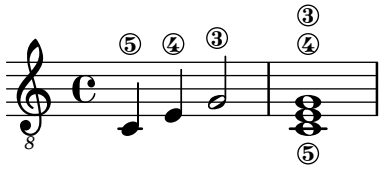
See also

Notation Reference: [Fingering instructions], page 254, [Ties], page 58, [Collision resolution], page 202, [Instrument names], page 236, [Writing music in parallel], page 213, [Arpeggio], page 162, Section A.15 [List of articulations], page 824, [Clef], page 17, [Instrument transpositions], page 27.

String number indications

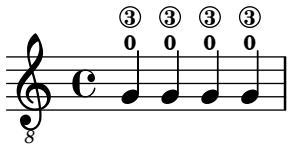
The string on which a note should be played may be indicated by appending *number* to a note.

```
\clef "treble_8"
c4\5 e\4 g2\3
<c\5 e\4 g\3>1
```



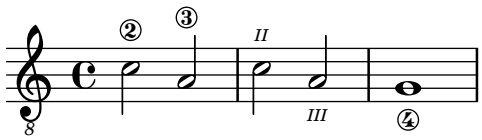
When fingerings and string indications are used together, their placement can be controlled by the order in which the two items appear in the code *only* if they appear inside of an explicit chord: applied to whole chords or single notes *outside* of chords, fingerings are placed using a different mechanism.

```
\clef "treble_8"
g4\3-0
g-0\3
<g\3-0>
<g-0\3>
```



String numbers may also, as is customary with unfretted strings, be printed in Roman numerals and placed below the staff rather than above.

```
\clef "treble_8"
c'2\2
a\3
\romanStringNumbers
c'\2
\set stringNumberOrientations = #'(down)
a\3
\arabicStringNumbers
g1\4
```



Most behaviors of string number indications (namely, the `StringNumber` object), including their placement, may be set in the same way as fingerings: see [Fingering instructions], page 254.

Predefined commands

`\arabicStringNumbers`, `\romanStringNumbers`.

See also

Notation Reference: [Fingering instructions], page 254.

Snippets: Section “Fretted strings” in *Snippets*.

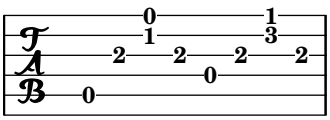
Internals Reference: Section “StringNumber” in *Internals Reference*, Section “Fingering” in *Internals Reference*.

Default tablatures

Music for plucked string instruments is frequently notated using a finger/touch notation or tablature. In contrast to traditional notation pitches are not denoted with note heads, but by numbers (or letter-like symbols in historical intavolatura). The staff lines in tablature indicate the string on which the note is to be played, and a number placed on a staff line indicated the fret at which the corresponding string is to be pressed. Notes that are to be played simultaneously are vertically aligned.

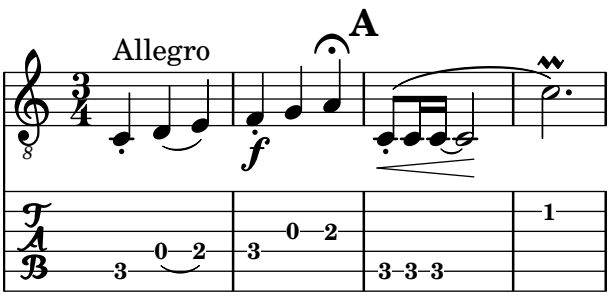
By default, string 1 is the highest string, and corresponds to the top line on the `TabStaff`. The tuning of the `TabStaff` strings defaults to the standard guitar tuning (with 6 strings). The notes are printed as tablature, by using `TabStaff` and `TabVoice` contexts. A calligraphic tablature clef is added automatically.

```
\new TabStaff \relative {
  a,8 a' <c e> a
  d,8 a' <d f> a
}
```



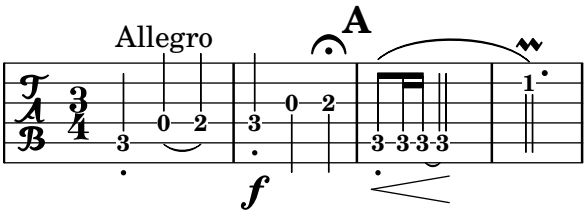
Default tablatures do not contain any symbols for tone duration nor any other musical symbols such as expressive marks, for example.

```
symbols = {
  \time 3/4
  c4-.^"Allegro" d( e)
  f4-.\f g a^\fermata
  \mark \default
  c8_.\<\( c16 c~ 2\!
  c'2.\prall\)
}

\score {
  <<
    \new Staff { \clef "G_8" \symbols }
    \new TabStaff { \symbols }
  >>
}
```



If all musical symbols used in traditional notation should also show up in tablature one has to apply the command `\tabFullNotation` in a `TabStaff`-context. Please bear in mind that half notes are double-stemmed in tablature in order to distinguish them from quarter notes.

```
symbols = {
  \time 3/4
  c4-.^"Allegro" d( e)
  f4-.\f g a^\fermata
  \mark \default
  c8_.\<\( c16 c~ 2\!
  c'2.\prall\)
}

\score {
  \new TabStaff {
    \tabFullNotation
    \symbols
  }
}
```

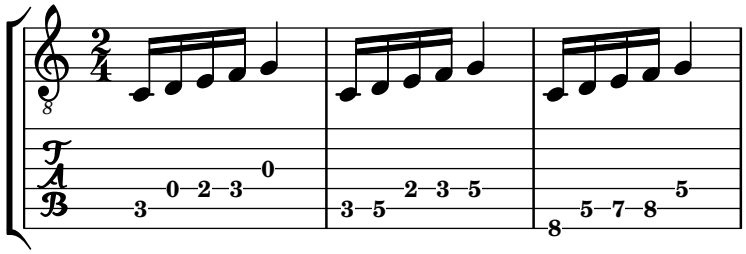


By default pitches are assigned to the lowest playing position on the fretboard (first position). Open strings are automatically preferred. If you would like a certain pitch to be played on a specific string you can add a string number indication to the pitch name. If you don't want to have string number indications appear in traditional notation, you can override the respective stencil. Usually it will be more comfortable to define the playing position by using the value of `minimumFret`. The default value for `minimumFret` is 0.

Even when `minimumFret` is set, open strings are used whenever possible. This behavior can be changed by setting `restrainOpenStrings` to `#t`.

```
\layout { \omit Voice.StringNumber }
\new StaffGroup <<
   \new Staff \relative {
     \clef "treble_8"
     \time 2/4
     c16 d e f g4
     c,16\5 d\5 e\4 f\4 g4\4
     c,16 d e f g4
   }
```

```
    \new TabStaff \relative {
      c16 d e f g4
      c,16\5 d\5 e\4 f\4 g4\4
      \set TabStaff.minimumFret = #5
      \set TabStaff.restrainOpenStrings = ##t
      c,16 d e f g4
    }
>>
```

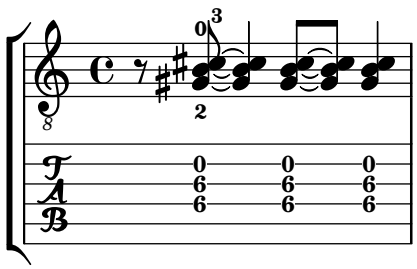


Chord constructs can be repeated by the chord repetition symbol q. In combination with tablatures, its behavior of removing string and finger numbers alongside with other events is cumbersome, so you'll want to run

```
\chordRepeats #'(string-number-event fingering-event)
```

explicitly on music expressions in tablature using [Chord repetition], page 194. This particular command is so common that it is available as \tabChordRepeats.

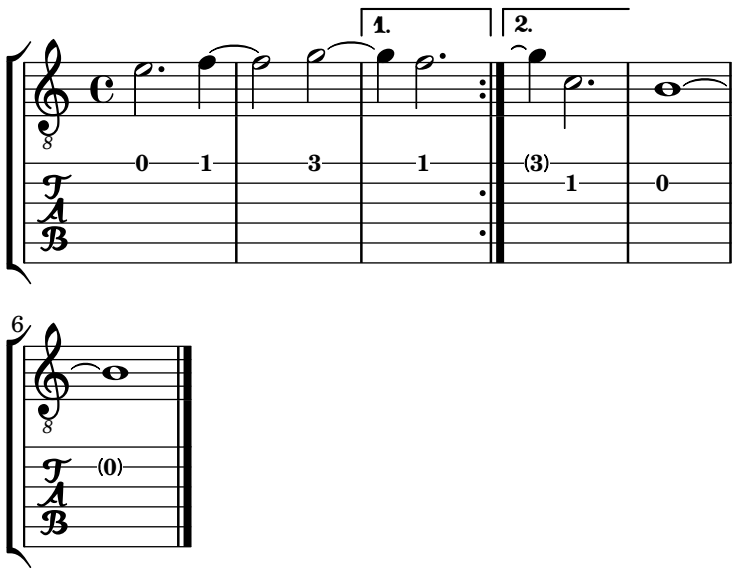
```
guitar = \relative {
  r8 <gis-2 cis-3 b-0>~ q4 q8~ 8 q4
}

\new StaffGroup <<
  \new Staff {
    \clef "treble_8"
    \guitar
  }
  \new TabStaff {
    \tabChordRepeats \guitar
  }
>>
```



Ties over a line break are parenthesized by default. The same holds for the second alternative of a repeat.

```
ties = \relative {
  \repeat volta 2 {
    e'2. f4~
    2 g2~
```

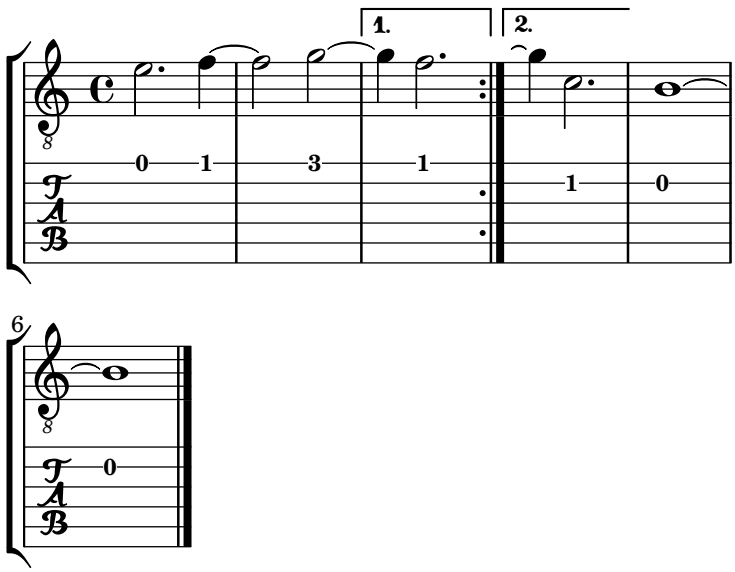
```
  }
  \alternative {
     \volta 1 { g4 f2. }
     \volta 2 { g4\repeatTie c,2. }
  }
  b1~
  \break
  b1
  \bar "|."
}

\score {
  <<
    \new StaffGroup  <<
      \new Staff {
        \clef "treble_8"
        \ties
      }
      \new TabStaff {
        \ties
      }
    >>
  >>
  \layout {
  indent = #0
  ragged-right = ##t
  }
}
```



The command \hideSplitTiedTabNotes cancels the behavior of engraving fret numbers in parentheses:

```
ties = \relative {
  \repeat volta 2 {
    e'2. f4~
    2 g2~ }
```

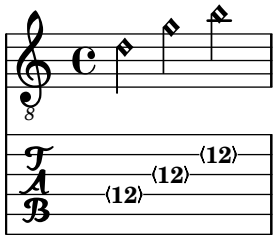
```
  \alternative {
    \volta 1 { g4 f2. }
    \volta 2 { g4\repeatTie c,2. }
  }
  b1~
  \break
  b1
  \bar "|."
}

\score {
  <<
    \new StaffGroup  <<
      \new Staff {
        \clef "treble_8"
        \ties
      }
      \new TabStaff {
      \hideSplitTiedTabNotes
        \ties
      }
    >>
  >>
  \layout {
  indent = #0
  ragged-right = ##t
  }
}
```



Harmonic indications can be added to tablature notation as sounding pitches:

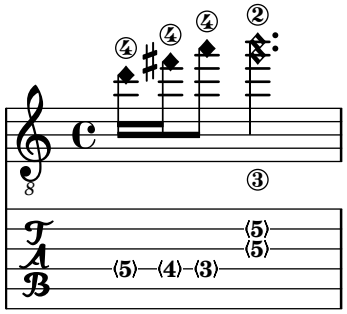
```
\layout { \omit Voice.StringNumber }
firstHarmonic = {
  d'4\4\harmonic
  g'4\3\harmonic
  b'2\2\harmonic
```

```
}
\score {
  <<
    \new Staff {
      \clef "treble_8"
      \firstHarmonic
    }
    \new TabStaff { \firstHarmonic }
  >>
}
```



Note that the command \harmonic must always be attached to single notes (possibly inside of a chord) instead of whole chords. It only makes sense for open-string harmonics in the 12th fret. All other harmonics should be calculated by LilyPond. This can be achieved by indicating the fret where a finger of the fretting hand should touch a string.

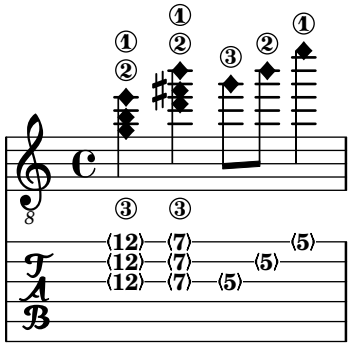
```
fretHarmonics = {
  \harmonicByFret #5 d16\4
  \harmonicByFret #4 d16\4
  \harmonicByFret #3 d8\4
  \harmonicByFret #5 <g\3 b\2>2.
}
\score {
  <<
    \new Staff {
      \clef "treble_8"
      \fretHarmonics
    }
    \new TabStaff { \fretHarmonics }
  >>
}
```



Alternatively, harmonics can be computed by defining the ratio of string lengths above and below the harmonic fingering.

```
ratioHarmonics = {
  \harmonicByRatio #1/2 <g\3 b\2 e'\1>4
```

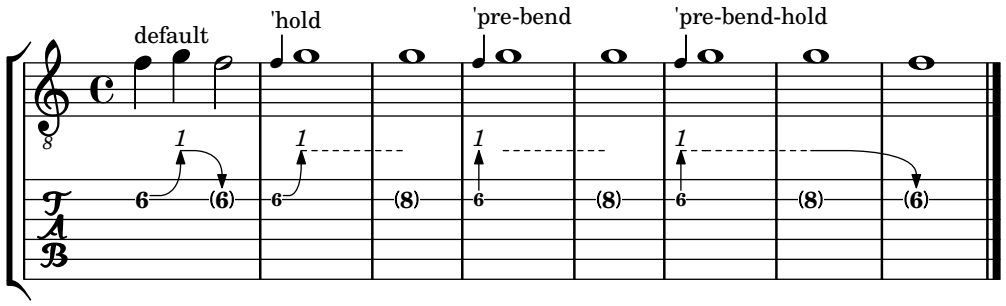
```
  \harmonicByRatio #1/3 <g\3 b\2 e'\1>4
  \harmonicByRatio #1/4 { g8\3 b8\2 e'4\1 }
}
\score {
  <<
    \new Staff {
      \clef "treble_8"
      \ratioHarmonics
    }
    \new TabStaff { \ratioHarmonics }
  >>
}
```



String bendings can be added to tablature notation. A bending is introduced by appending \^ to the note or chord to be bent; it terminates automatically at the next note or chord. Available are the following styles: the default prints a curve with an arrow head up or down, 'hold a dashed horizontal line, 'pre-bend a vertical line with an arrow head, and 'pre-bend-hold a vertical line with an arrow head continued by a dashed line.

```
bend-styles = {
  <>^"default"
  f'4\^ g'4\^ f'2

  <>^"'hold"
  \grace f'4\^ g'1\bendHold \^ g'1

  <>^"'pre-bend"
  \grace f'4\preBend \^ g'1\bendHold \^ g'1

  <>^"'pre-bend-hold"
  \grace f'4\preBendHold \^ g'1\bendHold \^ g'1\^ f'

  \bar "|."
}

\score {
  \new StaffGroup
  <<
    \new Staff {
      \override TextScript.font-size = -2
      \clef "G_8"
      \bend-styles
    }
```

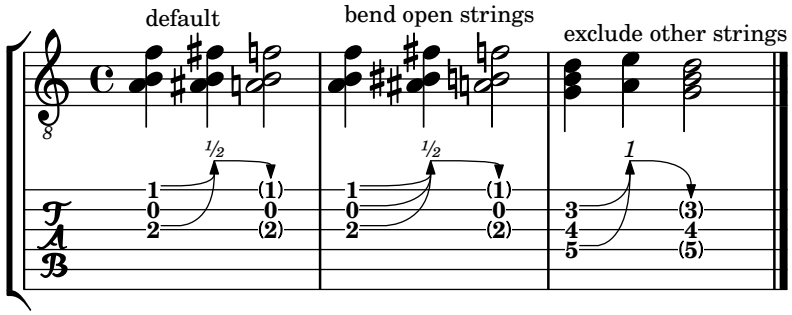
```
    \new TabStaff \bend-styles
  >>
  \layout {
    \context {
      \Voice
      \omit StringNumber
    }
    \context {
      \TabStaff
      minimumFret = #5
    }
    \context {
      \TabVoice
      \consists Bend_spanner_engraver
    }
  }
}
```



Open strings are usually not bent. To have them bent as well set the property `bend-me` to `#t`. To exclude other notes from being bent set it to `#f`.

```
mus = {
  <>^"default"
  <a b f'>4\^
  <ais b fis'>\^
  <a b f'>2

  <>^"bend open strings"
  <a \tweak bend-me ##t b f'>4\^
  <ais \tweak bend-me ##t bis fis'>\^
  <a b f'>2

  <>^"exclude other strings"
  <g \tweak bend-me ##f b\3 d'>4\^
  <a e'\2 >\^
  <g \tweak bend-me ##f b\3 d'>2

  \bar "|."
}

\score {
  \new StaffGroup
  <<
    \new Staff {
```

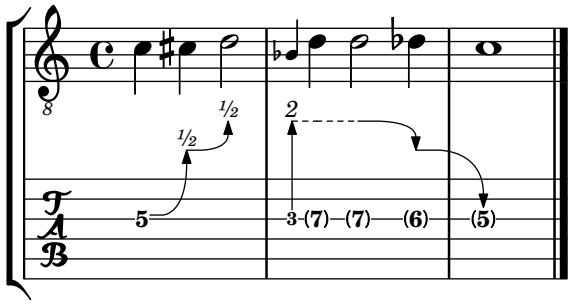
```
      \override TextScript.font-size = -2
      \clef "G_8"
      \mus
    }
    \new TabStaff \mus
  >>
  \layout {
    \context {
      \Voice
      \omit StringNumber
    }
    \context {
      \TabVoice
      \consists Bend_spanner_engraver
    }
  }
}
```



For consecutive bendings the starting bend may need to have an appropriate setting for `details.successive-level`. For convenience there is the function `bendStartLevel`, taking an integer.

```
printNext = -\tweak details.target-visibility ##t \etc

mus = {
  c'4\3\^ cis'\3 \^ d'2\3

  \grace bes4\3\preBendHold \bendStartLevel 2 \printNext \^
  d'4\3\bendHold \^ d'2\3\^ des'4\3 \^ c'1\3

  \bar "|."
}

\score {
  \new StaffGroup
  <<
    \new Staff {
      \override TextScript.font-size = -2
      \clef "G_8"
      \mus
    }
    \new TabStaff \mus
  >>
```

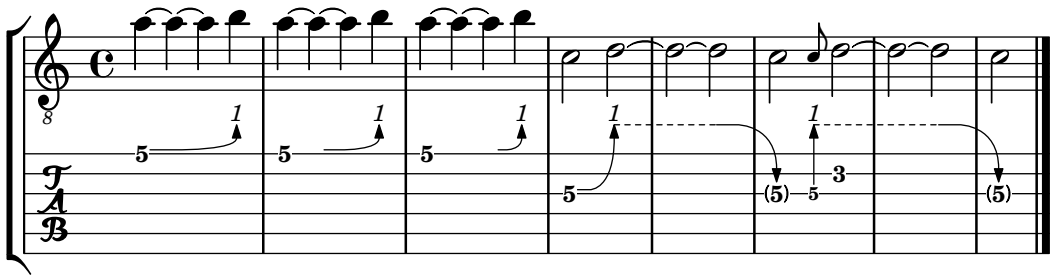
```
  \layout {
    \context {
      \Voice
      \omit StringNumber
    }
    \context {
      \TabVoice
      \consists Bend_spanner_engraver
    }
  }
}
```



Per default the BendSpanner ends at the following note or chord even if it is tied to the starting note or chord. A single NoteColumn may be skipped by using \skipNC. A group of NoteColumns can be skipped by using \skipNCs at the beginning and \endSkipNCs at the end.

```
bends-with-ties-and-skips = {
  a'4~\^ \skipNC a'4~ \skipNC a'4 b'4
  a'4~ a'4~\^ \skipNC a'4 b'4
  a'4~ a'4~ a'4\^ b'4
  c'2\^ d'~ \bendHold \^ \skipNC d'~ d'\^ c'
  \grace { c'8-\preBendHold \^ }
  \skipNCs d'2~ d'2~ \endSkipNCs d'\^ c'2
  \bar "|."
}

\score {
  \new StaffGroup
  <<
    \new Staff {
      \clef "G_8"
      \bends-with-ties-and-skips
    }
    \new TabVoice \bends-with-ties-and-skips
  >>
  \layout {
    \context {
      \Voice
      \omit StringNumber
    }
    \context {
      \TabStaff
      minimumFret = #3
      restrainOpenStrings = ##t
```

```
    }
    \context {
      \TabVoice
      \consists Bend_spanner_engraver
    }
  }
}
```



Predefined commands

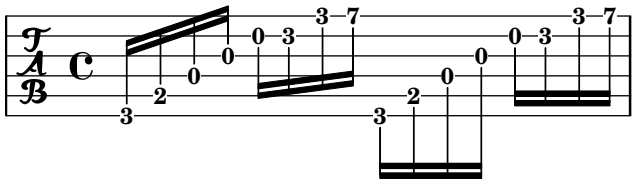
\skipNCs, \skipNC, \endSkipNCs.

Selected Snippets

Stem and beam behavior in tablature

The direction of stems is controlled the same way in tablature as in traditional notation. Beams can be made horizontal, as shown in this example.

```
\new TabStaff {
  \relative c {
    \tabFullNotation
    g16 b d g b d g b
    \stemDown
    \override Beam.concaveness = #10000
    g,,16 b d g b d g b
  }
}
```

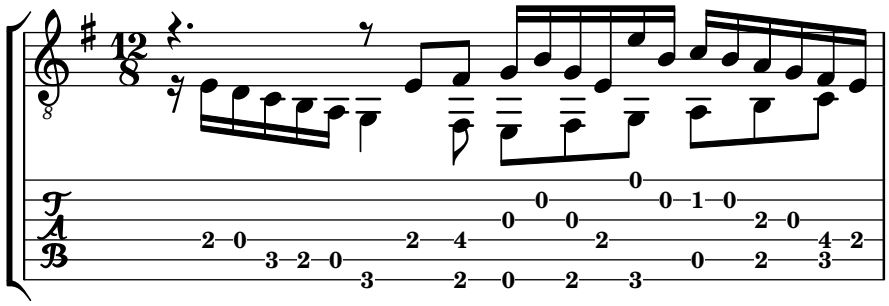


Polyphony in tablature

Polyphony is created the same way in a TabStaff as in a regular staff.

```
upper = \relative c' {
  \time 12/8
  \key e \minor
  \voiceOne
  r4. r8 e, fis g16 b g e e' b c b a g fis e
}

lower = \relative c {
  \key e \minor
```

```
  \voiceTwo
  r16 e d c b a g4 fis8 e fis g a b c
}

\score {
  <<
    \new StaffGroup = "tab with traditional" <<
      \new Staff = "guitar traditional" <<
        \clef "treble_8"
        \new Voice = "upper" \upper
        \new Voice = "lower" \lower
      >>
      \new TabStaff = "guitar tab" <<
        \new TabVoice = "upper" \upper
        \new TabVoice = "lower" \lower
      >>
    >>
  >>
}
```



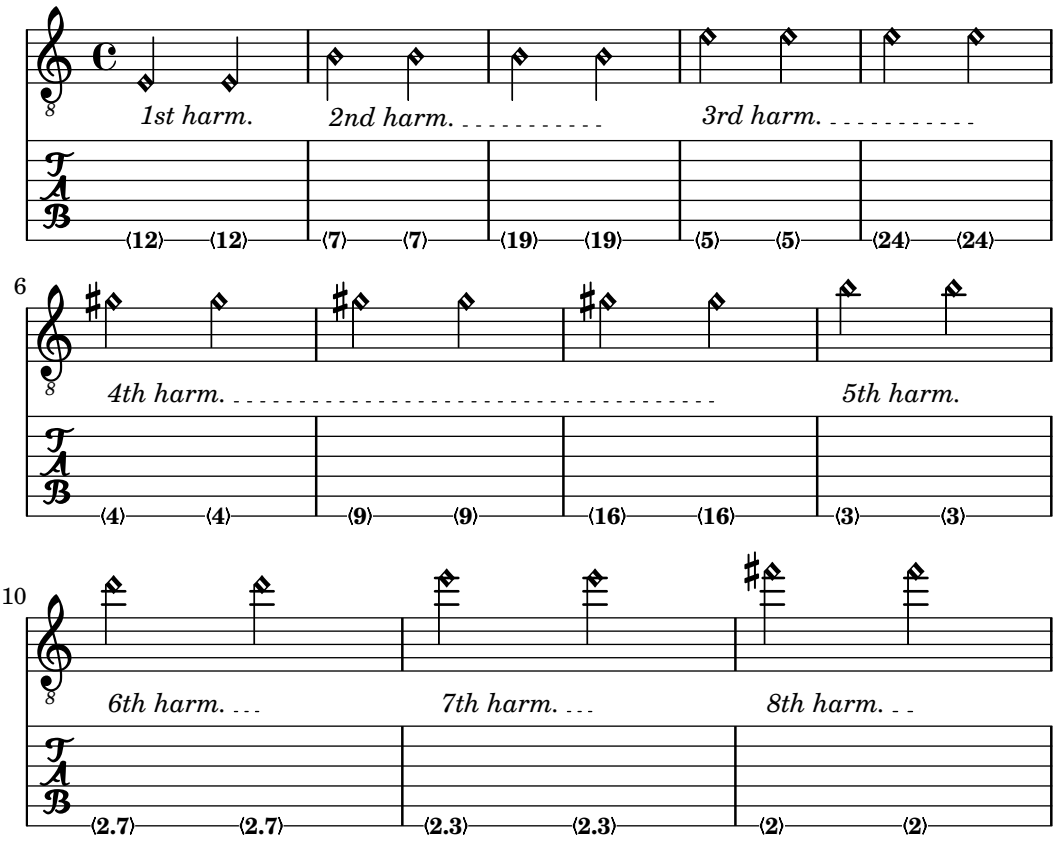
Open string harmonics in tablature

This snippet demonstrates open-string harmonics.

```
openStringHarmonics = {
  \textSpannerDown
  \override TextSpanner.staff-padding = #3
  \override TextSpanner.dash-fraction = #0.3
  \override TextSpanner.dash-period = #1

  %first harmonic
  \override TextSpanner.bound-details.left.text =
    \markup\small "1st harm. "
  \harmonicByFret #12 e,2\6\startTextSpan
  \harmonicByRatio #1/2 e,\6\stopTextSpan

  %second harmonic
  \override TextSpanner.bound-details.left.text =
    \markup\small "2nd harm. "
  \harmonicByFret #7 e,\6\startTextSpan
  \harmonicByRatio #1/3 e,\6
  \harmonicByFret #19 e,\6
  \harmonicByRatio #2/3 e,\6\stopTextSpan
  %\harmonicByFret #19 < e,\6 a,\5 d\4 >
```

```
  %\harmonicByRatio #2/3 < e,\6 a,\5 d\4 >

  %third harmonic
  \override TextSpanner.bound-details.left.text =
    \markup\small "3rd harm. "
  \harmonicByFret #5 e,\6\startTextSpan
  \harmonicByRatio #1/4 e,\6
  \harmonicByFret #24 e,\6
  \harmonicByRatio #3/4 e,\6\stopTextSpan
  \break

  %fourth harmonic
  \override TextSpanner.bound-details.left.text =
    \markup\small "4th harm. "
  \harmonicByFret #4 e,\6\startTextSpan
  \harmonicByRatio #1/5 e,\6
  \harmonicByFret #9 e,\6
  \harmonicByRatio #2/5 e,\6
  \harmonicByFret #16 e,\6
  \harmonicByRatio #3/5 e,\6\stopTextSpan

  %fifth harmonic
  \override TextSpanner.bound-details.left.text =
    \markup\small "5th harm. "
  \harmonicByFret #3 e,\6\startTextSpan
  \harmonicByRatio #1/6 e,\6\stopTextSpan
  \break

  %sixth harmonic
  \override TextSpanner.bound-details.left.text =
    \markup\small "6th harm. "
  \harmonicByFret #2.7 e,\6\startTextSpan
  \harmonicByRatio #1/7 e,\6\stopTextSpan

  %seventh harmonic
  \override TextSpanner.bound-details.left.text =
    \markup\small "7th harm. "
  \harmonicByFret #2.3 e,\6\startTextSpan
  \harmonicByRatio #1/8 e,\6\stopTextSpan

  %eighth harmonic
  \override TextSpanner.bound-details.left.text =
    \markup\small "8th harm. "
  \harmonicByFret #2 e,\6\startTextSpan
  \harmonicByRatio #1/9 e,\6\stopTextSpan
}

\score {
  <<
    \new Staff
    \with { \omit StringNumber } {
      \new Voice {
```

```
        \clef "treble_8"
        \openStringHarmonics
      }
    }
    \new TabStaff {
      \new TabVoice {
        \openStringHarmonics
      }
    }
  >>
}
```

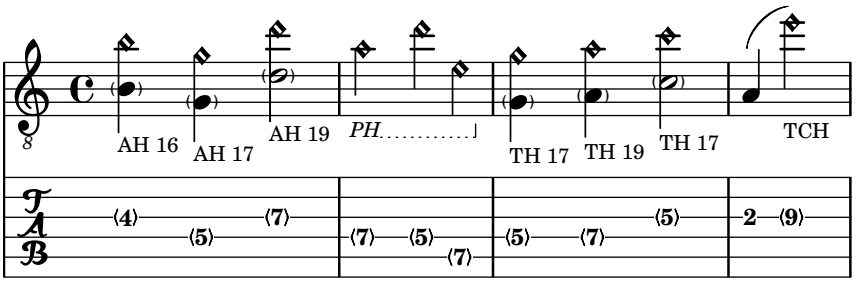


Fretted-string harmonics in tablature

Demonstrates fretted-string harmonics in tablature

```
pinchedHarmonics = {
  \textSpannerDown
  \override TextSpanner.bound-details.left.text =
    \markup {\halign #-0.5 \teeny "PH" }
    \override TextSpanner.style =
      #'dashed-line
  \override TextSpanner.dash-period = #0.6
  \override TextSpanner.bound-details.right.attach-dir = #1
  \override TextSpanner.bound-details.right.text =
    \markup { \draw-line #'(0 . 1) }
  \override TextSpanner.bound-details.right.padding = #-0.5
}
```

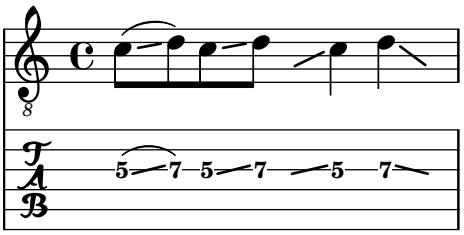
```
harmonics = {
  %artificial harmonics (AH)
  \textLengthOn
  <\parenthesize b b'\harmonic>4_\markup { \teeny "AH 16" }
  <\parenthesize g g'\harmonic>4_\markup { \teeny "AH 17" }
  <\parenthesize d' d''\harmonic>2_\markup { \teeny "AH 19" }
  %pinched harmonics (PH)
  \pinchedHarmonics
  <a'\harmonic>2\startTextSpan
  <d''\harmonic>4
  <e'\harmonic>4\stopTextSpan
  %tapped harmonics (TH)
  <\parenthesize g\4 g'\harmonic>4_\markup { \teeny "TH 17" }
  <\parenthesize a\4 a'\harmonic>4_\markup { \teeny "TH 19" }
  <\parenthesize c'\3 c''\harmonic>2_\markup { \teeny "TH 17" }
  %touch harmonics (TCH)
  a4( <e''\harmonic>2. )_\markup { \teeny "TCH" }
}

frettedStrings = {
  %artificial harmonics (AH)
  \harmonicByFret #4 g4\3
  \harmonicByFret #5 d4\4
  \harmonicByFret #7 g2\3
  %pinched harmonics (PH)
  \harmonicByFret #7 d2\4
  \harmonicByFret #5 d4\4
  \harmonicByFret #7 a4\5
  %tapped harmonics (TH)
  \harmonicByFret #5 d4\4
  \harmonicByFret #7 d4\4
  \harmonicByFret #5 g2\3
  %touch harmonics (TCH)
  a4 \harmonicByFret #9 g2.\3
}

\score {
  <<
    \new Staff
    \with { \omit StringNumber } {
      \new Voice {
        \clef "treble_8"
        \harmonics
      }
    }
    \new TabStaff {
      \new TabVoice {
        \frettedStrings
      }
    }
  >>
}
```



Slides in tablature

Slides can be typeset in both `Staff` and `TabStaff` contexts:

```
slides = {
  c'8\3(\glissando d'8\3)
  c'8\3\glissando d'8\3
  \hideNotes
  \grace { g16\glissando }
  \unHideNotes
  c'4\3
  \afterGrace d'4\3\glissando {
  \stemDown \hideNotes
  g16 }
  \unHideNotes
}

\score {
  <<
    \new Staff { \clef "treble_8" \slides }
    \new TabStaff { \slides }
  >>
  \layout {
    \context {
      \Score
      \override Glissando.minimum-length = #4
      \override Glissando.springs-and-rods =
                          #ly:spanner::set-spacing-rods
      \override Glissando.thickness = #2
      \omit StringNumber
      % or:
      %\override StringNumber.stencil = ##f
    }
  }
}
```

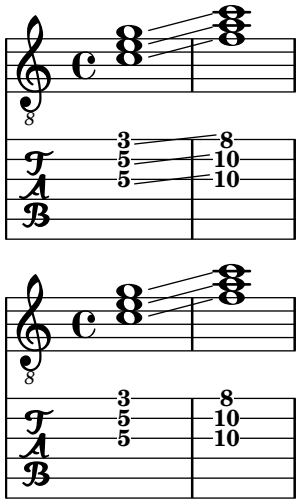


Chord glissando in tablature

Slides for chords are indicated by default in both `Staff` and `TabStaff`.

String numbers are necessary for `TabStaff` because automatic string calculations are different for chords and for single notes.

```
myMusic = \relative c' {
  <c e g>1 \glissando <f a c>
}

\score {
  <<
    \new Staff {
      \clef "treble_8"
      \myMusic
    }
    \new TabStaff \myMusic
  >>
}

\score {
  <<
    \new Staff {
      \clef "treble_8"
      \myMusic
    }
    \new TabStaff \with { \override Glissando.style = #'none } {
      \myMusic
    }
  >>
}
```

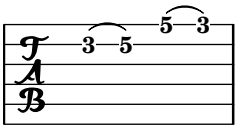


Hammer on and pull off

Hammer-on and pull-off can be obtained using slurs.

```
\new TabStaff {
  \relative c' {
    d4( e\2)
    a( g)
```

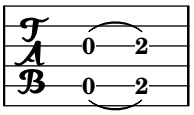
```
  }
}
```



Hammer on and pull off using voices

The arc of hammer-on and pull-off is upwards in voices one and three and downwards in voices two and four:

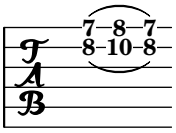
```
\new TabStaff {
  \relative c' {
    << { \voiceOne g2( a) }
    \\ { \voiceTwo a,( b) }
    >> \oneVoice
  }
}
```



Hammer on and pull off using chords

When using hammer-on or pull-off with chorded notes, only a single arc is drawn. However "double arcs" are possible by setting the `doubleSlurs` property to `#t`.

```
\new TabStaff {
  \relative c' {
    % chord hammer-on and pull-off
    \set doubleSlurs = ##t
    <g' b>8( <a c> <g b>)
  }
}
```



See also

Notation Reference: [Chord repetition], page 194, [Glissando], page 158, [Harmonics], page 391, [Stems], page 267, [Written-out repeats], page 169.

Snippets: Section "Fretted strings" in *Snippets*.

Internals Reference: Section "TabNoteHead" in *Internals Reference*, Section "TabStaff" in *Internals Reference*, Section "TabVoice" in *Internals Reference*, Section "Beam" in *Internals Reference*.

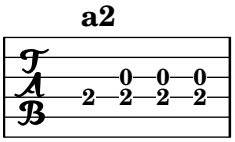
Known issues and warnings

Chords are not handled in a special way, and hence the automatic string selector may easily select the same string for two notes in a chord.

In order to handle `\partCombine`, a `TabStaff` must use specially-created voices:

```
melodia = \partCombine { e4 g g g } { e4 e e e }
```

```
<<
  \new TabStaff <<
    \new TabVoice = "one" s1
    \new TabVoice = "two" s1
    \new TabVoice = "shared" s1
    \new TabVoice = "solo" s1
    { \melodia }
  >>
>>
```



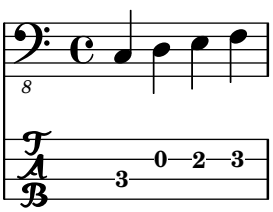
Guitar special effects are limited to harmonics and slides.

Custom tablatures

LilyPond tablature automatically calculates the fret for a note based on the string to which the note is assigned. In order to do this, the tuning of the strings must be specified. The tuning of the strings is given in the `stringTunings` property.

LilyPond comes with predefined string tunings for banjo, mandolin, guitar, bass guitar, ukulele, violin, viola, cello, and double bass. LilyPond automatically sets the correct transposition for predefined tunings. The following example is for bass guitar, which sounds an octave lower than written.

```
<<
  \new Voice \with {
    \omit StringNumber
  } {
    \clef "bass_8"
    \relative {
      c,4 d e f
    }
  }
  \new TabStaff \with {
    stringTunings = #bass-tuning
  } {
    \relative {
      c,4 d e f
    }
  }
>>
```

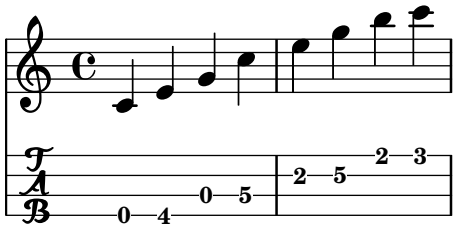


The default string tuning is `guitar-tuning`, which is the standard EADGBE tuning. Some other predefined tunings are `guitar-open-g-tuning`, `mandolin-tuning` and `banjo-open-g-tuning`. The predefined string tunings are found in `ly/string-tunings-init.ly`.

Any desired string tuning can be created. The `\stringTuning` function can be used to define a string tuning which can be used to set `stringTunings` for the current context.

Its argument is a chord construct defining the pitches of each string in the tuning. The chord construct must be in absolute octave mode, see [Absolute octave entry], page 1. The string with the highest number (generally the lowest string) must come first in the chord. For example, we can define a string tuning for a four-string instrument with pitches of `a''`, `d''`, `g'`, and `c'`:

```
mynotes = {
  c'4 e' g' c'' |
  e''4 g'' b'' c'''
}

<<
  \new Staff {
    \clef treble
    \mynotes
  }
  \new TabStaff {
    \set Staff.stringTunings = \stringTuning <c' g' d'' a''>
    \mynotes
  }
>>
```

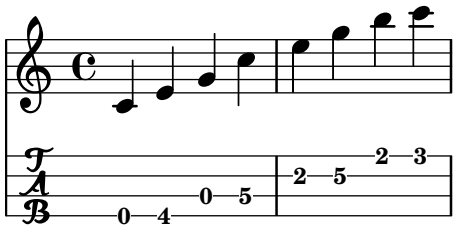


The `stringTunings` property is also used by `FretBoards` to calculate automatic fret diagrams.

String tunings are used as part of the hash key for predefined fret diagrams (see [Predefined fret diagrams], page 426).

The previous example could also be written as follows:

```
custom-tuning = \stringTuning <c' g' d'' a''>

mynotes = {
  c'4 e' g' c'' |
  e''4 g'' b'' c'''
}

<<
  \new Staff {
    \clef treble
    \mynotes
  }
  \new TabStaff {
    \set TabStaff.stringTunings = #custom-tuning
    \mynotes
  }
>>
```



Internally, a string tuning is a Scheme list of string pitches, one for each string, ordered by string number from 1 to N, where string 1 is at the top of the tablature staff and string N is at the bottom. This ordinarily results in ordering from highest pitch to lowest pitch, but some instruments (e.g., ukulele) do not have strings ordered by pitch.

A string pitch in a string tuning list is a LilyPond pitch object. Pitch objects are created with the Scheme function `ly:make-pitch` (see Section "Scheme functions" in *Internals Reference*).

`\stringTuning` creates such an object from chord input.

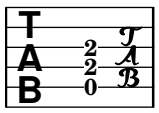
LilyPond automatically calculates the number of lines in the `TabStaff` and the number of strings in an automatically calculated `FretBoard` as the number of elements in `stringTunings`.

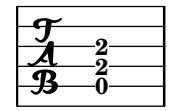
To let all `TabStaff` contexts use the same custom tuning by default, you can use

```
\layout {
  \context {
    \TabStaff
    stringTunings = \stringTuning <c' g' d'' a''>
  }
}
```

A modern tab clef can also be used.

```
\new TabStaff {
  \clef moderntab
  <a, e a>1
  \break
  \clef tab
  <a, e a>1
}
```



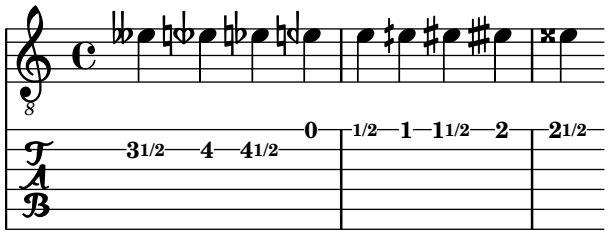


The modern tab clef supports tablatures from 4 to 7 strings.

`TabStaff` may support microtones like quarter tones, which can be played using bendings. `supportNonIntegerFret = ##t` needs to be set in `Score` context. However, microtones are not supported in `FretBoards`.

```
\layout {
  \context {
    \Score
    supportNonIntegerFret = ##t
  }
}
```

```
custom-tuning = \stringTuning <e, a, d ges beh eeh'>

mus = \relative {
  eeses'4
  eeseh
  ees
  eeh
  e
  eih
  eis
  eisih
  eisis
}

<<
  \new Staff << \clef "G_8" \mus >>
  \new TabStaff \with { stringTunings = \custom-tuning } \mus
>>
```



See also

Notation Reference: [Absolute octave entry], page 1, [Predefined fret diagrams], page 426.

Installed Files: `ly/string-tunings-init.ly`, `scm/tablature.scm`.

Snippets: Section "Fretted strings" in *Snippets*.

Internals Reference: Section "Tab_note_heads_engraver" in *Internals Reference*, Section "Scheme functions" in *Internals Reference*.

Known issues and warnings

Automatic tablature calculations do not work properly in most cases for instruments where string pitches do not vary monotonically with string number, such as ukuleles.

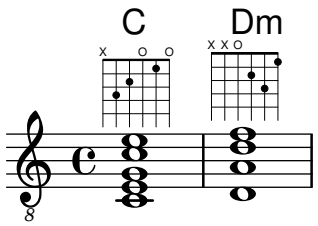
Fret diagram markups

Fret diagrams can be added to music as a markup to the desired note. The markup contains information about the desired fret diagram. There are three different fret diagram markup interfaces: standard, terse, and verbose. The three interfaces produce equivalent markups, but have varying amounts of information in the markup string. Details about the syntax of the different markup strings used to define fret diagrams are found at Section A.12.6 [Instrument-specific markup], page 802.

The standard fret diagram markup string indicates the string number and the fret number for each dot to be placed on the string. In addition, open and unplayed (muted) strings can be indicated.

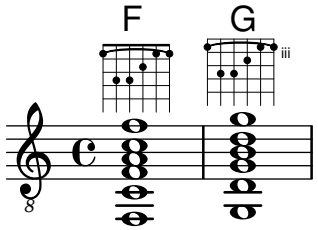
```
<<
  \new ChordNames {
```

```
    \chordmode {
      c1 d:m
    }
  }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1^\markup {
      \fret-diagram "6-x;5-3;4-2;3-o;2-1;1-o;"
    }
    <d a d' f'>1^\markup {
      \fret-diagram "6-x;5-x;4-o;3-2;2-3;1-1;"
    }
  }
>>
```



Barre indications can be added to the diagram from the fret diagram markup string.

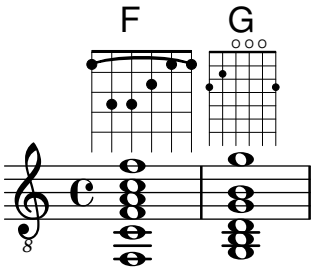
```
<<
  \new ChordNames {
     \chordmode {
       f1 g
     }
  }
  \new Staff {
    \clef "treble_8"
    <f, c f a c' f'>1^\markup {
      \fret-diagram "c:6-1-1;6-1;5-3;4-3;3-2;2-1;1-1;"
    }
    <g, d g b d' g'>1^\markup {
      \fret-diagram "c:6-1-3;6-3;5-5;4-5;3-4;2-3;1-3;"
    }
  }
>>
```



The size of the fret diagram, and the number of frets in the diagram can be changed in the fret diagram markup string.

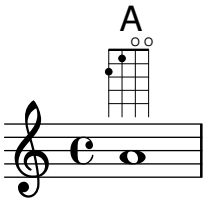
```
<<
  \new ChordNames {
     \chordmode {
```

```
        f1 g
      }
    }
    \new Staff {
      \clef "treble_8"
      <f, c f a c' f'>1^\markup {
        \fret-diagram "s:1.5;c:6-1-1;6-1;5-3;4-3;3-2;2-1;1-1;"
      }
      <g, b, d g b g'>1^\markup {
        \fret-diagram "h:6;6-3;5-2;4-o;3-o;2-o;1-3;"
      }
    }
  >>
```



The number of strings in a fret diagram can be changed to accommodate different instruments such as banjos and ukuleles with the fret diagram markup string.

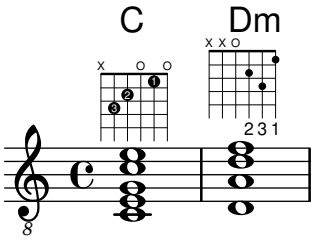
```
  <<
    \new ChordNames {
      \chordmode {
        a1
      }
    }
    \new Staff {
      % An 'A' chord for ukulele
      a'1^\markup {
        \fret-diagram "w:4;4-2-2;3-1-1;2-o;1-o;"
      }
    }
  >>
```



Fingering indications can be added, and the location of fingering labels can be controlled by the fret diagram markup string.

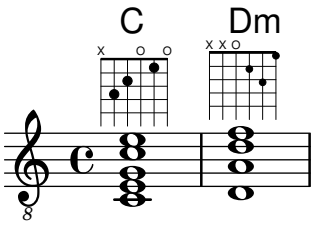
```
  <<
    \new ChordNames {
      \chordmode {
        c1 d:m
      }
```

```
  }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1^\markup {
      \fret-diagram "f:1;6-x;5-3-3;4-2-2;3-o;2-1-1;1-o;"
    }
    <d a d' f'>1^\markup {
      \fret-diagram "f:2;6-x;5-x;4-o;3-2-2;2-3-3;1-1-1;"
    }
  }
>>
```



Dot radius and dot position can be controlled with the fret diagram markup string.

```
<<
  \new ChordNames {
    \chordmode {
      c1 d:m
    }
  }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1^\markup {
      \fret-diagram "d:0.35;6-x;5-3;4-2;3-o;2-1;1-o;"
    }
    <d a d' f'>1^\markup {
      \fret-diagram "p:0.2;6-x;5-x;4-o;3-2;2-3;1-1;"
    }
  }
>>
```



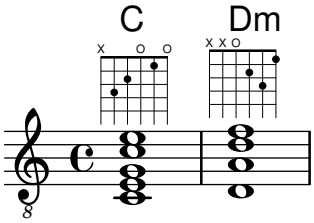
Fret-diagrams may be printed left-handed

```
\markup
  \center-column {
    "C"
    "(left-handed)"
     \override #`(fret-diagram-details . ((handedness . ,LEFT)))
     \fret-diagram "6-x;5-3-3;4-2-2;3-o;2-1;1-o;"
  }
```

C
(left-handed)

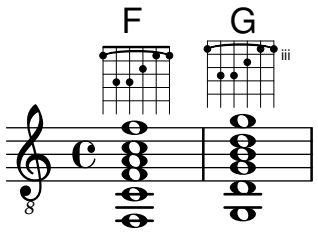
The \fret-diagram-terse markup string omits string numbers; the string number is implied by the presence of semicolons. There is one semicolon for each string in the diagram. The first semicolon corresponds to the highest string number and the last semicolon corresponds to the first string. Mute strings, open strings, and fret numbers can be indicated.

```
<<
  \new ChordNames {
    \chordmode {
      c1 d:m
    }
  }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1^\markup {
      \fret-diagram-terse "x;3;2;o;1;o;"
    }
    <d a d' f'>1^\markup {
      \fret-diagram-terse "x;x;o;2;3;1;"
    }
  }
>>
```



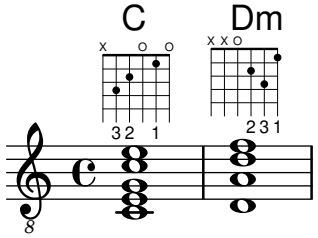
Barre indicators can be included in the \fret-diagram-terse markup string.

```
<<
  \new ChordNames {
    \chordmode {
      f1 g
    }
  }
  \new Staff {
    \clef "treble_8"
    <f, c f a c' f'>1^\markup {
      \fret-diagram-terse "1-(;3;3;2;1;1-);"
    }
    <g, d g b d' g'>1^\markup {
      \fret-diagram-terse "3-(;5;5;4;3;3-);"
    }
  }
>>
```



Fingering indications can be included in the \fret-diagram-terse markup string.

```
<<
  \new ChordNames {
    \chordmode {
      c1 d:m
    }
  }
  \new Staff {
    \override Voice.TextScript.fret-diagram-details.finger-code =
      #'below-string
    \clef "treble_8"
    <c e g c' e'>1^\markup {
      \fret-diagram-terse "x;3-3;2-2;o;1-1;o;"
    }
    <d a d' f'>1^\markup {
      \fret-diagram-terse "x;x;o;2-2;3-3;1-1;"
    }
  }
>>
```



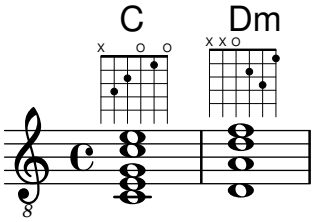
Other fret diagram properties must be adjusted using \override when using the \fret-diagram-terse markup.

Only one indication per string can be included in a \fret-diagram-terse markup. To have multiple indications per string use a fret diagram or \fret-diagram-verbose markup.

The \fret-diagram-verbose markup string is in the format of a Scheme list. Each element of the list indicates an item to be placed on the fret diagram.

```
<<
    \new ChordNames {
      \chordmode {
        c1 d:m
      }
    }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1^\markup {
      \fret-diagram-verbose #'(
        (mute 6)
```

```
          (place-fret 5 3)
          (place-fret 4 2)
          (open 3)
          (place-fret 2 1)
          (open 1)
        )
      }
      <d a d' f'>1^\markup {
        \fret-diagram-verbose #'(
          (mute 6)
          (mute 5)
          (open 4)
          (place-fret 3 2)
          (place-fret 2 3)
          (place-fret 1 1)
        )
      }
    }
>>
```



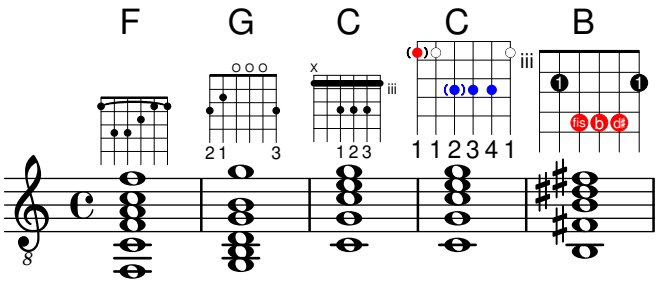
Fingering indications and barres can be included in a `\fret-diagram-verbose` markup string. Unique to the `\fret-diagram-verbose` interface is a capo indication that can be placed on the fret diagram. The capo indication is a thick bar that covers all strings. The fret with the capo will be the lowest fret in the fret diagram.

Fingering indication dots can be colored as well as parenthesized; the parenthesis's color can also be altered independently.

Markups can be placed into the dots as well.

```
<<
    \new ChordNames {
      \chordmode {
        f1 g c c b
      }
    }
  \new Staff {
    \clef "treble_8"
    \override Voice.TextScript
      .fret-diagram-details.finger-code = #'below-string
    <f, c f a c' f'>1^\markup {
      \fret-diagram-verbose #'(
        (place-fret 6 1)
        (place-fret 5 3)
        (place-fret 4 3)
        (place-fret 3 2)
        (place-fret 2 1)
        (place-fret 1 1)
```

```
        (barre 6 1 1)
      )
    }
    <g, b, d g b g'>1^\markup {
      \fret-diagram-verbose #'(
        (place-fret 6 3 2)
        (place-fret 5 2 1)
        (open 4)
        (open 3)
        (open 2)
        (place-fret 1 3 3)
      )
    }
    <c g c' e' g'>1^\markup {
      \fret-diagram-verbose #'(
        (capo 3)
        (mute 6)
        (place-fret 4 5 1)
        (place-fret 3 5 2)
        (place-fret 2 5 3)
      )
    }
    \override Voice.TextScript.size = 1.4
    <c g c' e' g'>1^\markup {
      \fret-diagram-verbose #'(
        (place-fret 6 3 1 red parenthesized default-paren-color)
        (place-fret 5 3 1 inverted)
        (place-fret 4 5 2 blue parenthesized)
        (place-fret 3 5 3 blue)
        (place-fret 2 5 4 blue)
        (place-fret 1 3 1 inverted)
      )
    }
    \override Voice.TextScript.size = 1.5
    <b, fis b dis' fis'>1^\markup
      \override #'(fret-diagram-details . ((finger-code . in-dot)))
      \fret-diagram-verbose #`(
        (place-fret 5 2 1)
        (place-fret 4 4 "fis" red)
        (place-fret 3 4 "b" red)
        (place-fret
          2 4
          ,#{ \markup
                \concat {
                  \vcenter "d"
                  \fontsize #-5
                  \musicglyph "accidentals.sharp"} #}
          red)
        (place-fret 1 2 1)
      )
  }
>>
```



All other fret diagram properties must be adjusted using `\override` when using the `\fret-diagram-verbose` markup.

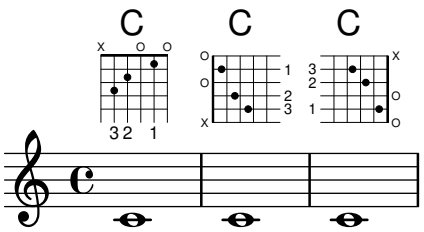
The graphical layout of a fret diagram can be customized according to user preference through the properties of the `fret-diagram-interface`. Details are found at Section "fret-diagram-interface" in *Internals Reference*. For a fret diagram markup, the interface properties belong to `Voice.TextScript`.

Selected Snippets

Changing fret orientations

Fret diagrams can be oriented in three ways. By default the top string or fret in the different orientations will be aligned.

```
\include "predefined-guitar-fretboards.ly"

<<
  \chords {
    c1
    c1
    c1
  }
  \new FretBoards {
    \chordmode {
      c1
      \override FretBoard.fret-diagram-details.orientation =
        #'landscape
      c1
      \override FretBoard.fret-diagram-details.orientation =
        #'opposing-landscape
      c1
    }
  }
  \new Voice {
    c'1
    c'1
    c'
  }
>>
```

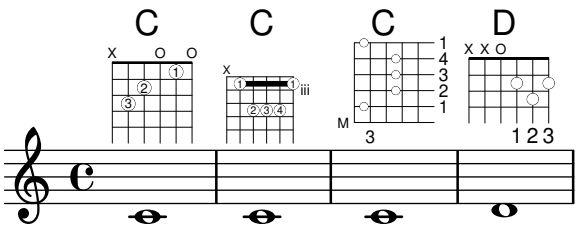


Customizing markup fret diagrams

Fret diagram properties can be set through `'fret-diagram-details`. For markup fret diagrams, overrides can be applied to the `Voice.TextScript` object or directly to the markup.

```
<<
  \chords { c1 | c | c | d }

  \new Voice = "mel" {
    \textLengthOn
    % Set global properties of fret diagram
    \override TextScript.size = #'1.2
    \override TextScript.fret-diagram-details.finger-code = #'in-dot
    \override TextScript.fret-diagram-details.dot-color = #'white

    %% C major for guitar, no barre, using defaults
       % terse style
    c'1^\markup { \fret-diagram-terse "x;3-3;2-2;o;1-1;o;" }

    %% C major for guitar, barred on third fret
       % verbose style
       % size 1.0
       % roman fret label, finger labels below string, straight barre
    c'1^\markup {
      % standard size
      \override #'(size . 1.0) {
        \override #'(fret-diagram-details . (
                     (number-type . roman-lower)
                     (finger-code . in-dot)
                     (barre-type . straight))) {
          \fret-diagram-verbose #'((mute 6)
                                   (place-fret 5 3 1)
                                   (place-fret 4 5 2)
                                   (place-fret 3 5 3)
                                   (place-fret 2 5 4)
                                   (place-fret 1 3 1)
                                   (barre 5 1 3))
      }
      }
    }

    %% C major for guitar, barred on third fret
       % verbose style
       % landscape orientation, arabic numbers, M for mute string
       % no barre, fret label down or left, small mute label font
    c'1^\markup {
```

```
      \override #'(fret-diagram-details . (
                   (finger-code . below-string)
                   (number-type . arabic)
                   (label-dir . -1)
                   (mute-string . "M")
                   (orientation . landscape)
                   (barre-type . none)
                   (xo-font-magnification . 0.4)
                   (xo-padding . 0.3))) {
        \fret-diagram-verbose #'((mute 6)
                                 (place-fret 5 3 1)
                                 (place-fret 4 5 2)
                                 (place-fret 3 5 3)
                                 (place-fret 2 5 4)
                                 (place-fret 1 3 1)
                                 (barre 5 1 3))
      }
    }

    %% simple D chord
       % terse style
       % larger dots, centered dots, fewer frets
       % label below string
    d'1^\markup {
      \override #'(fret-diagram-details . (
                   (finger-code . below-string)
                   (dot-radius . 0.35)
                   (dot-position . 0.5)
                   (fret-count . 3))) {
        \fret-diagram-terse "x;x;o;2-1;3-2;2-3;"
      }
    }
  }
>>
```



See also

Notation Reference: Section A.12.6 [Instrument-specific markup], page 802.

Snippets: Section “Fretted strings” in *Snippets*.

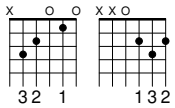
Internals Reference: Section “fret-diagram-interface” in *Internals Reference*.

Predefined fret diagrams

Fret diagrams can be displayed using the `FretBoards` context. By default, the `FretBoards` context will display fret diagrams that are stored in a lookup table:

```
\include "predefined-guitar-fretboards.ly"
```

```
\new FretBoards {
  \chordmode {
    c1 d
  }
}
```

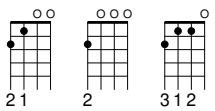


The default predefined fret diagrams are contained in the file `predefined-guitar-fretboards.ly`. Fret diagrams are stored based on the pitches of a chord and the value of `stringTunings` that is currently in use. `predefined-guitar-fretboards.ly` contains predefined fret diagrams only for `guitar-tuning`. Predefined fret diagrams can be added for other instruments or other tunings by following the examples found in `predefined-guitar-fretboards.ly`.

Fret diagrams for the ukulele are contained in the file `predefined-ukulele-fretboards.ly`.

```
\include "predefined-ukulele-fretboards.ly"

myChords = \chordmode { a1 a:m a:aug }

\new ChordNames {
  \myChords
}

\new FretBoards {
  \set Staff.stringTunings = #ukulele-tuning
  \myChords
}
```

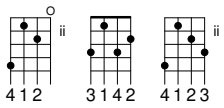
A Am A+



Fret diagrams for the mandolin are contained in the file `predefined-mandolin-fretboards.ly`.

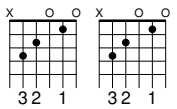
```
\include "predefined-mandolin-fretboards.ly"

myChords = \chordmode { c1 c:m7.5- c:aug }

\new ChordNames {
  \myChords
}

\new FretBoards {
  \set Staff.stringTunings = #mandolin-tuning
  \myChords
}
```

C C$^{\emptyset}$ C+



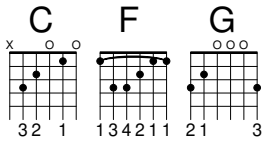
Chord pitches can be entered either as simultaneous music or using chord mode (see [Chord mode overview], page 467).

```
\include "predefined-guitar-fretboards.ly"
\new FretBoards {
  \chordmode { c1 }
  <c' e' g'>1
}
```



It is common that both chord names and fret diagrams are displayed together. This is achieved by putting a `ChordNames` context in parallel with a `FretBoards` context and giving both contexts the same music.

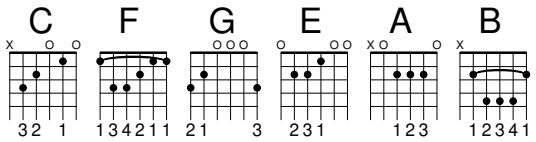
```
\include "predefined-guitar-fretboards.ly"
mychords = \chordmode {
  c1 f g
}

<<
  \new ChordNames {
    \mychords
  }
  \new FretBoards {
    \mychords
  }
>>
```



Predefined fret diagrams are transposable, as long as a diagram for the transposed chord is stored in the fret diagram table.

```
\include "predefined-guitar-fretboards.ly"
mychords = \chordmode {
  c1 f g
}

mychordlist = {
  \mychords
  \transpose c e { \mychords }
}
<<
  \new ChordNames {
    \mychordlist
  }
```

```
  \new FretBoards {
    \mychordlist
  }
>>
```

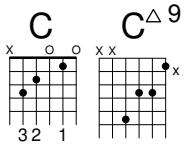


The predefined fret diagram table for guitar contains eight chords (major, minor, augmented, diminished, dominant seventh, major seventh, minor seventh, dominant ninth) for each of 17 keys.

The predefined fret diagram table for ukulele contains these chords plus an additional three chords (major sixth, suspended second, and suspended fourth).

See Section A.4 [Predefined fretboard diagrams], page 726, for a complete list of the predefined fret diagrams. If there is no entry in the table for a chord, the `FretBoards` engraver calculates a fret diagram using the automatic fret diagram functionality, see [Automatic fret diagrams], page 437.

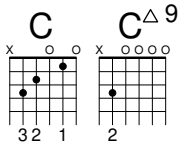
```
\include "predefined-guitar-fretboards.ly"
mychords = \chordmode {
  c1 c:maj9
}

<<
  \new ChordNames {
    \mychords
  }
  \new FretBoards {
    \mychords
  }
>>
```



Fret diagrams can be added to the fret diagram table. To add a diagram, you must specify the hash table for the diagram, the chord for the diagram, the tuning to be used, and a definition for the diagram. Normally, the hash table will be *default-fret-table*. The diagram definition can be either a `\fret-diagram-terse` definition string or a `\fret-diagram-verbose` marking list.

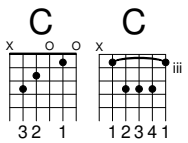
```
\include "predefined-guitar-fretboards.ly"

\storePredefinedDiagram #default-fret-table
                        \chordmode { c:maj9 }
                        #guitar-tuning
                        "x;3-2;o;o;o;o;"

mychords = \chordmode {
  c1 c:maj9
}
```

```
<<
  \new ChordNames {
    \mychords
  }
  \new FretBoards {
    \mychords
  }
>>
```



Different fret diagrams for the same chord name can be stored using different octaves of pitches. The different octave should be at least two octaves above or below the default octave, because the octaves above and below the default octave are used for transposing fretboards.

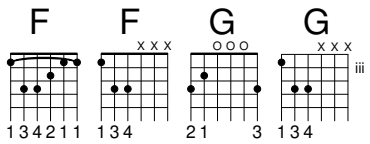
```
\include "predefined-guitar-fretboards.ly"

\storePredefinedDiagram #default-fret-table
                        \chordmode { c'' }
                        #guitar-tuning
                        #(offset-fret 2
                           (chord-shape 'bes guitar-tuning))

mychords = \chordmode {
  c1 c''
}

<<
  \new ChordNames {
    \mychords
  }
  \new FretBoards {
    \mychords
  }
>>
```



In addition to fret diagrams, LilyPond stores an internal list of chord shapes. The chord shapes are fret diagrams that can be shifted along the neck to different positions to provide different chords. Chord shapes can be added to the internal list and then used to define predefined fret diagrams. Because they can be moved to various positions on the neck, chord shapes will normally not contain any open strings. Like fret diagrams, chord shapes can be entered as either `\fret-diagram-terse` strings or `\fret-diagram-verbose` marking lists.

```
\include "predefined-guitar-fretboards.ly"

% Add a new chord shape
```

```
\addChordShape #'powerf #guitar-tuning "1-1;3-3;3-4;x;x;x;"

% add some new chords based on the power chord shape

\storePredefinedDiagram #default-fret-table
                        \chordmode { f'' }
                        #guitar-tuning
                        #(chord-shape 'powerf guitar-tuning)
\storePredefinedDiagram #default-fret-table
                        \chordmode { g'' }
                        #guitar-tuning
                        #(offset-fret 2
                           (chord-shape 'powerf guitar-tuning))

mychords = \chordmode {
  f1 f'' g g''
}

<<
  \new ChordNames {
    \mychords
  }
  \new FretBoards {
    \mychords
  }
>>
```



The graphical layout of a fret diagram can be customized according to user preference through the properties of the `fret-diagram-interface`. Details are found at Section "fret-diagram-interface" in *Internals Reference*. For a predefined fret diagram, the interface properties belong to `FretBoards.FretBoard`.

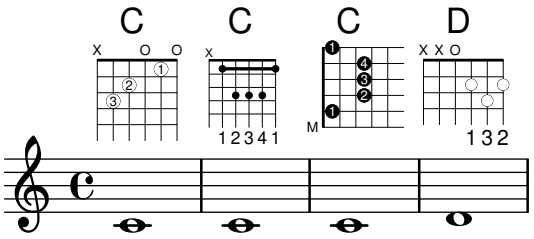
Selected Snippets

Customizing fretboard fret diagrams

Fret diagram properties can be set through `'fret-diagram-details`. For FretBoard fret diagrams, overrides are applied to the `FretBoards.FretBoard` object. Like `Voice`, `FretBoards` is a bottom level context, therefore can be omitted in property overrides.

```
\include "predefined-guitar-fretboards.ly"

\storePredefinedDiagram #default-fret-table \chordmode { c' }
                        #guitar-tuning
                        #"x;1-1-(;3-2;3-3;3-4;1-1-);"

% shorthand
oo = #(define-music-function
```

```
        (grob-path value)
        (list? scheme?)
        #{ \once \override $grob-path = #value #})

<<
  \new ChordNames {
    \chordmode { c1 | c | c | d }
  }
  \new FretBoards {
    % Set global properties of fret diagram
    \override FretBoards.FretBoard.size = #'1.2
    \override FretBoard.fret-diagram-details.finger-code = #'in-dot
    \override FretBoard.fret-diagram-details.dot-color = #'white
    \chordmode {
      c
      \oo FretBoard.size #'1.0
      \oo FretBoard.fret-diagram-details.barre-type #'straight
      \oo FretBoard.fret-diagram-details.dot-color #'black
      \oo FretBoard.fret-diagram-details.finger-code #'below-string
      c'
      \oo FretBoard.fret-diagram-details.barre-type #'none
      \oo FretBoard.fret-diagram-details.number-type #'arabic
      \oo FretBoard.fret-diagram-details.orientation #'landscape
      \oo FretBoard.fret-diagram-details.mute-string #"M"
      \oo FretBoard.fret-diagram-details.label-dir #LEFT
      \oo FretBoard.fret-diagram-details.dot-color #'black
      c'
      \oo FretBoard.fret-diagram-details.finger-code #'below-string
      \oo FretBoard.fret-diagram-details.dot-radius #0.35
      \oo FretBoard.fret-diagram-details.dot-position #0.5
      \oo FretBoard.fret-diagram-details.fret-count #3
      d
    }
  }
  \new Voice {
    c'1 | c' | c' | d'
  }
>>
```



Defining predefined fretboards for other instruments

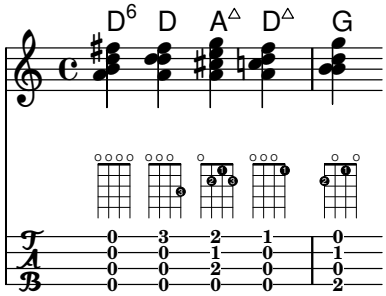
Predefined fret diagrams can be added for new instruments in addition to the standards used for guitar. This file shows how this is done by defining a new string-tuning and a few predefined fretboards for the Venezuelan *cuatro*.

This file also shows how fingerings can be included in the chords used as reference points for the chord lookup, and displayed in the fret diagram and the TabStaff, but not the music.

These fretboards are not transposable because they contain string information. This is planned to be corrected in the future.

```
% add FretBoards for the Cuatro
%   Note: This section could be put into a separate file
%      predefined-cuatro-fretboards.ly
%      and \included into each of your compositions

cuatroTuning = #`(,(ly:make-pitch 0 6 0)
                  ,(ly:make-pitch 1 3 SHARP)
  ,(ly:make-pitch 1 1 0)
  ,(ly:make-pitch 0 5 0))

dSix = { <a\4 b\1 d\3 fis\2> }
dMajor = { <a\4 d\1 d\3 fis \2> }
aMajSeven = { <a\4 cis\1 e\3 g\2> }
dMajSeven = { <a\4 c\1 d\3 fis\2> }
gMajor = { <b\4 b\1 d\3 g\2> }

\storePredefinedDiagram #default-fret-table \dSix
                        #cuatroTuning
                        #"o;o;o;o;"
\storePredefinedDiagram #default-fret-table \dMajor
                        #cuatroTuning
                        #"o;o;o;3-3;"
\storePredefinedDiagram #default-fret-table \aMajSeven
                        #cuatroTuning
                        #"o;2-2;1-1;2-3;"
\storePredefinedDiagram #default-fret-table \dMajSeven
                        #cuatroTuning
                        #"o;o;o;1-1;"
\storePredefinedDiagram #default-fret-table \gMajor
                        #cuatroTuning
                        #"2-2;o;1-1;o;"

% end of potential include file /predefined-cuatro-fretboards.ly


#(set-global-staff-size 16)

primerosNames = \chordmode {
  d:6 d a:maj7 d:maj7
  g
}
primeros = {
  \dSix \dMajor \aMajSeven \dMajSeven
  \gMajor
}

\score {
```

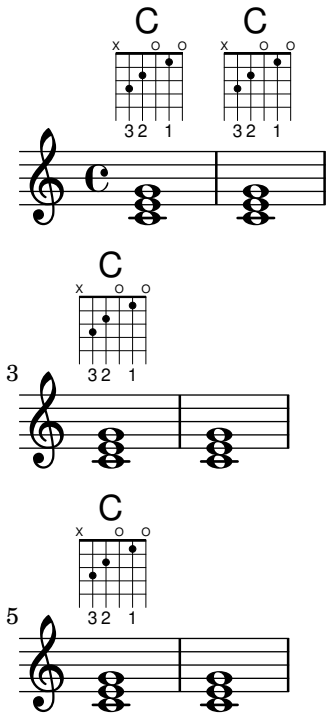
```
  <<
    \new ChordNames {
      \set chordChanges = ##t
      \primerosNames
    }

    \new Staff {
      \new Voice \with {
        \remove "New_fingering_engraver"
      }
      \relative c'' {
        \primeros
      }
    }

    \new FretBoards {
      \set Staff.stringTunings = #cuatroTuning
%      \override FretBoard
%        #'(fret-diagram-details string-count) = 4
      \override FretBoard.fret-diagram-details.finger-code = #'in-dot
      \primeros
    }

    \new TabStaff \relative c'' {
      \set TabStaff.stringTunings = #cuatroTuning
      \primeros
    }

  >>

  \layout {
    \context {
      \Score
      \override SpacingSpanner.base-shortest-duration =
        \musicLength 16
    }
  }
  \midi { }
}
```



ChordChanges for FretBoards

FretBoards can be set to display only when the chord changes or at the beginning of a new line.

```
\include "predefined-guitar-fretboards.ly"

myChords = \chordmode {
  c1 c1 \break
  \set chordChanges = ##t
  c1 c1 \break
  c1 c1
}

<<
  \new ChordNames { \myChords }
  \new FretBoards { \myChords }
  \new Staff { \myChords }
>>
```



Fretboards alternate tables

Alternate fretboard tables can be created. These would be used in order to have alternate fretboards for a given chord.

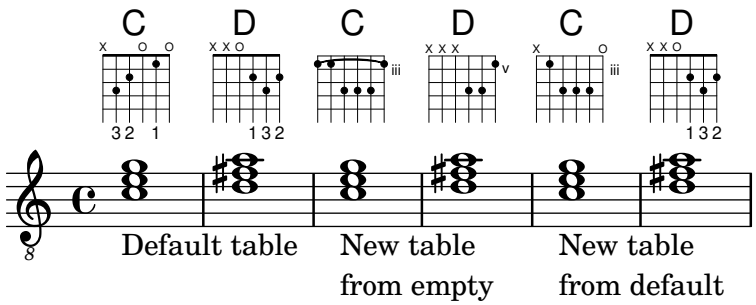
In order to use an alternate fretboard table, the table must first be created. Fretboards are then added to the table.

The created fretboard table can be blank, or it can be copied from an existing table.

The table to be used in displaying predefined fretboards is selected by the property \predefinedDiagramTable.

```
\include "predefined-guitar-fretboards.ly"

% Make a blank new fretboard table
#(define custom-fretboard-table-one
   (make-fretboard-table))

% Make a new fretboard table as a copy of default-fret-table
```

```
#(define custom-fretboard-table-two
   (make-fretboard-table default-fret-table))

% Add a chord to custom-fretboard-table-one
\storePredefinedDiagram #custom-fretboard-table-one
                        \chordmode {c}
                        #guitar-tuning
                        "3-(;3;5;5;5;3-);"

% Add a chord to custom-fretboard-table-two
\storePredefinedDiagram #custom-fretboard-table-two
                        \chordmode {c}
                        #guitar-tuning
                        "x;3;5;5;5;o;"

<<
  \chords {
    c1 | d1 |
    c1 | d1 |
    c1 | d1 |
  }
  \new FretBoards {
    \chordmode {
      \set predefinedDiagramTable = #default-fret-table
      c1 | d1 |
      \set predefinedDiagramTable = #custom-fretboard-table-one
      c1 | d1 |
      \set predefinedDiagramTable = #custom-fretboard-table-two
      c1 | d1 |
    }
  }
  \new Staff {
    \clef "treble_8"
    <<
      \chordmode {
        c1 | d1 |
        c1 | d1 |
        c1 | d1 |
      }
      {
        s1_\markup "Default table" | s1 |
        s1_\markup \column {"New table" "from empty"} | s1 |
        s1_\markup \column {"New table" "from default"} | s1 |
      }
    >>
  }
>>
```



See also

Notation Reference: [Custom tablatures], page 413, [Automatic fret diagrams], page 437, [Chord mode overview], page 467, Section A.4 [Predefined fretboard diagrams], page 726.

Installed Files: `ly/predefined-guitar-fretboards.ly`, `ly/predefined-guitar-ninth-fretboards.ly`, `ly/predefined-ukulele-fretboards.ly`, `ly/predefined-mandolin-fretboards.ly`.

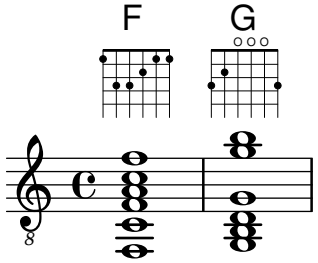
Snippets: Section "Fretted strings" in *Snippets*.

Internals Reference: Section "fret-diagram-interface" in *Internals Reference*.

Automatic fret diagrams

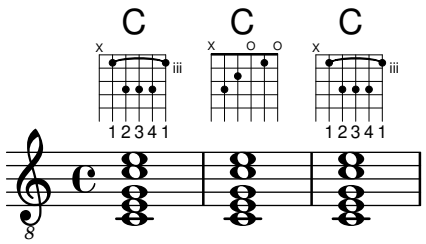
Fret diagrams can be automatically created from entered notes using the `FretBoards` context. If no predefined diagram is available for the entered notes in the active `stringTunings`, this context calculates strings and frets that can be used to play the notes.

```
<<
  \new ChordNames {
    \chordmode {
      f1 g
    }
  }
  \new FretBoards {
    <f, c f a c' f'>1
    <g,\6 b, d g b g'>1
  }
  \new Staff {
    \clef "treble_8"
    <f, c f a c' f'>1
    <g, b, d g b' g'>1
  }
>>
```



As no predefined diagrams are loaded by default, automatic calculation of fret diagrams is the default behavior. Once default diagrams are loaded, automatic calculation can be enabled and disabled with predefined commands:

```
\storePredefinedDiagram #default-fret-table
                        <c e g c' e'>
                        #guitar-tuning
                        "x;3-1-(;5-2;5-3;5-4;3-1-1-);"
<<
  \new ChordNames {
    \chordmode {
      c1 c c
    }
  }
  \new FretBoards {
    <c e g c' e'>1
    \predefinedFretboardsOff
    <c e g c' e'>1
    \predefinedFretboardsOn
    <c e g c' e'>1
  }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1
    <c e g c' e'>1
    <c e g c' e'>1
  }
>>
```

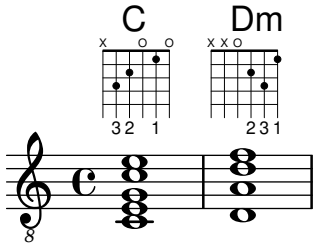


Sometimes the fretboard calculator will be unable to find an acceptable diagram. This can often be remedied by manually assigning a note to a string. In many cases, only one note need be manually placed on a string; the rest of the notes will then be placed appropriately by the `FretBoards` context.

Fingerings can be added to `FretBoard` fret diagrams.

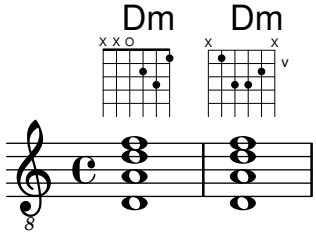
```
<<
  \new ChordNames {
    \chordmode {
      c1 d:m
    }
  }
  \new FretBoards {
    <c-3 e-2 g c'-1 e'>1
    <d a-2 d'-3 f'-1>1
  }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1
    <d a d' f'>1
```

```
  }
>>
```



The minimum fret to be used in calculating strings and frets for the `FretBoard` context can be set with the `minimumFret` property.

```
<<
  \new ChordNames {
    \chordmode {
      d1:m d:m
    }
  }
  \new FretBoards {
    <d a d' f'>1
    \set FretBoards.minimumFret = #5
    <d a d' f'>1
  }
  \new Staff {
    \clef "treble_8"
    <d a d' f'>1
    <d a d' f'>1
  }
>>
```



The strings and frets for the `FretBoards` context depend on the `stringTunings` property, which has the same meaning as in the `TabStaff` context. See [Custom tablatures], page 413, for information on the `stringTunings` property.

The graphical layout of a fret diagram can be customized according to user preference through the properties of the `fret-diagram-interface`. Details are found at Section "fret-diagram-interface" in *Internals Reference*. For a `FretBoards` fret diagram, the interface properties belong to `FretBoards.FretBoard`.

Predefined commands

`\predefinedFretboardsOff`, `\predefinedFretboardsOn`.

See also

Notation Reference: [Custom tablatures], page 413.

Snippets: Section "Fretted strings" in *Snippets*.

Internals Reference: Section “fret-diagram-interface” in *Internals Reference*.

Known issues and warnings

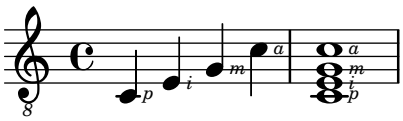
Automatic fretboard calculations do not work properly for instruments with non-monotonic tunings.

Right-hand fingerings

Right-hand fingerings *p-i-m-a* must be entered using `\rightHandFinger` followed by a number.

> **Note:** If the number is entered in Scheme notation, remember to append a space before following it with a closing `>` or similar.

```
\clef "treble_8"
c4\rightHandFinger #1
e\rightHandFinger #2
g\rightHandFinger #3
c'\rightHandFinger #4
<c\rightHandFinger #1 e\rightHandFinger #2
 g\rightHandFinger #3 c'\rightHandFinger #4 >1
```



For convenience, `\rightHandFinger` may be abbreviated to something shorter, for example `\RH`, by adding the appropriate definition at the source file's top level:

```
RH = \rightHandFinger \etc
```

Most behaviors of right-hand fingerings (namely, the `StrokeFinger` object) may be set in the same way as ordinary fingerings: see [Fingering instructions], page 254.

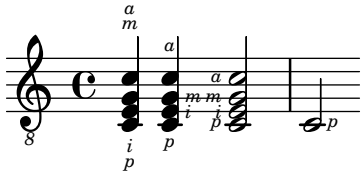
Selected Snippets

Placement of right-hand fingerings

It is possible to exercise greater control over the placement of right-hand fingerings by setting a specific property, as demonstrated in the following example.

```
#(define RH rightHandFinger)

\relative c {
  \clef "treble_8"

  \set strokeFingerOrientations = #'(up down)
  <c\RH #1 e\RH #2 g\RH #3 c\RH #4 >4

  \set strokeFingerOrientations = #'(up right down)
  <c\RH #1 e\RH #2 g\RH #3 c\RH #4 >4

  \set strokeFingerOrientations = #'(left)
  <c\RH #1 e\RH #2 g\RH #3 c\RH #4 >2

  \set strokeFingerOrientations = #'(right)
  c\RH #1
```

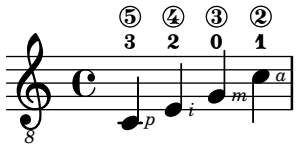
```
}
```



Fingerings, string indications, and right-hand fingerings

This example combines left-hand fingering, string indications, and right-hand fingering.

```
#(define RH rightHandFinger)

\relative c {
  \clef "treble_8"
  <c-3\5\RH #1 >4
  <e-2\4\RH #2 >4
  <g-0\3\RH #3 >4
  <c-1\2\RH #4 >4
}
```



See also

Notation Reference: [Fingering instructions], page 254.

Snippets: Section “Fretted strings” in *Snippets*.

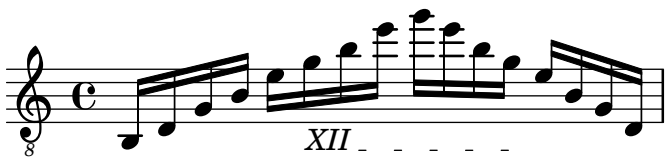
Internals Reference: Section “StrokeFinger” in *Internals Reference*.

2.4.2 Guitar

Most of the notational issues associated with guitar music are covered sufficiently in the general fretted strings section, but there are a few more worth covering here. Occasionally users want to create songbook-type documents having only lyrics with chord indications above them. Since LilyPond is a music typesetter, it is not recommended for documents that have no music notation in them. A better alternative is a word processor, text editor, or, for experienced users, a typesetter like GuitarTeX.

Indicating position and barring

This example demonstrates how to include guitar position and barring indications.

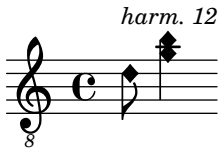
```
\relative {
  \clef "treble_8"
  b,16 d g b e
  \textSpannerDown
  \override TextSpanner.bound-details.left.text = "XII "
  g16\startTextSpan
  b16 e g e b g\stopTextSpan
  e16 b g d
}
```

See also

Notation Reference: [Text spanners], page 280.

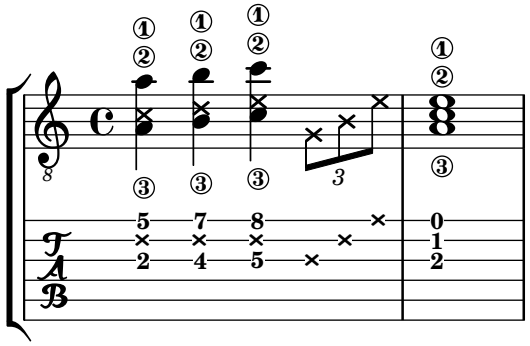
Snippets: Section “Fretted strings” in *Snippets*, Section “Expressive marks” in *Snippets*.

Indicating harmonics and dampened notes

Special note heads can be used to indicate dampened notes or harmonics. Harmonics are normally further explained with a text markup.

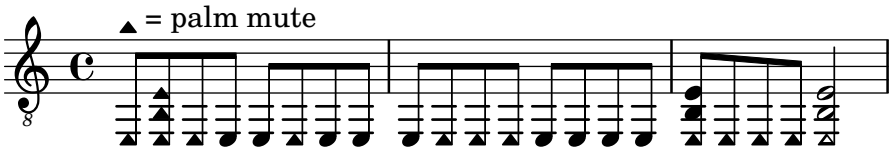
```
\relative {
  \clef "treble_8"
  \override NoteHead.style = #'harmonic-mixed
  d'8^\markup { \italic \fontsize #-2 "harm. 12" } <g b>4
}
```

Dampened notes (also called *dead notes*) are supported within normal and tablature staves:

```
music = \relative {
  < a\3 \deadNote c\2 a'\1 >4
  < b\3 \deadNote d\2 b'\1 >
  < c\3 \deadNote e\2 c'\1 >
  \deadNotesOn
  \tuplet 3/2 { g8 b e }
  \deadNotesOff
  < a,\3 c\2 e\1 >1
}
\new StaffGroup <<
  \new Staff {
    \clef "treble_8"
    \music
  }
  \new TabStaff {
    \music
  }
>>
```



Another playing technique (especially used on electric guitars) is called *palm mute*. The string is hereby partly muted by the palm of the striking hand (hence the name). LilyPond supports the notation of palm mute-style notes by changing the note head to a triangle shape.

```
\new Voice { % Warning: explicit Voice instantiation is
             %    required to have palmMuteOff work properly
             %    when palmMuteOn comes at the beginning of
             %    the piece.
  \relative c, {
    \clef "G_8"
    \palmMuteOn
    e8^\markup { \musicglyph "noteheads.s2do"  = palm mute }
    < e b' e > e
    \palmMuteOff
    e e  \palmMute e e e |
    e8 \palmMute { e e e } e e e e |
    < \palmMute e b' e >8 \palmMute { e e e } < \palmMute e b' e >2
  }
}
```



See also

Snippets: Section “Fretted strings” in *Snippets*.

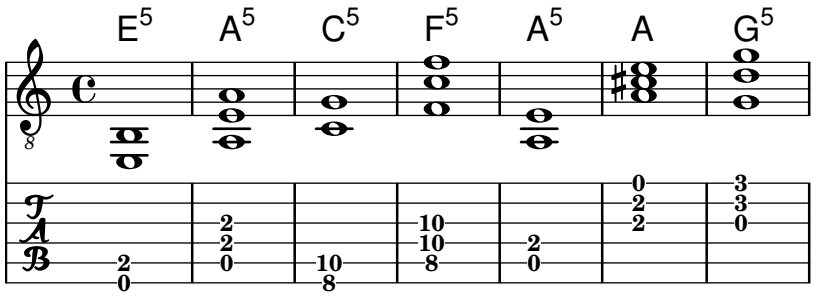
Notation Reference: [Special note heads], page 40, Section A.9 [Note head styles], page 753.

Indicating power chords

Power chords and their symbols can be engraved in chord mode or as chord constructs. As an exception, the fifth is specified in these chord names, whereas it is usually left out in other chords (e.g., major or minor triads).

```
ChordsAndSymbols = {
  \chordmode {
    e,,1:5
    a,,:5.8
    \set TabStaff.restrainOpenStrings = ##t
    \set minimumFret = #8
    c,:5
    f,:5.8
```

```
  }
  \set minimumFret = #2
  \set restrainOpenStrings = ##f
  <a, e> <a cis' e'>
  <g d' g'>
}
\score {
  <<
    \new ChordNames {
    \ChordsAndSymbols
    }
    \new Staff {
      \clef "treble_8"
      \ChordsAndSymbols
    }
    \new TabStaff {
      \ChordsAndSymbols
    }
  >>
}
```



See also

Music Glossary: Section “power chord” in *Music Glossary*.

Notation Reference: [Extended and altered chords], page 469, [Printing chord names], page 472.

Snippets: Section “Fretted strings” in *Snippets*.

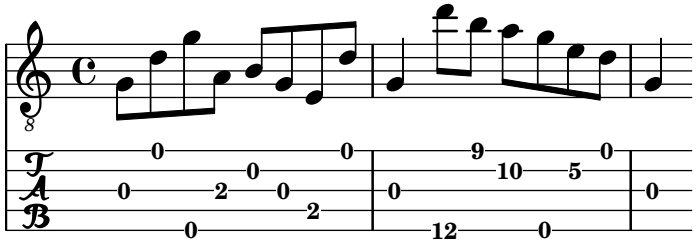
2.4.3 Banjo

Banjo tablatures

LilyPond has basic support for the five-string banjo. When making tablatures for five-string banjo, use the banjo tablature format function to get correct fret numbers for the fifth string:

```
music = {
  g8 d' g'\5 a b g e d' |
  g4 d''8\5 b' a'\2 g'\5 e'\2 d' |
  g4
}

<<
  \new Staff \with { \omit StringNumber }
  { \clef "treble_8"  \music }
  \new TabStaff \with {
```

```
    tablatureFormat = #fret-number-tablature-format-banjo
    stringTunings = #banjo-open-g-tuning
  }
  { \music }
>>
```



A number of common tunings for the five-string banjo are predefined: `banjo-open-g-tuning` (gDGBD), `banjo-c-tuning` (gCGBD), `banjo-modal-tuning` (gDGCD), `banjo-open-d-tuning` (aDF#AD), `banjo-open-dm-tuning` (aDFAD), `banjo-double-c-tuning` (gCGCD) and `banjo-double-d-tuning` (aDGDE).

These may be converted to four-string tunings using the `four-string-banjo` function:

```
\set TabStaff.stringTunings = #(four-string-banjo banjo-c-tuning)
```

See also

Installed Files: `ly/string-tunings-init.ly`.

Snippets: Section "Fretted strings" in *Snippets*.

2.4.4 Lute

Lute tablatures

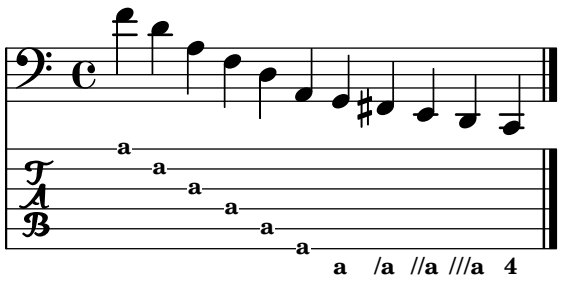
LilyPond supports tablature for lute.

To get additional bass strings use `additionalBassStrings`, where the pitches of those strings are set. They will be printed below lowest line as: a, /a, //a, ///a, 4, 5, etc.

`fret-letter-tablature-format` for `tablatureFormat` should be used, probably also `fretLabels` for further customizing.

```
m = { f'4 d' a f d a, g, fis, e, d, c,  \bar "|." }

\score {
  <<
    \new Staff { \clef bass \cadenzaOn  \m }
    \new TabStaff \m
  >>
  \layout {
    \context {
      \Score
      tablatureFormat = #fret-letter-tablature-format
    }
    \context {
      \TabStaff
      stringTunings = \stringTuning <a, d f a d' f'>
      additionalBassStrings = \stringTuning <c, d, e, fis, g,>
      fretLabels = #'("a" "b" "r" "d" "e" "f" "g" "h" "i" "k")
    }
```

```
  }
}
```



Known issues and warnings

Using `FretBoards` with `additionalBassStrings` is not supported and will yield unsatisfying results.

2.5 Percussion

2.5.1 Common notation for percussion

Rhythmic music is primarily used for percussion and drum notation, but it can also be used to show the rhythms of melodies.

References for percussion

- Some percussion may be notated on a rhythmic staff; this is discussed in [Showing melody rhythms], page 88, and [Instantiating new staves], page 216.
- MIDI output is discussed in a separate section; please see Section 3.6 [Creating MIDI output], page 587.

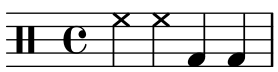
See also

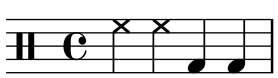
Notation Reference: [Showing melody rhythms], page 88, [Instantiating new staves], page 216, Section 3.6 [Creating MIDI output], page 587.

Snippets: Section "Percussion" in *Snippets*.

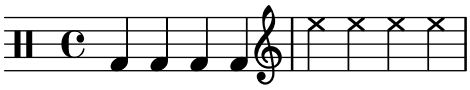
Basic percussion notation

Percussion notes may be entered in `\drummode` mode, which is similar to the standard mode for entering notes. The simplest way to enter percussion notes is to use the `\drums` command, which creates the correct context and entry mode for percussion:

```
\drums {
  hihat4 hh bassdrum bd
}
```

This is shorthand for:

```
\new DrumStaff \drummode {
  hihat4 hh bassdrum bd
}
```

Each piece of percussion has a full name and an abbreviated name, and both can be used in input files. The full list of percussion note names may be found in Section A.17 [Percussion notes], page 826.

Note that the normal notation of pitches (such as `cis4`) in a `DrumStaff` context will cause an error message. Percussion clefs are added automatically to a `DrumStaff` context but they can also be set explicitly. Other clefs may be used as well.

```
\drums {
  \clef percussion
  bd4 4 4 4
  \clef treble
  hh4 4 4 4
}
```

There are a few issues concerning MIDI support for percussion instruments; for details please see Section 3.6 [Creating MIDI output], page 587.

See also

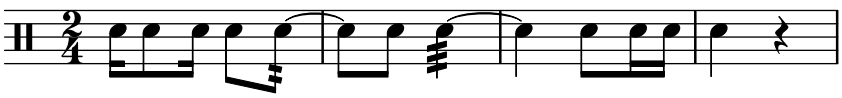
Notation Reference: Section 3.6 [Creating MIDI output], page 587, Section A.17 [Percussion notes], page 826.

Installed Files: `ly/drumpitch-init.ly`.

Snippets: Section "Percussion" in *Snippets*.

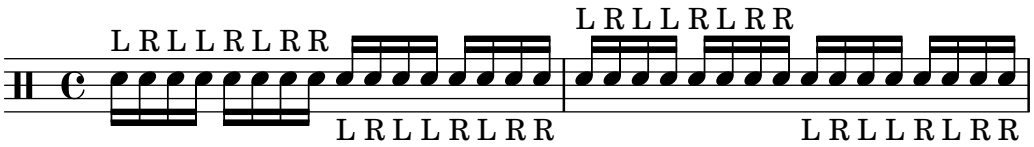
Drum rolls

Drum rolls are indicated with three slashes across the stem. For quarter notes or longer the three slashes are shown explicitly, eighth notes are shown with two slashes (the beam being the third), and drum rolls shorter than eighths have one stem slash to supplement the beams. This is achieved with the tremolo notation, as described in [Tremolo repeats], page 189.

```
\drums {
  \time 2/4
  sn16 8 16 8 8:32 ~
  8 8 4:32 ~
  4 8 16 16
  4 r4
}
```

Sticking can be indicated by placing a markup for `"R"` or `"L"` above or below notes, as discussed in Section 5.4.1 [Direction and placement], page 694. The `staff-padding` property may be overridden to achieve a pleasing baseline.

```
\drums {
  \repeat unfold 2 {
    sn16^"L" 16^"R" 16^"L" 16^"L" 16^"R" 16^"L" 16^"R" 16^"R"
    \stemUp
    sn16_"L" 16_"R" 16_"L" 16_"L" 16_"R" 16_"L" 16_"R" 16_"R"
  }
```

```
}
```



See also

Notation Reference: [Tremolo repeats], page 189.

Snippets: Section "Percussion" in *Snippets*.

Pitched percussion

Certain pitched percussion instruments (e.g., xylophone, vibraphone, and timpani) are written using normal staves. This is covered in other sections of the manual.

See also

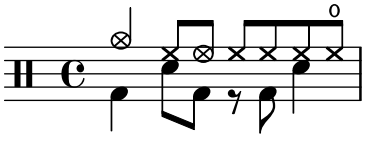
Notation Reference: Section 3.6 [Creating MIDI output], page 587.

Snippets: Section "Percussion" in *Snippets*.

Percussion staves

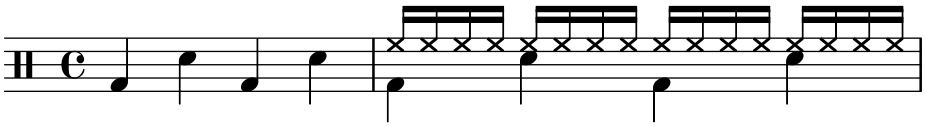
A percussion part for more than one instrument typically uses a multi-line staff where each position in the staff refers to one piece of percussion. To typeset the music, the notes must be interpreted in `DrumStaff` and `DrumVoice` context.

```
up = \drummode {
  crashcymbal4 hihat8 halfopenhihat hh hh hh openhihat
}
down = \drummode {
  bassdrum4 snare8 bd r bd sn4
}
\new DrumStaff <<
  \new DrumVoice { \voiceOne \up }
  \new DrumVoice { \voiceTwo \down }
>>
```



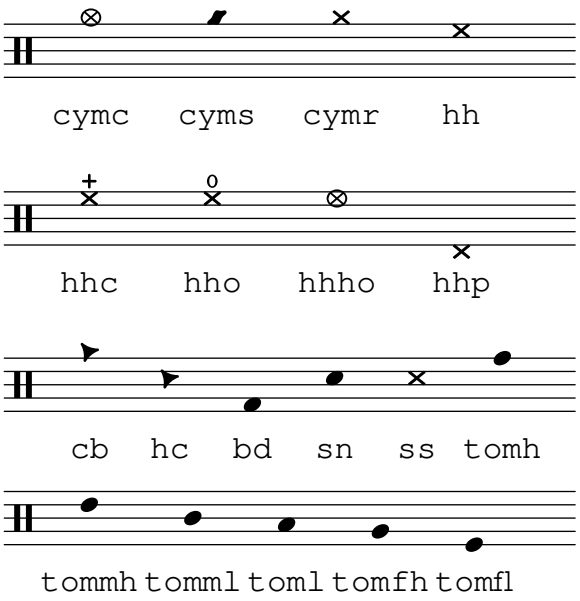
The above example shows verbose polyphonic notation. The short polyphonic notation, described in Section "I'm hearing voices" in *Learning Manual*, can also be used. For example,

```
\new DrumStaff <<
  \drummode {
    bd4 sn4 bd4 sn4
    << {
      \repeat unfold 16 hh16
    } \\ {
      bd4 sn4 bd4 sn4
    } >>
  }
>>
```



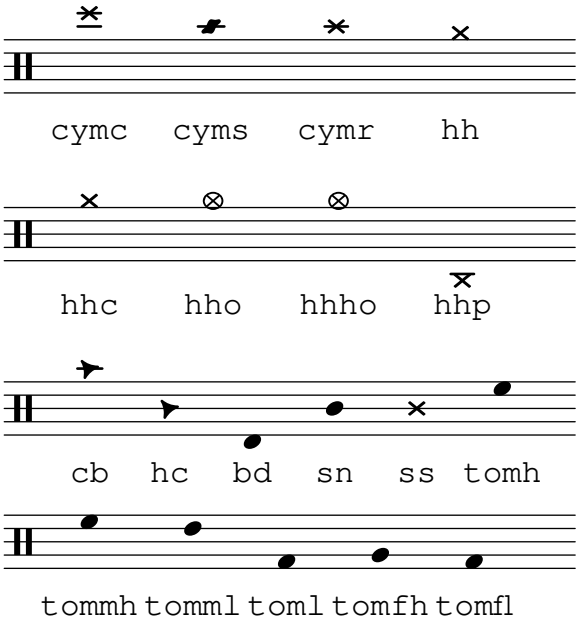
There are also other layout possibilities. To use these, set the property `drumStyleTable` in context `DrumVoice`. The following variables have been predefined:

`drums-style`
: This is the default. It typesets a typical drum kit on a five-line staff:



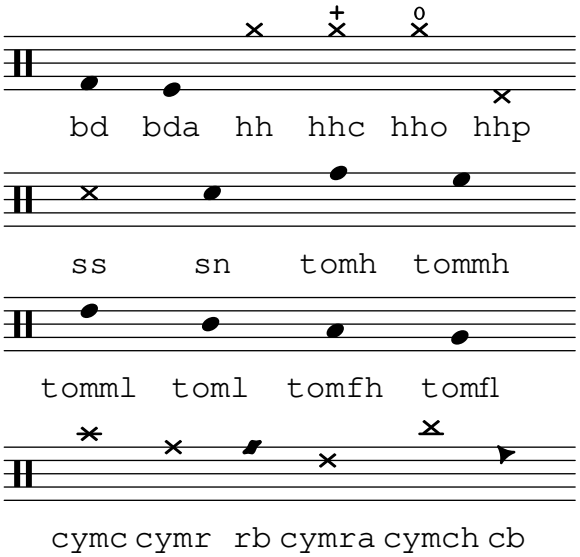
The drum scheme supports six different toms. When there are fewer toms, simply select the toms that produce the desired result. For example, to get toms on the three middle lines you use `tommh`, `tomml`, and `tomfh`.

`agostini-drums-style`
: Invented by the French percussionist Dante Agostini in 1965, this notation is commonly employed in France but also elsewhere.



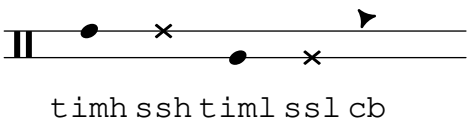
`weinberg-drums-style`

Based on the work of Norman Weinberg, published in his *Guidelines for Drumset Notation*.



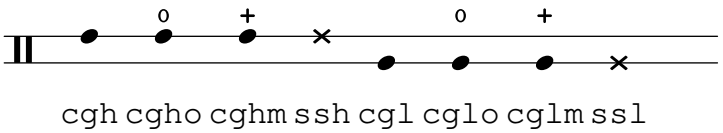
`timbales-style`

This typesets timbales on a two line staff:



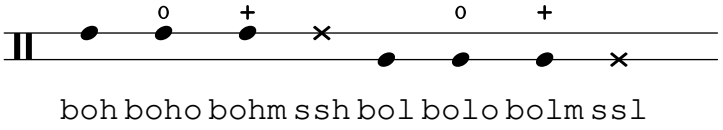
`congas-style`

This typesets congas on a two line staff:



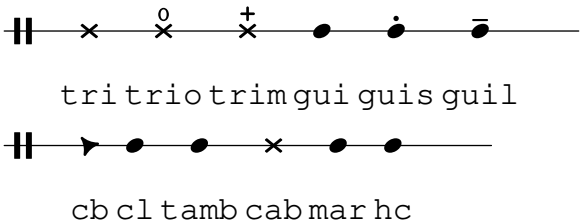
`bongos-style`

This typesets bongos on a two line staff:



`percussion-style`

To typeset all kinds of simple percussion on one-line staves:



Custom percussion styles may also be defined, as explained in [Custom percussion staves], page 451.

See also

Learning Manual: Section “I’m hearing voices” in *Learning Manual*.

Notation Reference: [Custom percussion staves], page 451.

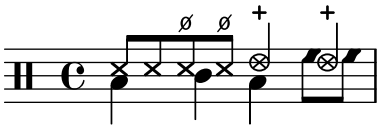
Installed Files: `ly/drumpitch-init.ly`.

Snippets: Section “Percussion” in *Snippets*.

Custom percussion staves

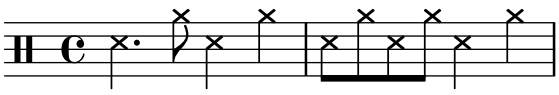
Custom percussion styles may be defined, to which the `drumStyleTable` property may then be set. Existing notations may be redefined as an association list where each entry has to be comprised of four items: a name, the note head style (or `default`), an articulation sign if needed (or `#f` if not), and the note head’s position on the staff. That list must then be converted into a Scheme hash table, using the `alist->hash-table` function.

```
#(define mydrums '(
         (bassdrum        default   #f           -1)
         (snare           default   #f           0)
         (hihat           cross     #f           1)
         (halfopenhihat   cross     halfopen     1)
         (pedalhihat      xcircle   stopped      2)
         (lowtom          diamond   #f           3)))

up = \drummode { hh8 hh hhho hhho hhp4 hhp }
down = \drummode { bd4 sn bd toml8 toml }

\new DrumStaff \with { drumStyleTable = #(alist->hash-table mydrums) }
  <<
    \new DrumVoice { \voiceOne \up }
    \new DrumVoice { \voiceTwo \down }
  >>
```

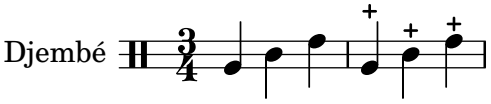


New names may also be added to these custom notations through the `drumPitchNames` variable, that may be redefined as an association list (or augmented by appending a new list to its existing value, as demonstrated below), but also through its individual entries. This also makes it possible to define aliases: alternate input shorthand for some notations.

```
drumPitchNames =
  #(append
    '((leftsnap . sidestick)
      (rightsnap . ridecymbal))
    drumPitchNames)

drumPitchNames.ls = #'sidestick
drumPitchNames.rs = #'ridecymbal

\drums {
  leftsnap4. rightsnap8 leftsnap4 rightsnap
  ls8 rs ls rs ls4 rs
}
```



In a similar manner, the drumPitchTable property associates a specific pitch (meaning a different instrument sound, as provided by available MIDI sound fonts) to each notation. That property needs to be defined as a hash table, which is again converted from an association list (stored by default as the midiDrumPitches variable). Redefining these associations is achieved as explained above, either by defining an entire association list or through individual entries. The following example demonstrates how to create a whole notation set with its own input syntax, custom notations and corresponding MIDI output.

```
drumPitchNames.dbass      = #'dbass
drumPitchNames.dba        = #'dbass  % 'db is in use already
drumPitchNames.dbassmute  = #'dbassmute
drumPitchNames.dbm        = #'dbassmute
drumPitchNames.do         = #'dopen
drumPitchNames.dopenmute  = #'dopenmute
drumPitchNames.dom        = #'dopenmute
drumPitchNames.dslap      = #'dslap
drumPitchNames.ds         = #'dslap
drumPitchNames.dslapmute  = #'dslapmute
drumPitchNames.dsm        = #'dslapmute

#(define djembe-style
  '((dbass      default  #f         -2)
    (dbassmute  default  stopped    -2)
    (dopen      default  #f          0)
    (dopenmute  default  stopped     0)
    (dslap      default  #f          2)
    (dslapmute  default  stopped     2)))

midiDrumPitches.dbass     = g
midiDrumPitches.dbassmute = fis
midiDrumPitches.dopen     = a
midiDrumPitches.dopenmute = gis
midiDrumPitches.dslap     = b
midiDrumPitches.dslapmute = ais

test = \drummode { dba4 do ds dbm dom dsm }

\score {
  \new DrumStaff \with {
    \override StaffSymbol.line-count = #3
    instrumentName = "Djembé "
    drumStyleTable = #(alist->hash-table djembe-style)
    drumPitchTable = #(alist->hash-table midiDrumPitches)
  } {
    \time 3/4
    \test
  }
  \layout {}
  \midi {}
```

```
}
```

See also

Installed Files: `ly/drumpitch-init.ly`.

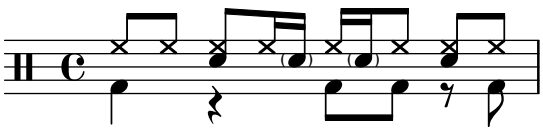
Snippets: Section "Percussion" in *Snippets*.

Internals Reference: Section "DrumStaff" in *Internals Reference*, Section "DrumVoice" in *Internals Reference*.

Ghost notes

Also known as dead, muted, silenced or false notes; ghost notes can be created using the `\parenthesize` command, see [Parentheses], page 265.

```
\new DrumStaff <<
  \new DrumVoice  = "1" { s1 }
  \new DrumVoice  = "2" { s1 }
  \drummode {
    <<
      {
        hh8[ 8] <hh sn> hh16
        \parenthesize sn hh
        \parenthesize sn hh8 <hh sn> hh
      } \\
      {
        bd4 r4 bd8 8 r8 bd
      }
    >>
  }
>>
```

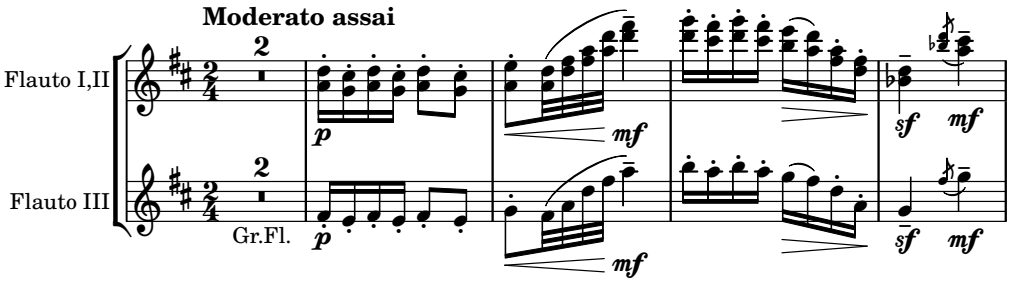


See also

Notation Reference: [Parentheses], page 265.

Snippets: Section "Percussion" in *Snippets*.

2.6 Wind instruments



This section includes elements of music notation that arise when writing specifically for wind instruments.

2.6.1 Common notation for wind instruments

This section discusses notation common to most wind instruments.

References for wind instruments

Many notation issues for wind instruments pertain to breathing and tonguing:

- Breathing can be specified by rests or [Breath marks], page 156.
- Legato playing is indicated by [Slurs], page 151.
- Different types of tonguings, ranging from legato to non-legato to staccato are usually shown by articulation marks, sometimes combined with slurs, see [Articulations and ornamentations], page 138, and Section A.15 [List of articulations], page 824.
- Flutter tonguing is usually indicated by placing a tremolo mark and a text markup on the note. See [Tremolo repeats], page 189.

Other aspects of musical notation that can apply to wind instruments:

- Many wind instruments are transposing instruments, see [Instrument transpositions], page 27.
- Slide glissandi are characteristic of the trombone, but other winds may perform keyed or valved glissandi. See [Glissando], page 158.
- Harmonic series glissandi, which are possible on all brass instruments but common for French Horns, are usually written out as [Grace notes], page 130.
- Pitch inflections at the end of a note are discussed in [Falls and doits], page 157.
- Key slaps or valve slaps are often shown by the `cross` style of [Special note heads], page 40.
- Woodwinds can overblow low notes to sound harmonics. These are shown by the `flageolet` articulation. See Section A.15 [List of articulations], page 824.
- The use of brass mutes is usually indicated by a text markup, but where there are many rapid changes it is better to use the `stopped` and `open` articulations. See [Articulations and ornamentations], page 138, and Section A.15 [List of articulations], page 824.
- Stopped horns are indicated by the `stopped` articulation. See [Articulations and ornamentations], page 138.

See also

Notation Reference: [Breath marks], page 156, [Slurs], page 151, [Articulations and ornamentations], page 138, Section A.15 [List of articulations], page 824, [Tremolo repeats], page 189, [Instrument transpositions], page 27, [Glissando], page 158, [Grace notes], page 130, [Falls and doits], page 157, [Special note heads], page 40.

Snippets: Section “Winds” in *Snippets*.

Fingerings

All wind instruments other than the trombone require the use of several fingers to produce each pitch. Some fingering examples are shown in the snippets below.

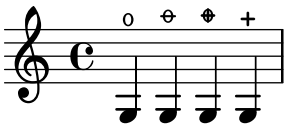
Woodwind diagrams can be produced and are described in Section 2.6.3.1 [Woodwind diagrams], page 458.

Selected Snippets

Fingering symbols for wind instruments

Special symbols can be achieved by combining existing glyphs, which is useful for wind instruments.

```
centermarkup = {
  \once \override TextScript.self-alignment-X = #CENTER
  \once \override TextScript.X-offset =#(lambda (g)
  (+ (ly:self-alignment-interface::centered-on-x-parent g)
     (ly:self-alignment-interface::x-aligned-on-self g)))
}

\score {
  \relative c'{
    g\open
    \once \override TextScript.staff-padding = #-1.0
    \centermarkup
    g^\markup {
      \combine
        \musicglyph "scripts.open"
        \musicglyph "scripts.tenuto"
    }
    \centermarkup
    g^\markup {
      \combine
        \musicglyph "scripts.open"
        \musicglyph "scripts.stopped"
    }
    g\stopped
  }
}
```

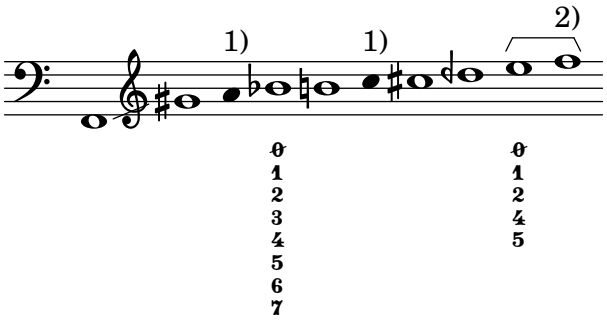


Recorder fingering chart

The following example demonstrates how fingering charts for wind instruments can be realized.

```
% range chart for paetzold contrabass recorder

centermarkup = {
  \once \override TextScript.self-alignment-X = #CENTER
  \once \override TextScript.X-offset = #(lambda (g)
    (+ (ly:self-alignment-interface::centered-on-x-parent g)
       (ly:self-alignment-interface::x-aligned-on-self g)))
}

\score {
  \new Staff \with {
    \remove "Time_signature_engraver"
    \omit Stem
    \omit Flag
    \consists "Horizontal_bracket_engraver"
```

```
  }
  {
    \clef bass
    \set Score.timing = ##f
    f,1*1/4 \glissando
    \clef violin
    gis'1*1/4
    \stemDown a'4^\markup {1)}
    \centermarkup
    \once \override TextScript.padding = #2
    bes'1*1/4_\markup {\override #'(baseline-skip . 1.7) \column
      { \fontsize #-5 \slashed-digit #0 \finger 1 \finger 2
        \finger 3 \finger 4 \finger 5 \finger 6 \finger 7} }
    b'1*1/4
    c''4^\markup {1)}
    \centermarkup
    \once \override TextScript.padding = #2
    cis''1*1/4
    deh''1*1/4
    \centermarkup
    \once \override TextScript.padding = #2
    \once \override Staff.HorizontalBracket.direction = #UP
    e''1*1/4_\markup {\override #'(baseline-skip . 1.7) \column
      { \fontsize #-5 \slashed-digit #0 \finger 1 \finger 2
        \finger 4 \finger 5} }\startGroup
    f''1*1/4^\markup {2)}\stopGroup
  }
}
```



See also

Notation Reference: Section 2.6.3.1 [Woodwind diagrams], page 458.

Snippets: Section “Winds” in *Snippets*.

2.6.2 Bagpipes

This section discusses notation common bagpipes.

Bagpipe definitions

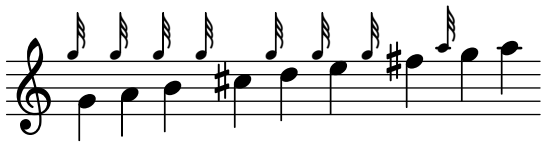
LilyPond contains special definitions for Scottish, Highland Bagpipe music; to use them, add

```
\include "bagpipe.ly"
```

to the top of your input file. This lets you add the special grace notes common to bagpipe music with short commands. For example, you could write `\taor` instead of

```
\grace { \small G32[ d G e] }
```

bagpipe.ly also contains pitch definitions for the bagpipe notes in the appropriate octaves, so you do not need to worry about \relative or \transpose.

```
\include "bagpipe.ly"
{ \grg G4 \grg a \grg b \grg c \grg d \grg e \grg f \grA g A }
```

Bagpipe music nominally uses the key of D Major (even though that isn't really true). However, since that is the only key that can be used, the key signature is normally not written out. To set this up correctly, always start your music with \hideKeySignature. If you for some reason want to show the key signature, you can use \showKeySignature instead.

Some modern music use cross-fingering on c and f to flatten those notes. This can be indicated by c-flat or f-flat. Similarly, the *Piobaireachd* high g can be written g-flat when it occurs in light music.

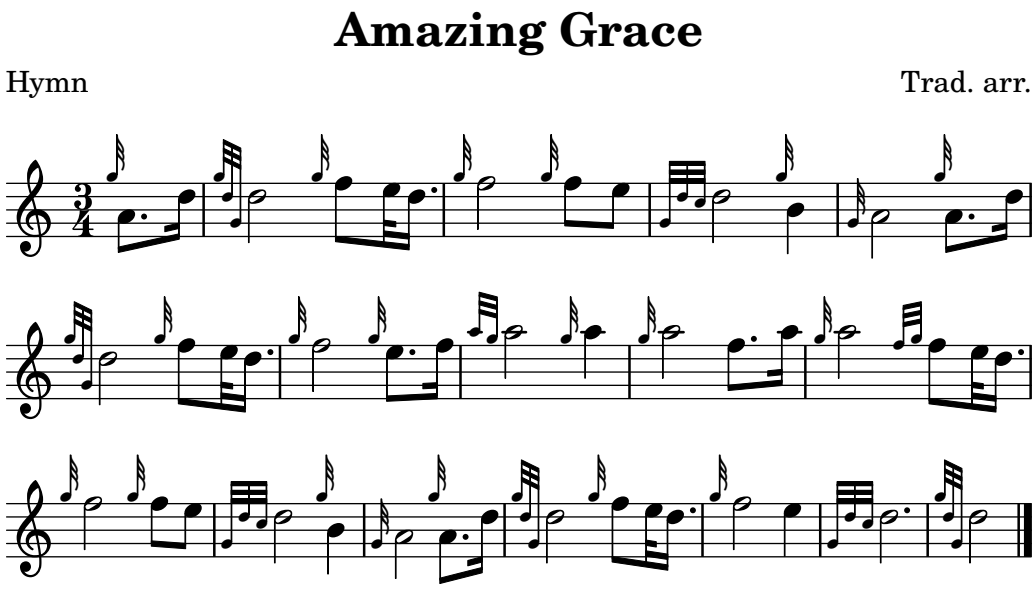
See also

Snippets: Section "Winds" in *Snippets*.

Bagpipe example

This is what the well known tune Amazing Grace looks like in bagpipe notation.

```
\include "bagpipe.ly"
\layout {
  indent = 0.0\cm
  \context { \Score \remove Bar_number_engraver }
}

\header {
  title = "Amazing Grace"
  meter = "Hymn"
  arranger = "Trad. arr."
}

{
  \hideKeySignature
  \time 3/4
  \grg \partial 4 a8. d16
  \slurd d2 \grg f8[ e32 d16.]
  \grg f2 \grg f8 e
  \thrwd d2 \grg b4
  \grG a2 \grg a8. d16
  \slurd d2 \grg f8[ e32 d16.]
  \grg f2 \grg e8. f16
  \dblA A2 \grg A4
  \grg A2 f8. A16
  \grg A2 \hdblf f8[ e32 d16.]
  \grg f2 \grg f8 e
  \thrwd d2 \grg b4
```

```
  \grG a2 \grg a8. d16
  \slurd d2 \grg f8[ e32 d16.]
  \grg f2 e4
  \thrwd d2.
  \slurd d2
  \bar "|."
}
```

See also

Snippets: Section “Winds” in *Snippets*.

2.6.3 Woodwinds

This section discusses notation specifically for woodwind instruments.

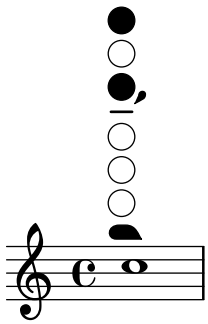
2.6.3.1 Woodwind diagrams

Woodwind diagrams can be used to indicate the fingering to be used for specific notes and are available for the following instruments:

- piccolo
- flute
- oboe
- clarinet
- bass clarinet
- saxophone
- bassoon
- contrabassoon

Woodwind diagrams are created as markups:

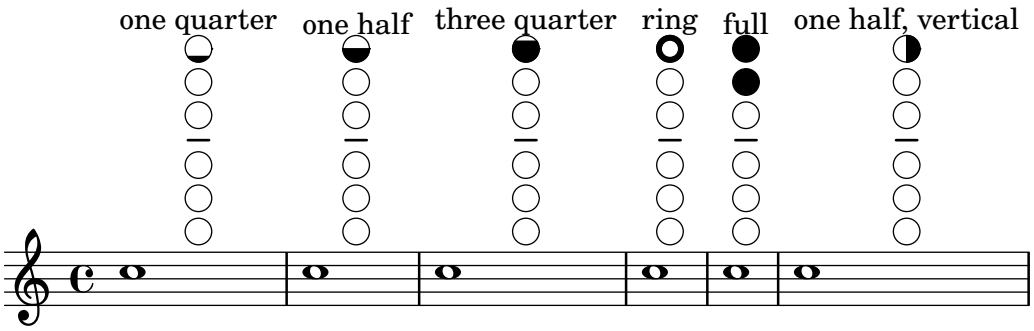
```
c''1^\markup {
  \woodwind-diagram #'piccolo #'((lh . (gis))
                                 (cc . (one three))
                                 (rh . (ees)))
}
```



Keys can be open, partially-covered, ring-depressed, or fully covered. The angle of partially-covered keys can be specified:

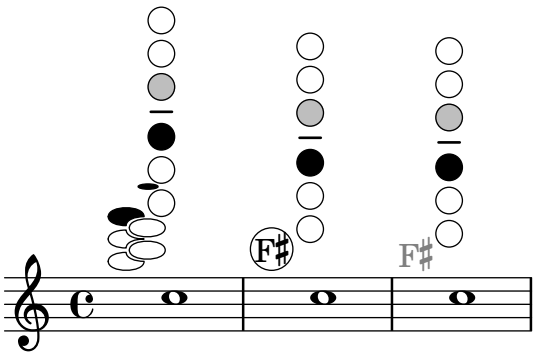
```
\textLengthOn
c''1^\markup {
  \center-column {
    "one quarter"
    \woodwind-diagram #'flute #'((cc . (one1q))
                                 (lh . ())
                                 (rh . ()))
  }
}

c''1^\markup {
  \center-column {
    "one half"
    \woodwind-diagram #'flute #'((cc . (one1h))
                                 (lh . ())
                                 (rh . ()))
  }
}

c''1^\markup {
  \center-column {
    "three quarter"
    \woodwind-diagram #'flute #'((cc . (one3q))
                                 (lh . ())
                                 (rh . ()))
  }
}

c''1^\markup {
  \center-column {
    "ring"
    \woodwind-diagram #'flute #'((cc . (oneR))
                                 (lh . ())
                                 (rh . ()))
  }
}

c''1^\markup {
  \center-column {
    "full"
```

```
    \woodwind-diagram #'flute #'((cc . (oneF two))
                                 (lh . ())
                                 (rh . ()))
  }
}

c''1^\markup {
  \center-column {
    "one half, vertical"
    \override #'(woodwind-diagram-details . ((fill-angle . 90)))
    \woodwind-diagram #'flute #'((cc . (one1h))
                                 (lh . ())
                                 (rh . ()))
  }
}
```



Trills are indicated as shaded keys, or in non-graphical mode, as either circled (the default) or shaded text:

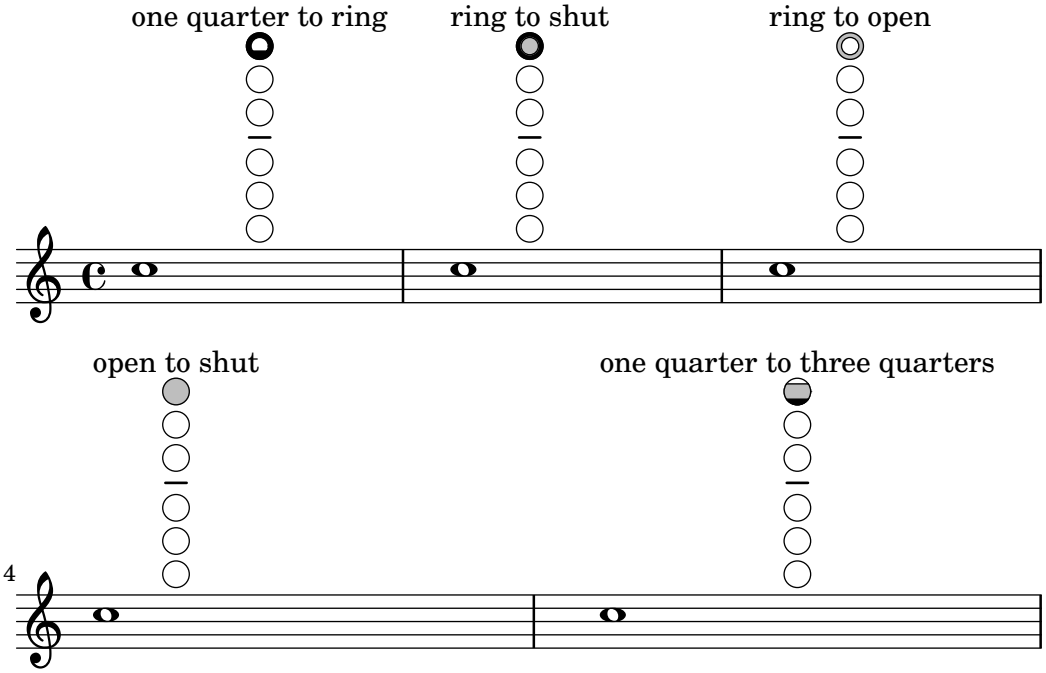
```
\textLengthOn
c''1^\markup {
  \woodwind-diagram #'bass-clarinet
                    #'((cc . (threeT four))
                       (lh . ())
                       (rh . (b fis)))
}

c''1^\markup {
  \override #'(graphical . #f)
  \woodwind-diagram #'bass-clarinet
                    #'((cc . (threeT four))
                       (lh . ())
                       (rh . (b fisT)))
}

c''1^\markup {
  \override #'(graphical . #f)
  \override #'(woodwind-diagram-details . ((text-trill-circled . #f)))
  \woodwind-diagram #'bass-clarinet
                    #'((cc . (threeT four))
                       (lh . ())
                       (rh . (b fisT)))
}
```



A variety of trills can be displayed:

```
\textLengthOn
c''1^\markup {
  \center-column {
    "one quarter to ring"
    \woodwind-diagram #'flute #'((cc . (one1qTR))
                                 (lh . ())
                                 (rh . ()))
  }
}

c''1^\markup {
  \center-column {
    "ring to shut"
    \woodwind-diagram #'flute #'((cc . (oneTR))
                                 (lh . ())
                                 (rh . ()))
  }
}

c''1^\markup {
  \center-column {
    "ring to open"
    \woodwind-diagram #'flute #'((cc . (oneRT))
                                 (lh . ())
                                 (rh . ()))
  }
}

c''1^\markup {
  \center-column {
    "open to shut"
    \woodwind-diagram #'flute #'((cc . (oneT))
                                 (lh . ())
                                 (rh . ()))
  }
}

c''1^\markup {
  \center-column {
    "one quarter to three quarters"
```

```
    \woodwind-diagram #'flute #'((cc . (one1qT3q))
                                 (lh . ())
                                 (rh . ()))
  }
}
```



The list of all possible keys and settings for a given instrument can be displayed on the console using `#(print-keys-verbose 'flute)` or in the log file using `#(print-keys-verbose 'flute (current-error-port))`, although they will not show up in the music output.

Creating new diagrams is possible, although this will require Scheme ability and may not be accessible to all users. The patterns for the diagrams are in files `scm/define-woodwind-diagrams.scm` and `scm/display-woodwind-diagrams.scm`.

Predefined commands

Selected Snippets

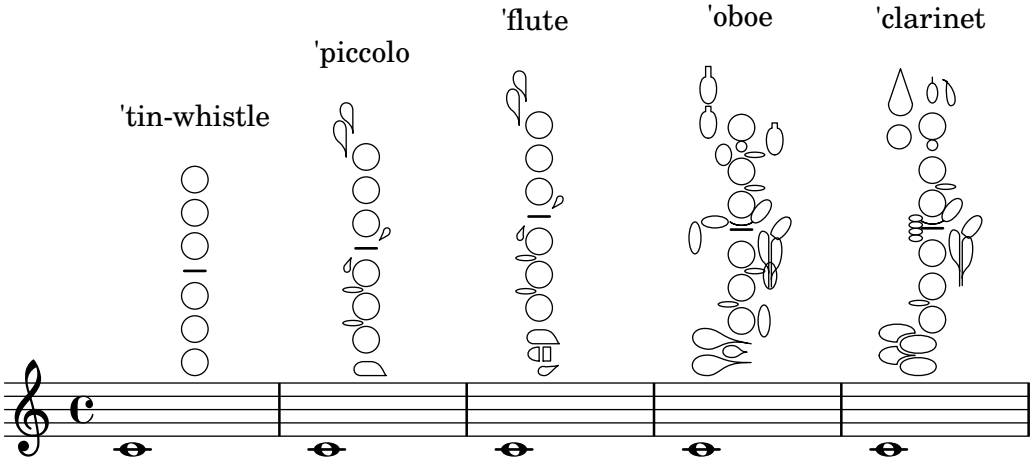
Woodwind diagrams listing

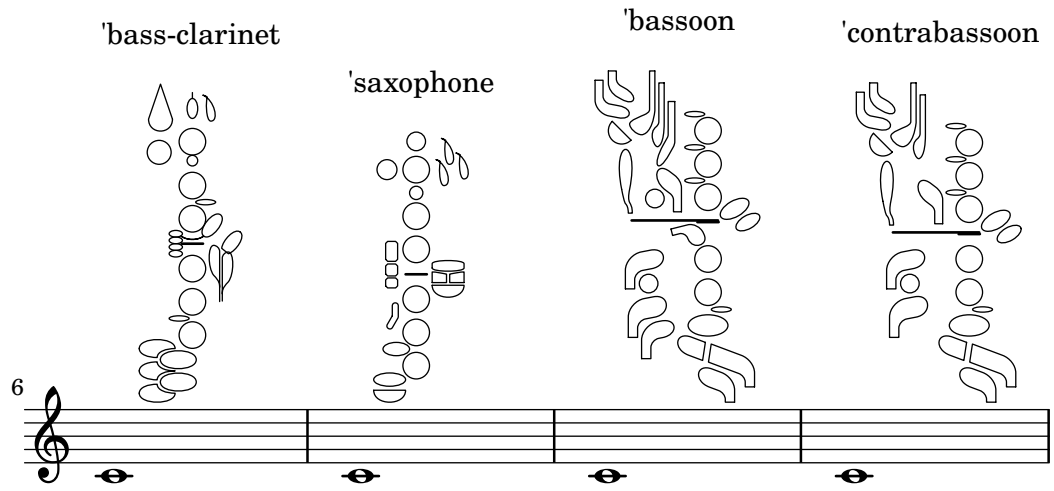
The following music shows all of the woodwind diagrams currently defined in LilyPond.

```
\layout {
  indent = 0
}

\relative c' {
  \textLengthOn
  c1^
  \markup {
    \center-column {
      'tin-whistle
      " "
       \woodwind-diagram
                 #'tin-whistle
```

```
                #'()
  }
}

c1^
\markup {
  \center-column {
    'piccolo
    " "
     \woodwind-diagram
                #'piccolo
                #'()
  }
}

c1^
\markup {
  \center-column {
     'flute
     " "
     \woodwind-diagram
        #'flute
        #'()
  }
}
c1^\markup {
  \center-column {
    'oboe
    " "
    \woodwind-diagram
      #'oboe
      #'()
  }
}

c1^\markup {
  \center-column {
    'clarinet
    " "
    \woodwind-diagram
      #'clarinet
      #'()
  }
}

c1^\markup {
  \center-column {
    'bass-clarinet
    " "
    \woodwind-diagram
      #'bass-clarinet
      #'()
```

```
    }
  }

  c1^\markup {
    \center-column {
      'saxophone
      " "
      \woodwind-diagram
        #'saxophone
        #'()
    }
  }

  c1^\markup {
    \center-column {
      'bassoon
      " "
      \woodwind-diagram
        #'bassoon
        #'()
    }
  }

  c1^\markup {
    \center-column {
      'contrabassoon
      " "
      \woodwind-diagram
        #'contrabassoon
        #'()
    }
  }
}
```

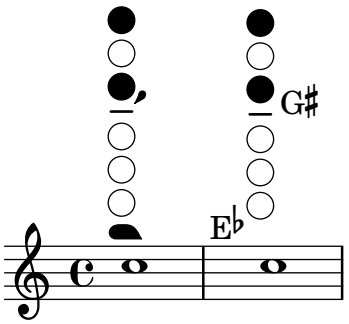




Graphical and text woodwind diagrams

In many cases, the keys other than the central column can be displayed by key name as well as by graphical means.

```
\relative c'' {
  \textLengthOn
  c1^\markup
    \woodwind-diagram
      #'piccolo
      #'((cc . (one three))
         (lh . (gis))
         (rh . (ees)))

  c^\markup
    \override #'(graphical . #f) {
      \woodwind-diagram
        #'piccolo
        #'((cc . (one three))
           (lh . (gis))
           (rh . (ees)))
    }
}
```

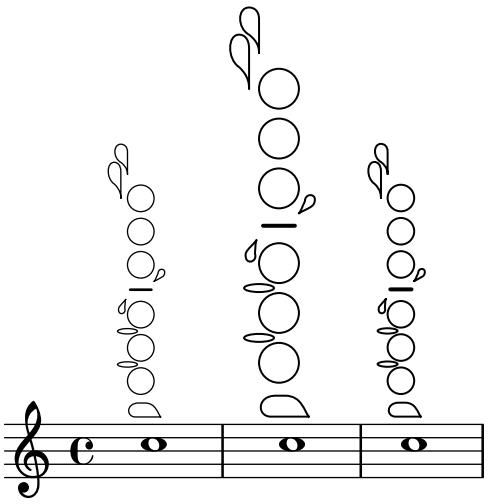


Changing the size of woodwind diagrams

The size and thickness of woodwind diagrams can be changed.

```
\relative c'' {
  \textLengthOn
  c1^\markup
```

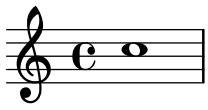
```
      \woodwind-diagram
        #'piccolo
        #'()

    c^\markup
      \override #'(size . 1.5) {
        \woodwind-diagram
          #'piccolo
          #'()
      }
    c^\markup
      \override #'(thickness . 0.15) {
        \woodwind-diagram
          #'piccolo
          #'()
      }
}
```



Woodwind diagrams key lists

The snippet below produces a list of all possible keys and key settings for woodwind diagrams as defined in `scm/define-woodwind-diagrams.scm`. The list will be displayed in the log file, but not in the music. If output to the console is wanted, omit the `(current-error-port)` from the commands.

```
#(print-keys-verbose 'piccolo (current-error-port))
#(print-keys-verbose 'flute (current-error-port))
#(print-keys-verbose 'flute-b-extension (current-error-port))
#(print-keys-verbose 'tin-whistle (current-error-port))
#(print-keys-verbose 'oboe (current-error-port))
#(print-keys-verbose 'clarinet (current-error-port))
#(print-keys-verbose 'bass-clarinet (current-error-port))
#(print-keys-verbose 'low-bass-clarinet (current-error-port))
#(print-keys-verbose 'saxophone (current-error-port))
#(print-keys-verbose 'soprano-saxophone (current-error-port))
#(print-keys-verbose 'alto-saxophone (current-error-port))
#(print-keys-verbose 'tenor-saxophone (current-error-port))
#(print-keys-verbose 'baritone-saxophone (current-error-port))
#(print-keys-verbose 'bassoon (current-error-port))
```

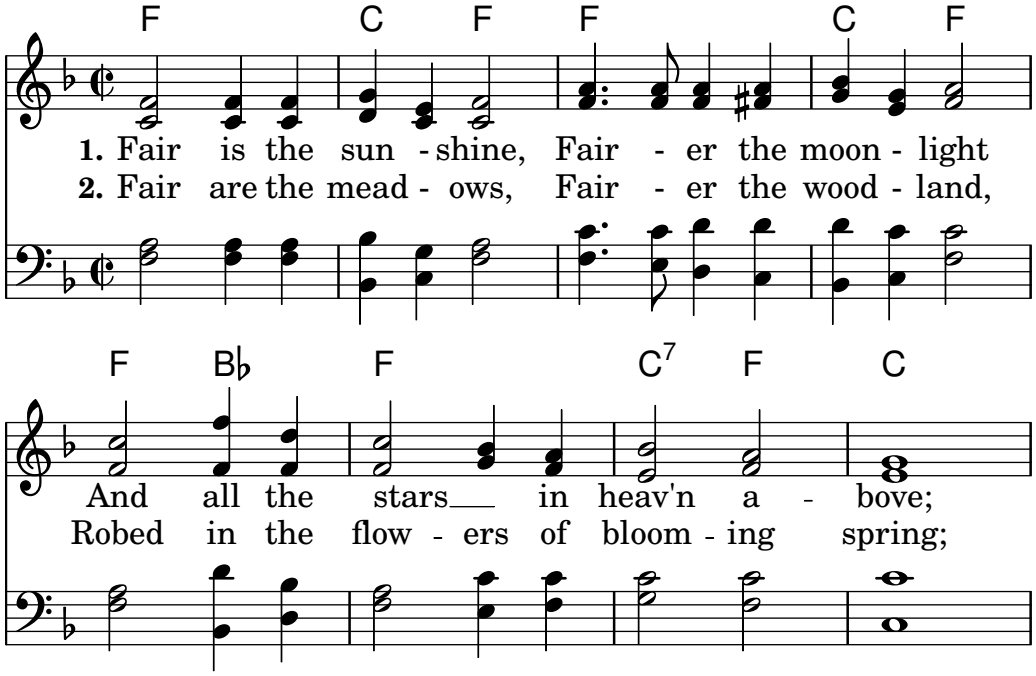
```
#(print-keys-verbose 'contrabassoon (current-error-port))

\score {c''1}
```

See also

Installed Files: `scm/define-woodwind-diagrams.scm`, `scm/display-woodwind-diagrams.scm`.

Snippets: Section "Winds" in *Snippets*.

Internals Reference: Section "TextScript" in *Internals Reference*, Section "instrument-specific-markup-interface" in *Internals Reference*.

2.7 Chord notation



Chords can be entered either as normal notes or in chord mode and displayed using a variety of traditional European chord naming conventions. Chord names and figured bass notation can also be displayed.

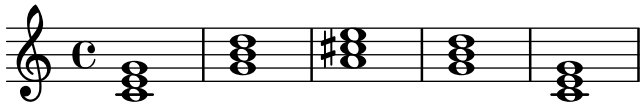
2.7.1 Chord mode

Chord mode is used to enter chords using an indicator of the chord structure, rather than the chord pitches.

Chord mode overview

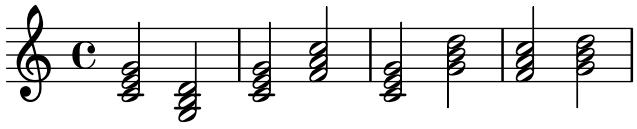
Chords can be entered as simultaneous music, as discussed in [Chorded notes], page 192.

Chords can also be entered in "chord mode", which is an input mode that focuses on the structures of chords in traditional European music, rather than on specific pitches. This is convenient for those who are familiar with using chord names to describe chords. More information on different input modes can be found at Section 3.1 [Input modes], page 534.

```
\chordmode { c1 g a g c }
```

Chords entered using chord mode are music elements, and can be transposed just like chords entered using simultaneous music. `\chordmode` is absolute, as `\relative` has no effect on `chordmode` blocks. However, in `\chordmode` the absolute pitches are one octave higher than in note mode.

Chord mode and note mode can be mixed in sequential music:

```
\relative {
  <c' e g>2 <g b d>
  \chordmode { c2 f }
  <c e g>2 <g' b d>
  \chordmode { f2 g }
}
```



See also

Music Glossary: Section “chord” in *Music Glossary*.

Notation Reference: [Chorded notes], page 192, Section 3.1 [Input modes], page 534.

Snippets: Section “Chords” in *Snippets*.

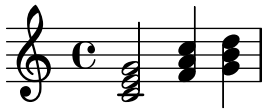
Known issues and warnings

Predefined shorthands for articulations and ornaments cannot be used on notes in chord mode, see [Articulations and ornamentations], page 138.

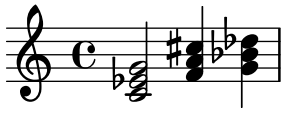
Common chords

Major triads are entered by including the root and an optional duration:

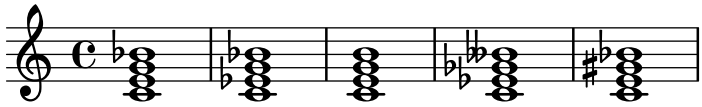
```
\chordmode { c2 f4 g }
```



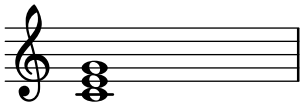
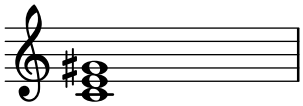
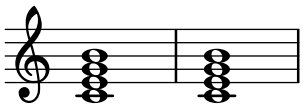
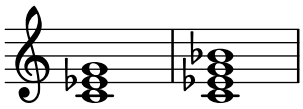
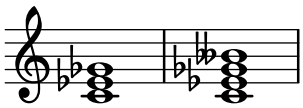
Minor, augmented, and diminished triads are entered by placing : and a quality modifier string after the duration:

```
\chordmode { c2:m f4:aug g:dim }
```

Seventh chords can be created:

```
\chordmode { c1:7 c:m7 c:maj7 c:dim7 c:aug7 }
```



The table below shows the actions of the quality modifiers on triads and seventh chords. The default seventh step added to chords is a minor or flatted seventh, which makes the dominant seventh the basic seventh chord. All alterations are relative to the dominant seventh. A more complete table of modifier usage is found at Section A.2 [Common chord modifiers], page 722.

Modifier	**Action**	**Example**
None	The default action; produces a major triad.	
m, m7	The minor chord. This modifier lowers the 3rd.	
dim, dim7	The diminished chord. This modifier lowers the 3rd, 5th and (if present) the 7th step.	
aug	The augmented chord. This modifier raises the 5th step.	
maj, maj7	The major 7th chord. This modifier adds a raised 7th step. The `7` following `maj` is optional. Do NOT use this modifier to create a major triad.	

See also

Notation Reference: Section A.2 [Common chord modifiers], page 722, [Extended and altered chords], page 469.

Snippets: Section “Chords” in *Snippets*.

Known issues and warnings

Only one quality modifier should be used per chord, typically on the highest step present in the chord. Chords with more than quality modifier will be parsed without an error or warning, but the results are unpredictable. Chords that cannot be achieved with a single quality modifier should be altered by individual pitches, as described in [Extended and altered chords], page 469.

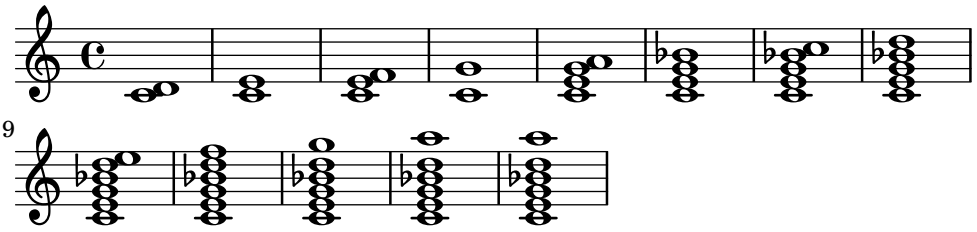
Extended and altered chords

Chord structures of arbitrary complexity can be created in chord mode. The modifier string can be used to extend a chord, add or remove chord steps, raise or lower chord steps, and add a bass note or create an inversion.

The first number following the : is taken to be the extent of the chord. The chord is constructed by sequentially adding thirds to the root until the specified number has been reached. Note that the seventh step added as part of an extended chord will be the minor or flatted seventh, not the major seventh. If the extent is not a third (e.g., 6), thirds are added up to the highest

third below the extent, and then the step of the extent is added. The largest possible value for the extent is 13. Any larger value is interpreted as 13.

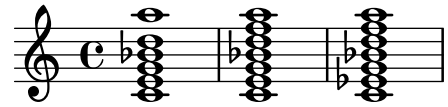
```
\chordmode {
  c1:2 c:3 c:4 c:5
  c1:6 c:7 c:8 c:9
  c1:10 c:11 c:12 c:13
  c1:14
}
```



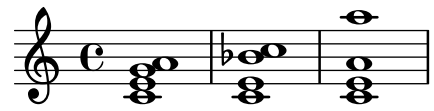
As a special exception, `c:5` produces a 'power chord' only consisting of root and fifth.

Since an unaltered 11 does not sound good when combined with an unaltered 13, the 11 is removed from a `:13` chord (unless it is added explicitly).

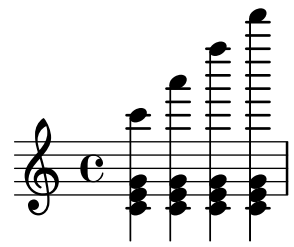
```
\chordmode {
  c1:13 c:13.11 c:m13
}
```



Individual steps can be added to a chord. Additions follow the extent and are prefixed by a dot (`.`). The basic seventh step added to a chord is the minor or flatted seventh, rather than the major seventh.

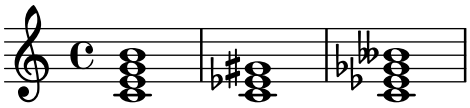
```
\chordmode {
  c1:3.5.6 c:3.7.8 c:3.6.13
}
```

Added steps can be as high as desired.

```
\chordmode {
  c4:3.5.15 c:3.5.20 c:3.5.25 c:3.5.30
}
```

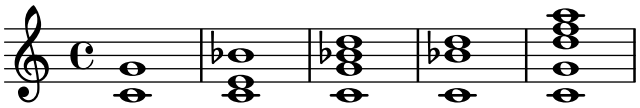


Added chord steps can be altered by suffixing a `-` or `+` sign to the number. To alter a step that is automatically included as part of the basic chord structure, add it as an altered step.

```
\chordmode {
```

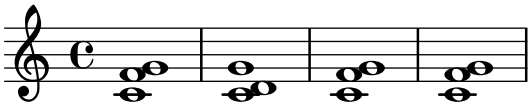
```
  c1:7+ c:5+.3- c:3-.5-.7-
}
```

Following any steps to be added, a series of steps to be removed is introduced in a modifier string with a prefix of `^`. If more than one step is to be removed, the steps to be removed are separated by `.` following the initial `^`.

```
\chordmode {
  c1^3 c:7^5 c:9^3 c:9^3.5 c:13.11^3.7
}
```



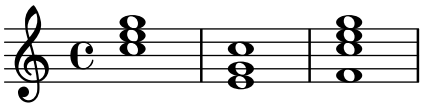
The modifier `sus` can be added to the modifier string to create suspended chords. This removes the 3rd step from the chord. Append either `2` or `4` to add the 2nd or 4th step to the chord. When `sus` is followed by either a 2nd or 4th step, it is equivalent to `^3`, otherwise to `sus4`, namely `5.4`.

```
\chordmode {
  c1:sus c:sus2 c:sus4 c:5.4
}
```



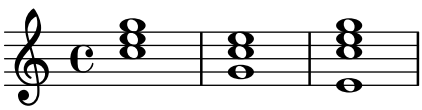
Added bass notes (putting a pitch other than the root on the bottom of the chord) can be specified by appending */pitch* to the chord.

```
\chordmode {
  c'1 c'/e c'/f
}
```



If the added pitch is already part of the chord, this may be used to print chord inversions, in which case the pitch is not added but merely moved to the bottom of the chord. It may however be treated as an added note (and thus printed twice), by using the syntax */+pitch*.

```
\chordmode {
  c'1 c'/g c'/+e
}
```



Automatic chord inversions and voicings are demonstrated in [Chord inversions and specific voicings], page 472.

Chord modifiers that can be used to produce a variety of standard chords are shown in Section A.2 [Common chord modifiers], page 722.

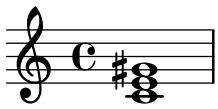
See also

Notation Reference: [Chord inversions and specific voicings], page 472, Section A.2 [Common chord modifiers], page 722.

Snippets: Section “Chords” in *Snippets*.

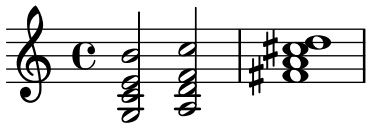
Known issues and warnings

Each step can only be present in a chord once. The following simply produces the augmented chord, since 5+ is interpreted last.

```
\chordmode { c1:3.5.5-.5+ }
```

Chord inversions and specific voicings

In addition to chord modifiers and added bass notes, various functions may be used to automatically print chords in a specific inversion or voicing – for example the so-called ‘drop 2’ voicing commonly used in jazz music.

```
\chordmode {
  \dropNote 2 {
    c2:maj7 d:m7
  }
  \invertChords 1 d1:maj7
}
```



Unlike added bass notes shown in [Extended and altered chords], page 469, this only affects the way chords are printed on a staff, and not chord names written with letters. Furthermore, these functions may be used not only in chord mode but also with <. . .> chords constructs explained in [Chorded notes], page 192.

See also

Notation Reference: [Extended and altered chords], page 469, [Chorded notes], page 192.

Snippets: Section “Chords” in *Snippets*.

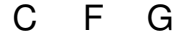
2.7.2 Displaying chords

Chords can be displayed by name, in addition to the standard display as notes on a staff.

Printing chord names

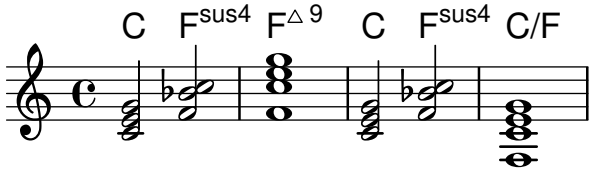
Chord names are printed in the ChordNames context:

```
\new ChordNames {
  \chordmode {
    c2 f4. g8
  }
}
```



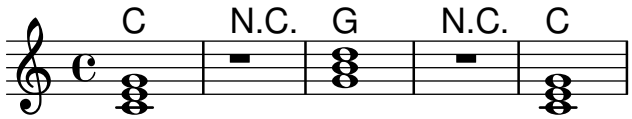
Chords can be entered as simultaneous notes or through the use of chord mode. The displayed chord name will be the same, regardless of the mode of entry, unless there are inversions or added bass notes:

```
chordmusic = \relative {
  <c' e g>2 <f bes c>
  <f c' e g>1
  \chordmode {
    c2 f:sus4 c1:/f
  }
}
<<
  \new ChordNames {
    \chordmusic
  }
  {
    \chordmusic
  }
>>
```



When passed to a ChordNames context, rests (including multi-measure rests) cause the text "N.C." (*No Chord*) to be displayed.

```
myChords = \chordmode {
  c1
  r1
  g1
  R1
  c1
}

<<
  \new ChordNames \myChords
  \new Staff \myChords
>>
```



\chords { ... } is a shortcut notation for \new ChordNames \chordmode { ... }.

```
\chords {
  c2 f4.:m g8:maj7
}
```

```
\new ChordNames {
  \chordmode {
```

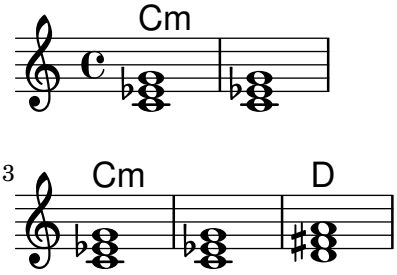
```
    c2 f4.:m g8:maj7
  }
}
```


Selected Snippets

Showing chords at changes

By default, every chord entered is printed; this behavior can be modified so that chord names are printed only at the start of lines and when the chord changes.

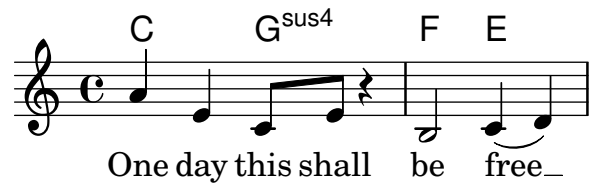
```
harmonies = \chordmode {
  c1:m c:m \break c:m c:m d
}

<<
  \new ChordNames {
    \set chordChanges = ##t
    \harmonies
  }
  \new Staff {
    \relative c' { \harmonies }
  }
>>
```



Simple lead sheet

When put together, chord names, a melody, and lyrics form a lead sheet:

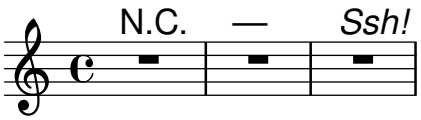
```
<<
  \chords { c2 g:sus4 f e }
  \new Staff \relative c'' {
    a4 e c8 e r4
    b2 c4( d)
  }
  \addlyrics { One day this shall be free __ }
>>
```



Customizing the no-chord symbol

By default, rests in a `ChordNames` context cause the "N.C." symbol to be printed. This markup can be customized.

```
<<
  \chords {
    R1
    \set noChordSymbol = "---"
    R1
    \set noChordSymbol = \markup \italic "Ssh!"
    R1
  }
  {
    R1*3
  }
>>
```



See also

Music Glossary: Section "chord" in *Music Glossary*.

Notation Reference: [Writing music in parallel], page 213.

Snippets: Section "Chords" in *Snippets*.

Internals Reference: Section "ChordNames" in *Internals Reference*, Section "ChordName" in *Internals Reference*, Section "Chord_name_engraver" in *Internals Reference*, Section "Volta_engraver" in *Internals Reference*, Section "Bar_engraver" in *Internals Reference*.

Known issues and warnings

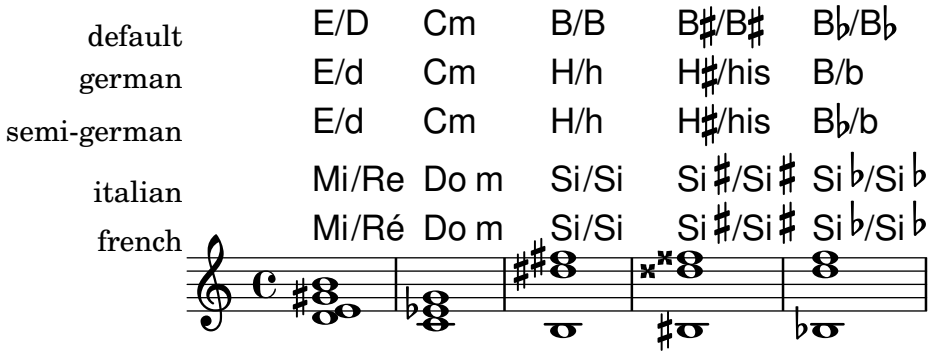
Chords containing inversions or altered bass notes are not named properly if entered using simultaneous music.

Customizing chord names

There is no unique system for naming chords. Different musical traditions use different names for the same set of chords. There are also different symbols displayed for a given chord name. The names and symbols displayed for chord names are customizable.

The basic chord name layout is a system for Jazz music, proposed by Klaus Ignatzek (see Section "Literature list" in *Essay*). (Other chord naming systems may be implemented through Scheme functions, as demonstrated by the "Chord names alternative" snippet in Section "Chords" in *Snippets*.) A list of common jazz chords notations may be found on the chart in Section A.1 [Chord name chart], page 722.

The default naming system may be tweaked easily in a number of ways. To begin with, predefined commands allow to use different languages for the root pitch. These include `\germanChords`, `\semiGermanChords`, `\italianChords` and `\frenchChords`:



German songbooks may indicate minor chords as lowercase letters, without any *m* suffix. This can be obtained by setting the `chordNameLowercaseMinor` property:

```
\chords {
  \set chordNameLowercaseMinor = ##t
  c2 d:m e:m f
}
```

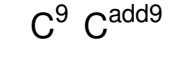
The chord name display can also be tuned through the following properties.

`chordRootNamer`
: The chord name is usually printed as a letter for the root with an optional alteration. The transformation from pitch to letter is done by this function. Special note names (for example, the German 'H' for a B-chord) can be produced by storing a new function in this property.

`majorSevenSymbol`
: This property contains the markup object used to follow the output of `chordRootNamer` to identify a major 7 chord. Predefined options are `whiteTriangleMarkup` and `blackTriangleMarkup`.

`additionalPitchPrefix`
: When the chord name contains additional pitches, they can optionally be prefixed with some text. The default is no prefix, in order to avoid too much visual clutter, but for small numbers of additional pitches this can be visually effective.

```
\new ChordNames {
  <c e g d'>    % add9
  \set additionalPitchPrefix = "add"
  <c e g d'>    % add9
}
```

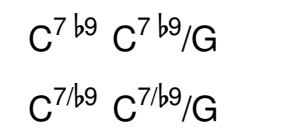


`chordNoteNamer`
: When the chord name contains additional pitches other than the root (e.g., an added bass note), this function is used to print the additional pitch. By default the pitch is printed using `chordRootNamer`. The `chordNoteNamer` property can be set to a specialized function to change this behavior. For example, the bass note can be printed in lower case.

`chordNameSeparator`
: Different parts of a chord name are normally separated by a small amount of horizontal space. By setting `chordNameSeparator`, you can use any desired markup for

a separator. This does not affect the separator between a chord and its bass note; to customize that, use `slashChordSeparator`.

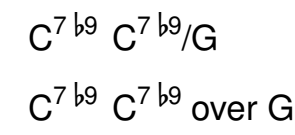
```
\chords {
  c4:7.9- c:7.9-/g
  \set chordNameSeparator = \markup { "/" }
  \break
  c4:7.9- c:7.9-/g
}
```



`slashChordSeparator`

Chords can be played over a bass note other than the conventional root of the chord. These are known as "inversions" or "slash chords", because the default way of notating them is with a forward slash between the main chord and the bass note. Therefore the value of `slashChordSeparator` defaults to a forward slash, but you can change it to any markup you choose.

```
\chords {
  c4:7.9- c:7.9-/g
  \set slashChordSeparator = \markup { " over " }
  \break
  c4:7.9- c:7.9-/g
}
```



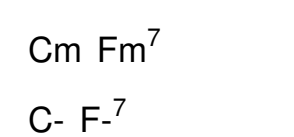
`chordNameExceptions`

This property is a list of pairs. The first item in each pair is a set of pitches used to identify the steps present in the chord. The second item is a markup that will follow the `chordRootNamer` output to create the chord name.

`minorChordModifier`

Minor chords are often denoted via a 'm' suffix to the right of the root of the chord. However some idioms prefer other suffices, such as a minus sign.

```
\chords {
  c4:min f:min7
  \set minorChordModifier = \markup { "-" }
  \break
  c4:min f:min7
}
```



`chordPrefixSpacer`

The modifier for minor chords as determined by `minorChordModifier` is usually printed immediately to the right of the root of the chord. A spacer can be placed between the root and the modifier by setting `chordPrefixSpacer`. The spacer is not used when the root is altered.

Predefined commands

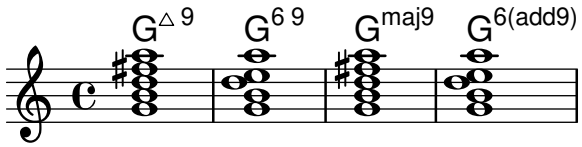
\whiteTriangleMarkup, \blackTriangleMarkup, \germanChords, \semiGermanChords, \italianChords, \frenchChords.

Selected Snippets

Chord name exceptions

The property chordNameExceptions can be used to store a list of special notations for specific chords.

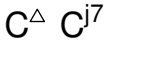
```
% modify maj9 and 6(add9)
% Exception music is chords with markups
chExceptionMusic = {
  <c e g b d'>1-\markup { \super "maj9" }
  <c e g a d'>1-\markup { \super "6(add9)" }
}

% Convert music to list and prepend to existing exceptions.
chExceptions = #(append
  (sequential-music-to-chord-exceptions chExceptionMusic #t)
  ignatzekExceptions)

theMusic = \chordmode {
  g1:maj9 g1:6.9
  \set chordNameExceptions = #chExceptions
  g1:maj9 g1:6.9
}

\layout {
  ragged-right = ##t
}

<<
   \new ChordNames \theMusic
   \new Voice \theMusic
>>
```



chord name major7

The layout of the major 7 can be tuned with majorSevenSymbol.

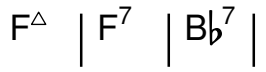
```
\chords {
  c:7+
  \set majorSevenSymbol = \markup { j7 }
  c:7+
}
```



Adding bar lines to ChordNames context

To add bar line indications in the ChordNames context, add the Bar_engraver.

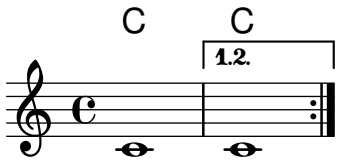
```
\new ChordNames \with {
  \override BarLine.bar-extent = #'(-2 . 2)
  \consists "Bar_engraver"
}

\chordmode {
  f1:maj7 f:7 bes:7
}
```



Volta below chords

By adding the Volta_engraver to the relevant staff, volte can be put under chords.

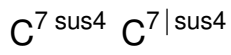
```
\score {
  <<
    \chords {
      c1
      c1
    }
    \new Staff \with {
      \consists "Volta_engraver"
    }
    {
      \repeat volta 2 { c'1 }
      \alternative { c' }
    }
  >>
  \layout {
    \context {
      \Score
      \remove "Volta_engraver"
    }
  }
}
```



Changing chord separator

The separator between different parts of a chord name can be set to any markup.

```
\chords {
  c:7sus4
  \set chordNameSeparator
    = \markup { \typewriter | }
  c:7sus4
}
```



See also

Notation Reference: Section A.1 [Chord name chart], page 722, Section A.2 [Common chord modifiers], page 722.

Essay on automated music engraving: Section "Literature list" in *Essay*.

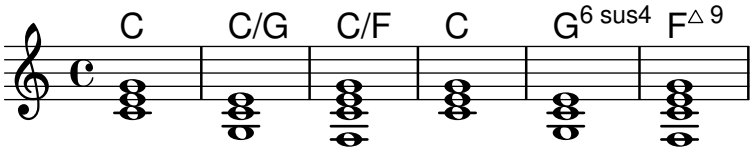
Installed Files: `scm/chords-ignatzek-names.scm`, `scm/chord-entry.scm`, `ly/chord-modifiers-init.ly`.

Snippets: Section "Chords" in *Snippets*.

Known issues and warnings

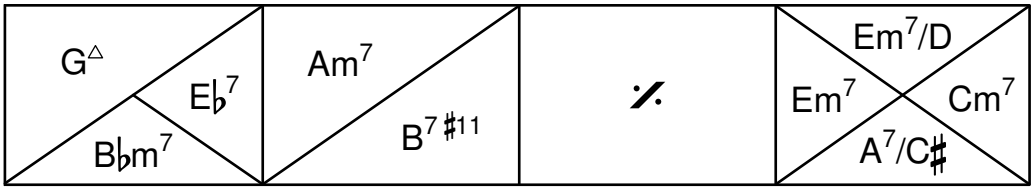
Chord names are determined from both the pitches that are present in the chord and the information on the chord structure that may have been entered in `\chordmode`. If the simultaneous pitches method of entering chords is used, undesired names result from inversions or bass notes.

```
myChords = \relative c' {
  \chordmode { c1 c/g c/f }
  <c e g>1 <g c e> <f c' e g>
}
<<
  \new ChordNames { \myChords }
  \new Staff { \myChords }
>>
```



Chord grids

In some European countries, particularly France, jazz musicians use so-called 'chord grids', which notate chords visually by placing them in squares.



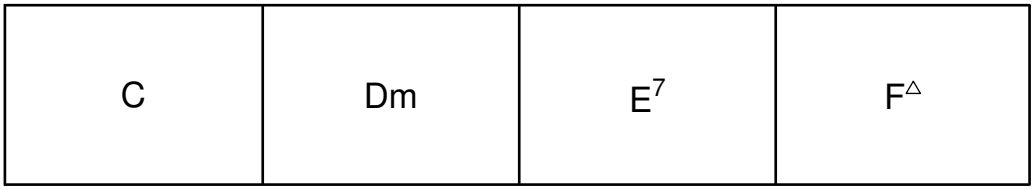
Although they are omitted in the rest of this section for brevity, it is recommended to use the following `\paper` settings for chord grids:

```
\paper {
  indent = 0
  ragged-right = ##f
}
```

`indent = 0` ensures that the first line is not indented as it would normally be (see [`\paper` variables for shifts and indents], page 608). `ragged-right = ##f` is necessary for single-line grids to ensure they span the whole page; see [`\paper` variables for widths and margins], page 606.

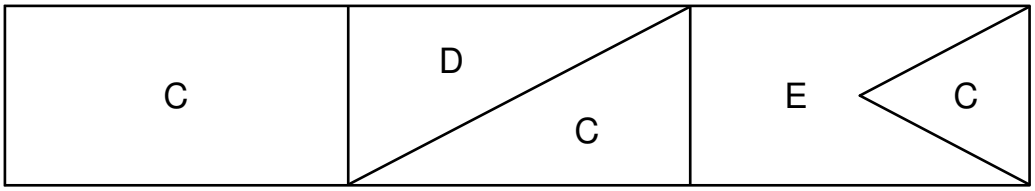
In order to create a chord grid, instantiate a `ChordGrid` context.

```
\new ChordGrid \chordmode { c1 d1:m e1:7 f1:7+ }
```

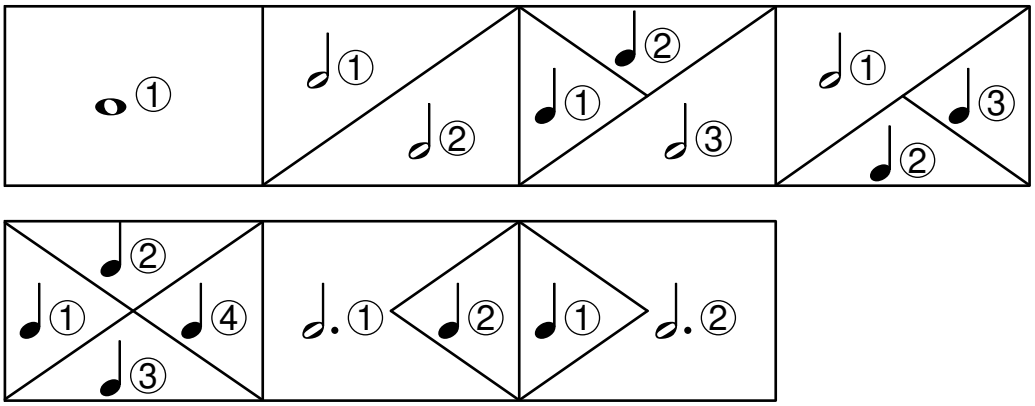


Each square is automatically subdivided.

```
\new ChordGrid \chordmode {
  c1
  d2 c2
  e2. c4
}
```



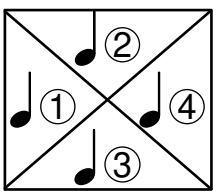
Chords spanning a complete measure are centered within their square. Chords lasting half a measure take half the square, and those lasting a quarter of a measure take a quarter of the square. This summary picture shows the default rules for subdividing the square:



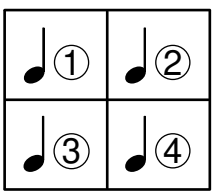
The `\medianChordGridStyle` changes the default display of squares with four chords of equal length to use the style recommended by Philippe Baudoin in his book *Jazz, mode d'emploi* ("Jazz, user instructions").

```
\layout {
  \context {
    \ChordGrid
    \medianChordGridStyle
  }
}
```

default

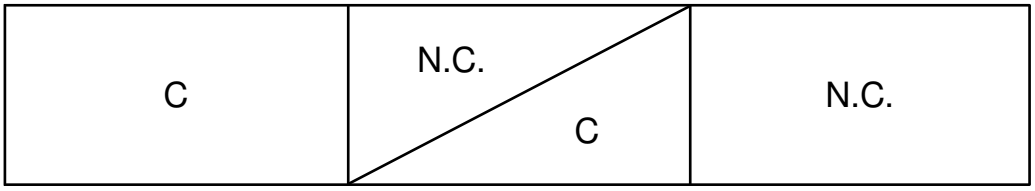


`\medianChordGridStyle`



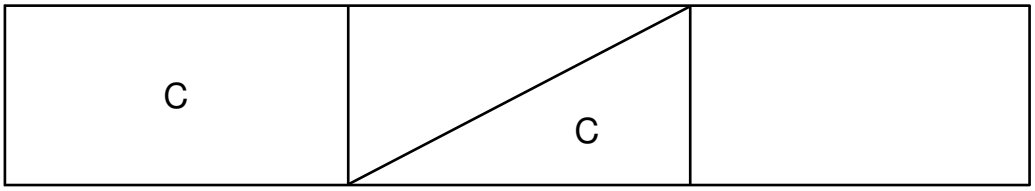
In chord grids, rests cause the noChordSymbol to be printed, just like in a regular ChordNames context (see [Printing chord names], page 472).

```
\new ChordGrid \chordmode { c1 r2 c2 R1 }
```



Skips cause blank space. They can occupy part of a square.

```
\new ChordGrid \chordmode { c1 s2 c2 s1 }
```



Selected Snippets

Customizing the chord grid style

Custom divisions of chord squares can be defined through the measure-division-lines-alist and measure-division-chord-placement-alist properties of ChordSquare. These are both alists. Their keys are measure divisions, namely lists which give the fraction of the measure that each chord (or rest, or skip) represents. More precisely, a measure division alist is made of positive, exact numbers adding up to 1, for example: '(1/2 1/4 1/4). The exactness requirement means that, e.g., 1/2 is valid but not 0.5.

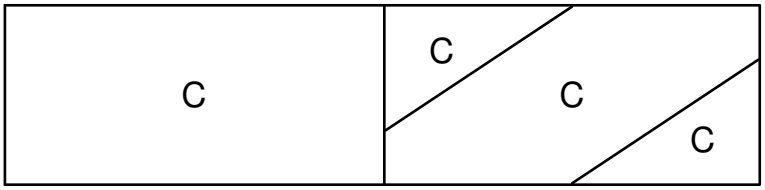
The values in measure-division-lines-alist are lists of lines, which are represented as (*x1 y1 x2 y2*). The line starts at the point (*x1 . y1*) and ends at (*x2 . y2*). Coordinates are expressed in the [-1, 1] scale relative to the extent of the square.

The values in measure-division-chord-placement-alist are lists of (*x . y*) pairs giving the placement of the respective chords.

This example defines a peculiar chord grid style that has a rule for measures divided in three equal parts.

```
\paper {
  line-width = 10\cm
  ragged-right = ##f
}

\new ChordGrid \with {
  \override ChordSquare.measure-division-lines-alist =
    #'(((1) . ())
       ((1/3 1/3 1/3) . ((-1 -0.4 0 1) (0 -1 1 0.4))))
  \override ChordSquare.measure-division-chord-placement-alist =
    #'(((1) . ((0 . 0)))
       ((1/3 1/3 1/3) . ((-0.7 . 0.5) (0 . 0) (0.7 . -0.5))))
}
\chordmode {
  \time 3/4
  c2.
```

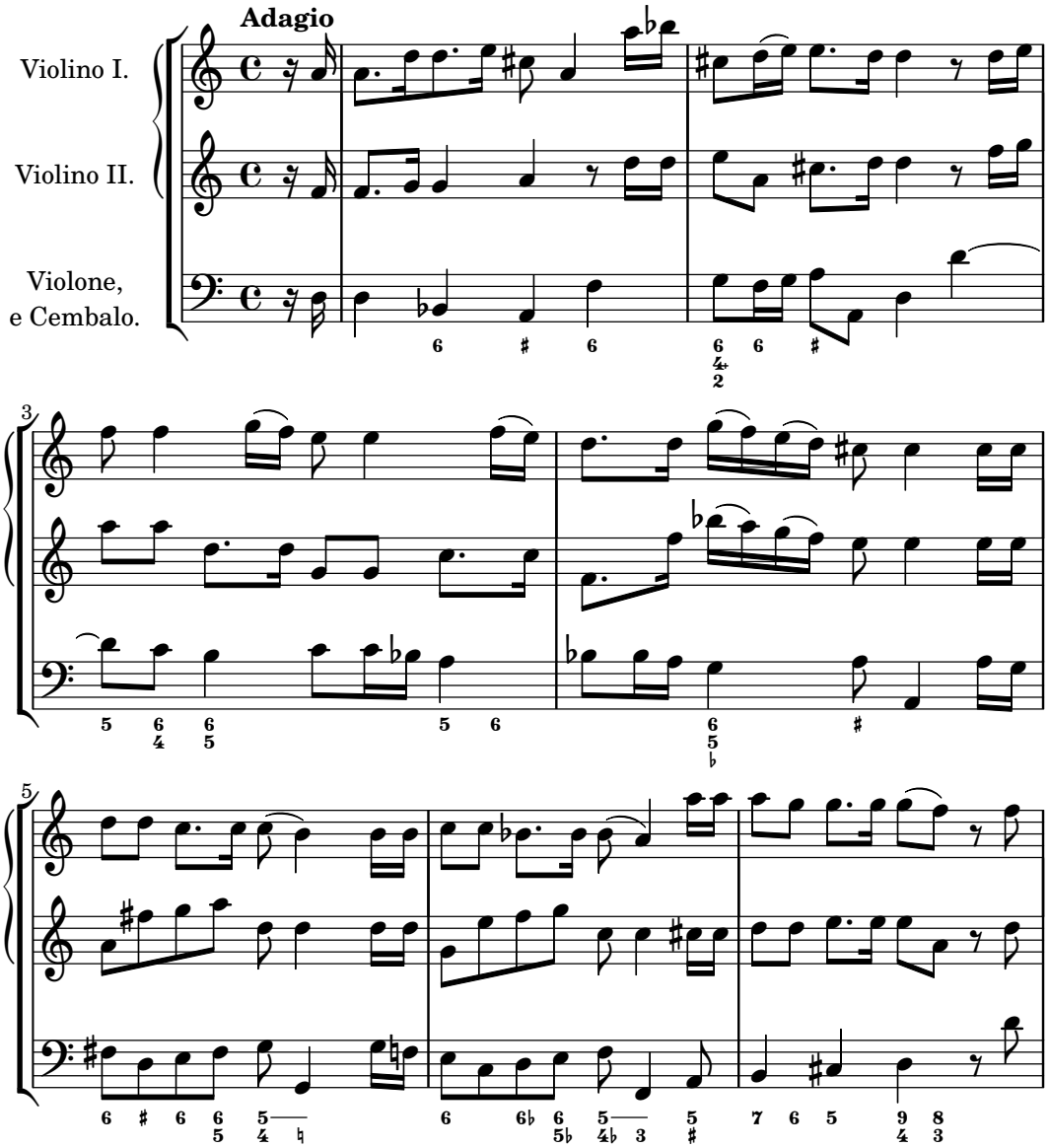
```
  c4 c4 c4
}
```



See also

Music Glossary: Section “chord grid” in *Music Glossary*.

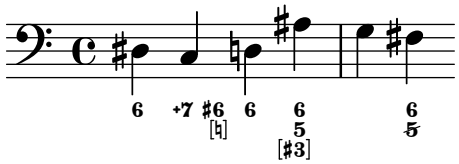
Internals Reference: Section “ChordGrid” in *Internals Reference*, Section “ChordGridScore” in *Internals Reference*, Section “GridChordName” in *Internals Reference*, Section “ChordSquare” in *Internals Reference*, Section “Grid_chord_name_engraver” in *Internals Reference*, Section “Chord_square_engraver” in *Internals Reference*.

2.7.3 Figured bass

Figured bass notation can be displayed.

Introduction to figured bass

LilyPond has support for figured bass, also called *thorough bass* or *basso continuo*.

```
<<
  \new Voice { \clef bass dis4 c d ais g fis}
  \new FiguredBass {
    \figuremode {
      <6>4 <7\+>8 <6+ [_!]> <6>4 <6 5 [3+]> |
      <_>4 <6 5/>4
    }
  }
>>
```



The support for figured bass consists of two parts: there is an input mode, introduced by `\figuremode`, that accepts entry of bass figures, and there is a context named `FiguredBass` that takes care of displaying `BassFigure` objects. Figured bass can also be displayed in `Staff` contexts.

`\figures { ... }` is a shortcut notation for `\new FiguredBass \figuremode { ... }`.

Although the support for figured bass may superficially resemble chord support, it is much simpler. `\figuremode` mode simply stores the figures and the `FiguredBass` context prints them as entered. There is no conversion to pitches.

See also

Music Glossary: Section “figured bass” in *Music Glossary*.

Snippets: Section “Chords” in *Snippets*.

Entering figured bass

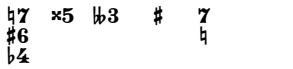
`\figuremode` is used to switch the input mode to figure mode. See Section 3.1 [Input modes], page 534, for more information on different input modes.

In figure mode, a group of bass figures is delimited by ‘<’ and ‘>’. The duration is entered after the ‘>’.

```
\new FiguredBass {
  \figuremode {
    <6 4>2
  }
}
```

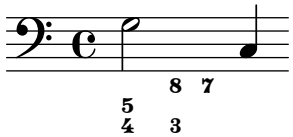
Accidentals (including naturals) may be used for modifying scale steps. These are entered by appending ‘+’ (for sharps), ‘-’ (for flats) or ‘!’ (for naturals) after the number. For double accidentals the modifier is applied twice. For the modification of the third step the number is often omitted, which can be achieved by using ‘_’ instead of a number.

```
\figures {
  <7! 6+ 4-> <5++> <3--> <_+> <7 _!>
}
```



If used without accidental, '_' creates an empty figure which nevertheless takes up space. This can be used for controlling the stacking of bass figures.

```
<<
  {
    \clef bass
    g2 c4
  }
  \figures {
    <_ 5 4>4 <8 _ 3>8 <7>
  }
>>
```



Augmented and diminished steps can be indicated.

```
\figures {
  <6\+ 5/> <7/> <7 _\+>
}
```

A backward slash through a figure is also available.

```
\figures {
  <5> <5\\>
}
```

For some figures, special backward slash glyphs are provided.

```
\figures {
  <8 6\\> <9 7\\> <9\\ 7>
}
```

Brackets can be added around accidentals, figures, and consecutive groups of figures.

```
\figures {
  <9[-] 8 [7-] 5 [4[!] 2+]>
}
```

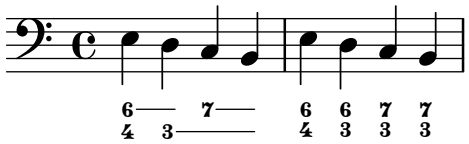
Any text markup can be inserted as a figure.

```
\figures {
  <\markup { \fontsize #-5 \number 6 \teeny \super (1) } 5>
```

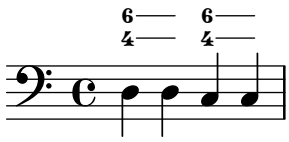
```
}
```

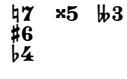
Continuation lines can be used to indicate repeated figures.

```
<<
  {
    \clef bass
    e4 d c b,
    e4 d c b,
  }
  \figures {
    \bassFigureExtendersOn
    <6 4>4 <6 3> <7 3> <7 3>
    \bassFigureExtendersOff
    <6 4>4 <6 3> <7 3> <7 3>
  }
>>
```

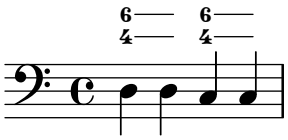


In this case, the extender lines replace existing figures, unless the continuation lines have been explicitly terminated with `\!`.

```
<<
  \figures {
    \bassFigureExtendersOn
    <6 4>4 <6 4> <6\! 4\!> <6 4>
  }
  {
    \clef bass
    d4 d c c
  }
>>
```

The table below summarizes the figure modifiers available.

modifier	purpose	example
+, -, !	accidentals	
\+, /	augmented and diminished steps	
\\	raised by a semitone	

`\!` end of continuation line



Predefined commands

`\bassFigureExtendersOn`, `\bassFigureExtendersOff`.

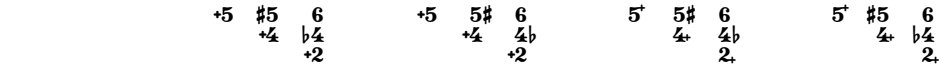
Selected Snippets

Changing the positions of figured bass alterations

Accidentals and plus signs can appear before or after the numbers, depending on the `figuredBassAlterationDirection` and `figuredBassPlusDirection` properties.

If plus signs appear after the number, specially designed glyphs are provided for some figures.

```
\figures {
  <5\+> <5+ 4\+> <6 4- 2\+> r
  \set figuredBassAlterationDirection = #RIGHT
  <5\+> <5+ 4\+> <6 4- 2\+> r
  \set figuredBassPlusDirection = #RIGHT
  <5\+> <5+ 4\+> <6 4- 2\+> r
  \set figuredBassAlterationDirection = #LEFT
  <5\+> <5+ 4\+> <6 4- 2\+> r
}
```

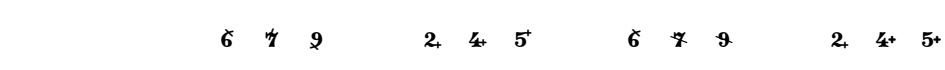


Adjusting figured bass alteration glyphs

In figured bass, specially designed glyphs for `6\\`, `7\\`, and `9\\` are used by default. Similarly, specially designed glyphs for symbols `2\+`, `4\+`, and `5\+` are used by default if plus signs appear after the number.

To change that, pass an alist to `figuredBassPlusStrokedAlist` and set the glyph in question to `#f` (or omit it).

```
\figures {
  \set figuredBassPlusDirection = #RIGHT
  <6\\> <7\\> <9\\> r
  <2\+> <4\+> <5\+> r

  \set figuredBassPlusStrokedAlist =
    #'((2 . "figbass.twoplus")
       ;; (4 . "figbass.fourplus")
       ;; (5 . "figbass.fiveplus")
       (6 . "figbass.sixstroked")
       ;; (7 . "figbass.sevenstroked")
       ;; (9 . "figbass.ninestroked")
      )
  <6\\> <7\\> <9\\> r
  <2\+> <4\+> <5\+> r
}
```



See also

Snippets: Section “Chords” in *Snippets*.

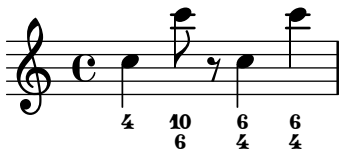
Internals Reference: Section “BassFigure” in *Internals Reference*, Section “BassFigure-Alignment” in *Internals Reference*, Section “BassFigureLine” in *Internals Reference*, Section “BassFigureBracket” in *Internals Reference*, Section “BassFigureContinuation” in *Internals Reference*, Section “FiguredBass” in *Internals Reference*.

Displaying figured bass

Figured bass can be displayed using the `FiguredBass` context, or in most staff contexts.

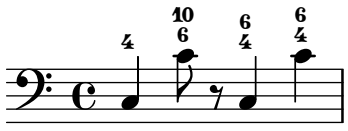
When displayed in a `FiguredBass` context, the vertical location of the figures is independent of the notes on the staff.

```
<<
  \relative {
    c''4 c'8 r8 c,4 c'
  }
  \new FiguredBass {
    \figuremode {
      <4>4 <10 6>8 s8
      <6 4>4 <6 4>
    }
  }
>>
```



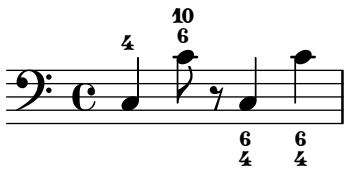
In the example above, the `FiguredBass` context must be explicitly instantiated to avoid creating a second (empty) staff.

Figured bass can also be added to `Staff` contexts directly. In this case, the vertical position of the figures is adjusted automatically.

```
<<
  \new Staff = "myStaff"
  \figuremode {
    <4>4 <10 6>8 s8
    <6 4>4 <6 4>
  }
  %% Put notes on same Staff as figures
  \context Staff = "myStaff" {
    \clef bass
    c4 c'8 r8 c4 c'
  }
>>
```

When added in a `Staff` context, figured bass can be displayed above or below the staff.

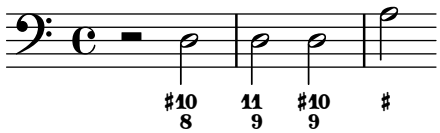
```
<<
```

```
  \new Staff = "myStaff"
  \figuremode {
    <4>4 <10 6>8 s8
    \bassFigureStaffAlignmentDown
    <6 4>4 <6 4>
  }
  %% Put notes on same Staff as figures
  \context Staff = "myStaff" {
    \clef bass
    c4 c'8 r8 c4 c'
  }
>>
```



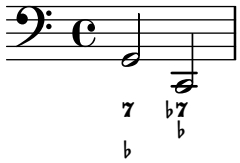
The horizontal alignment of numbers in a figured bass stack that have more than a single digit can be controlled with the context property `figuredBassLargeNumberAlignment`.

```
<<
  \new Voice {
    \clef bass
    r2 d | d d | a2
  }
  \new FiguredBass \figuremode {
    s2 <10+ 8> |
    \set figuredBassLargeNumberAlignment = #RIGHT
    <11 9>2
    \set figuredBassLargeNumberAlignment = #LEFT
    <10+ 9>2 |
    <_+>2
  }
>>
```



The vertical distance of figured bass elements can be controlled with subproperties `minimum-distance` and `padding` of `staff-staff-spacing`.

```
<<
  { \clef bass g,2 c, }
  \figures {
    \once \override BassFigureLine
                    .staff-staff-spacing.minimum-distance = 3
    <7 _-> <7- _->
  }
>>
```



Predefined commands

`\bassFigureStaffAlignmentDown`, `\bassFigureStaffAlignmentUp`, `\bassFigureStaffAlignmentNeutral`.

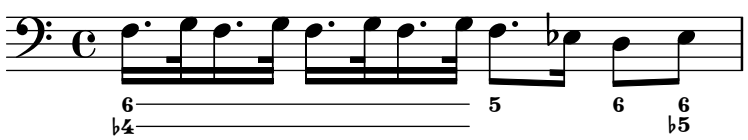
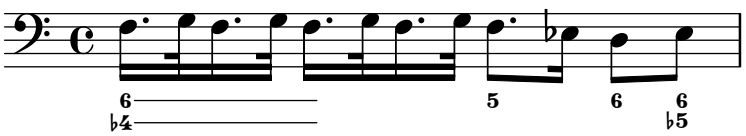
See also

Snippets: Section “Chords” in *Snippets*.

Internals Reference: Section “BassFigure” in *Internals Reference*, Section “BassFigureAlignment” in *Internals Reference*, Section “BassFigureLine” in *Internals Reference*, Section “BassFigureBracket” in *Internals Reference*, Section “BassFigureContinuation” in *Internals Reference*, Section “FiguredBass” in *Internals Reference*.

Known issues and warnings

To ensure that continuation lines work properly, it is safest to use the same rhythm in the figure line as in the bass line.

```
<<
  {
    \clef bass
    \repeat unfold 4 { f16. g32 } f8. es16 d8 es
  }
  \figures {
    \bassFigureExtendersOn
    % The extenders are correct here,
    % with the same rhythm as the bass.
    \repeat unfold 4 { <6 4->16. <6 4->32 }
    <5>8. r16 <6>8 <6\! 5->
  }
>>
<<
  {
    \clef bass
    \repeat unfold 4 { f16. g32 } f8. es16 d8 es
  }
  \figures {
    \bassFigureExtendersOn
    % The extenders are incorrect here,
    % even though the timing is the same.
    <6 4->4 <6 4->4
    <5>8. r16 <6>8 <6\! 5->
  }
>>
```

2.8 Contemporary music

From the beginning of the 20th Century there has been a massive expansion of compositional style and technique. New harmonic and rhythmic developments, an expansion of the pitch spectrum and the development of a wide range of new instrumental techniques have been accompanied by a parallel evolution and expansion of musical notation. The purpose of this section is to provide references and information relevant to working with these new notational techniques.

2.8.1 Pitch and harmony in contemporary music

This section highlights issues that are relevant to notating pitch and harmony in contemporary music.

References for pitch and harmony in contemporary music

- Standard quarter tone notation is addressed in [Note names in other languages], page 8.
- Non-standard key signatures are addressed in [Key signature], page 21.
- Contemporary practices in displaying accidentals are addressed in [Automatic accidentals], page 28.

Microtonal notation

Contemporary key signatures and harmony

2.8.2 Contemporary approaches to rhythm

This section highlights issues that are relevant to the notation of rhythm in contemporary music.

References for contemporary approaches to rhythm

- Compound time signatures are addressed in [Time signature], page 72.
- Basic polymetric notation is addressed in [Polymetric notation], page 83.
- Feathered beams are addressed in [Feathered beams], page 105.
- Mensurstriche bar lines (bar lines between staves only) are addressed in [Grouping staves], page 217.

Tuplets in contemporary music

Contemporary time signatures

Extended polymetric notation

Beams in contemporary music

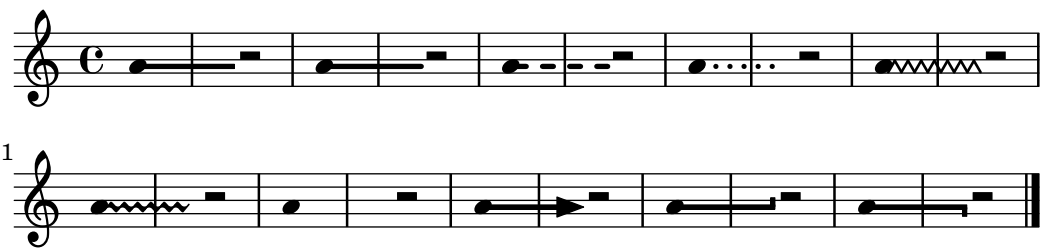
Bar lines in contemporary music

2.8.3 Graphical notation

Rhythmic items may be continued by a duration line, which gets represented by a `DurationLine` grob. Possible styles are `'beam`, `'line`, `'dashed-line`, `'dotted-line`, `'zigzag`, `'trill` and `'none`. The duration line may end with a hook (beam-style only) or an arrow.

```
\layout {
```

```
  \context {
    \Voice
    \consists Duration_line_engraver
    \omit Stem
    \omit Flag
    \omit Beam
    \override NoteHead.duration-log = 2
  }
}

{
  a'1\- s2 r
  \once \override DurationLine.style = #'line
  a'1\- s2 r
  \once \override DurationLine.style = #'dashed-line
  \once \override DurationLine.dash-period = 2
  a'1\- s2 r
  \once \override DurationLine.style = #'dotted-line
  \once \override DurationLine.dash-period = 1
  \once \override DurationLine.bound-details.right.padding = 1
  a'1\- s2 r
  \once \override DurationLine.thickness = 2
  \once \override DurationLine.style = #'zigzag
  a'1\- s2 r
  \once \override DurationLine.style = #'trill
  a'1\- s2 r
  \once \override DurationLine.style = #'none
  a'1\- s2 r
  \once \override DurationLine.bound-details.right.end-style = #'arrow
  a'1\- s2 r
  \override DurationLine.bound-details.right.end-style = #'hook
  a'1\- s2 r
  \override DurationLine.details.hook-direction = #DOWN
  a'1\- s2 r
  \bar "|."
}
```



2.8.4 Contemporary scoring techniques

2.8.5 New instrumental techniques

2.8.6 Further reading and scores of interest

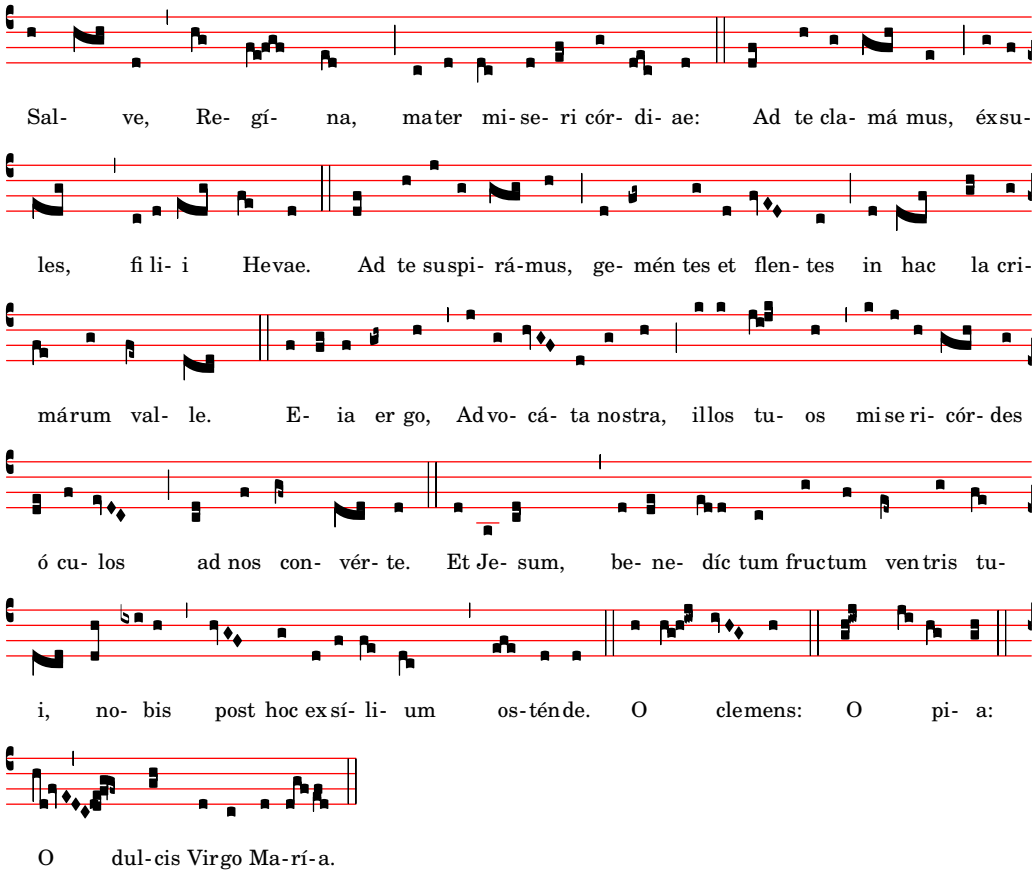
This section suggests books, musical examples and other resources useful in studying contemporary musical notation.

Books and articles on contemporary musical notation

- *Music Notation in the Twentieth Century: A Practical Guidebook* by Kurt Stone [W. W. Norton, 1980]
- *Music Notation: A Manual of Modern Practice* by Gardner Read [Taplinger, 1979]
- *Instrumentation and Orchestration* by Alfred Blatter [Schirmer, 2nd ed. 1997]

Scores and musical examples

2.9 Ancient notation



Support for ancient notation includes features for mensural notation, Gregorian chant notation, and Kievan square notation. These features can be accessed either by modifying style properties of graphical objects such as note heads and rests, or by using one of the predefined contexts for these styles.

Many graphical objects, such as note heads and flags, accidentals, time signatures, and rests, provide a `style` property, which can be changed to emulate several different styles of ancient notation. See

- [Mensural note heads], page 499,
- [Mensural accidentals and key signatures], page 501,
- [Mensural rests], page 501,
- [Mensural clefs], page 497,
- [Gregorian clefs], page 504,
- [Mensural flags], page 500,
- [Mensural time signatures], page 498.

Some notational concepts are introduced specifically for ancient notation,

- [Custodes], page 496,
- [Divisiones], page 505,
- [Ligatures], page 495.

See also

Music Glossary: Section "custos" in *Music Glossary*, Section "ligature" in *Music Glossary*, Section "mensural notation" in *Music Glossary*.

Notation Reference: [Mensural note heads], page 499, [Mensural accidentals and key signatures], page 501, [Mensural rests], page 501, [Gregorian clefs], page 504, [Mensural flags], page 500, [Mensural time signatures], page 498, [Custodes], page 496, [Divisiones], page 505, [Ligatures], page 495.

2.9.1 Overview of the supported styles

Three styles are available for typesetting Gregorian chant:

- *Editio Vaticana* is a complete style for Gregorian chant, following the appearance of the Solesmes editions, the official chant books of the Vatican since 1904. LilyPond has support for all the notational signs used in this style, including ligatures, *custodes*, and special signs such as the quilisma and the oriscus.
- The *Editio Medicaea* style offers certain features used in the Medicaea (or Ratisbona) editions which were used prior to the Solesmes editions. The most significant differences from the *Vaticana* style are the clefs, which have downward-slanted strokes, and the note heads, which are square and regular.
- The *Hufnagel* ("horseshoe nail") or *Gothic* style mimics the writing style in chant manuscripts from Germany and Central Europe during the middle ages. It is named after the basic note shape (the *virga*), which looks like a small nail.

Three styles emulate the appearance of late-medieval and renaissance manuscripts and prints of mensural music:

- The *Mensural* style most closely resembles the writing style used in late-medieval and early renaissance manuscripts, with its small and narrow, diamond-shaped note heads and its rests which approach a hand-drawn style.
- The *Neomensural* style is a modernized and stylized version of the former: the note heads are broader and the rests are made up of straight lines. This style is particularly suited, e.g., for incipits of transcribed pieces of mensural music.
- The *Petrucci* style is named after Ottaviano Petrucci (1466-1539), the first printer to use movable type for music (in his *Harmonice musices odhecaton*, 1501). The style uses larger note heads than the other mensural styles.

Baroque and *Classical* are not complete styles but differ from the default style only in some details: certain note heads (Baroque) and the quarter rest (Classical).

Only the mensural style has alternatives for all aspects of the notation. Thus, there are no rests or flags in the Gregorian styles, since these signs are not used in plainchant notation, and the Petrucci style has no flags or accidentals of its own.

Each element of the notation can be changed independently of the others, so that one can use mensural flags, Petrucci note heads, classical rests and Vaticana clefs in the same piece, if one wishes.

See also

Music Glossary: Section "mensural notation" in *Music Glossary*, Section "flag" in *Music Glossary*.

2.9.2 Ancient notation – common features

Predefined contexts

For Gregorian chant and mensural notation, there are predefined voice and staff contexts available, which set all the various notation signs to values suitable for these styles. If one is satisfied with these defaults, one can proceed directly with note entry without worrying about the details on how to customize a context. See one of the predefined contexts `VaticanaVoice`, `VaticanaStaff`, `MensuralVoice`, `MensuralStaff`, `KievanVoice`, and `KievanStaff`.

See also

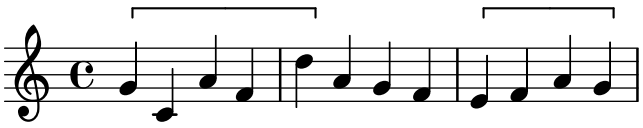
Music Glossary: Section "mensural notation" in *Music Glossary*.

Notation Reference: [Gregorian chant contexts], page 504, [Mensural contexts], page 497, [Kievan contexts], page 513.

Ligatures

A ligature is a graphical symbol that represents at least two distinct notes. Ligatures originally appeared in the manuscripts of Gregorian chant notation to denote ascending or descending sequences of notes on the same syllable. They are also used in mensural notation.

Ligatures are entered by *enclosing* them in `\[` and `\]`. Some ligature styles may need additional input syntax specific for this particular type of ligature. By default, the `LigatureBracket` engraver just puts a square bracket above the ligature.

```
\relative {
  \[ g' c, a' f d' \]
  a g f
  \[ e f a g \]
}
```

Three other ligature styles are available: 'Vaticana' for Gregorian chant, 'Mensural' for mensural music (only white mensural ligatures are supported for mensural music, and with certain limitations), and 'Kievan' for Kievan melismata. To use any of these styles, the default `Ligature_bracket_engraver` has to be replaced with one of the specialized ligature engravers in the `Voice` context. For more information, see [White mensural ligatures], page 502, [Gregorian square neume ligatures], page 507, and [Kievan melismata], page 515.

See also

Music Glossary: Section "ligature" in *Music Glossary*.

Notation Reference: [White mensural ligatures], page 502, [Gregorian square neume ligatures], page 507.

Known issues and warnings

Spacing required for ligatures is not currently implemented and, as a result, there may end up being too much space between them. Line breaking may also be unsatisfactory.

Lyrics might not align as expected when using ligatures.

Accidentals must not be printed within a ligature, but instead be collected and printed in front of it.

The syntax still uses the deprecated "infix" style `\[ music expr \]`. For consistency reasons, it will eventually be changed to "postfix" style `note\[ ... note\]`.

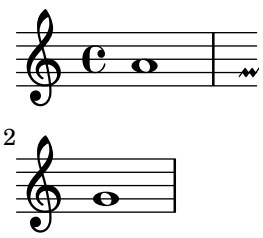
Custodes

A *custos* (plural: *custodes*; Latin word for "guard") is a symbol that appears at the end of a staff. It anticipates the pitch of the first note of the following line, thus helping the performer to manage line breaks during performance.

Custodes were frequently used in music notation until the seventeenth century. Nowadays, they have survived only in a few particular forms of musical notation such as contemporary editions of Gregorian chant like the *Editio Vaticana*. There are different custos glyphs used in different flavors of notational style.

For typesetting custodes, just put a `Custos_engraver` into the `Staff` context when declaring the `\layout` block, and change the style of the custos with an `\override` if desired, as shown in the following example:

```
\score {
  \relative {
    a'1
    \break
    g
  }
  \layout {
    \context {
      \Staff
      \consists Custos_engraver
      \override Custos.style = #'mensural
    }
  }
}
```



The custos glyph is selected by the `style` property. The styles supported are `vaticana`, `medicaea`, `hufnagel`, and `mensural`.

```
\new Lyrics \lyricmode {
  \markup { \column {
    \typewriter "vaticana "
    \line { " " \musicglyph "custodes.vaticana.u0" }
  } }
  \markup { \column {
    \typewriter "medicaea "
    \line { " " \musicglyph "custodes.medicaea.u0" }
  }}
  \markup { \column {
    \typewriter "hufnagel "
    \line { " " \musicglyph "custodes.hufnagel.u0" }
  }}
  \markup { \column {
    \typewriter "mensural "
    \line { " " \musicglyph "custodes.mensural.u0" }
```

```
  }}
}
```

```
vaticana medicaea hufnagel mensural
```

See also

Music Glossary: Section “custos” in *Music Glossary*.

Snippets: Section “Ancient notation” in *Snippets*.

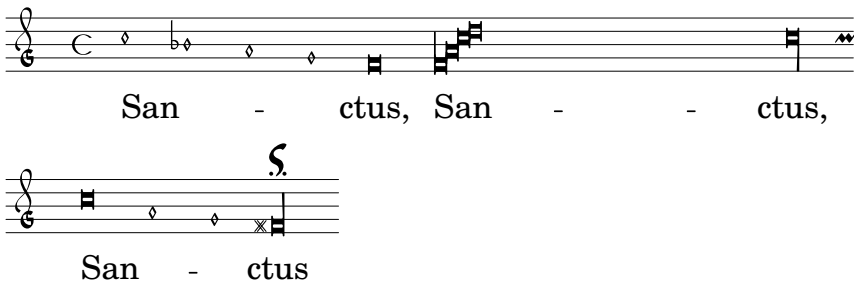
Internals Reference: Section “Custos” in *Internals Reference*.

2.9.3 Typesetting mensural music

Mensural contexts

The predefined `MensuralVoice` and `MensuralStaff` contexts can be used to engrave a piece in mensural style. These contexts initialize all relevant context properties and grob properties to proper values, so you can immediately go ahead entering the chant, as the following excerpt demonstrates:

```
\score {
  <<
    \new MensuralVoice = "discantus" \relative {
      \hide Score.BarNumber {
        c''1\melisma bes a g\melismaEnd
        f\breve
        \[ f1\melisma a c\breve d\melismaEnd \]
        c\longa
        c\breve\melisma a1 g1\melismaEnd
        fis\longa^\signumcongruentiae
      }
    }
    \new Lyrics \lyricsto "discantus" {
      San -- ctus, San -- ctus, San -- ctus
    }
  >>
}
```

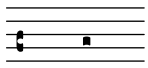


See also

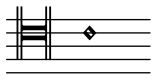
Music Glossary: Section “mensural notation” in *Music Glossary*.

Mensural clefs

Mensural clefs are supported using the `\clef` command. Some of the clefs use the same glyph, but differ only with respect to the line they are printed on. In such cases, a trailing number in the name is used to enumerate these clefs, numbered from the lowest to the highest line.

```
\override NoteHead.style = #'vaticana.punctum
\clef "vaticana-do1"
c'1
```

```
\override NoteHead.style = #'medicaea.punctum
\clef "medicaea-do3"
c'1
```

```
\override NoteHead.style = #'hufnagel.punctum
\clef "hufnagel-fa2"
c'1
```

```
\override NoteHead.style = #'neomensural
\clef "neomensural-c4"
c'1
```

It is possible to manually force a clef glyph to be typeset on an arbitrary line, as described in [Clef], page 17. For the complete range of possible clefs see Section A.11 [Clef styles], page 755.

See also

Music Glossary: Section “mensural notation” in *Music Glossary*, Section “clef” in *Music Glossary*.

Notation Reference: [Gregorian clefs], page 504, [Clef], page 17.

Installed Files: `scm/parser-clef.scm`.

Snippets: Section “Pitches” in *Snippets*.

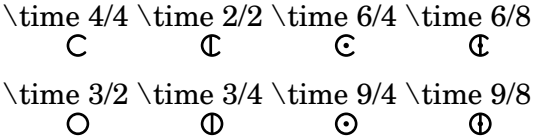
Internals Reference: Section “Clef_engraver” in *Internals Reference*, Section “Clef” in *Internals Reference*, Section “ClefModifier” in *Internals Reference*, Section “clef-interface” in *Internals Reference*.

Known issues and warnings

The Mensural g clef is mapped to the Petrucci g clef.

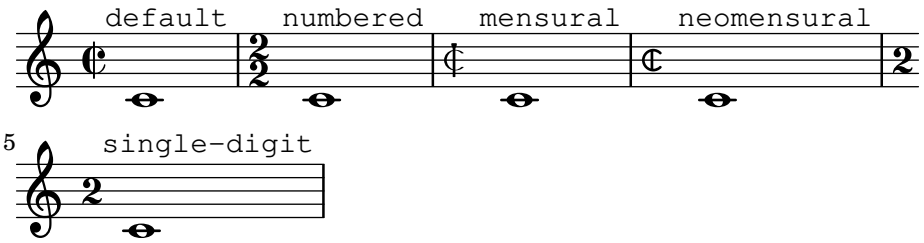
Mensural time signatures

There is limited support for mensuration signs (which are similar to, but not exactly the same as time signatures). The glyphs are hard-wired to particular time fractions. In other words, to get a particular mensuration sign with the `\time n/m` command, `n` and `m` have to be chosen according to the following table



\time 4/8 \time 2/4

Use the style property of grob TimeSignature to select ancient time signatures. Supported styles are neomensural and mensural. The above table uses the neomensural style. The following examples show the differences in style:



[Time signature], page 72, gives a general introduction to the use of time signatures.

See also

Music Glossary: Section "mensural notation" in *Music Glossary*.

Notation Reference: [Time signature], page 72.

Known issues and warnings

Ratios of note durations cannot change with the time signature, as those are not constant. For example, the ratio of 1 breve = 3 semibreves (*tempus perfectum*) can be made by hand, by setting

```
breveTP = #(ly:make-duration -1 0 3/2)
...
{ c\breveTP f1 }
```

This sets breveTP to 3/2 times 2 = 3 times a whole note.

The mensural68alt and neomensural68alt symbols (alternate symbols for 6/8) are not addressable with \time. Use \markup {\musicglyph "timesig.mensural68alt" } instead.

Mensural note heads

For ancient notation, a note head style other than the default style may be chosen. This is accomplished by setting the style property of the NoteHead object to baroque, neomensural, mensural, petrucci, blackpetrucci or semipetrucci.

The baroque style differs from the default style by:

- Providing a maxima note head, and
- Using a square shape for \breve note heads.

The neomensural, mensural, and petrucci styles differ from the baroque style by:

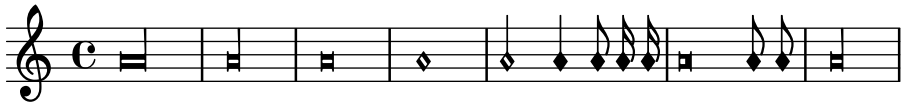
- Using rhomboidal heads for semibreves and all smaller durations, and
- Centering the stems on the note heads.

The blackpetrucci style produces note heads usable in black mensural notation or coloratio sections in white mensural notation. Because note head style does not influence flag count, in this style a semiminima should be notated as a8*2, not a4, otherwise it will look like a minima. The multiplier can be different if coloratio is used, e.g., to notate triplets.

Use semipetrucci style to draw half-colored note heads (breves, longas and maximas).

The following example demonstrates the petrucci style:

```
\compressEmptyMeasures
```

```
\autoBeamOff
\override NoteHead.style = #'petrucci
a'\maxima a'\longa a'\breve a'1 a'2 a'4 a'8 a'16 a'
\override NoteHead.style = #'semipetrucci
a'\breve*5/6
\override NoteHead.style = #'blackpetrucci
a'8*4/3 a'
\override NoteHead.style = #'petrucci
a'\longa
```

Section A.9 [Note head styles], page 753, gives an overview of all available note head styles.

See also

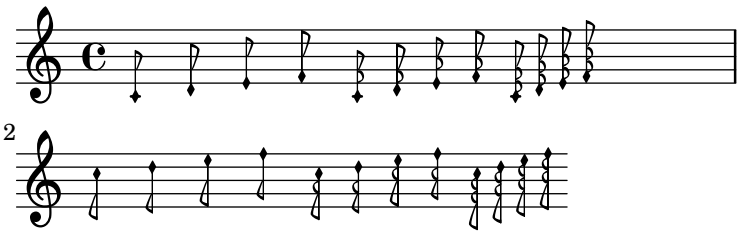
Music Glossary: Section “mensural notation” in *Music Glossary*, Section “note head” in *Music Glossary*.

Notation Reference: Section A.9 [Note head styles], page 753.

Mensural flags

Use the `flag-style` property of grob `Stem` to select ancient flags. Besides the `default` flag style, only the `mensural` style is supported.

```
\relative c' {
  \override Flag.style = #'mensural
  \override Stem.thickness = #1.0
  \override NoteHead.style = #'mensural
  \autoBeamOff
  c8 d e f c16 d e f c32 d e f s8
  c'8 d e f c16 d e f c32 d e f
}
```



Note that the innermost flare of each mensural flag is vertically aligned with a staff line.

There is no particular flag style for neo-mensural or Petrucci notation. There are no flags in Gregorian chant notation.

See also

Music Glossary: Section “mensural notation” in *Music Glossary*, Section “flag” in *Music Glossary*.

Known issues and warnings

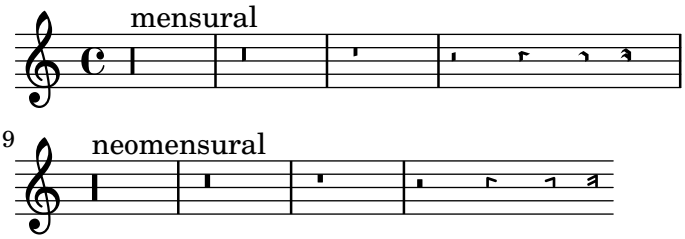
Vertically aligning each flag with a staff line assumes that stems always end either exactly on or exactly in the middle of two staff lines. This may not always be true when using advanced layout features of classical notation (which however are typically out of scope for mensural notation).

Mensural rests

Use the `style` property of grob `Rest` to select ancient rests. Supported ancient styles are `neomensural`, and `mensural`.

The following example demonstrates these styles:

```
\compressEmptyMeasures
\override Rest.style = #'mensural
r\longa^"mensural" r\breve r1 r2 r4 r8 r16 s \break
\override Rest.style = #'neomensural
r\longa^"neomensural" r\breve r1 r2 r4 r8 r16
```



There are no 32nd and 64th rests specifically for the mensural or neo-mensural styles. Rests from the default style are used.

See also

Music Glossary: Section “mensural notation” in *Music Glossary*.

Notation Reference: [Rests], page 61.

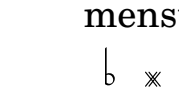
Snippets: Section “Ancient notation” in *Snippets*.

Known issues and warnings

The glyph for the maxima rest in mensural style is actually a perfect longa rest; use two (or three) longa rests to print a maxima rest. Longa rests are not grouped automatically, so have to be done manually by using pitched rests.

Mensural accidentals and key signatures

The `mensural` style provides a sharp and a flat sign different from the default style. Mensural notation rarely used a natural sign: instead the appropriate sharp or flat is used. For example, a B natural in the key of F major would be indicated with a sharp. However, if specifically called for, the natural sign is taken from the `vaticana` style.



The way to use this style is covered in [Alternate accidental glyphs], page 36. It is the default in the `MensuralStaff` context.

See also

Music Glossary: Section “mensural notation” in *Music Glossary*, Section “Pitch names” in *Music Glossary*, Section “accidental” in *Music Glossary*, Section “key signature” in *Music Glossary*.

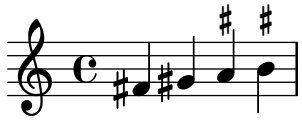
Notation Reference: Section 1.1 [Pitches], page 1, [Accidentals], page 6, [Automatic accidentals], page 28, [Alternate accidental glyphs], page 36, Section A.10 [Accidental glyph sets], page 754, [Key signature], page 21.

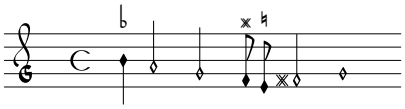
Internals Reference: Section “KeySignature” in *Internals Reference*.

Annotational accidentals (*musica ficta*)

In European music from before about 1600, singers were expected to chromatically alter notes at their own initiative according to certain rules. This is called *musica ficta*. In modern transcriptions, these accidentals are usually printed over the note.

Support for such suggested accidentals is included, and can be switched on by setting `suggestAccidentals` to true.

```
\relative {
  fis' gis
  \set suggestAccidentals = ##t
  ais bis
}
```

This will treat *every* subsequent accidental as *musica ficta* until it is unset with `\set suggestAccidentals = ##f`. A more practical way is to use `\once \set suggestAccidentals = ##t`, which can even be defined as a convenient shorthand:

```
ficta = { \once \set suggestAccidentals = ##t }
\score { \relative
  \new MensuralVoice  {
    \once \set suggestAccidentals = ##t
    bes'4 a2 g2 \ficta fis8 \ficta e! fis2 g1
  }
}
```

See also

Internals Reference: Section “Accidental_engraver” in *Internals Reference*, Section “AccidentalSuggestion” in *Internals Reference*.

White mensural ligatures

There is limited support for white mensural ligatures.

To engrave white mensural ligatures, in the layout block, replace the `Ligature_bracket_engraver` with the `Mensural_ligature_engraver` in the `Voice` context:

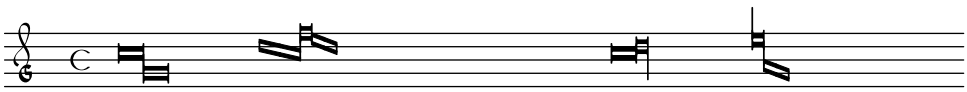
```
\layout {
  \context {
    \Voice
    \remove Ligature_bracket_engraver
    \consists Mensural_ligature_engraver
  }
}
```

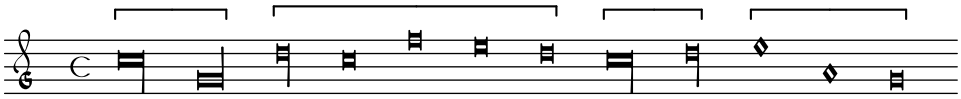
There is no additional input language to describe the shape of a white mensural ligature. The shape is rather determined solely from the pitch and duration of the enclosed notes. While this approach may take a new user a while to get accustomed to, it has the great advantage that the full musical information of the ligature is known internally. This is not only required for correct MIDI output, but also allows for automatic transcription of the ligatures.

At certain places two consecutive notes can be represented either as two squares or as an oblique parallelogram (flexa shape). In such cases the default is the two squares, but a flexa can be required by setting the `ligature-flexa` property of the *second* note head. The length of a flexa can be set by the note head property `flexa-width`.

For example,

```
\score {
  \relative {
    \set Score.timing = ##f
    \set Score.measureBarType = #'()
    \override NoteHead.style = #'petrucci
    \override Staff.TimeSignature.style = #'mensural
    \clef "petrucci-g"
    \[ c''\maxima g \]
    \[ d'\longa
       \override NoteHead.ligature-flexa = ##t
       \once \override NoteHead.flexa-width = #3.2
       c\breve f e d \]
    \[ c\maxima d\longa \]
    \[ e1 a, g\breve \]
  }
  \layout {
    \context {
      \Voice
      \remove Ligature_bracket_engraver
      \consists Mensural_ligature_engraver
    }
  }
}
```



Without replacing `Ligature_bracket_engraver` with `Mensural_ligature_engraver`, the same music looks as follows:

See also

Music Glossary: Section “ligature” in *Music Glossary*.

Notation Reference: [Gregorian square neume ligatures], page 507, [Ligatures], page 495.

Known issues and warnings

Horizontal spacing of ligatures may be poor. Accidentals may collide with previous notes.

2.9.4 Typesetting Gregorian chant

When typesetting a piece in Gregorian chant notation, the `Vaticana_ligature_engraver` automatically selects the proper note heads, so there is no need to explicitly set the note head style. Still, the note head style can be set, e.g., to `vaticana.punctum` to produce punctum neumes. Similarly, the `Mensural_ligature_engraver` automatically assembles mensural ligatures.

See also

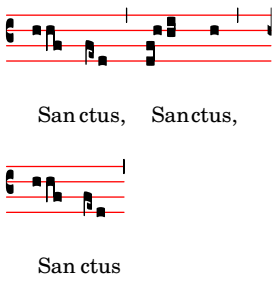
Music Glossary: Section “ligature” in *Music Glossary*.

Notation Reference: [White mensural ligatures], page 502, [Ligatures], page 495.

Gregorian chant contexts

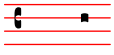
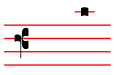
The predefined contexts `VaticanaVoice`, `VaticanaStaff`, and `VaticanaLyrics` can be used to engrave a piece of Gregorian chant in the style of the Editio Vaticana. These contexts initialize all relevant context and grob properties to proper values; you can immediately go ahead entering the chant, as the following excerpt demonstrates.

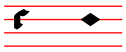
```
\include "gregorian.ly"
\score {
  <<
    \new VaticanaVoice = "cantus" {
      \[ c'\melisma c' \flexa a \]
      \[ a \flexa \deminutum g\melismaEnd \]
      f \divisioMinima
      \[ f\melisma \pes a c' c' \pes d'\melismaEnd \]
      c' \divisioMinima \break
      \[ c'\melisma c' \flexa a \]
      \[ a \flexa \deminutum g\melismaEnd \] f \divisioMinima
    }
    \new VaticanaLyrics \lyricsto "cantus" {
      San -- ctus, San -- ctus, San -- ctus
    }
  >>
}
```



Gregorian clefs

The following table shows all Gregorian clefs that are supported via the `\clef` command. Some of the clefs use the same glyph, but differ only with respect to the line they are printed on. In such cases, a trailing number in the name is used to enumerate these clefs, numbered from the lowest to the highest line. Still, you can manually force a clef glyph to be typeset on an arbitrary line, as described in [Clef], page 17. The note printed to the right side of each clef in the example column denotes the `c'` with respect to that clef.

Description	Supported Clefs	Example
Editio Vaticana style do clef	`vaticana-do1`, `vaticana-do2`, `vaticana-do3`	
Editio Vaticana style fa clef	`vaticana-fa1`, `vaticana-fa2`	

Editio Medicaea style do clef	`medicaea-do1`, `medicaea-do2`, `medicaea-do3`	
Editio Medicaea style fa clef	`medicaea-fa1`, `medicaea-fa2`	
Hufnagel style do clef	`hufnagel-do1`, `hufnagel-do2`, `hufnagel-do3`	
Hufnagel style fa clef	`hufnagel-fa1`, `hufnagel-fa2`	
Hufnagel style combined do/fa clef	`hufnagel-do-fa`	

See also

Music Glossary: Section “clef” in *Music Glossary*.

Notation Reference: [Clef], page 17.

Gregorian accidentals and key signatures

Accidentals for the three different Gregorian styles are available:

vaticana medicaea hufnagel

As shown, not all accidentals are supported by each style. When trying to access an unsupported accidental, LilyPond will switch to a different style.

How to switch between styles is covered in [Alternate accidental glyphs], page 36.

See also

Music Glossary: Section “accidental” in *Music Glossary*, Section “key signature” in *Music Glossary*.

Notation Reference: Section 1.1 [Pitches], page 1, [Accidentals], page 6, [Automatic accidentals], page 28, [Alternate accidental glyphs], page 36, [Key signature], page 21.

Internals Reference: Section “KeySignature” in *Internals Reference*.

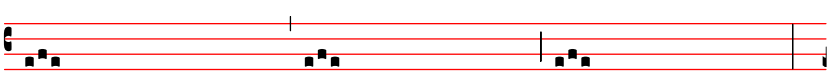
Divisiones

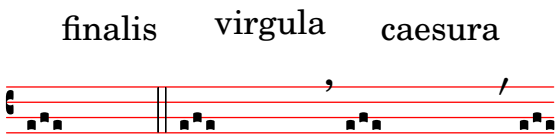
There are no rests in Gregorian chant notation; instead, it uses [Divisiones], page 505.

A *divisio* (plural: *divisiones*; Latin word for ‘division’) is a staff-context symbol indicating the phrase and section structure of Gregorian music. The musical meaning of *divisio minima*, *divisio maior*, and *divisio maxima* can be characterized as short, medium, and long pause. The *finalis* sign not only marks the end of a chant, but is also frequently used within a single antiphonal/responsorial chant to mark the end of each section.

To use divisiones, include the file `gregorian.ly`. It contains definitions that you can apply by just inserting `\divisioMinima`, `\divisioMaior`, `\divisioMaxima`, and `\finalis` at proper places in the input. Some editions use *virgula* or *caesura* instead of divisio minima; therefore, `gregorian.ly` also defines `\virgula`, and the predefined staff contexts for Gregorian chant configure `\caesura` to produce an ancient caesura mark.

divisio minima divisio maior divisio maxima





Predefined commands

`\virgula`, `\caesura`, `\divisioMinima`, `\divisioMaior`, `\divisioMaxima`, `\finalis`.

See also

Music Glossary: Section “caesura” in *Music Glossary*, Section “divisio” in *Music Glossary*.

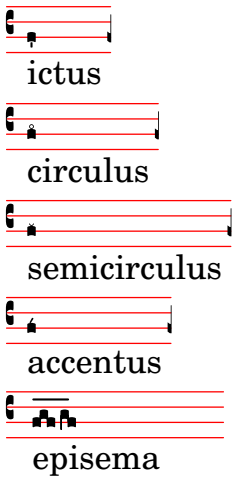
Notation Reference: [Breath marks], page 156.

Installed Files: `ly/gregorian.ly`.

Gregorian articulation signs

In addition to the standard articulation signs described in section [Articulations and ornamentations], page 138, articulation signs specifically designed for use with notation in *Editio Vaticana* style are provided.

```
\include "gregorian.ly"
\score {
  \new VaticanaVoice {
    \override Script.padding = #-0.1
    a\ictus_"ictus " \break
    a\circulus_"circulus " \break
    a\semicirculus_"semicirculus " \break
    a\accentus_"accentus " \break
    \[ a_"episema" \episemInitium \pes b
       \flexa a b \episemFinis \flexa a \]
  }
}
```



See also

Notation Reference: [Articulations and ornamentations], page 138.

Snippets: Section “Ancient notation” in *Snippets*.

Internals Reference: Section “Episema” in *Internals Reference*, Section “EpisemaEvent” in *Internals Reference*, Section “Episema_engraver” in *Internals Reference*, Section “Script” in *Internals Reference*, Section “ScriptEvent” in *Internals Reference*, Section “Script_engraver” in *Internals Reference*.

Known issues and warnings

Some articulations are vertically placed too closely to the corresponding note heads.

Augmentum dots (*morae*)

Augmentum dots, also called *morae*, are added with the music function `\augmentum`. Note that `\augmentum` is implemented as a unary music function rather than as head prefix. It applies to the immediately following music expression only. That is, `\augmentum \virga c` will have no visible effect. Instead, say `\virga \augmentum c` or `\augmentum {\virga c}`. Also note that you can say `\augmentum {a g}` as a shortcut for `\augmentum a \augmentum g`.

```
\include "gregorian.ly"
\score {
  \new VaticanaVoice {
    \[ \augmentum a \flexa \augmentum g \]
    \augmentum g
  }
}
```

See also

Notation Reference: [Breath marks], page 156.

Internals Reference: Section “Divisio” in *Internals Reference*.

Snippets: Section “Ancient notation” in *Snippets*.

Gregorian square neume ligatures

There is limited support for Gregorian square neumes notation (following the style of the Editio Vaticana). Core ligatures can already be typeset, but essential issues for serious typesetting are still lacking, such as (among others) horizontal alignment of multiple ligatures, lyrics alignment, and proper handling of accidentals.

The support for Gregorian neumes is enabled by `\includeing gregorian.ly` at the beginning of the file. This makes available a number of extra commands to produce the neume symbols used in plainchant notation.

Note heads can be *modified* and/or *joined*.

- The shape of the note head can be modified by *prefixing* the note name with any of the following commands: `\virga`, `\stropha`, `\inclinatum`, `\auctum`, `\descendens`, `\ascendens`, `\oriscus`, `\quilisma`, `\deminutum`, `\cavum`, `\linea`.
- Ligatures, properly speaking (i.e., notes joined together), are produced by placing one of the joining commands `\pes` or `\flexa`, for upwards and downwards movement, respectively, *between* the notes to be joined.

A note name without any qualifiers will produce a *punctum*. All other neumes, including the single-note neumes with a different shape such as the *virga*, are in principle considered as ligatures and should therefore be placed between `\[...\]`.

Single-note neumes

- The *punctum* is the basic note shape (in the *Vaticana* style: a square with some curvation for typographical finesse). In addition to the regular *punctum*, there is also the oblique *punctum inclinatum*, produced with the prefix `\inclinatum`. The regular *punctum* can be modified with `\cavum`, which produces a hollow note, and `\linea`, which draws vertical lines on either side of the note.

- The *virga* has a descending stem on the right side. It is produced by the modifier `\virga`.

Ligatures

Unlike most other neumes notation systems, the typographical appearance of ligatures is not directly dictated by the input commands, but follows certain conventions dependent on musical meaning. For example, a three-note ligature with the musical shape low-high-low, such as `\[ a \pes b \flexa g \]`, produces a Torculus consisting of three Punctum heads, while the shape high-low-high, such as `\[ a \flexa g \pes b \]`, produces a Porrectus with a curved flexa shape and only a single Punctum head. There is no command to explicitly typeset the curved flexa shape; the decision of when to typeset a curved flexa shape is based on the musical input. The idea of this approach is to separate the musical aspects of the input from the notation style of the output. This way, the same input can be reused to typeset the same music in a different style of Gregorian chant notation.

Liquescent neumes

Another main category of notes in Gregorian chant is the so-called liquescent neumes. They are used under certain circumstances at the end of a syllable which ends in a 'liquescent' letter, i.e., the sounding consonants that can hold a tone (the nasals, l, r, v, j, and their diphthong equivalents). Thus, the liquescent neumes are never used alone (although some of them can be produced), and they always fall at the end of a ligature.

Liquescent neumes are represented graphically in two different, more or less interchangeable ways: with a smaller note or by 'twisting' the main note upwards or downwards. The first is produced by making a regular `pes` or `flexa` and modifying the shape of the second note: `\[ a \pes \deminutum b \]` , the second by modifying the shape of a single-note neume with `\auctum` and one of the direction markers `\descendens` or `\ascendens`, e.g., `\[ \auctum \descendens a \]` .

Special signs

A third category of signs is made up of a small number of signs with a special meaning (which, incidentally, in most cases is only vaguely known): the *quilisma*, the *oriscus*, and the *strophicus*. These are all produced by prefixing a note name with the corresponding modifier, `\quilisma`, `\oriscus`, or `\stropha`.

Virtually, within the ligature delimiters `\[` and `\]`, any number of heads may be accumulated to form a single ligature, and head prefixes like `\pes`, `\flexa`, `\virga`, `\inclinatum`, etc., may be mixed in as desired. The use of the set of rules that underlies the construction of the ligatures in the above table is accordingly extrapolated. This way, infinitely many different ligatures can be created.

Note that the use of these signs in the music itself follows certain rules, which are not checked by LilyPond. E.g., the *quilisma* is always the middle note of an ascending ligature, and usually falls on a half-tone step, but it is perfectly possible, although incorrect, to make a single-note quilisma.

In addition to the note signs, `gregorian.ly` also defines the commands `\versus`, `\responsum`, `\ij`, `\iij`, `\IJ`, and `\IIJ`, that will produce the corresponding characters, e.g., for use in lyrics, as section markers, etc. These commands use special Unicode characters and will only work if a font is used which supports them.

The following table shows a limited, but still representative pool of Gregorian ligatures, together with the code fragments that produce the ligatures. The table is based on the extended neumes table of the 2nd volume of the Antiphonale Romanum (*Liber Hymnarius*), published 1983 by the monks of Solesmes. The first column gives the name of the ligature, with the main form in boldface and the liquescent forms in italics. The third column shows the code fragment that produces this ligature, using `g`, `a`, and `b` as example pitches.

Single-note neumes

Basic and *Liquescent* forms	**Output**	**LilyPond code**
Punctum		`\[ b \]`
		`\[ \cavum b \]`
		`\[ \linea b \]`
Punctum Auctum Ascendens		`\[ \auctum \ascendens b \]`
Punctum Auctum Descendens		`\[ \auctum \descendens b \]`
Punctum inclinatum		`\[ \inclinatum b \]`
Punctum Inclinatum Auctum		`\[ \inclinatum \auctum b \]`
Punctum Inclinatum Parvum		`\[ \inclinatum \deminutum b \]`
Virga		`\[ \virga b' \]`

Two-note ligatures

Clivis vel Flexa		`\[ b \flexa g \]`
Clivis Aucta Descendens		`\[ b \flexa \auctum \descendens g \]`
Clivis Aucta Ascendens		`\[ b \flexa \auctum \ascendens g \]`
Cephalicus		`\[ b \flexa \deminutum g \]`
Podatus/Pes		`\[ g \pes b \]`
Pes Auctus Descendens		`\[ g \pes \auctum \descendens b \]`
Pes Auctus Ascendens		`\[ g \pes \auctum \ascendens b \]`
Epiphonus		`\[ g \pes \deminutum b \]`
Pes Initio Debilis		`\[ \deminutum g \pes b \]`
Pes Auctus Descendens Initio Debilis		`\[ \deminutum g \pes \auctum \descendens b \]`

Multi-note ligatures

Torculus		`\[ a \pes b \flexa g \]`
Torculus Auctus Descendens		`\[ a \pes b \flexa \auctum \descendens g \]`
Torculus Deminutus		`\[ a \pes b \flexa \deminutum g \]`
Torculus Initio Debilis		`\[ \deminutum a \pes b \flexa g \]`
Torculus Auctus Descendens Initio Debilis		`\[ \deminutum a \pes b \flexa \auctum \descendens g \]`
Torculus Deminutus Initio Debilis		`\[ \deminutum a \pes b \flexa \deminutum g \]`
Porrectus		`\[ a \flexa g \pes b \]`
Porrectus Auctus Descendens		`\[ a \flexa g \pes \auctum \descendens b \]`
Porrectus Deminutus		`\[ a \flexa g \pes \deminutum b \]`
Climacus		`\[ \virga b \inclinatum a \inclinatum g \]`
Climacus Auctus		`\[ \virga b \inclinatum a \inclinatum \auctum g \]`
Climacus Deminutus		`\[ \virga b \inclinatum a \inclinatum \deminutum g \]`
Scandicus		`\[ g \pes a \virga b \]`
Scandicus Auctus Descendens		`\[ g \pes a \pes \auctum \descendens b \]`

Scandicus Deminutus		`\[ g \pes a \pes \deminutum b \]`

Special signs

Quilisma		`\[ g \pes \quilisma a \pes b \]`
Quilisma Pes Auctus Descendens		`\[ g \quilisma a \pes \auctum \descendens b \]`
Oriscus		`\[ \oriscus b \]`
Pes Quassus		`\[ \oriscus g \pes \virga b \]`
Pes Quassus Auctus Descendens		`\[ \oriscus g \pes \auctum \descendens b \]`
Salicus		`\[ g \oriscus a \pes \virga b \]`
Salicus Auctus Descendens		`\[ g \oriscus a \pes \auctum \descendens b \]`
(Apo)stropha		`\[ \stropha b \]`
Stropha Aucta		`\[ \stropha \auctum b \]`
Bistropha		`\[ \stropha b \stropha b \]`
Tristropha		`\[ \stropha b \stropha b \stropha b \]`
Trigonus		`\[ \stropha b \stropha b \stropha a \]`

Predefined commands

The following head prefixes are supported: `\virga`, `\stropha`, `\inclinatum`, `\auctum`, `\descendens`, `\ascendens`, `\oriscus`, `\quilisma`, `\deminutum`, `\cavum`, `\linea`.

Head prefixes can be accumulated, though restrictions apply. For example, either `\descendens` or `\ascendens` can be applied to a head, but not both to the same head.

Two adjacent heads can be tied together with the `\pes` and `\flexa` infix commands for a rising and falling line of melody, respectively.

Use the unary music function `\augmentum` to add augmentum dots.

See also

Music Glossary: Section “ligature” in *Music Glossary*.

Notation Reference: [Gregorian square neume ligatures], page 507, [White mensural ligatures], page 502, [Ligatures], page 495.

Known issues and warnings

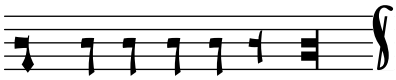
When an `\augmentum` dot appears at the end of the last staff within a ligature, it is sometimes vertically placed wrong. As a workaround, add an additional skip note (e.g., `s8`) as last note of the staff.

`\augmentum` should be implemented as a head prefix rather than a unary music function, such that `\augmentum` can be intermixed with head prefixes in arbitrary order.

2.9.5 Typesetting Kievan square notation

Kievan contexts

As with Mensural and Gregorian notation, the predefined `KievanVoice` and `KievanStaff` contexts can be used to engrave a piece in square notation. These contexts initialize all relevant context properties and grob properties to proper values, so you can immediately go ahead entering the chant:

```
% Font settings for Cyrillic
\paper {
  #(define fonts
    (set-global-fonts
     #:roman "Linux Libertine O,serif"
   ))
}

\score {
  <<
    \new KievanVoice = "melody" \relative c' {
      \cadenzaOn
        c4 c c c c2 b\longa
        \fine
    }
    \new Lyrics \lyricsto "melody" {
      Го -- спо -- ди по -- ми -- луй.
    }
  >>
}
```

Господи помилуй.

See also

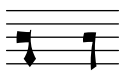
Music Glossary: Section “Kievan notation” in *Music Glossary*.

Known issues and warnings

LilyPond supports Kievan notation of the Synodal style, as used in the corpus of chant books printed by the Russian Holy Synod in the 1910’s and recently reprinted by the Moscow Patriarchate Publishing House. LilyPond does not support the older (less common) forms of Kievan notation that were used in Galicia to notate Rusyn plainchant.

Kievan clefs

There is only one clef used in Kievan notation (the Tse-fa-ut Clef). It is used to indicate the position of `c`:

```
\clef "kievan-do"
\kievanOn
c'
```

See also

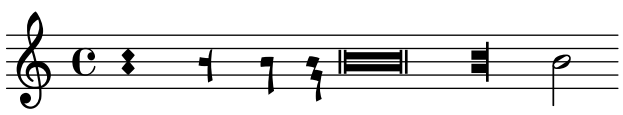
Music Glossary: Section “Kievan notation” in *Music Glossary*, Section “clef” in *Music Glossary*.

Notation Reference: [Clef], page 17.

Kievan notes

For Kievan square notation, the appropriate note head style needs to be chosen and the flags and stems need to be turned off. This is accomplished by calling the `\kievanOn` function, which sets the appropriate properties of the note head, stems, and flags. Once Kievan note heads are not needed, these properties can be reverted by calling the `\kievanOff` function.

The Kievan final note, which usually comes at the end of a piece of music, may be selected by setting the duration to `\longa`. The Kievan recitative mark, used to indicate the chanting of several syllables on one note, may be selected by setting the duration to `\breve`. The following example demonstrates the various Kievan note heads:

```
\autoBeamOff
\cadenzaOn
\kievanOn
b'1 b'2 b'4 b'8 b'\breve b'\longa
\kievanOff
b'2
```

See also

Music Glossary: Section “Kievan notation” in *Music Glossary*, Section “note head” in *Music Glossary*.

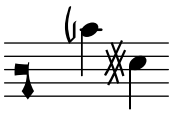
Notation Reference: Section A.9 [Note head styles], page 753.

Known issues and warnings

LilyPond automatically determines if the stem up or stem down form of a note is drawn. When setting chant in square notation, however, it is customary to have the stems point in the same direction within a single melisma. This can be done manually by setting the `direction` property of the `Stem` object.

Kievan accidentals

The `kievan` style provides a sharp and a flat sign different from the default style. There is no natural sign in Kievan notation. The sharp sign is not used in Synodal music but may occur in earlier manuscripts. It has been included primarily for the sake of compatibility.

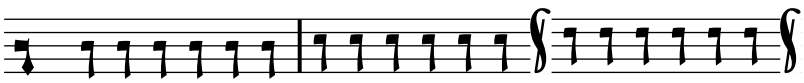
```
\clef "kievan-do"
\set Staff.alterationGlyphs =
  #alteration-kievan-glyph-name-alist
bes' dis'
```

See also

Music Glossary: Section “Kievan notation” in *Music Glossary*, Section “accidental” in *Music Glossary*.

Notation Reference: [Accidentals], page 6, [Automatic accidentals], page 28, [Alternate accidental glyphs], page 36, Section A.8 [The Emmentaler font], page 739.

Kievan bar lines

In a `KievanStaff`, there are no measures, but the `\caesura` command creates a phrase bar line, and the `\section` and `\fine` commands create a special section bar line.

```
\new KievanStaff {
  c'4 4 4 4 4 4 \caesura  % \bar "."
  d'4 4 4 4 4 4 \section  % \bar "k"
  e'4 4 4 4 4 4 \fine
}
```

See also

Notation Reference: Section 1.2.5 [Bars], page 106, Section A.8 [The Emmentaler font], page 739.

Kievan melismata

Notes within a Kievan melisma are usually placed close to each other and the melismata separated by whitespace. This is done to allow the chanter to quickly identify the melodic structures of *Znamenny chant*. In LilyPond, melismata are treated as ligatures and the spacing is implemented by the `Kievan_ligature_engraver`.

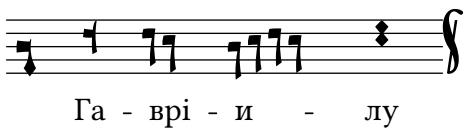
When the `KievanVoice` and `KievanStaff` contexts are used, the `Kievan_ligature_engraver` is enabled by default. In other contexts, it can be invoked by replacing the `Ligature_bracket_engraver` with the `Kievan_ligature_engraver` in the layout block:

```
\layout {
```

```
  \context {
    \Voice
    \remove Ligature_bracket_engraver
    \consists Kievan_ligature_engraver
  }
}
```

The spacing between the notes within a Kievan ligature can be controlled by setting the `padding` property of the `KievanLigature`.

The following example demonstrates the use of Kievan ligatures:

```
% Font settings for Cyrillic
\paper {
  #(define fonts
    (set-global-fonts
     #:roman "Linux Libertine O,serif"
   ))
}

\score {
  <<
    \new KievanVoice = "melody" \relative c' {
      \cadenzaOn
        e2 \[ e4( d4 ) \] \[ c4( d e d ) \] e1 \fine
    }
    \new Lyrics \lyricsto "melody" {
      Га -- врі -- и -- лу
    }
  >>
}
```

See also

Music Glossary: Section “ligature” in *Music Glossary*.

Notation Reference: [White mensural ligatures], page 502, [Gregorian square neume ligatures], page 507, [Ligatures], page 495.

Known issues and warnings

Horizontal spacing of ligatures is poor.

2.9.6 Working with ancient music – scenarios and solutions

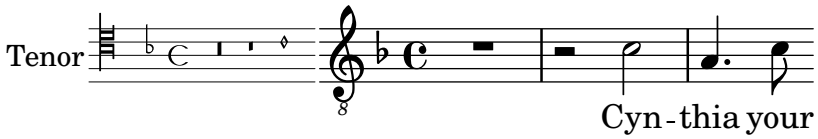
Working with ancient music frequently involves particular tasks which differ considerably from the modern notation for which LilyPond is designed. In the rest of this section, a number of typical scenarios are outlined, with suggestions of solutions. These involve:

- how to make incipits (i.e., prefatory material to indicate what the original has looked like) to modern transcriptions of mensural music;
- how to achieve the *Mensurstriche* layout frequently used for modern transcriptions of polyphonic music;
- how to transcribe Gregorian chant in modern notation;

- how to generate both ancient and modern notation from the same source.

Incipits

It is customary when transcribing mensural music into modern notation to place an indication of how the initial rests and note or notes of the original version appeared – including the original clefs. This is called an *incipit*. The `\incipit` command uses the `indent` of the main staff to set the width occupied by the incipit, and `incipit-width` to set the width of the incipit staff.

```
\score {
  \new Staff <<
    \new Voice = Tenor {
      \set Staff.instrumentName = "Tenor"
      \override Staff.InstrumentName.self-alignment-X = #RIGHT
      \incipit { \clef "mensural-c4" \key f \major r\breve r1 c'1 }
      \clef "treble_8"
      \key f \major
      R1 r2 c'2 |
      a4. c'8
    }
    \new Lyrics \lyricsto Tenor { Cyn -- thia your }
  >>
  \layout
  {
    indent = 5\cm
    incipit-width = 3\cm
  }
}
```

Known issues and warnings

Note that instrumentName must be set in the music for the incipit to be produced. If no instrument name is required then use `\set Staff.instrumentName = ""`.

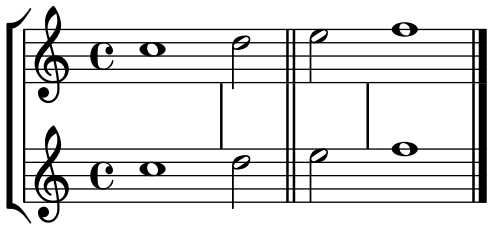
Mensurstriche layout

Mensurstriche ('mensuration lines') is the accepted term for bar lines that are drawn between the staves of a system but not through the staves themselves. It is a common way to preserve the rhythmic appearance of the original, i.e., not having to break syncopated notes at bar lines, while still providing the orientation aids that bar lines give.

The *mensurstriche* layout, where bar lines do not appear on staves but between staves only, can be achieved with a `StaffGroup` instead of a `ChoirStaff`. The bar line on staves is blanked out using `\hide`.

```
\layout {
  \context {
    \Staff
    measureBarType = "-span|"
  }
}
```

```
music = \fixed c'' {
  c1
  d2 \section e2
  f1 \fine
}

\new StaffGroup <<
  \new Staff \music
  \new Staff \music
>>
```



Transcribing Gregorian chant

Gregorian chant can be transcribed into modern notation with a number of simple tweaks.

Stems. The `GregorianTranscriptionVoice` context does not create stems. You can extend this behavior to other contexts by removing `Stem_engraver`:

```
\layout {
  ...
  \context {
    \Voice
    \remove Stem_engraver
  }
}
```

Timing. For unmetered chant, there are several alternatives.

The Time_signature_engraver can be removed from the Staff context without any negative side effects. The alternative, to make it transparent, will leave an empty space in the score, since the invisible signature will still take up space.

In many cases, `\set Score.timing = ##f` will give good results. An alternative is to use `\cadenzaOn` and `\cadenzaOff`.

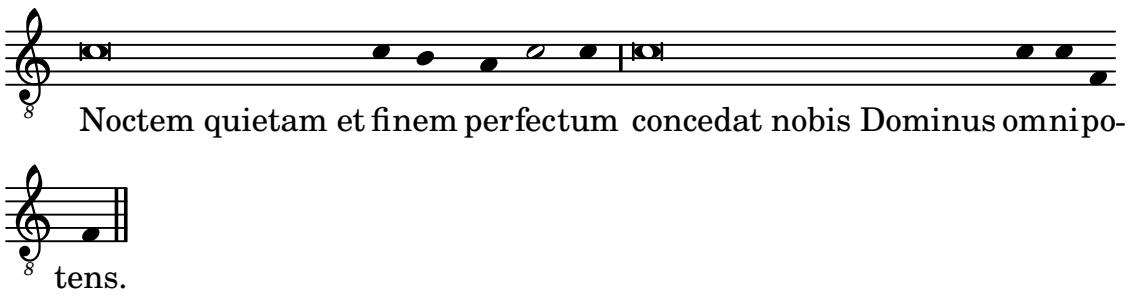
The predefined staff contexts for ancient music do not create measure bar lines. You can extend this behavior to all other contexts with `\set Score.measureBarType = #'()` or to particular staves with `\set Staff.measureBarType = #'()`.

The predefined staff contexts for ancient music allow line breaks without bar lines. You can extend this behavior to all other contexts with `\set Score.forbidBreakBetweenBarLines = ##f` or to particular staves with `\set Staff.forbidBreakBetweenBarLines = ##f`.

A common type of transcription is recitativic chant where the repeated notes are indicated with a single breve. The text to the recitation tone can be dealt with in two different ways: either set as a single, left-aligned syllable:

```
\include "gregorian.ly"
chant = \relative {
  \clef "G_8"
  c'\breve c4 b4 a c2 c4 \divisioMaior
  c\breve c4 c f, f \finalis
}
```

```
verba = \lyricmode {
  \once \override LyricText.self-alignment-X = #-1
  "Noctem quietam et" fi -- nem per -- fec -- tum
  \once \override LyricText.self-alignment-X = #-1
  "concedat nobis Dominus" om -- ni -- po -- tens.
}
\score {
  \new GregorianTranscriptionStaff <<
    \new GregorianTranscriptionVoice = "melody" {
      \chant
    }
    \new GregorianTranscriptionLyrics = "one" {
      \lyricsto "melody" \verba
    }
  >>
}
```

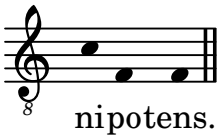


This works fine, as long as the text doesn't span a line break. If that is the case, an alternative is to add hidden notes to the score, as below.

In some transcription styles, stems are used occasionally, for example to indicate the transition from a single-tone recitative to a fixed melodic gesture. In these cases, one can use the `Stem_engraver` and manually `\omit Stem` and `\undo \omit Stem`.

```
\include "gregorian.ly"
chant = \relative {
  \clef "G_8"
  \set Score.timing = ##f
  \omit Stem
  c'\breve \hide NoteHead c c c c c
  \undo \hide NoteHead
  \undo \omit Stem \stemUp c4 b4 a
  \omit Stem c2 c4 \divisioMaior
  c\breve \hide NoteHead c c c c c c c
  \undo \hide NoteHead c4 c f, f \finalis
}

verba = \lyricmode {
  No -- ctem qui -- e -- tam et fi -- nem per -- fec -- tum
  con -- ce -- dat no -- bis Do -- mi -- nus om -- ni -- po -- tens.
}

\score {
  \new GregorianTranscriptionStaff <<
```

```
    \new GregorianTranscriptionVoice = "melody" {
      \chant
    }
    \new GregorianTranscriptionLyrics = "one" {
      \lyricsto "melody" \verba
    }
  >>
  \layout {
    \context {
      \GregorianTranscriptionVoice
      \consists Stem_engraver
    }
  }
}
```

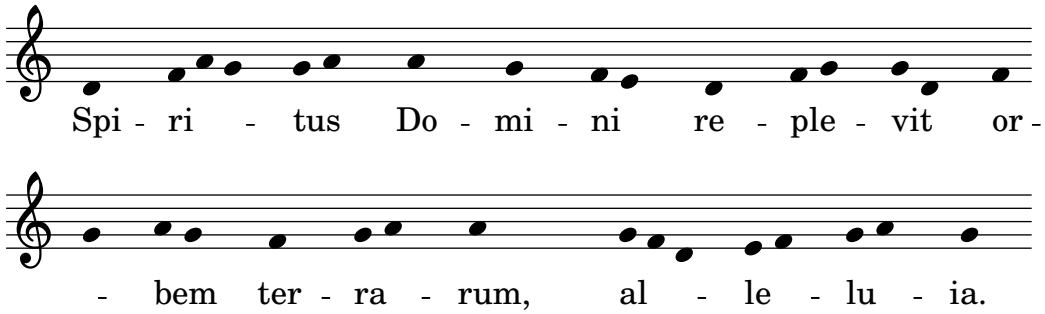


Another common situation is transcription of neumatic or melismatic chants, i.e., chants with a varying number of notes to each syllable. In this case, one would want to set the syllable groups clearly apart, usually also the subdivisions of a longer melisma. One way to achieve this is to use a fixed `\time`, e.g., 1/4, and let each syllable or note group fill one of these measures, with the help of tuplets or shorter durations. If the bar lines and all other rhythmical indications are made transparent, and the space around the bar lines is increased, this will give a fairly good representation in modern notation of the original.

To avoid that syllables of different width (such as “-ri” and “-rum”) spread the syllable note groups unevenly apart, the `X-extent` property of the `LyricText` object may be set to a fixed value. Another, more cumbersome way would be to add the syllables as `\markup` elements. If further adjustments are necessary, this can be easily done with `s` ‘notes’.

```
spiritus = \relative {
  \time 1/4
  \override Lyrics.LyricText.X-extent  = #'(0 . 3)
  d'4 \tuplet 3/2 { f8 a g } g a a4 g f8 e
  d4 f8 g g8 d f g a g f4 g8 a a4 s
  \tuplet 3/2 { g8 f d } e f g a g4
}

spirLyr = \lyricmode {
  Spi -- ri -- _ _ tus _ Do -- mi -- ni _ re -- ple -- _ vit _
  or -- _ bem _ ter -- ra -- _ rum, al -- _ _ le -- _ lu
  -- _ ia.
}
\score {
  \new GregorianTranscriptionStaff <<
    \new GregorianTranscriptionVoice = "chant" {
      \spiritus
```

```
    }
    \new GregorianTranscriptionLyrics = "one" {
      \lyricsto "chant" \spirLyr
    }
  >>
  \layout {
    \context {
      \GregorianTranscriptionStaff
      measureBarType = ""
      \override BarLine.X-extent = #'(-1 . 1)
      \hide Beam
      \hide TupletNumber
      \hide TupletBracket
    }
  }
}
```



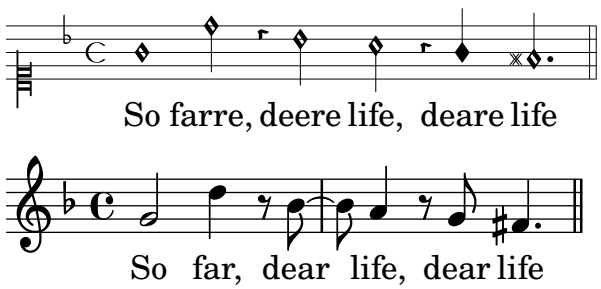
Ancient and modern from one source

Using tags to produce mensural and modern music from the same source

Using tags, it is possible to produce both mensural and modern notation from the same music. In this snippet, a function `menrest` is introduced, allowing mensural rests to be pitched as in the original, but with modern rests in the standard staff position. Tags can also be used where other differences are needed: for example using "whole measure rests" (`R1`, `R\breve`, etc.) in modern music, but normal rests (`r1`, `r\breve`, etc.) in the mensural version. Converting mensural music to its modern equivalent is usually referred to as "transcription".

```
menrest = #(define-music-function (note)
  (ly:music?)
#{
    \tag #'mens $(make-music 'RestEvent note)
    \tag #'mod $(make-music 'RestEvent note 'pitch '())
#})

MenStyle = {
  \autoBeamOff
  \override NoteHead.style = #'petrucci
  \override Score.BarNumber.transparent = ##t
  \override Stem.neutral-direction = #up
}

finalis = \section
```

```
Music = \relative c'' {
  \set Score.tempoHideNote = ##t
  \key f \major
  \time 4/4
  g1 d'2 \menrest bes4 bes2 a2 r4 g4 fis2.
  \finalis
}

MenLyr = \lyricmode { So farre, deere life, deare life }
ModLyr = \lyricmode { So far, dear life, dear life }

\score {
  \keepWithTag #'mens {
    <<
      \new MensuralStaff
      {
        \new MensuralVoice = Cantus
          \clef "mensural-c1" \MenStyle \Music
      }
      \new Lyrics \lyricsto Cantus \MenLyr
    >>
  }
}

\score {
  \keepWithTag #'mod {
    \new ChoirStaff <<
      \new Staff
      {
        \new Voice = Sop \with {
          \remove "Note_heads_engraver"
          \consists "Completion_heads_engraver"
          \remove "Rest_engraver"
          \consists "Completion_rest_engraver" }
        {
          \shiftDurations #1 #0 { \autoBeamOff \Music }
        }
      }
      \new Lyrics \lyricsto Sop \ModLyr
    >>
  }
}
```



2.10 World music

The purpose of this section is to highlight musical notation issues that are relevant to traditions outside the Western tradition.

2.10.1 Common notation for non-Western music

This section discusses how to enter and print music scores that do not belong to the Western classical tradition, also referred to as *Common Practice Period*.

Extending notation and tuning systems

Standard classical notation (also known as *Common Practice Period* notation) is commonly used in all sorts of music, not limited to 'classical' Western music. This notation is discussed in Section 1.1.1 [Writing pitches], page 1, and the various note names that may be used are explained in [Note names in other languages], page 8.

Some types of non-Western music and folk/traditional music often employ alternative or extended tuning systems that do not fit easily into standard, classical notation.

Standard notation is still used but with pitch differences being implicit. For example, *Arabic music* is notated with semi and quarter tone accidentals but with precise pitch alterations being determined by context. In the case of *Arabic music*, the init file `arabic.ly` provides a suitable set of macros and definitions that extend the standard notation using Italian note names. For more details see Section 2.10.2 [Arabic music], page 523.

Other types of music require extended or unique notations, for example, *Turkish classical music* (also known as Ottoman classical music) employs melodic forms known as *makamlar* where intervals are based on 1/9 divisions of the whole tone. Standard, Western staff notes are still used, but with special accidentals uniquely defined in the files `turkish-makam.ly`. For more information on Turkish classical music and makamlar see Section 2.10.3 [Turkish classical music], page 529.

Other, related init files are also available; `hel-arabic.ly` and `makam.ly`.

To locate these init files on your system, see Section "Other sources of information" in *Learning Manual*.

See also

Music Glossary: Section "Common Practice Period" in *Music Glossary*, Section "makamlar" in *Music Glossary*.

Learning Manual: Section "Other sources of information" in *Learning Manual*.

Notation Reference: Section 1.1.1 [Writing pitches], page 1, [Note names in other languages], page 8, Section 2.10.2 [Arabic music], page 523, Section 2.10.3 [Turkish classical music], page 529, Section 2.10.4 [Persian classical music], page 531.

2.10.2 Arabic music

This section highlights issues that are relevant to notating Arabic music.

References for Arabic music

Arabic music so far has been mainly an oral tradition. When music is transcribed, it is usually in a sketch format, on which performers are expected to improvise significantly. Increasingly, Western notation, with a few variations, is adopted in order to communicate and preserve Arabic music.

Some elements of Western musical notation such as the transcription of chords or independent parts, are not required to typeset the more traditional Arabic pieces. There are however some different issues, such as the need to indicate medium intervals that are somewhere between a

semi-tone and a tone, in addition to the minor and major intervals that are used in Western music. There is also the need to group and indicate a large number of different maqams (modes) that are part of Arabic music.

In general, Arabic music notation does not attempt to precisely indicate microtonal elements that are present in musical practice.

Several issues that are relevant to Arabic music are covered elsewhere:

- Note names and accidentals (including quarter tones) can be tailored as discussed in Section 2.10.1 [Common notation for non-Western music], page 523.
- Additional key signatures can also be tailored as described in [Key signature], page 21.
- Complex time signatures may require that notes be grouped manually as described in [Manual beams], page 102.
- *Takasim* which are rhythmically free improvisations may be written down omitting bar lines as described in [Unmetered music], page 81.

See also

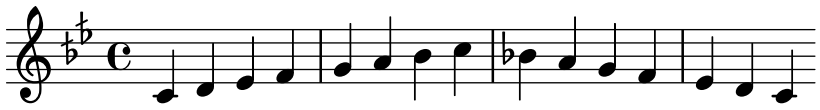
Notation Reference: Section 2.10.1 [Common notation for non-Western music], page 523, [Key signature], page 21, [Manual beams], page 102.

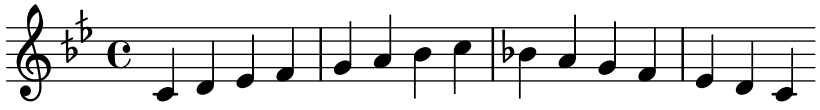
Snippets: Section "World music" in *Snippets*.

Arabic note names

Traditional Arabic note names (like 'rast', 'dukah', 'sikah', etc.) can be quite long and so may not always be suitable for the purpose of music writing.

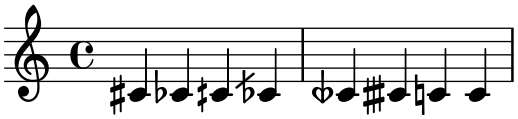
Include the file `arabic.ly` to write Arabic sheet music. The following example demonstrates how to write a 'rast' scale:

```
\include "arabic.ly"
\relative {
  \key do \rast
  do' re misb fa | sol la sisb do | sib la sol fa | misb re do
}
```

The file `arabic.ly` sets the note language to Italian (or Solfege), since that is the modern standard in Arabic music and is widely adopted among Arabic musicians. If you prefer to write sheet music in another language, simply change the language to your preferred language directly after including the file `arabic.ly`. This is a 'rast' scale with English note names:

```
\include "arabic.ly"
\language "english"
\relative {
  \key c \rast
  c' d eqf f | g a bqf c | bf a g f | eqf d c
}
```

"Rast" is a heptatonic scale that uses quarter tone intervals and is considered the most important and central scale of the "Arabic Maqamat". For the full list of supported Arabic scales, see [Arabic key signatures], page 525.

The use of standard Western notation to notate non-Western music is discussed in Section 2.10.1 [Common notation for non-Western music], page 523. Also see [Note names in other languages], page 8.

The symbol for semi-flat does not match the symbol which is used in Arabic notation. The `\dwn` symbol defined in `arabic.ly` may be used preceding a flat symbol as a work around if it is important to use the specific Arabic semi-flat symbol. The appearance of the semi-flat symbol in the key signature cannot be altered by using this method.

```
\include "arabic.ly"
\relative {
  \set Staff.extraNatural = ##f
  dod' dob dosd \dwn dob dobsb dodsd do do
}
```

See also

Notation Reference: [Note names in other languages], page 8, Section 2.10.1 [Common notation for non-Western music], page 523, Section 3.4.1 [Including LilyPond files], page 567.

Installed Files: `ly/arabic.ly`

Snippets: Section "World music" in *Snippets*.

Arabic key signatures

In addition to the minor and major key signatures, LilyPond provides the most common Arabic key signatures in the file `arabic.ly`. With that being said LilyPond is not aiming at providing a full suite of all possible maqams. It rather defines the most common ones that are frequently used and offers key signatures by grouping maqams together. In general, a maqam uses the key signature of its family, or a neighboring family, and varying accidentals are marked throughout the music. When forming key signatures neighboring maqam families are grouped together. For example, maqam *saba* seldom occurs outside of the context of maqam *bayati* and adds only a single alteration. Although both maqams come from different *maqam families* they are inside the same key signature *group*. Arabic maqams only allow for limited modulations, due to the nature of Arabic musical instruments.

Here is an example of the key signature for a "maqam muhayer" piece of music:

```
\key re \bayati
```

Here *re* is the default pitch of the muhayer maqam, and *bayati* is the name of the base maqam in the group.

While the key signature indicates the group, it is common for the title to indicate the more specific maqam, so in this example, the name of "maqam muhayer" should also appear in the title.

Other maqams in the same *bayati* group, as shown in the table below (e.g., *bayati*, *hussaini*, *saba*, and *ushaq*) can be indicated in the same way. These are all variations of the base and most common maqam in the group, which is *bayati*. They usually differ from the base maqam in their upper tetrachords, or certain flow details that do not change their fundamental nature, as siblings.

The other maqam in the same group (*nawa*) is related to *bayati* by modulation and is shown in the table in parentheses for those that are modulations of their base maqam. *Nawa*, for example, can be indicated as follows:

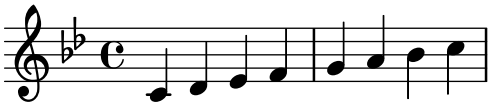
```
\key sol \bayati
```

In Arabic music, the same term, for example *bayati*, that is used to indicate a maqam family, is also a maqam that is usually the most important in the family so can also be thought of as a *base maqam*.

Here is the grouping that maps the more common maqams to key signatures as defined in the file `arabic.ly`:

maqam group	**key**	**finalis**	**Other maqams in group (finalis)**
ajam	`major`	sib	jaharka (fa)
bayati	`bayati`	re	hussaini, muhayer, saba, ushaq, nawa (sol)
hijaz	`hijaz`	re	zanjaran (do)
hijaz kar	`hijaz_kar`	do	shahnaz, shad arban (sol)
huzam	`huzam`	misb	-
iraq	`iraq`	sisb	-
kurd	`kurd`	re	hijazkar kurd (do)
nahawand	`minor`	do	busalik (re), farah faza (sol)
nakriz	`nakriz`	do	nawa athar, hisar (re)
rast	`rast`	do	mahur, yakah (sol)
sikah	`sikah`	misb	-

In case you are missing a specific maqam, you can define it yourself in your sheet music before using it. The following example defines and then uses the *zanjaran* maqam.

```
\include "arabic.ly"

% For example on do: do reb mi fa sol la sib do
% reb and sib are FLAT
% You can also use SHARP, SEMI-FLAT, SEMI-SHARP
zanjaran = #`(
  (0 . ,NATURAL)
  (1 . ,FLAT)
  (2 . ,NATURAL)
  (3 . ,NATURAL)
  (4 . ,NATURAL)
  (5 . ,NATURAL)
  (6 . ,FLAT)
)

\relative {
  \key do \zanjaran
  do' reb mi fa sol la sib do
}
```

For special cases, rare maqams are defined in the `hel-arabic.ly` file. Please refer to the file included with LilyPond for a full list of the provided maqams.

Selected Snippets

Non-traditional key signatures

The commonly used `\key` command sets the `keyAlterations` property, in the `Staff` context.

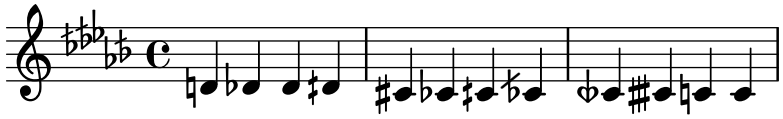
To create non-standard key signatures, set this property directly. The format of this command is a list:

```
\set Staff.keyAlterations =
  #`(((octave . step) . alter) ((octave . step) . alter) ...)
```

where, for each element in the list, `octave` specifies the octave (0 being the octave from middle C to the B above), `step` specifies the note within the octave (0 means C and 6 means B), and `alter` is `,SHARP` `,FLAT` `,DOUBLE-SHARP` etc.

Alternatively, using the more concise format for each item in the list `(step . alter)` specifies the same alteration holds in all octaves.

For microtonal scales where a "sharp" is not 100 cents, `alter` refers to the alteration as a proportion of a 200-cent whole tone.

```
\include "arabic.ly"
\relative do' {
  \set Staff.keyAlterations = #`((0 . ,SEMI-FLAT)
                                 (1 . ,SEMI-FLAT)
                                 (2 . ,FLAT)
                                 (5 . ,FLAT)
                                 (6 . ,SEMI-FLAT))
%\set Staff.extraNatural = ##f
  re reb \dwn reb resd
  dod dob dosd \dwn dob |
  dobsb dodsd do do |
}
```

See also

Music Glossary: Section "maqam" in *Music Glossary*, Section "bayati" in *Music Glossary*, Section "rast" in *Music Glossary*, Section "sikah" in *Music Glossary*, Section "iraq" in *Music Glossary*, Section "kurd" in *Music Glossary*.

Learning Manual: Section "Pitches and key signatures" in *Learning Manual*.

Notation Reference: [Key signature], page 21.

Installed Files: `ly/arabic.ly` `ly/hel-arabic.ly`

Snippets: Section "World music" in *Snippets*, Section "Pitches" in *Snippets*.

Internals Reference: Section "KeySignature" in *Internals Reference*.

Arabic time signatures

Some Arabic and Turkish music classical forms such as *Semai* use unusual time signatures such as 10/8. This may lead to an automatic grouping of notes that is quite different from existing typeset music, where notes may not be grouped on the beat, but in a manner that is difficult to match by adjusting automatic beaming. The alternative is to switch off automatic beaming and beam the notes manually. Even if a match to existing typeset music is not required, it may still be desirable to adjust the automatic beaming behavior and/or use compound time signatures.

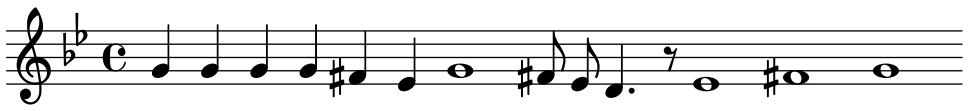
Selected Snippets

Arabic improvisation

For improvisations or *taqasim* which are temporarily free, the time signature can be omitted and `\cadenzaOn` can be used. Adjusting the accidental style might be required, since the absence of

bar lines will cause the accidental to be marked only once. Here is an example of what could be the start of a *hijaz* improvisation:

```
\include "arabic.ly"

\relative sol' {
  \key re \kurd
  \accidentalStyle forget
  \cadenzaOn
  sol4 sol sol sol fad mib sol1 fad8 mib re4. r8 mib1 fad sol
}
```



See also

Music Glossary: Section "semai" in *Music Glossary*, Section "taqasim" in *Music Glossary*.

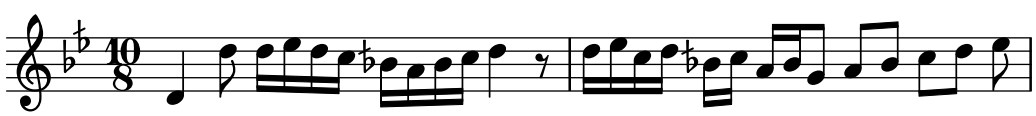
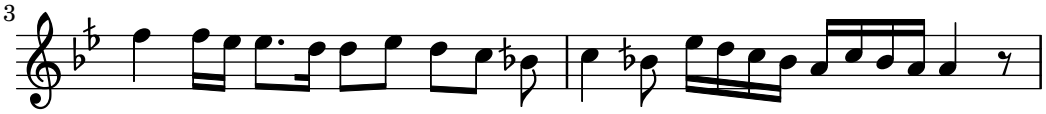
Notation Reference: [Manual beams], page 102, [Automatic beams], page 91, [Unmetered music], page 81, [Automatic accidentals], page 28, [Setting automatic beam behavior], page 94, [Time signature], page 72.

Installed Files: `ly/arabic.ly`

Snippets: Section "World music" in *Snippets*.

Arabic music example

Here is a template that also uses the start of a Turkish *Semai* that is familiar in Arabic music education in order to illustrate some of the peculiarities of Arabic music notation, such as medium intervals and unusual modes that are discussed in this section.

```
\include "arabic.ly"
\score {
  \header {
    title = "Semai Muhayer"
    composer = "Jamil Bek"
  }
  \relative {
    \set Staff.extraNatural = ##f
    \set Staff.autoBeaming = ##f
    \key re \bayati
    \time 10/8

    re'4 re'8 re16 [misb re do] sisb [la sisb do] re4 r8
    re16 [misb do re] sisb [do] la [sisb sol8] la [sisb] do [re] misb
    fa4 fa16 [misb] misb8. [re16] re8 [misb] re  [do] sisb
    do4 sisb8 misb16 [re do sisb] la [do sisb la] la4 r8
  }
}
```

See also

Installed Files: `ly/arabic.ly`

Snippets: Section "World music" in *Snippets*.

Further reading for Arabic music

There are some variations in the details of how maqams are grouped, despite agreement of grouping maqams related through common lower tetra chords or by modulation. There are also some inconsistencies, even within the same texts, on how key signatures for a particular maqam should be specified. However, it is common to use a key signature per 'group' of maqams instead of individual key signatures for each maqam separately.

- *The music of the Arabs* by Habib Hassan Touma [Amadeus Press, 1996], contains a discussion of maqams and their method of groupings.
- There are also some web sites that explain maqams and even provide audio examples:
  - `https://www.maqamworld.com/`
  - `https://www.turath.org/`
- Method books by the following authors for the oud (the Arabic lute) contain examples of mainly Turkish and Arabic compositions.
  - Charbel Rouhana
  - George Farah
  - Ibrahim Ali Darwish Al-masri

2.10.3 Turkish classical music

This section highlights issues that are relevant to notating Turkish classical music.

References for Turkish classical music

Turkish classical music developed in the Ottoman Empire at roughly the same time as classical music in Europe, and has continued on into the 20th and 21st centuries as a vibrant and distinct tradition with its own compositional forms, theory and performance styles. Among its striking features is the use of microtonal intervals based on 'commas' of 1/9 of a tone, from which are constructed the melodic forms known as *makam* (plural *makamlar*) are constructed.

Some issues relevant to Turkish classical music are covered elsewhere. Special note names and accidentals are explained in Section 2.10.1 [Common notation for non-Western music], page 523.

Turkish note names

Pitches in Turkish classical music traditionally have unique names and the basis of pitch on 1/9-tone divisions means that makamlar employ a completely different set of intervals compared to Western scales and modes:

From a modern, notational point of view it is convenient to use standard, Western staff notes (c, d, e, etc.) but with custom accidentals that raise or lower notes by intervals of 1/9, 4/9, 5/9 or 8/9 of a tone.

These custom accidentals are defined in the file `turkish-makam.ly`.

For a more general explanation of non-Western music notation, see Section 2.10.1 [Common notation for non-Western music], page 523.

See also

Music Glossary: Section “makam” in *Music Glossary*, Section “makamlar” in *Music Glossary*.

Notation Reference: Section 2.10.1 [Common notation for non-Western music], page 523.

Turkish key signatures

LilyPond supports over 200 makam key signature definitions – well beyond what is used in Turkish classical music – with each makam having its own specific tonic / finalis pitch (known as ‘karar’ in Turkish).

It is important to be aware of the finalis of each makam. Here is an example where *g* is the default tonic and *rast* is the name of the makam.

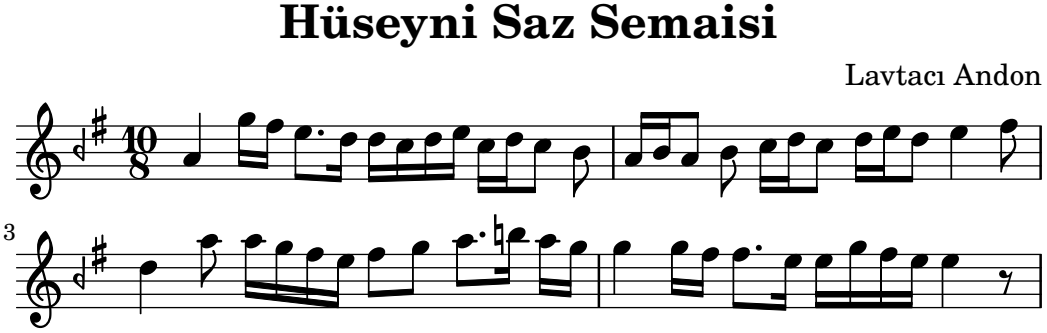
```
\key g \rast
```

The correct accidentals, koma flat (*b1*) and koma sharp (`f4`), (both in relation to the tonic *g*), will be displayed automatically.

Selected Snippets

Turkish Makam example

This template uses the start of a well-known Turkish Saz Semai that is familiar in the repertoire in order to illustrate some of the elements of Turkish music notation.

```
\paper { tagline = ##f }

% Initialize makam settings
\include "turkish-makam.ly"

\header {
    title = "Hüseyni Saz Semaisi"
    composer = "Lavtacı Andon"
}

\relative {
  \set Staff.extraNatural = ##f
  \set Staff.autoBeaming = ##f

  \key a \huseyni
  \time 10/8

  a'4 g'16 [fb] e8. [d16] d [c d e] c [d c8] bfc |
  a16 [bfc a8] bfc c16 [d c8] d16 [e d8] e4 fb8 |
  d4 a'8 a16 [g fb e] fb8 [g] a8. [b16] a16 [g] |
  g4 g16 [fb] fb8. [e16] e [g fb e] e4 r8 |
}
```

Further reading for Turkish music

- *Turk Musikisi Nazariyati ve Usulleri: Kudum Velveleleri* by Ismail Hakki Ozkan [(Kultur serisi, 41) (Turkish) Paperback – 1986]

  contains information about the theory of makams and usul.
- *Music of the Ottoman Court* by Walter Feldman [VWB Hardback – 1996]

  contains information about the history of Ottoman court music.
- *Turkish Music Makam Guide* by Murat Aydemir [Pan Paperback – 2010]

  contains information in English regarding Turkish makam including two CDs.

2.10.4 Persian classical music

This section highlights issues that are relevant to notating Persian classical music.

Persian music notation

The notation for Persian classical music commonly uses two accidentals for microtones, *sori* and *koron*. Invented by Ali-Naqi Vaziri around 1935, they indicate raising and lowering a pitch by (approximately) a quarter tone, respectively.

sori **koron**

The file `persian.ly`[1] provides support for koron and sori; they can be obtained by appending 'k' (koron) and 'o' (sori) to the English note symbols.

LilyPond supports tunings for all major Persian modes in all keys, sufficient to notate the *gushehs* (central nuclear melodies) of all *dastgahs* (musical modal systems).

The note immediately following a koron is sometimes[2] lowered by about 20 cents. This is not notated but considered part of the tuning. However, for getting better MIDI support you can make a sound flat by appending 'v' to the note name ('*v*lat'). This note should actually also get a strong vibrato, and the vibrato and low tuning are perceptually integrated (*serialism*). This is just for MIDI and has no effect on the notation itself.

There are no further tuning issues in Persian music. Since the music is monophonic, the difference between just intonation (for example) and equal temperament is merely academic – there are no chords where out-of-tune intervals would be noticeable.

The following suffixes to English note names are provided.

`ff`	double-flat
`f`	flat
`k`	koron (about quarter flat, -3/10 of whole tone, 60 cents)
`o`	sori (about quarter sharp, 2/10 of whole tone, 40 cents)
`s`	sharp
`x`	double-sharp
`v`	20 cent flat-tuned note ("vlat", not notated)
`fv`	flat, tuned 20 cents down (notated as a normal flat)
`sv`	sharp, tuned 20 cents down (notated as a normal sharp; does never occur in traditional Persian music)

[1] There exists another, older support file for Persian classical music also called `persian.ly` (written by Kees van den Doel) that no longer works with the current LilyPond version; while note names are compatible, the selection of key signatures is not.

[2] If the interval defined by the note before the koron and after the koron is a minor third. The same is true for the note below the finalis in the 'Esfahan' dastgah according to some (but not all) Persian musicians.

Persian tunings

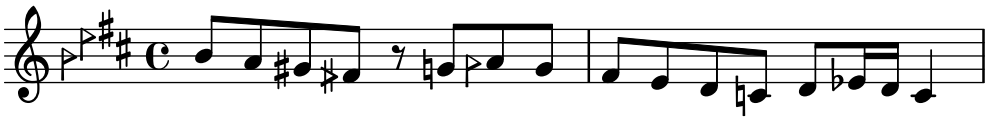
Dastgahs can have many tunings; it has become common to name tunings after representative dastgahs featuring them. The following Persian tunings are provided to be used as the second argument of the `\key` command. Note that in practice not all tunings are used in all keys.

`\shur`	'Shur' gushehs with natural 5th degree
`\shurk`	'Shur' gushehs with koron 5th degree
`\esfahan`	
`\mokhalefsegah`	
`\chahargah`	
`\mahur`	the same as `\major` but used in a completely different context
`\delkashMahur`	

In dastgah 'Shur', the 5th degree can either be natural or koron, so two tunings are provided (`\shur`, `\shurk`). Secondary dastgahs 'Dashti', 'Abuata', and 'Bayat-e-tork' use `\shur`, the derived dastgah 'Afshari' uses `\shurk`. 'Nava' on G is like 'Shur' on D (a 4th apart). The tuning of 'Segah' is `\shurk`. Other tunings are `\esfahan` ('Homayoun' on C is like 'Esfahan' on G, a 5th apart), `\chahargah`, and `\mokhalefsegah`. For dastgahs 'Mahur' and 'Rast-panjgah' the same tuning `\mahur` can be used.

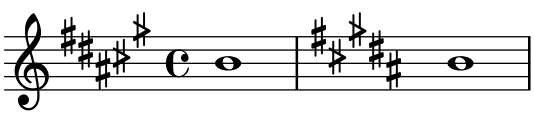
All the various modulatory gushehs in all dastgahs can be notated with these tunings, with the exception of 'Delkash' in 'Mahur', but traditionally the peculiar accidentals there are notated explicitly (however, `persian.ly` also defines a tuning `\delkashMahur`).

As an example, Chahargah in D can be input with the following.

```
\include "persian.ly"

\relative c' {
  \key d \chahargah
  bk'8 a gs fo r g ak g |
  fs ek d c d ef16 d c4 |
}
```

Persian key signatures

By default, the order of accidentals in Persian key signatures is flats followed by korons, then sharps followed by soris (then double flats, then double sharps).

An alternative key order, similar to the one used in `turkish-makam.ly`, can be selected. Here, the order is flats or korons (or double flats), then sharps or soris (or double sharps). In other words, korons and soris are handled equal to flats and sharps, respectively.

```
\include "persian.ly"

{
  \key b \chahargah b'1 |
  \set Staff.keyAlterationOrder = \persianAltKeyAlterationOrder
  \key b \chahargah b'1 |
}
```

Further reading on Persian music

- *Traditional Persian Art Music* by Dariush Tala'i [Bibliotheca Persica, Costa Mesa CA, 2000]

  The provided Persian tunings closely follow this book.
- *The Dastgah Concept in Persian Music* by Hormoz Farhat [Cambridge University Press, Cambridge, 1990]
- *Le répertoire-modèle de la musique iranienne* by Jean During (in French) [Sourush, Tehran, 1995]

  This book contains measurements of the intervals in actual practice, consistent with the tunings of `persian.ly`.
- *Armoni-e Musiqi-e Iran* by Ali-Naqi Vaziri (in Persian) [1935]
- *Scales and Modes Around the World* by Herman Rechberger [Fennica Gehrman, 2018, ISBN 978-952-5489-07-1]

3 General input and output

This section deals with general LilyPond input and output issues, rather than specific notation.

3.1 Input modes

The way in which the notation contained within an input file is interpreted is determined by the current input mode. In general, there are two ways of specifying the mode: a long form, e.g. `\chordmode`, and a short form, e.g. `\chords`. The long form is typically used when supplying input to a variable or when entering input directly into an explicitly created context. The short form implicitly creates a context of the correct type for the input and passes the input directly to it. It is useful in simple situations when there is no requirement to explicitly create the receiving context.

Chord mode

This is activated with the `\chordmode` command, and causes input to be interpreted with the syntax of chord notation, see Section 2.7 [Chord notation], page 467. Music in chord mode is rendered as chords on a staff when entered into a `Staff` context, as chord names when entered into a `ChordNames` context or as fretboards when entered into a `FretBoards` context.

Chord mode is also activated with the `\chords` command. This also causes the following input to be interpreted with the syntax of chord notation but in addition it implicitly creates a new `ChordNames` context and renders the input into it as chord names, see [Printing chord names], page 472.

Drum mode

This is activated with the `\drummode` command, and causes input to be interpreted with the syntax of drum notation, see [Basic percussion notation], page 446. Music in drum mode is rendered as percussion notes when entered into a `DrumStaff` context.

Drum mode is also activated with the `\drums` command. This also causes the following input to be interpreted with the syntax of drum notation but in addition it implicitly creates a new `DrumStaff` context and renders the input into it as percussion notes, see [Basic percussion notation], page 446.

Figure mode

This is activated with the `\figuremode` command, and causes input to be interpreted with the syntax of figured bass, see [Entering figured bass], page 484. Music in figure mode is rendered as figured bass when entered into a `FiguredBass` context or a `Staff` context.

Figure mode is also activated with the `\figures` command. This also causes the following input to be interpreted with the figured bass syntax but in addition it implicitly creates a new `FiguredBass` context and renders the input into it as figured bass, see [Introduction to figured bass], page 484.

Fret and tab modes

There are no special input modes for entering fret and tab symbols.

To create tab diagrams, enter notes or chords in note mode and render them in a `TabStaff` context, see [Default tablatures], page 395.

To create fret diagrams above a staff, enter notes or chords in either note mode or chord mode and render them in a `FretBoards` context, see [Automatic fret diagrams], page 437. Alternatively, fret diagrams can be entered as markup above the notes using the `\fret-diagram` command, see [Fret diagram markups], page 416.

Lyrics mode

This is activated with the `\lyricmode` command, and causes input to be interpreted as lyric syllables with optional durations and associated lyric modifiers, see Section 2.1 [Vocal music], page 313. Input in lyric mode is rendered as lyric syllables when entered into a `Lyrics` context.

Lyric mode is also activated with the `\lyrics` command. This also causes the following input to be interpreted as lyric syllables but in addition it implicitly creates a new `Lyrics` context and renders the input into it as lyric syllables.

Lyric mode is also activated with the `\addlyrics` command. This also implicitly creates a new `Lyrics` context and in addition it adds an implicit `\lyricsto` command which associates the following lyrics with the preceding music, see [Automatic syllable durations], page 317.

Markup mode

This is activated with the `\markup` command, and causes input to be interpreted with the syntax of markup, see Section A.12 [Text markup commands], page 758.

Note mode

This is the default mode or it may be activated with the `\notemode` command. Input is interpreted as pitches, durations, markup, etc and typeset as musical notation on a staff.

It is not normally necessary to specify note mode explicitly, but it may be useful to do so in certain situations, for example if you are in lyric mode, chord mode or any other mode and want to insert something that only can be done with note mode syntax.

3.2 Input structure

The main format of input for LilyPond are text files. By convention, these files end with `.ly`.

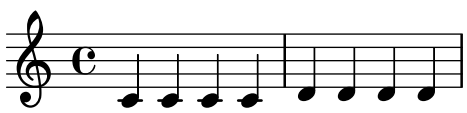
3.2.1 Structure of a score

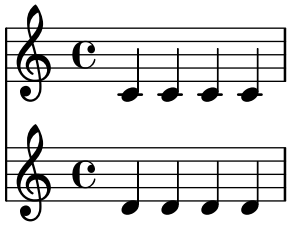
A `\score` block must contain a single music expression delimited by curly brackets:

```
\score {
  ...
}
```

> **Note:** There must be **only one** outer music expression in a `\score` block, and it **must** be surrounded by curly brackets.

This single music expression may be of any size, and may contain other music expressions to any complexity. All of these examples are music expressions:

```
{ c'4 c' c' c' }
{
  { c'4 c' c' c' }
  { d'4 d' d' d' }
}
```

```
<<
  \new Staff { c'4 c' c' c' }
  \new Staff { d'4 d' d' d' }
>>
```



```
{
  \new GrandStaff <<
    \new StaffGroup <<
      \new Staff { \flute }
      \new Staff { \oboe }
    >>
    \new StaffGroup <<
      \new Staff { \violinI }
      \new Staff { \violinII }
    >>
  >>
}
```

Comments are one exception to this general rule. (For others see Section 3.2.5 [File structure], page 539.) Both single-line comments and comments delimited by %{ ... %} may be placed anywhere within an input file. They may be placed inside or outside a \score block, and inside or outside the single music expression within a \score block.

Remember that even in a file containing only a \score block, it is implicitly enclosed in a \book block. A \book block in a source file produces at least one output file, and by default the name of the output file produced is derived from the name of the input file, so fandangoforelephants.ly will produce fandangoforelephants.pdf.

(For more details about \book blocks, see Section 3.2.2 [Multiple scores in a book], page 536, Section 3.2.3 [Multiple output files from one input file], page 538, Section 3.2.5 [File structure], page 539.)

See also

Learning Manual: Section "Working on input files" in *Learning Manual*, Section "Music expressions explained" in *Learning Manual*, Section "A score is a (single) compound musical expression" in *Learning Manual*.

3.2.2 Multiple scores in a book

A document may contain multiple pieces of music and text. Examples of these are an etude book, or an orchestral part with multiple movements. Each movement is entered with a \score block,

```
\score {
  ...music...
}
```

and texts are entered with a \markup block,

```
\markup {
  ...text...
}
```

All the movements and texts which appear in the same .ly file will normally be typeset in the form of a single output file.

```
\score {
```

```
  ...
}
\markup {
  ...
}
\score {
  ...
}
```

One important exception is within `lilypond-book` documents, where you explicitly have to add a `\book` block, otherwise only the first `\score` or `\markup` will appear in the output.

The header for each piece of music can be put inside the `\score` block. The `piece` name from the header will be printed before each movement. The title for the entire book can be put inside the `\book`, but if it is not present, the `\header` which is at the top of the file is inserted.

```
\header {
  title = "Eight miniatures"
  composer = "Igor Stravinsky"
}
\score {
  \header { piece = "Romanze" }
  ...
}
\markup {
   ...text of second verse...
}
\markup {
   ...text of third verse...
}
\score {
  \header { piece = "Menuetto" }
  ...
}
```

Pieces of music may be grouped into book parts using `\bookpart` blocks. Book parts are separated by a page break, and can start with a title, like the book itself, by specifying a `\header` block.

```
\bookpart {
  \header {
    title = "Book title"
    subtitle = "First part"
  }
  \score { ... }
  ...
}
\bookpart {
  \header {
    subtitle = "Second part"
  }
  \score { ... }
  ...
}
```

By design, you cannot define variables within a `\book` or `\bookpart` block (the same is true for `\score`, by the way); this is especially relevant if you want to use multiple files to set up your

music with variables that should be 'local' to single files. You can use the following structure for such situations.

```
% movement1.ly
variableI = { ... }
bookpartI = \bookpart { \score { ... use \variableI ... } }

% movement2.ly
variableII = { ... }
bookpartII = \bookpart { \score { ... use \variableII ... } }

% main.ly
\include "movement1.ly"
\include "movement2.ly"
\book {
  \bookpart { \bookpartI }
  \bookpart { \bookpartII }
}
```

Similarly, you can't directly have a `\layout` block within `\book` or `\bookpart`. Put it into a `\score` block instead that is included by `\book` or `\bookpart`.

3.2.3 Multiple output files from one input file

If you want multiple output files from the same `.ly` file, then you can add multiple `\book` blocks, where each such \book block will result in a separate output file. If you do not specify any `\book` block in the input file, LilyPond will implicitly treat the whole file as a single \book block, see Section 3.2.5 [File structure], page 539.

When producing multiple files from a single source file, LilyPond ensures that none of the output files from any `\book` block overwrites the output file produced by a preceding `\book` from the same input file.

It does this by adding a suffix to the output name for each `\book` which uses the default output file name derived from the input source file.

The default behavior is to append a version number suffix for each name which may clash, so

```
\book {
  \score { ... }
  \paper { ... }
}
\book {
  \score { ... }
  \paper { ... }
}
\book {
  \score { ... }
  \paper { ... }
}
```

in source file `eightminiatures.ly` produces

```
eightminiatures.pdf
eightminiatures-1.pdf
eightminiatures-2.pdf
```

as output files.

3.2.4 Output file names

LilyPond provides facilities to allow you to control what file names are used by the various backends when producing output files.

In the previous section, we saw how LilyPond prevents name clashes when producing several outputs from a single source file. You also have the ability to specify your own suffixes for each `\book` block, so for example you can produce files called

```
eightminiatures-Romanze.pdf
eightminiatures-Menuetto.pdf
eightminiatures-Nocturne.pdf
```

by adding a `\bookOutputSuffix` declaration inside each `\book` block.

```
\book {
  \bookOutputSuffix "Romanze"
  \score { ... }
  \paper { ... }
}
\book {
  \bookOutputSuffix "Menuetto"
  \score { ... }
  \paper { ... }
}
\book {
  \bookOutputSuffix "Nocturne"
  \score { ... }
  \paper { ... }
}
```

You can also specify a different output filename for `book` block, by using `\bookOutputName` declarations

```
\book {
  \bookOutputName "Romanze"
  \score { ... }
  \paper { ... }
}
\book {
  \bookOutputName "Menuetto"
  \score { ... }
  \paper { ... }
}
\book {
  \bookOutputName "Nocturne"
  \score { ... }
  \paper { ... }
}
```

The file above produces the following output files.

```
Romanze.pdf
Menuetto.pdf
Nocturne.pdf
```

3.2.5 File structure

A `.ly` file may contain any number of top-level expressions, where a top-level expression is one of the following:

- An output definition, such as \paper, \midi, and \layout. Such a definition at the top-level changes the default book-wide settings. If more than one such definition of the same type is entered at the top level the definitions are combined, but in conflicting situations the later definitions take precedence. For details of how this affects the \layout block see Section 4.2.1 [The \layout block], page 612.
- A direct scheme expression, such as `#(set-default-paper-size "a7" 'landscape)` or `#(ly:set-option 'point-and-click #f)`.
- A \header block. This sets the global (i.e., the top of file) header block. This is the block containing the default settings of titling fields like composer, title, etc., for all books within the file (see [Titles explained], page 542).
- A \score block. This score will be collected with other top-level scores, and combined as a single \book. This behavior can be changed by setting the variable `toplevel-score-handler` at top level. (The default handler is defined in the file `../scm/lily-library.scm` and set in the file `../ly/declarations-init.ly`.)
- A \book block logically combines multiple movements (i.e., multiple \score blocks) in one document. If there are a number of \scores, one output file will be created for each \book block, in which all corresponding movements are concatenated. The only reason to explicitly specify \book blocks in a `.ly` file is if you wish to create multiple output files from a single input file. One exception is within `lilypond-book` documents, where you explicitly have to add a \book block if you want more than a single \score or \markup in the same example. This behavior can be changed by setting the variable `toplevel-book-handler` at top level. The default handler is defined in the init file `../scm/lily.scm`.
- A \bookpart block. A book may be divided into several parts, using \bookpart blocks, in order to ease the page breaking, or to use different \paper settings in different parts.
- A compound music expression, such as

  ```
  { c'4 d' e'2 }
  ```

  This will add the piece in a \score and format it in a single book together with all other top-level \scores and music expressions. In other words, a file containing only the above music expression will be translated into

  ```
  \book {
    \score {
      \new Staff {
        \new Voice {
          { c'4 d' e'2 }
        }
      }
      \layout { }
    }
    \paper { }
    \header { }
  }
  ```

  This behavior can be changed by setting the variable `toplevel-music-handler` at top level. The default handler is defined in the init file `../scm/lily.scm`.
- A markup text, a verse for example

  ```
  \markup {
     2.  The first line verse two.
  }
  ```

  Markup texts are rendered above, between or below the scores or music expressions, wherever they appear.

- A variable, such as

```
foo = { c4 d e d }
```

  This can be used later on in the file by entering `\foo`. The name of a variable should not contain (ASCII) numbers, multiple underscores, multiple dashes or space characters. All other characters Unicode provides are allowed, for example Latin, Greek, Chinese or Cyrillic. Non-adjacent single underscores and dashes are allowed, too. In other words, variable names like `HornIII` or $\alpha\beta\gamma$`XII` work.

  Any combination of characters is allowed if the variable name is enclosed in double quotation marks. In this case backslashes and double quotation marks need to be escaped with backslashes (not that you actually should use them). Examples: `"foo bar"`, `"a-b-c"`, `"Horn 3"`.

The following example shows three things that may be entered at top level.

```
\layout {
  % Don't justify the output
  ragged-right = ##t
}

\header {
   title = "Do-re-mi"
}

{ c'4 d' e2 }
```

At any point in a file, any of the following lexical instructions can be entered:

- `\version`
- `\include`
- `\sourcefilename`
- `\sourcefileline`
- A single-line comment, introduced by a leading % sign.
- A multi-line comment delimited by `%{ ... %}`.

Whitespace between items in the input stream is generally ignored, and may be freely omitted or extended to enhance readability. However, whitespace should always be used in the following circumstances to avoid errors:

- Around every opening and closing curly bracket.
- After every command or variable, i.e., every item that begins with a \ sign.
- After every item that is to be interpreted as a Scheme expression, i.e., every item that begins with a # sign.
- To separate all elements of a Scheme expression.
- In `lyricmode` before and after `\set` and `\override` commands.

See also

Learning Manual: Section "How LilyPond input files work" in *Learning Manual*.

Notation Reference: [Titles explained], page 542, Section 4.2.1 [The `\layout` block], page 612.

3.3 Titles and headers

Almost all printed music includes a title and the composer's name; some pieces include a lot more information.

3.3.1 Creating titles headers and footers

Titles explained

Each \book block in a single input file produces a separate output file, see Section 3.2.5 [File structure], page 539. Within each output file three types of titling areas are provided: *Book Titles* at the beginning of each book, *Bookpart Titles* at the beginning of each bookpart and *Score Titles* at the beginning of each score.

Values of titling fields such as title and composer are set in \header blocks. (For the syntax of \header blocks and a complete list of the fields available by default see [Default layout of bookpart and score titles], page 545). Book Titles, Bookpart Titles and Score Titles can all contain the same fields, although by default the fields in Score Titles are limited to piece and opus.

\header blocks may be placed in four different places to form a descending hierarchy of \header blocks:

- At the top of the input file, before all \book, \bookpart, and \score blocks.
- Within a \book block but outside all the \bookpart and \score blocks within that book.
- Within a \bookpart block but outside all \score blocks within that bookpart.
- Within a \score block.

The values of the fields filter down this hierarchy, with the values set higher in the hierarchy persisting unless they are overridden by a value set lower in the hierarchy, so:

- A Book Title is derived from fields set at the top of the input file, modified by fields set in the \book block. The resulting fields are used to print the Book Title for that book, providing that there is other material which generates a page at the start of the book, before the first bookpart. A single \pageBreak will suffice.
- A Bookpart Title is derived from fields set at the top of the input file, modified by fields set in the \book block, and further modified by fields set in the \bookpart block. The resulting values are used to print the Bookpart Title for that bookpart.
- A Score Title is derived from fields set at the top of the input file, modified by fields set in the \book block, further modified by fields set in the \bookpart block and finally modified by fields set in the \score block. The resulting values are used to print the Score Title for that score. Note, though, that only piece and opus fields are printed by default in Score Titles unless the \paper variable, print-all-headers, is set to #t.

It is not necessary to provide \header blocks in all four places: any or even all of them may be omitted. Similarly, simple input files may omit the \book and \bookpart blocks, leaving them to be created implicitly.

If the book has only a single score, the \header block should normally be placed at the top of the file so that just a Bookpart Title is produced, making all the titling fields available for use.

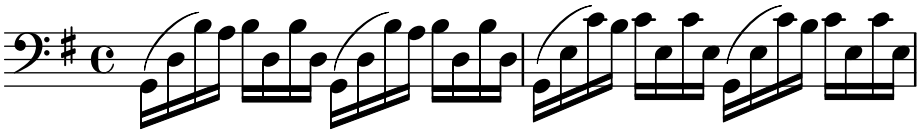
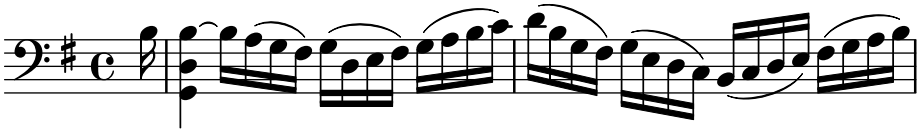
If the book has multiple scores a number of different arrangements of \header blocks are possible, corresponding to the various types of musical publications. For example, if the publication contains several pieces by the same composer a \header block placed at the top of the file specifying the book title and the composer with \header blocks in each \score block specifying the piece and/or opus would be most suitable, as here:

```
\header {
  title = "SUITE I."
  composer = "J. S. Bach."
}
```

```
\score {
  \header {
    piece = "Prélude."
  }
  \new Staff \relative {
    \clef bass
    \key g \major
    \repeat unfold 2 { g,16( d' b') a b d, b' d, } |
    \repeat unfold 2 { g,16( e' c') b c e, c' e, } |
  }
}

\score {
  \header {
    piece = "Allemande."
  }
  \new Staff \relative {
    \clef bass
    \key g \major
    \partial 16 b16 |
    <g, d' b'~>4 b'16 a( g fis) g( d e fis) g( a b c) |
    d16( b g fis) g( e d c) b(c d e) fis( g a b) |
  }
}
```

SUITE I.

J. S. Bach.

Prélude.

Allemande.

More complicated arrangements are possible. For example, text fields from the `\header` block in a book can be displayed in all Score Titles, with some fields overridden and some manually suppressed:

```
\book {
  \paper {
    print-all-headers = ##t
  }
  \header {
    title = "DAS WOHLTEMPERIRTE CLAVIER"
    subtitle = "TEIL I"
    % Do not display the default LilyPond footer for this book
```

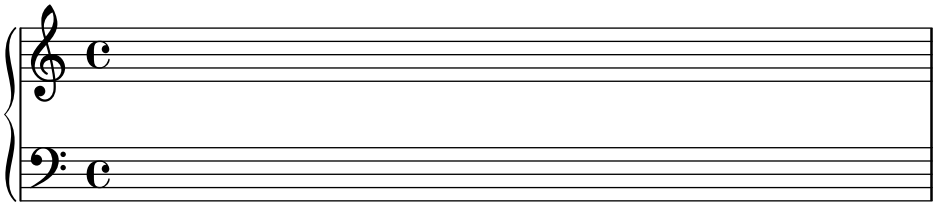
```
    tagline = ##f
  }
  \markup { \vspace #1 }
  \score {
    \header {
      title = "PRAELUDIUM I"
      opus = "BWV 846"
      % Do not display the subtitle for this score
      subtitle = ##f
    }
    \new PianoStaff <<
      \new Staff { s1 }
      \new Staff { \clef "bass" s1 }
    >>
  }
  \score {
    \header {
      title = "FUGA I"
      subsubtitle = "A 4 VOCI"
      opus = "BWV 846"
      % Do not display the subtitle for this score
      subtitle = ##f
    }
    \new PianoStaff <<
      \new Staff { s1 }
      \new Staff { \clef "bass" s1 }
    >>
  }
}
```

DAS WOHLTEMPERIRTE CLAVIER

TEIL I

PRAELUDIUM I

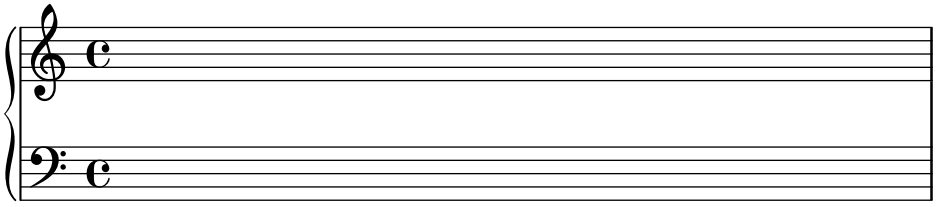
BWV 846



FUGA I

A 4 VOCI

BWV 846



See also

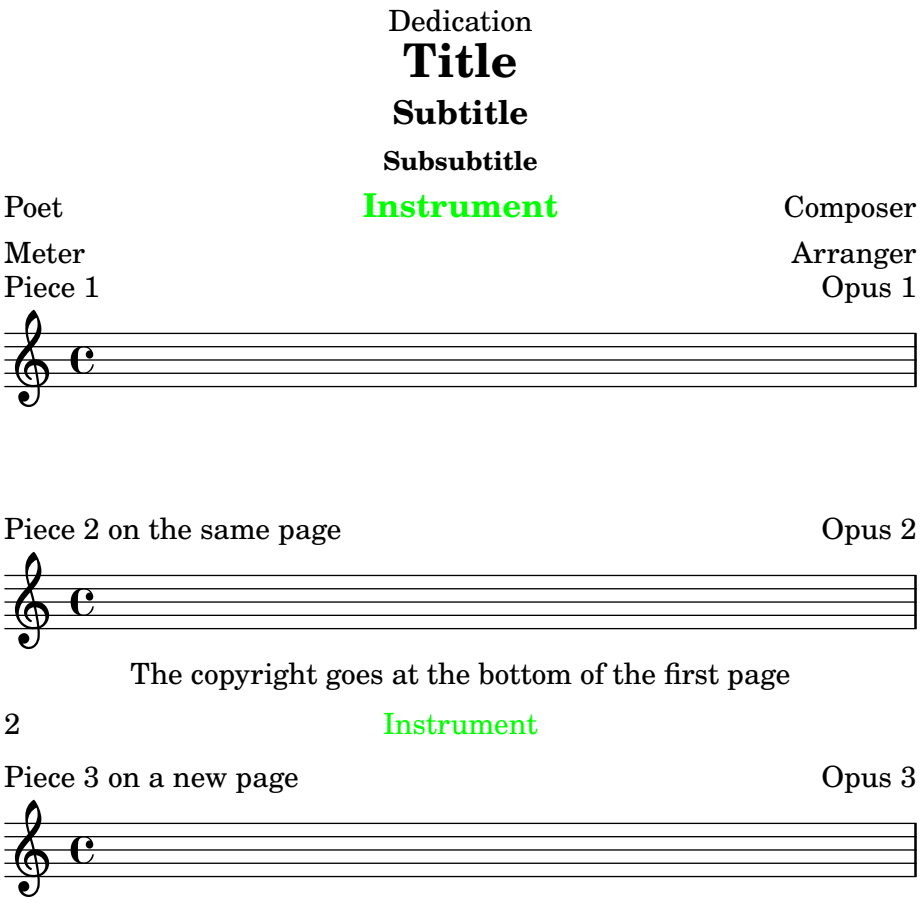
Notation Reference: Section 3.2.5 [File structure], page 539, [Default layout of bookpart and score titles], page 545, [Custom layout for titles], page 550.

Default layout of bookpart and score titles

This example demonstrates all printed \header variables:

```
\book {
  \header {
    % The following fields are centered
    dedication = "Dedication"
    title = "Title"
    subtitle = "Subtitle"
    subsubtitle = "Subsubtitle"

    % The following fields are evenly spread on one line;
    % the field "instrument" also appears on following pages
    instrument = \markup \with-color #green "Instrument"
    poet = "Poet"
    composer = "Composer"

    % The following fields are placed at opposite ends
    %of the same line
    meter = "Meter"
    arranger = "Arranger"
```

```
    % The following fields are centered at the bottom
    tagline = "The tagline goes at the bottom of the last page"
    copyright = "The copyright goes at the bottom of the first page"
  }
  \score {
    \header {
      % The following fields are placed at opposite ends
      % of the same line
      piece = "Piece 1"
      opus = "Opus 1"
    }
    { s1 }
  }
  \score {
    \header {
      % The following fields are placed at opposite ends
      % of the same line
      piece = "Piece 2 on the same page"
      opus = "Opus 2"
    }
    { s1 }
  }
  \pageBreak
  \score {
    \header {
      % The following fields are placed at opposite ends
      % of the same line
      piece = "Piece 3 on a new page"
      opus = "Opus 3"
    }
    { s1 }
  }
}
```



Note that

- The instrument name will be repeated on every page.
- Only `piece` and `opus` are printed in a `\score` when the paper variable `print-all-headers` is set to `#f` (the default).
- Text fields left unset in a `\header` block are replaced with `\null` markups so that the space is not wasted.
- The default settings for `scoreTitleMarkup` place the `piece` and `opus` text fields at opposite ends of the same line.

To change the default layout see [Custom layout for titles], page 550.

If a \book block starts immediately with a \bookpart block, no Book Title will be printed, as there is no page on which to print it. If a Book Title is required, begin the \book block with some markup material or a \pageBreak command.

Use the breakbefore variable inside a \header block that is itself in a \score block, to make the higher-level \header block titles appear on the first page on their own, with the music (defined in the \score block) starting on the next.

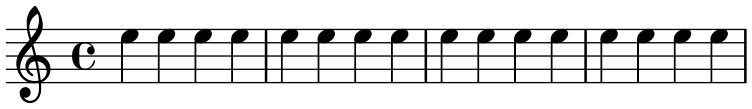
```
\book {
  \header {
    title = "This is my Title"
    subtitle = "This is my Subtitle"
    copyright = "This is the bottom of the first page"
  }
  \score {
    \header {
      piece = "This is the Music"
      breakbefore = ##t
    }
    \repeat unfold 4 { e'' e'' e'' e'' }
  }
}
```

This is my Title

This is my Subtitle

This is the bottom of the first page

2

This is the Music

Music engraving by LilyPond 2.25.3—www.lilypond.org

See also

Learning Manual: Section "How LilyPond input files work" in *Learning Manual*,

Notation Reference: [Custom layout for titles], page 550, Section 3.2.5 [File structure], page 539.

Installed Files: `ly/titling-init.ly`.

Default layout of headers and footers

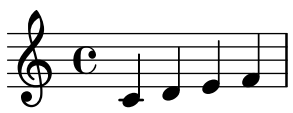
Headers and *footers* are lines of text appearing at the top and bottom of pages, separate from the main text of a book. They are controlled by the following `\paper` variables:

- `oddHeaderMarkup`
- `evenHeaderMarkup`
- `oddFooterMarkup`
- `evenFooterMarkup`

These markup variables can only access text fields from top-level `\header` blocks (which apply to all scores in the book) and are defined in `ly/titling-init.ly`. By default:

- page numbers are automatically placed on the top far left (if even) or top far right (if odd), starting from the second page.
- the `instrument` text field is placed in the center of every page, starting from the second page.
- the `copyright` text is centered on the bottom of the first page.
- the `tagline` is centered on the bottom of the last page, and below the `copyright` text if there is only a single page.

The default LilyPond footer text can be changed by adding a `tagline` in the top-level `\header` block.

```
\book {
  \header {
    tagline = "... music notation for Everyone"
  }
  \score {
    \relative {
      c'4 d e f
    }
  }
}
```

... music notation for Everyone

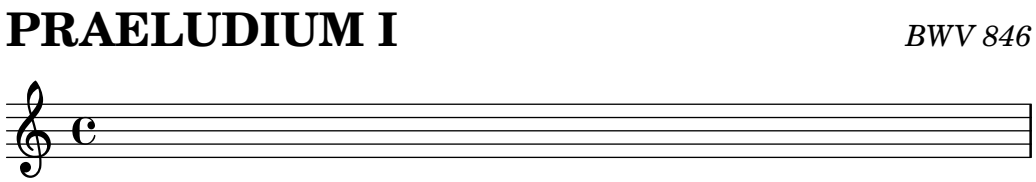
To remove the default LilyPond footer text, the `tagline` can be set to `#f`.

3.3.2 Custom titles headers and footers

Custom text formatting for titles

Standard \markup commands can be used to customize any header, footer and title text within the \header block.

```
\score {
  \header {
    piece = \markup { \fontsize #4 \bold "PRAELUDIUM I" }
    opus = \markup { \italic "BWV 846" }
  }
  { s1 }
}
```



See also

Notation Reference: Section 1.8.2 [Formatting text], page 289.

Custom layout for titles

\markup commands in the \header block are useful for simple text formatting, but they do not allow precise control over the placement of titles. To customize the placement of the text fields, change either or both of the following \paper variables:

- bookTitleMarkup
- scoreTitleMarkup

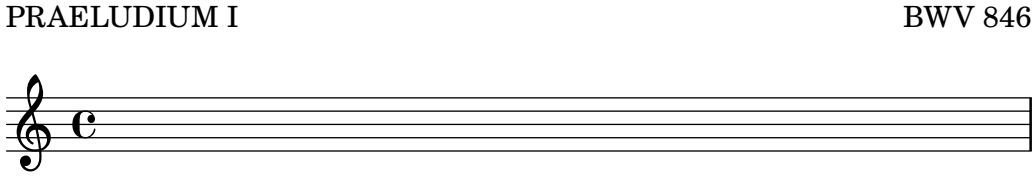
The placement of titles when using the default values of these \markup variables is shown in the examples in [Default layout of bookpart and score titles], page 545.

The default settings for scoreTitleMarkup as defined in ly/titling-init.ly are:

```
scoreTitleMarkup = \markup { \column {
  \if \should-print-all-headers { \bookTitleMarkup \hspace #1 }
  \fill-line {
    \fromproperty #'header:piece
    \fromproperty #'header:opus
  }
}
}
```

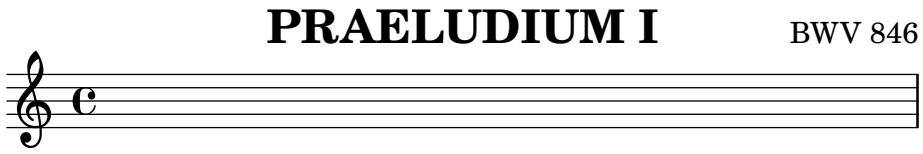
This places the piece and opus text fields at opposite ends of the same line:

```
\score {
  \header {
    piece = "PRAELUDIUM I"
    opus = "BWV 846"
  }
  { s1 }
}
```



This example redefines scoreTitleMarkup so that the piece text field is centered and in a large, bold font.

```
\book {
  \paper {
    indent = 0\mm
    scoreTitleMarkup = \markup {
      \fill-line {
        \null
        \fontsize #4 \bold \fromproperty #'header:piece
        \fromproperty #'header:opus
      }
    }
  }
  \header { tagline = ##f }
  \score {
    \header {
      piece = "PRAELUDIUM I"
      opus = "BWV 846"
    }
    { s1 }
  }
}
```

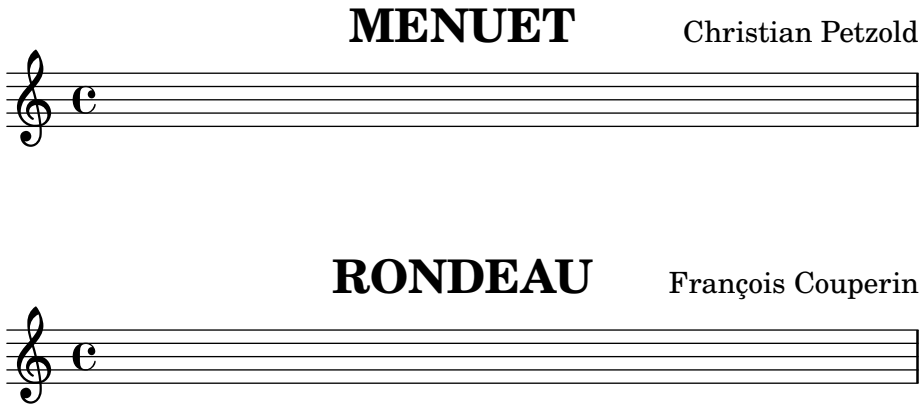


Text fields not normally effective in score \header blocks can be printed in the Score Title area if print-all-headers is placed inside the \paper block. A disadvantage of using this method is that text fields that are intended specifically for the Bookpart Title area need to be manually suppressed in every \score block. See [Titles explained], page 542.

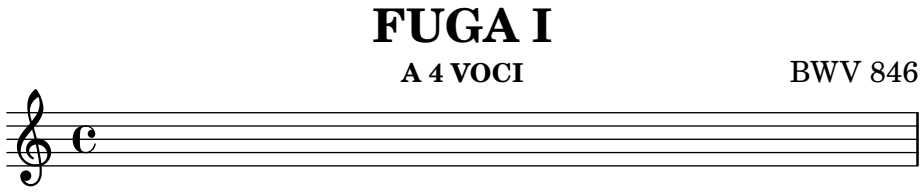
To avoid this, add the desired text field to the scoreTitleMarkup definition. In the following example, the composer text field (normally associated with bookTitleMarkup) is added to scoreTitleMarkup, allowing each score to list a different composer:

```
\book {
  \paper {
    indent = 0\mm
    scoreTitleMarkup = \markup {
      \fill-line {
        \null
        \fontsize #4 \bold \fromproperty #'header:piece
        \fromproperty #'header:composer
      }
    }
  }
  \header { tagline = ##f }
  \score {
    \header {
      piece = "MENUET"
      composer = "Christian Petzold"
    }
```

```
    { s1 }
  }
  \score {
    \header {
      piece = "RONDEAU"
      composer = "François Couperin"
    }
    { s1 }
  }
}
```



It is also possible to create your own custom text fields, and refer to them in the markup definition.

```
\book {
  \paper {
    indent = 0\mm
    scoreTitleMarkup = \markup {
      \fill-line {
        \null
        \override #`(direction . ,UP)
        \dir-column {
          \center-align \fontsize #-1 \bold
            \fromproperty #'header:mycustomtext %% User-defined field
          \center-align \fontsize #4 \bold
            \fromproperty #'header:piece
        }
        \fromproperty #'header:opus
      }
    }
  }
  \header { tagline = ##f }
  \score {
    \header {
      piece = "FUGA I"
      mycustomtext = "A 4 VOCI" %% User-defined field
      opus = "BWV 846"
    }
    { s1 }
  }
}
```

See also

Notation Reference: [Titles explained], page 542.

Custom layout for headers and footers

`\markup` commands in the `\header` block are useful for simple text formatting, but they do not allow precise control over the placement of headers and footers. To customize the placement of the text fields, use either or both of the following `\paper` variables:

- `oddHeaderMarkup`
- `evenHeaderMarkup`
- `oddFooterMarkup`
- `evenFooterMarkup`

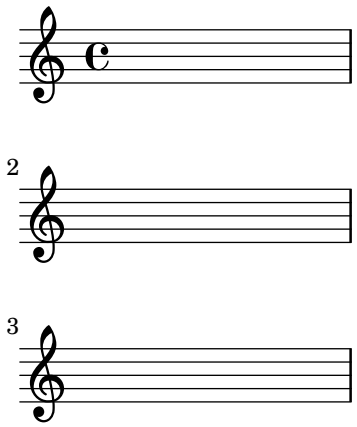
The `\markup` command `\if` can be used to add markup conditionally to header and footer text defined within the `\paper` block, using the following syntax within `\markup`:

```
\if condition argument
```

The *condition* is tested each time the markup is interpreted. The resulting markup is *argument* if the condition is true, but empty if false. Typical conditions include tests for page numbers (first page, last page, specific page, . . .). To test for the condition being false, replace `\if` with `\unless`.

The following example centers page numbers at the bottom of every page. First, the default settings for `oddHeaderMarkup` and `evenHeaderMarkup` are removed by defining each as a *null* markup. Then, `oddFooterMarkup` is redefined with the page number centered. Finally, `evenFooterMarkup` is given the same layout by defining it as `\oddFooterMarkup`:

```
\book {
  \paper {
    print-page-number = ##t
    print-first-page-number = ##t
    oddHeaderMarkup = \markup \null
    evenHeaderMarkup = \markup \null
    oddFooterMarkup = \markup {
      \fill-line {
        \if \should-print-page-number
        \fromproperty #'page:page-number-string
      }
    }
    evenFooterMarkup = \oddFooterMarkup
  }
  \score {
    \new Staff { s1 \break s1 \break s1 }
  }
}
```



1

Here is a list of all predefined procedures available for use with `\if` and `\unless`.

Syntax	**Condition tested**
`\on-first-page`	First page in the book?
`\on-last-page`	Last page in the book?
`\on-first-page-of-part`	First page in the book part?
`\on-last-page-of-part`	Last page in the book part?
`\on-page` *n*	On page number *n*?
`\single-page`	Does the book fit on just one page?
`\should-print-page-numbers-global`	Print page numbers in the book?[1]
`\should-print-page-number`	Print the number of the current page?
`\should-print-all-headers`	Is `print-all-headers` true?

See also

Notation Reference: [Titles explained], page 542, [Default layout of bookpart and score titles], page 545, Section A.12.5 [Conditional markup], page 802.

Installed Files: `../ly/titling-init.ly`.

3.3.3 Creating output file metadata

In addition to being shown in the printed output, `\header` variables are also used to set metadata for output files. For example, with PDF files, this metadata could be displayed by PDF readers as the `properties` of the PDF file. For each type of output file, only the `\header` definitions of blocks that define separate files of that type, and blocks higher in the block hierarchy, will be consulted. Therefore, for PDF files, only the `\book` level and the top level `\header` definitions affect the document-wide PDF metadata, whereas for MIDI files, all headers above or at the `\score` level are used.

For example, setting the `title` property of the `header` block to 'Symphony I' will also give this title to the PDF document, and use it as the sequence name of the MIDI file.

```
\header {
  title = "Symphony I"
}
```

[1] `\should-print-page-numbers-global` can differ from `\should-print-page-number` for the first page in the book, depending on the `print-first-page-number` setting of the `\paper` block.

If you want to set the title of the printed output to one value, but have the title property of the PDF to have a different value, you can use `pdftitle`, as below.

```
\header {
  title = "Symphony I"
  pdftitle = "Symphony I by Beethoven"
}
```

The variables `title`, `subject`, `keywords`, `subtitle`, `composer`, `arranger`, `poet`, `author` and `copyright` all set PDF properties and can all be prefixed with 'pdf' to set a PDF property to a value different from the printed output.

The PDF property `Creator` is automatically set to 'LilyPond' plus the current LilyPond version, and `CreationDate` and `ModDate` are both set to the current date and time. `ModDate` can be overridden by setting the header variable `moddate` (or `pdfmoddate`) to a valid PDF date string.

The `title` variable sets also the sequence name for MIDI. The `midititle` variable can be used to set the sequence name independently of the value used for typeset output.

3.3.4 Creating footnotes

Footnotes may be used in many different situations. In all cases, a 'footnote mark' is placed as a reference in text or music, and the corresponding 'footnote text' appears at the bottom of the same page, separated from the music by a horizontal line. The appearance of this separator can be changed by setting the paper variable `footnote-separator-markup`, see [\paper variables concerning headers and markups], page 611.

Footnotes within music expressions and footnotes in stand-alone text outside music expressions are created in different ways.

Footnotes in music expressions

Music footnotes overview

Footnotes in music expressions fall into two categories:

Event-based footnotes
: are attached to a particular event. Examples for such events are single notes, articulations (like fingering indications, accents, dynamics), and post-events (like slurs and manual beams). The general form for event-based footnotes is as follows:

  `[`*direction*`] \footnote [`*mark*`]` *offset footnote music*

Time-based footnotes
: are bound to a particular point of time in a musical context. Some commands like `\time` and `\clef` don't actually use events for creating objects like time signatures and clefs. Neither does a chord create an event of its own: its stem or flag is created at the end of a time step (nominally through one of the note events inside). Exactly which of a chord's multiple note events will be deemed the root cause of a stem or flag is undefined. So for annotating those, time-based footnotes are preferable as well.

  A time-based footnote allows such layout objects to be annotated without referring to an event. The general form for time-based footnotes is:

  `\footnote [`*mark*`]` *offset footnote* `[`*Context*`].`*GrobName*

The elements for both forms are:

direction
: If (and only if) the `\footnote` is being applied to a post-event or articulation, it must be preceded with a direction indicator ('-', '_', '^') in order to attach *music* (with a footnote mark) to the preceding note or rest.

mark is a markup or string specifying the footnote mark which is used for marking both the reference point and the footnote itself at the bottom of the page. It may be omitted (or equivalently replaced with `\default`) in which case a number in sequence will be generated automatically. By default, such numerical sequences restart on each page containing a footnote. Footnotes may be numbered consecutively across page beaks by setting the variable `reset-footnotes-on-new-page` to `#f`, see [\paper variables concerning headers and markups], page 611.

offset is a number pair such as '`#(2 . 1)`' specifying the X and Y offsets in units of staff spaces from the boundary of the object where the mark should be placed. Positive values of the offsets are taken from the right/top edge, negative values from the left/bottom edge and zero implies the mark is centered on the edge.

Context is the context in which the grob being footnoted is created. It may be omitted if the grob is in a bottom context, e.g., a `Voice` context.

GrobName specifies a type of grob to mark (like '`Flag`'). If it is specified, the footnote is not attached to a music expression in particular, but rather to all grobs of the type specified which occur at that moment of musical time.

footnote is the markup or string specifying the footnote text to use at the bottom of the page.

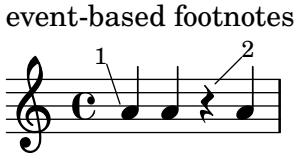
music is the music event or post-event or articulation that is being annotated.

Event-based footnotes

A footnote may be attached to a layout object directly caused by the event corresponding to *music* with the syntax:

```
\footnote [mark] offset footnote music
```

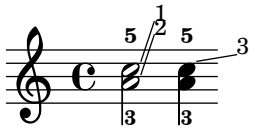
```
\book {
  \header { tagline = ##f }
  \markup "event-based footnotes"
  \markup \null
  \relative c'' {
    \footnote #'(-1 . 3) "A note." a4
    a4
    \footnote #'(2 . 2) "A rest." r4
    a4
  }
}
```



[1] A note.
[2] A rest.

If a chord is marked with an event-based footnote, each chord note gets a separate but identical footnote, which is undesired normally. However, it is possible to create footnotes for individual notes inside of a chord.

```
\book {
  \header { tagline = ##f }
  \markup "event-based footnotes"
  \markup \null
  \relative c'' {
    \footnote #'(1 . 3) "A chord." <a-3 c-5>2
    <a-3 \footnote #'(3 . 0.5) "A note in a chord." c-5>4
  }
}
```

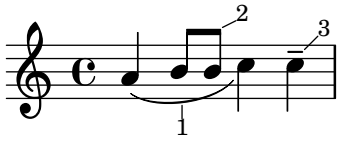
event-based footnotes

[1]A chord.
[2]A chord.
[3]A note in a chord.

If the footnote is to be attached to a post-event or articulation the `\footnote` command *must* be preceded by a direction indicator ('-', '_', '^'), and followed by the post-event or articulation to be annotated as the *music* argument. In this form the `\footnote` can be considered to be simply a copy of its last argument with a footnote mark attached to it. The syntax is:

direction `\footnote` [*mark*] *offset footnote music*

```
\book {
  \header { tagline = ##f }
  \markup "event-based footnotes"
  \markup \null
  \relative {
    a'4_\footnote #'(0 . -1) "A slur forced down." (
    b8^\footnote #'(1 . 0.5) "A manual beam forced up." [
    b8 ]
    c4 )
    c-\footnote #'(1 . 1) "Tenuto." --
  }
}
```

event-based footnotes



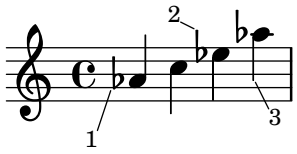
[1]A slur forced down.
[2]A manual beam forced up.
[3]Tenuto.

Time-based footnotes

If the layout object being footmarked is *indirectly* caused by an event (like an `Accidental` or `Stem` caused by a `NoteHead` event), the *GrobName* of the layout object is required after the footnote text instead of *music*:

```
\book {
  \header { tagline = ##f }
  \markup "time-based footnotes"
  \markup \null
  \relative c'' {
    \footnote #'(-1 . -3) "A flat." Accidental
    aes4 c
    \footnote #'(-1 . 0.5) "Another flat." Accidental
    ees
    \footnote #'(1 . -2) "A stem." Stem
    aes
  }
}
```

time-based footnotes

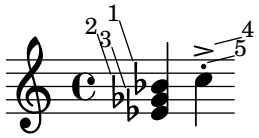


[1] A flat.
[2] Another flat.
[3] A stem.

Note, however, that when a *GrobName* is specified, a footnote is attached to all grobs of that type at the current time step:

```
\book {
  \header { tagline = ##f }
  \markup "time-based footnotes"
  \markup \null
  \markup \null
  \relative c' {
    \footnote #'(-1 . 3) "A flat." Accidental
    <ees ges bes>4
    \footnote #'(2 . 0.5) "Articulation." Script
    c'->-.
  }
}
```

time-based footnotes

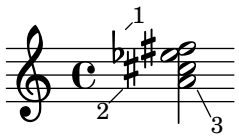


[1] A flat.
[2] A flat.
[3] A flat.
[4] Articulation.
[5] Articulation.

A note inside of a chord can be given an individual (event-based) footnote. A 'NoteHead' is the only grob directly caused from a chord note, so an event-based footnote command is *only* suitable for adding a footnote to the 'NoteHead' within a chord. All other chord note grobs

are indirectly caused. The \footnote command itself offers no syntax for specifying *both* a particular grob type *as well as* a particular event to attach to. However, one can use a time-based \footnote command for specifying the grob type, and then prefix this command with \single in order to have it applied to just the following event:

```
\book {
  \header { tagline = ##f }
  \markup "time-based footnotes"
  \markup \null
  \relative c'' {
    < \footnote #'(1 . -2) "An A." a
      \single \footnote #'(-1 . -1) "A sharp." Accidental
      cis
      \single \footnote #'(0.5 . 0.5) "A flat." Accidental
      ees fis
    >2
  }
}
```

time-based footnotes

[1]A flat.
[2]A sharp.
[3]An A.

Note: When footnotes are attached to several musical elements at the same musical moment, as they are in the example above, the footnotes are numbered from the higher to the lower elements as they appear in the printed output, not in the order in which they are written in the input stream.

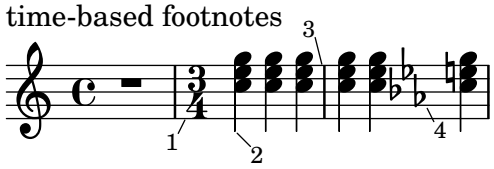
Layout objects like clefs and key change signatures are mostly caused as a consequence of changed properties rather than actual events. Others, like bar lines and bar numbers, are a direct consequence of timing. For this reason, footnotes on such objects have to be based on their musical timing. Time-based footnotes are also preferable when marking features like stems and beams on *chords*: while such per-chord features are nominally assigned to *one* event inside the chord, relying on a particular choice would be imprudent.

The layout object in question must always be explicitly specified for time-based footnotes, and the appropriate context must be specified if the grob is created in a context other than the bottom context.

```
\book {
  \header { tagline = ##f }
  \markup "time-based footnotes"
  \relative c'' {
    r1 |
    \footnote #'(-0.5 . -1) "Meter change." Staff.TimeSignature
    \time 3/4
```

```
    \footnote #'(1 . -1) "Chord stem." Stem
    <c e g>4 q q
    \footnote #'(-0.5 . 2) "Bar line." Staff.BarLine
    q q
    \footnote #'(0.5 . -1) "Key change." Staff.KeySignature
    \key c \minor
    q
  }
}
```

time-based footnotes

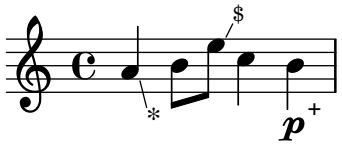


[1]Meter change.
[2]Chord stem.
[3]Bar line.
[4]Key change.

Custom marks can be used as alternatives to numerical marks, and the annotation line joining the marked object to the mark can be suppressed:

```
\book {
  \header { tagline = ##f }
  \markup "footnotes with custom marks"
  \markup \null
  \relative c' {
    \footnote "*" #'(0.5 . -2) \markup { \italic "* The first note" }
    a'4 b8
    \footnote \markup { \super "$" } #'(0.5 . 1)
      \markup { \super "$" \italic " The second note." } e
    c4
    \once \override Score.Footnote.annotation-line = ##f
    b-\footnote \markup \tiny "+" #'(0.1 . 0.1)
      \markup { \super "+" \italic " Editorial." } \p
  }
}
```

footnotes with custom marks



* *The first note*
$ *The second note.*
+ *Editorial.*

More examples of custom marks are shown in [Footnotes in stand-alone text], page 561.

Footnotes in stand-alone text

These are for use in markup outside of music expressions. They do not have a line drawn to their point of reference: their marks simply follow the referenced markup. Marks can be inserted automatically, in which case they are numerical. Alternatively, custom marks can be provided manually.

Footnotes to stand-alone text with automatic and custom marks are created in different ways.

Footnotes in stand-alone text with automatic marks

The syntax of a footnote in stand-alone text with automatic marks is

```
\markup { ... \auto-footnote text footnote ... }
```

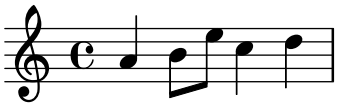
The elements are:

text the markup or string to be marked,

footnote the markup or string specifying the footnote text to use at the bottom of the page.

For example:

```
\book {
  \header { tagline = ##f }
  \markup {
    "A simple"
    \auto-footnote "tune" \italic " By me."
    "is shown below.  It is a"
    \auto-footnote "recent" \italic " Aug 2012."
    "composition."
  }
  \relative {
    a'4 b8 e c4 d
  }
}
```

A simple tune[1] is shown below. It is a recent[2] composition.

[1] *By me.*

[2] *Aug 2012.*

Footnotes in stand-alone text with custom marks

The syntax of a footnote in stand-alone text with custom marks is

```
\markup { ... \footnote mark footnote ... }
```

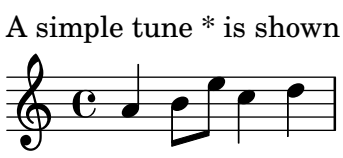
The elements are:

mark is a markup or string specifying the footnote mark which is used for marking the reference point. Note that this mark is *not* inserted automatically before the footnote itself.

footnote is the markup or string specifying the footnote text to use at the bottom of the page, preceded by the *mark*.

Any easy to type character such as '*' or '+' may be used as a mark, as shown in [Footnotes in music expressions], page 555. Alternatively, ASCII aliases may be used (see [ASCII aliases], page 582):

```
\book {
  \paper { #(include-special-characters) }
  \header { tagline = ##f }
  \markup {
    "A simple tune"
    \footnote "*" \italic "* By me."
    "is shown below.  It is a recent"
    \footnote \super &dagger; \concat {
      \super &dagger; \italic " Aug 2012."
    }
    "composition."
  }
  \relative {
    a'4 b8 e c4 d
  }
}
```

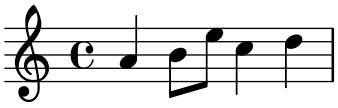


* *By me.*
† *Aug 2012.*

Unicode character codes may also be used to specify marks (see [Unicode], page 581):

```
\book {
  \header { tagline = ##f }
  \markup {
    "A simple tune"
    \footnote \super \char##x00a7 \concat {
      \super \char##x00a7 \italic " By me."
    }
    "is shown below.  It is a recent"
    \footnote \super \char##x00b6 \concat {
```

```
        \super \char##x00b6 \italic " Aug 2012."
      }
      "composition."
    }
    \relative {
      a'4 b8 e c4 d
    }
  }
```

A simple tune [§] is shown below. It is a recent [¶] composition.

[§] *By me.*
[¶] *Aug 2012.*

See also

Learning Manual: Section “Objects and interfaces” in *Learning Manual*.

Notation Reference: [ASCII aliases], page 582, [Balloon help], page 270, Section A.14 [List of special characters], page 822, [Text marks], page 283, [Text scripts], page 279, [Unicode], page 581.

Internals Reference: Section “FootnoteEvent” in *Internals Reference*, Section “Footnote” in *Internals Reference*, Section “Footnote_engraver” in *Internals Reference*.

Known issues and warnings

Multiple footnotes for the same page can only be stacked, one above the other; they cannot be printed on the same line.

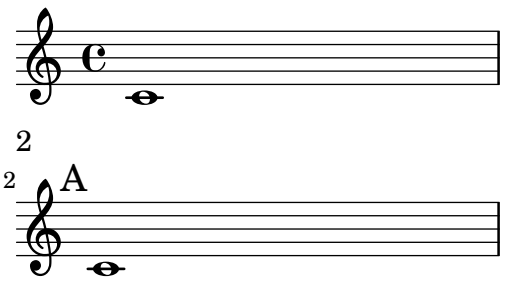
Footnote marks may collide with staves, `\markup` objects, other footnote marks and annotation lines.

3.3.5 Reference to page numbers

A particular place of a score can be marked using the `\label` command, either at top level or inside music. This label can then be referred to in a markup, to get the number of the page where the marked point is placed, using the `\page-ref` markup command.

```
\header { tagline = ##f }
\book {
  \label #'firstScore
  \score {
    {
      c'1
      \pageBreak \mark A \label #'markA
      c'1
```

```
    }
  }
  \markup { The first score begins on page \page-ref #'firstScore "0" "?" }
  \markup { Mark A is on page \page-ref #'markA "0" "?" }
}
```



The first score begins on page 1
Mark A is on page 2

The \page-ref markup command takes three arguments:

1. the label, a Scheme symbol, for example #'firstScore;
2. a markup that will be used as a gauge to estimate the dimensions of the markup;
3. a markup that will be used in place of the page number if the label is not known.

The reason why a gauge is needed is that, at the time markups are interpreted, the page breaking has not yet occurred, so the page numbers are not yet known. To work around this issue, the actual markup interpretation is delayed to a later time; however, the dimensions of the markup have to be known before, so a gauge is used to decide these dimensions. If the book has between 10 and 99 pages, it may be "00", i.e., a two digit number.

Predefined commands

\label, \page-ref.

3.3.6 Table of contents

A table of contents is included using the \markuplist \table-of-contents command. The elements which should appear in the table of contents are entered with the \tocItem command, which may be used either at top level, or inside a music expression.

```
\markuplist \table-of-contents
\pageBreak

\tocItem \markup "First score"
\score {
  {
    c'4  % ...
    \tocItem \markup "Some particular point in the first score"
    d'4  % ...
  }
}

\tocItem \markup "Second score"
\score {
```

```
  {
    e'4 % ...
    \tocItem actI \markup "Act I"
    f'4 % ...
    \tocItem actI.sceneI \markup "Scene 1"
    g'4 % ...
    \tocItem actI.sceneI.recitativo \markup "Recit."
    a'4 % ...
  }
}
```

Optionally, a label can be associated with a particular item, or a hierarchical list of existing labels, finishing with that item's label. That latter case allows to mark the item as a 'child' of the preceding labeled items, thus making the score's structure apparent in the table of contents.

Markups used for formatting the table of contents are defined in the `\paper` block. There are three 'predefined' markups already available;

- `tocTitleMarkup`

  Used for formatting the title of the table of contents.

  ```
  tocTitleMarkup = \markup \huge \column {
    \fill-line { \null "Table of Contents" \null }
    \null
  }
  ```

- `tocItemMarkup`

  Used for formatting the elements within the table of contents.

  ```
  tocItemMarkup = \markup \fill-line {
    \fromproperty #'toc:text \fromproperty #'toc:page
  }
  ```

- `tocFormatMarkup`

  How the table's top level entries will be formatted (if there are several hierarchical levels). This is actually a procedure, as explained in Section "Markup construction in Scheme" in *Extending*.

  ```
  tocFormatMarkup = #make-bold-markup
  ```

- `tocIndentMarkup`

  Used to define how the outline's hierarchy will be made apparent. This markup is printed zero, one or several times depending on the level of each entry.

  ```
  tocIndentMarkup = \markup \hspace #4
  ```

Any of these variables can be changed.

Here is an example translating the table of contents' title into French:

```
\paper {
  tocTitleMarkup = \markup \huge \column {
    \fill-line { \null "Table des matières" \null }
    \hspace #1
  }
```

Here is an example changing the font size of the elements in the table of contents:

```
tocItemMarkup = \markup \large \fill-line {
  \fromproperty #'toc:text \fromproperty #'toc:page
}
```

Note how the element text and page numbers are referred to in the `tocItemMarkup` definition.

The \tocItemWithDotsMarkup command can be included within the tocItemMarkup to fill the line, between a table of contents item and its corresponding page number, with dots:

```
\header { tagline = ##f }
\paper {
  tocItemMarkup = \tocItemWithDotsMarkup
}

\book {
  \markuplist \table-of-contents
  \tocItem \markup { Allegro }
  \tocItem \markup { Largo }
  \markup \null
}
```

Table of Contents

Allegro 1
Largo 1

In addition to the built-in outline mechanism, custom commands can also be defined to build a more personalized table of contents with different markups In the following example, a new style is defined for entering act and scenes in the table of contents of an opera:

A new markup variable (called tocActMarkup) is defined in the \paper block:

```
\paper {
  tocActMarkup = \markup \large \column {
    \hspace #1
    \fill-line { \null \italic \fromproperty #'toc:text \null }
    \hspace #1
  }
}
```

A custom music function (tocAct) is then created – which uses the new tocActMarkup markup definition, and allows to specify a label for each act.

```
tocAct =
  #(define-music-function (label text) (symbol? markup?)
     (add-toc-item! 'tocActMarkup text label))
```

Using these custom definitions and modifying some of the existing definitions, the source file could then be written as follows:

Table of Contents

Atto Primo

Coro. Viva il nostro Alcide 1
Cesare. Presti omai l'Egizia terra 1
Recit. Curio, Cesare venne, e vide, e vinse. . 1

Atto Secondo

Sinfonia 1
Cleopatra. V'adoro, pupille, saette d'Amore . . 1

The previous example also demonstrates how to use the `\fill-with-pattern` markup command within the context of a table of contents.

See also

Installed Files: `ly/toc-init.ly`.

Predefined commands

`\table-of-contents`, `\tocItem`, `tocItemMarkup`, `tocTitleMarkup`, `tocFormatMarkup`, `tocIndentMarkup`.

3.4 Working with input files

3.4.1 Including LilyPond files

A large project may be split up into separate files. To refer to another file, use

```
\include "otherfile.ly"
```

The line `\include "otherfile.ly"` is equivalent to pasting the contents of `otherfile.ly` into the current file at the place where the `\include` appears. For example, in a large project you might write separate files for each instrument part and create a "full score" file which brings together the individual instrument files. Normally the included file will define a number of variables which then become available for use in the full score file. Tagged sections can be marked in included files to assist in making them usable in different places in a score, see Section 3.4.2 [Different editions from one source], page 568.

Files in the current working directory may be referenced by specifying just the file name after the `\include` command. Files in other locations may be included by giving either a full path reference or a relative path reference (but use the UNIX forward slash, /, rather than the DOS/Windows back slash, \, as the directory separator.) For example, if `stuff.ly` is located one directory higher than the current working directory, use

```
\include "../stuff.ly"
```

or if the included orchestral parts files are all located in a subdirectory called `parts` within the current directory, use

```
\include "parts/VI.ly"
\include "parts/VII.ly"
... etc
```

Files which are to be included can also contain `\include` statements of their own. These second-level `\include` statements are then interpreted relatively to the path of the file containing that command, which is convenient for multiple files located in the same subdirectory. For example, a general library, 'libA', may itself use subfiles which are `\included` by the entry file of that library, like this:

```
libA/
  libA.ly
  A1.ly
  A2.ly
  ...
```

then the entry file, `libA.ly`, will contain

```
\include "A1.ly"
\include "A2.ly"
...
```

Any `.ly` file can then include the entire library simply with

```
\include "~/libA/libA.ly"
```

However, that behavior can be changed globally by passing the command-line option `-drelative-includes=#f`, or by adding `#(ly:set-option 'relative-includes #f)` at the top of the main input file. In that case, each file will be included relatively to the location of the main file, regardless of where its `\include` statement is located. Complex file structures, that require to `\include` *both* files relative to the main directory and files relative to some other directory, may even be devised by setting `relative-includes` to `#f` or `#t` at appropriate places in the files.

Files can also be included from a directory in a search path specified as an option when invoking LilyPond from the command line. The included files are then specified using just their file name. For example, to compile `main.ly` which includes files located in a subdirectory called `parts` by this method, change to the directory containing `main.ly` and enter

```
lilypond --include=parts main.ly
```

and in main.ly write

```
\include "VI.ly"
\include "VII.ly"
... etc
```

Files which are to be included in many scores may be placed in the LilyPond directory `../ly`. (The location of this directory is installation-dependent – see Section "Other sources of information" in *Learning Manual*). These files can then be included simply by naming them on an `\include` statement. This is how the language-dependent files like `english.ly` are included.

LilyPond includes a number of files by default when you start the program. These includes are not apparent to the user, but the files may be identified by running `lilypond --verbose` from the command line. This will display a list of paths and files that LilyPond uses, along with much other information. Alternatively, the more important of these files are discussed in Section "Other sources of information" in *Learning Manual*. These files may be edited, but changes to them will be lost on installing a new version of LilyPond.

Some simple examples of using `\include` are shown in Section "Scores and parts" in *Learning Manual*.

See also

Learning Manual: Section "Other sources of information" in *Learning Manual*, Section "Scores and parts" in *Learning Manual*.

Known issues and warnings

If an included file is given a name which is the same as one in LilyPond's installation files, LilyPond's file from the installation files takes precedence.

3.4.2 Different editions from one source

Several methods can be used to generate different versions of a score from the same music source. Variables are perhaps the most useful for combining lengthy sections of music and/or annotation. Tags are more useful for selecting one section from several alternative shorter sections of music, and can also be used for splicing pieces of music together at different points.

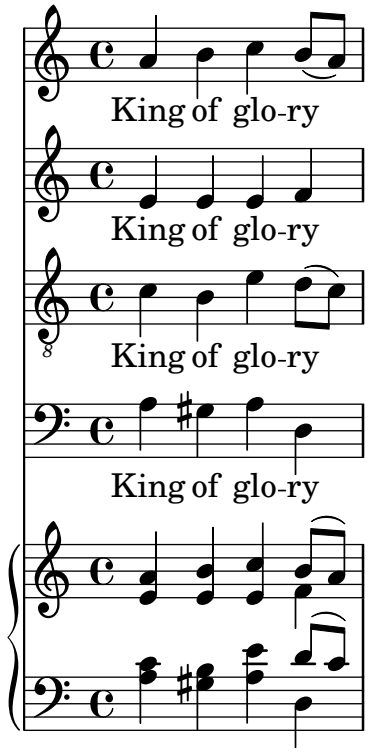
Whichever method is used, separating the notation from the structure of the score will make it easier to change the structure while leaving the notation untouched.

Using variables

If sections of the music are defined in variables they can be reused in different parts of the score, see Section "Organizing pieces with variables" in *Learning Manual*. For example, an *a cappella* vocal score frequently includes a piano reduction of the parts for rehearsal purposes which is

identical to the vocal music, so the music need be entered only once. Music from two variables may be combined on one staff, see [Automatic part combining], page 208. Here is an example:

```
sopranoMusic = \relative { a'4 b c b8( a) }
altoMusic = \relative { e'4 e e f }
tenorMusic = \relative { c'4 b e d8( c) }
bassMusic = \relative { a4 gis a d, }
allLyrics = \lyricmode { King of glo -- ry }
<<
  \new Staff = "Soprano" \sopranoMusic
  \new Lyrics \allLyrics
  \new Staff = "Alto" \altoMusic
  \new Lyrics \allLyrics
  \new Staff = "Tenor" {
    \clef "treble_8"
    \tenorMusic
  }
  \new Lyrics \allLyrics
  \new Staff = "Bass" {
    \clef "bass"
    \bassMusic
  }
  \new Lyrics \allLyrics
  \new PianoStaff <<
    \new Staff = "RH" {
      \partCombine \sopranoMusic \altoMusic
    }
    \new Staff = "LH" {
      \clef "bass"
      \partCombine \tenorMusic \bassMusic
    }
  >>
>>
```



Separate scores showing just the vocal parts or just the piano part can be produced by changing just the structural statements, leaving the musical notation unchanged.

For lengthy scores, the variable definitions may be placed in separate files which are then included, see Section 3.4.1 [Including LilyPond files], page 567.

Using tags

The `\tag #'partA` command marks a music expression with the name *partA*. Expressions tagged in this way can be selected or filtered out by name later, using either `\keepWithTag #'name` or `\removeWithTag #'name`. The result of applying these filters to tagged music is as follows:

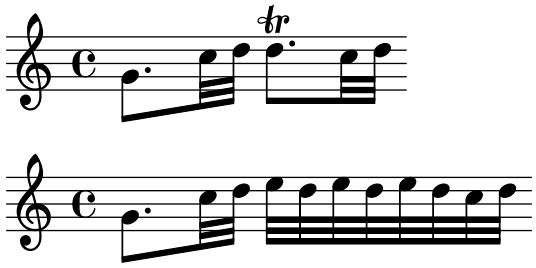
Filter	**Result**
Tagged music preceded by `\keepWithTag #'name` or `\keepWithTag #'(name1 name2...)`	Untagged music and music tagged with any of the given tag names is included; music tagged with any other tag name is excluded.
Tagged music preceded by `\removeWithTag #'name` or `\removeWithTag #'(name1 name2...)`	Untagged music and music not tagged with any of the given tag names is included; music tagged with any of the given tag names is excluded.
Tagged music not preceded by either `\keepWithTag` or `\removeWithTag`	All tagged and untagged music is included.

The arguments of the `\tag`, `\keepWithTag` and `\removeWithTag` commands should be a symbol or list of symbols (such as `#'score` or `#'(violinI violinII)`, followed by a music expression. If *and only if* the symbols are valid LilyPond identifiers (alphabetic characters only, no numbers, underscores, or dashes) which cannot be confused with notes, the `#'` may be omitted and, as a shorthand, a list of symbols can use the dot separator: i.e., `\tag #'(violinI`

violinII) can be written \tag violinI.violinII. The same applies to \keepWithTag and \removeWithTag. Tagging commands are music functions, thus they cannot be used to filter items that are not music expressions, such as \book or \score blocks.

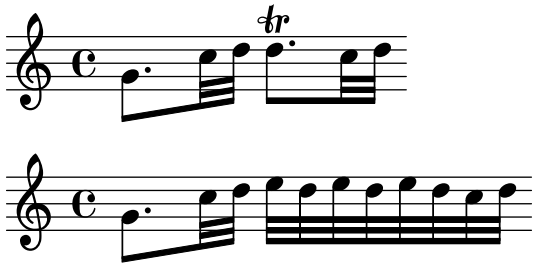
In the following example, we see two versions of a piece of music, one showing trills with the usual notation, and one with trills explicitly expanded:

```
music = \relative {
  g'8. c32 d
  \tag #'trills { d8.\trill }
  \tag #'expand { \repeat unfold 3 { e32 d } }
  c32 d
 }

\score {
  \keepWithTag #'trills \music
}
\score {
  \keepWithTag #'expand \music
}
```



Alternatively, it is sometimes easier to exclude sections of music:

```
music = \relative {
  g'8. c32 d
  \tag #'trills { d8.\trill }
  \tag #'expand {\repeat unfold 3 { e32 d } }
  c32 d
 }

\score {
  \removeWithTag #'expand
  \music
}
\score {
  \removeWithTag #'trills
  \music
}
```



Tagged filtering can be applied to articulations, texts, etc., by prepending

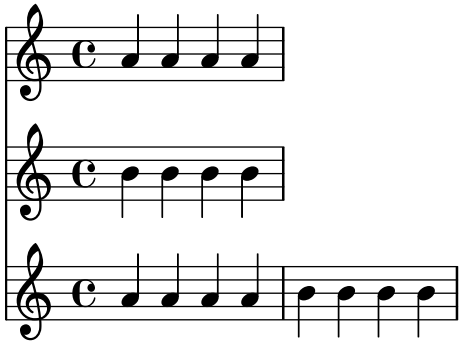
```
-\tag #'your-tag
```

to an articulation. For example, this would define a note with a conditional fingering indication and a note with a conditional annotation:

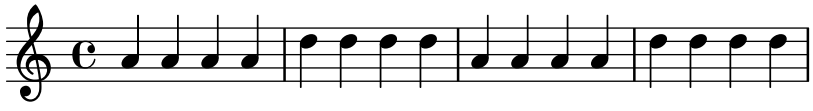
```
c1-\tag #'finger ^4
c1-\tag #'warn ^"Watch!"
```

Multiple tags may be placed on expressions with multiple \tag entries, or by combining multiple tags into one symbol list:

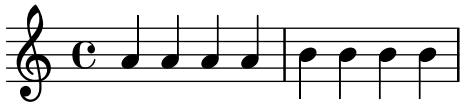
```
music = \relative c'' {
  \tag #'a \tag #'both { a4 a a a }
  \tag #'(b both) { b4 b b b }
}
<<
\keepWithTag #'a \music
\keepWithTag #'b \music
\keepWithTag #'both \music
>>
```



Multiple \removeWithTag filters may be applied to a single music expression to remove several differently named tagged sections. Alternatively, you can use a single \removeWithTag with a list of tags.

```
music = \relative c'' {
  \tag #'A { a4 a a a }
  \tag #'B { b4 b b b }
  \tag #'C { c4 c c c }
  \tag #'D { d4 d d d }
}
\new Voice {
  \removeWithTag #'B
  \removeWithTag #'C
  \music
  \removeWithTag #'(B C)
  \music
}
```

Using two or more \keepWithTag filters on a single music expression will cause *all* of the tagged sections to be removed. The first filter will remove all except the one named and any

subsequent filters will remove the rest. Using one \keepWithTag command with a list of multiple tags will only remove tagged sections that are not specified in that list.

```
music = \relative c'' {
  \tag #'violinI { a4 a a a }
  \tag #'violinII { b4 b b b }
  \tag #'viola { c4 c c c }
  \tag #'cello { d4 d d d }
}

\new Staff {
  \keepWithTag #'(violinI violinII)
  \music
}
```

will print \tags *violinI* and *violinII* but not *viola* or *cello*.

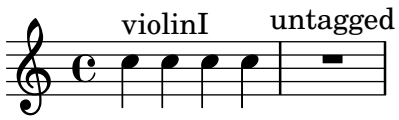
While \keepWithTag is convenient when dealing with *one* set of alternatives, the removal of music tagged with *unrelated* tags is problematic when using them for more than one purpose. In that case 'groups' of tags can be declared:

```
\tagGroup #'(violinI violinII viola cello)
```

Now all the different tags belong to a single 'tag group'. Note that individual tags cannot be members of more than one *tag group*.

```
\keepWithTag #'violinI ...
```

will now only show music tagged from violinI's tag group and any music tagged with one of the *other* tags will removed.

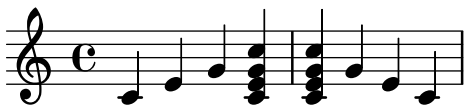
```
music = \relative {
  \tagGroup #'(violinI violinII viola cello)
  \tag #'violinI { c''4^"violinI" c c c }
  \tag #'violinII { a2 a }
  \tag #'viola { e8 e e2. }
  \tag #'cello { d'2 d4 d }
  R1^"untagged"
}

\new Voice {
  \keepWithTag #'violinI
  \music
}
```

When using the \keepWithTag command, only tags from the tag groups of the tags given in the command are visible.

Sometimes you want to splice some music at a particular place in an existing music expression. You can use \pushToTag and \appendToTag for adding material at the front or end of various music constructs. The supported places are

Sequential and simultaneous music
: If you tagged an entire `{...}` or `<<...>>` construct, you can add music expressions at its front or back.

Chords
: If you tagged a chord `<...>`, you can either add notes at its front or back, or articulations for the whole chord.

Notes and rests
: If you tagged a note (also inside of a chord) or a rest, you can add articulations to the front or back of its existing articulations. Note that to add other *notes*, you rather have to put the note inside of a chord and tag the *chord*. Also note that you cannot tag a single *articulation* and add to it since it isn't inherently a list. Instead, tag the note.

```
music = { \tag #'here { \tag #'here <<c''>> } }

{
  \pushToTag #'here c'
  \pushToTag #'here e'
  \pushToTag #'here g' \music
  \appendToTag #'here c'
  \appendToTag #'here e'
  \appendToTag #'here g' \music
}
```

Both commands get a tag, the material to splice in at every occurrence of the tag, and the tagged expression.

See also

Learning Manual: Section "Organizing pieces with variables" in *Learning Manual*.

Notation Reference: [Automatic part combining], page 208, Section 3.4.1 [Including LilyPond files], page 567.

Known issues and warnings

Calling `\relative` on a music expression obtained by filtering music through `\keepWithTag` or `\removeWithTag` might cause the octave relations to change, as only the pitches actually remaining in the filtered expression will be considered. Applying `\relative` first, before `\keepWithTag` or `\removeWithTag`, avoids this danger as `\relative` then acts on all the pitches as input.

Using global settings

Global settings can be included from a separate file:

```
lilypond -dinclude-settings=MY_SETTINGS.ly MY_SCORE.ly
```

Groups of settings such as page size, font or type face can be stored in separate files. This allows different editions from the same score as well as standard settings to be applied to many scores, simply by specifying the proper settings file.

This technique also works well with the use of style sheets, as discussed in Section "Style sheets" in *Learning Manual*.

See also

Learning Manual: Section "Organizing pieces with variables" in *Learning Manual*, Section "Style sheets" in *Learning Manual*.

Notation Reference: Section 3.4.1 [Including LilyPond files], page 567.

3.4.3 Using music functions

Where tweaks need to be reused with different music expressions, it is often convenient to make the tweak part of a *music function*. In this section, we discuss only *substitution* functions, where the object is to substitute a variable into a piece of LilyPond input code. Other more complex functions are described in Section "Music functions" in *Extending*.

3.4.3.1 Substitution function syntax

Making a function that substitutes a variable into LilyPond code is easy. The general form of these functions is

```
function =
#(define-music-function
     (arg1 arg2 ...)
     (type1? type2? ...)
   #{
     ...music...
   #})
```

where

argN	The *n*th argument.
typeN?	A Scheme *type predicate* for which *argN* must return `#t`.
...music...	Normal LilyPond input, using `$` (in places where only LilyPond constructs are allowed) or `#` (to use it as a Scheme value or music function argument or music inside of music lists) to reference arguments (e.g., '`#arg1`').

The list of type predicates is required. Some of the most common type predicates used in music functions are:

boolean?

cheap-list? *(use instead of* 'list?' *for faster processing)*

ly:duration?

ly:music?

ly:pitch?

markup?

number?

pair?

string?

symbol?

For a list of available type predicates, see Section A.24 [Predefined type predicates], page 851. User-defined type predicates are also allowed.

See also

Notation Reference: Section A.24 [Predefined type predicates], page 851.

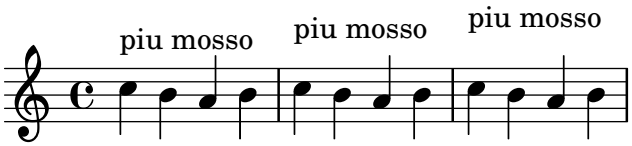
Extending LilyPond: Section “Music functions” in *Extending*.

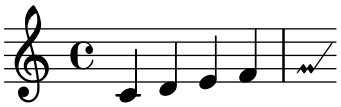
Installed Files: `lily/music-scheme.cc`, `scm/c++.scm`, `scm/lily.scm`.

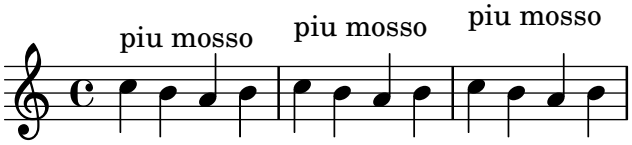
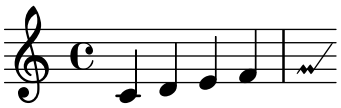
3.4.3.2 Substitution function examples

This section introduces some substitution function examples. These are not intended to be exhaustive, but rather to demonstrate some of the possibilities of simple substitution functions.

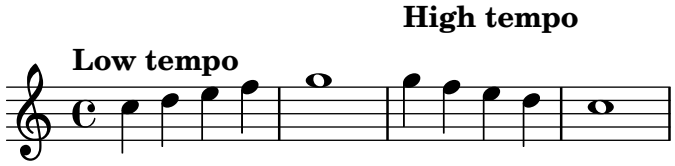
In the first example, a function is defined that simplifies setting the padding of a `TextScript` grob:

```
padText =
#(define-music-function
     (padding)
     (number?)
   #{
     \once \override TextScript.padding = #padding
   #})

\relative {
  c''4^"piu mosso" b a b
  \padText #1.8
  c4^"piu mosso" b a b
  \padText #2.6
  c4^"piu mosso" b a b
}
```

In addition to numbers, we can use music expressions such as notes for arguments to music functions:

```
custosNote =
#(define-music-function
     (note)
     (ly:music?)
   #{
     \tweak NoteHead.stencil #ly:text-interface::print
     \tweak NoteHead.text
        \markup \musicglyph "custodes.mensural.u0"
     \tweak Stem.stencil ##f
     #note
   #})

\relative { c'4 d e f \custosNote g }
```

Both of those functions are simple single expressions where only the last element of a function call or override is missing. For those particular function definitions, there is a simpler alternative syntax, namely just writing out the constant part of the expression and replacing its final missing element with \etc:

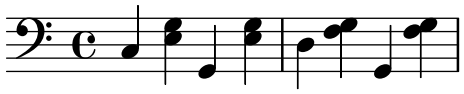
```
padText =
  \once \override TextScript.padding = \etc

\relative {
  c''4^"piu mosso" b a b
  \padText #1.8
  c4^"piu mosso" b a b
  \padText #2.6
  c4^"piu mosso" b a b
}
```

```
custosNote =
  \tweak NoteHead.stencil #ly:text-interface::print
  \tweak NoteHead.text
     \markup \musicglyph "custodes.mensural.u0"
  \tweak Stem.stencil ##f
  \etc

\relative { c'4 d e f \custosNote g }
```

Substitution functions with multiple arguments can be defined:

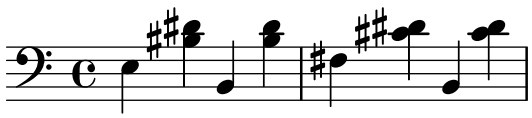
```
tempoPadded =
#(define-music-function
     (padding tempotext)
     (number? markup?)
   #{
     \once \override Score.MetronomeMark.padding = #padding
     \tempo \markup { \bold #tempotext }
   #})

\relative {
  \tempo \markup { "Low tempo" }
  c''4 d e f g1
  \tempoPadded #4.0 "High tempo"
  g4 f e d c1
}
```



3.4.3.3 How to prevent sharing of music expressions

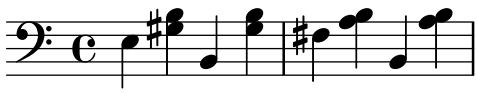
When writing music functions, it is important to abide by a rule: the same music expressions must not be shared in several places. As an example, here is a problematic function:

```
simpleAccompaniment =
#(define-music-function
   (bass-1 bass-2 chord) (ly:music? ly:music? ly:music?)
   #{
     #bass-1 #chord #bass-2 #chord
   #})

{
  \clef bass
  \simpleAccompaniment c g, <e g>
  \simpleAccompaniment d g, <f g>
}
```

The problem with this function becomes clear if the result is transposed:

```
simpleAccompaniment =
#(define-music-function
   (bass-1 bass-2 chord) (ly:music? ly:music? ly:music?)
   #{
     #bass-1 #chord #bass-2 #chord
   #})

\transpose c e {
  \clef bass
  \simpleAccompaniment c g, <e g>
  \simpleAccompaniment d g, <f g>
}
```

While the bass notes are correct, the chord is not transposed properly – in fact, it is being transposed twice. The reason for this is that the music expression *chord* was used twice in the result of the function, without copying it. Functions such as `\transpose` modify the music object directly (in the case of `\transpose`, the pitches are changed). If the same music object is reused, modifications made in one place where it is used affect both places, since they hold the same object. In this case, `\transpose` encounters the object twice and transposes it twice.

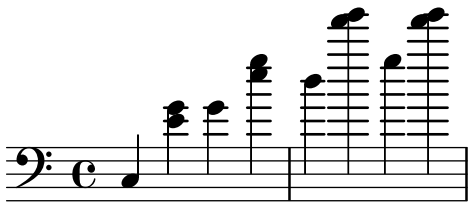
One way to fix this function is to use '`$`' instead of '`#`' to reference the variables, which makes a copy. The difference between '`#`' and '`$`' is detailed in Section "LilyPond Scheme syntax" in *Extending*.

```
simpleAccompaniment =
```

```
#(define-music-function
   (bass-1 bass-2 chord) (ly:music? ly:music? ly:music?)
   #{
     $bass-1 $chord $bass-2 $chord
   #})

\transpose c e {
  \clef bass
  \simpleAccompaniment c g, <e g>
  \simpleAccompaniment d g, <f g>
}
```

3.4.3.4 Substitution functions and relative octave entry

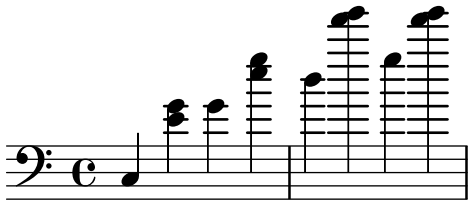
When `\relative` is applied to a music expression, it traverses it searching for pitched notes, and modifies the pitches in the order they are found, changing the octave of each pitch according to its octave marks (‘'’ and ‘,’) and the previous pitch. When writing substitution functions, this may lead to the situation that a music expression is ‘relativized’ in a surprising way because the output of the function uses the parameters several times and/or in a different order. Consider this function and how its output reacts to `\relative`:

```
simpleAccompaniment =
#(define-music-function
   (bass-1 bass-2 chord) (ly:music? ly:music? ly:music?)
   #{
     $bass-1 $chord $bass-2 $chord
   #})

\relative {
  \clef bass
  \simpleAccompaniment c g <e' g>
  \simpleAccompaniment d g, <f' g>
}
```

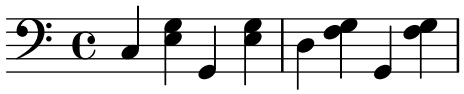


In this example, the output is the same as that of

```
\relative {
  \clef bass
  c <e' g> g <e' g>
  d <f' g>  g, <f' g>
}
```



However, this is not the desired output when using the `\simpleAccompaniment` function. The pitch `g,` is relative to the first note of the chord that precedes it, `<e' g>`, although it comes after `c` in the input. Clearly, the pitches should be made relative according to the order in which they are input when using the function, not in the order they appear in the output of the function. This can be achieved using the `make-relative` Scheme macro. Its arguments are: a list of variables, a reference expression, and a main music expression. The reference expression is intended to be a mock-up of how the variables were entered in the input. Most of the time, it can be a simple expression made with `#{ ... #}` containing the variables in order. Beware *not* to make copies in the reference expression (in particular, use '#', not '$'). The example above can be fixed using `make-relative` in this way:

```
simpleAccompaniment =
#(define-music-function
   (bass-1 bass-2 chord) (ly:music? ly:music? ly:music?)
   (make-relative
    (bass-1 bass-2 chord)
    #{ #bass-1 #bass-2 #chord #}
    #{ $bass-1 $chord $bass-2 $chord #}))

\relative {
  \clef bass
  \simpleAccompaniment c g <e' g>
  \simpleAccompaniment d g, <f' g>
}
```

3.4.4 Special characters

Text encoding

LilyPond uses the character repertoire defined by the Unicode consortium and ISO/IEC 10646. This defines a unique name and code point for the character sets used in virtually all modern languages and many others too. Unicode can be implemented using several different encodings. LilyPond uses the UTF-8 encoding (UTF stands for Unicode Transformation Format) which represents all common Latin characters in one byte, and represents other characters using a variable length format of up to four bytes.

The actual appearance of the characters is determined by the glyphs defined in the particular fonts available – a font defines the mapping of a subset of the Unicode code points to glyphs. LilyPond uses the Pango library to layout and render multi-lingual texts.

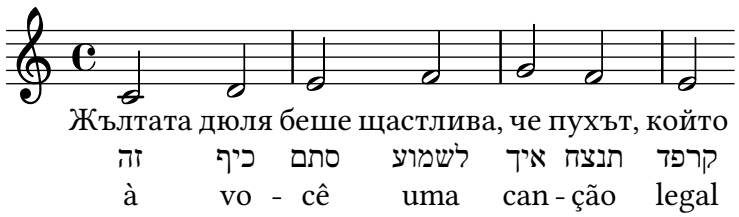
LilyPond does not perform any input encoding conversions. This means that any text, be it title, lyric text, or musical instruction containing non-ASCII characters, must be encoded in UTF-8. The easiest way to enter such text is by using a Unicode-aware editor and saving the file with UTF-8 encoding. Most popular modern editors have UTF-8 support, for example, vim, Emacs, jEdit, and Gedit do. All MS Windows systems later than NT use Unicode as their

native character encoding, so even Notepad can edit and save a file in UTF-8 format. A more functional alternative for Windows is BabelPad.

If a LilyPond input file containing a non-ASCII character is not saved in UTF-8 format the error message

```
FT_Get_Glyph_Name () error: invalid argument
```

will be generated.

Here is an example showing Cyrillic, Hebrew and Portuguese text:

Unicode

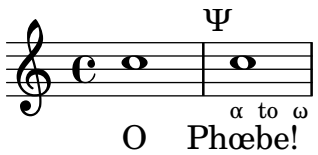
To enter a single character for which the Unicode code point is known but which is not available in the editor being used, use either `\char ##xhhhh` or `\char #dddd` within a `\markup` block, where `hhhh` is the hexadecimal code for the character required and `dddd` is the corresponding decimal value. Leading zeroes may be omitted, but it is usual to specify all four characters in the hexadecimal representation. (Note that the UTF-8 encoding of the code point should *not* be used after `\char`, as UTF-8 encodings contain extra bits indicating the number of octets.) Unicode code charts and a character name index giving the code point in hexadecimal for any character can be found on the Unicode Consortium website, `https://www.unicode.org/`.

For example, `\char ##x03BE` and `\char #958` would both enter the Unicode U+03BE character, which has the Unicode name "Greek Small Letter Xi".

Any Unicode code point may be entered in this way and if all special characters are entered in this format it is not necessary to save the input file in UTF-8 format. Of course, a font containing all such encoded characters must be installed and available to LilyPond.

The following example shows Unicode hexadecimal values being entered in four places – in a text mark, as articulation text, in lyrics and as stand-alone text below the score:

```
\score {
  \relative {
    c''1
    \textMark \markup { \char ##x03A8 }
    c1_\markup { \tiny { \char ##x03B1 " to " \char ##x03C9 } }
  }
  \addlyrics { O \markup { \concat { Ph \char ##x0153 be! } } }
}
\markup { "Copyright 2008--2023" \char ##x00A9 }
```



Copyright 2008--2023 ©

To enter the copyright sign in the copyright notice use:

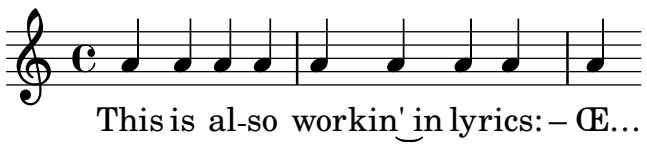
```
\header {
  copyright = \markup { \char ##x00A9 "2008" }
}
```

ASCII aliases

A list of ASCII aliases for special characters can be included:

```
\paper {
  #(include-special-characters)
}

\markup "&flqq; &ndash; &OE;uvre incomplète&hellip; &frqq;"

\score {
  \new Staff { \repeat unfold 9 a'4 }
  \addlyrics {
    This is al -- so wor -- kin'~in ly -- rics: &ndash;_&OE;&hellip;
  }
}

\markup \column {
  "The replacement can be disabled:"
  "&ndash; &OE; &hellip;"
  \override #'(replacement-alist . ()) "&ndash; &OE; &hellip;"
}
```

« – Œuvre incomplète… »



The replacement can be disabled:
– Œ …
– &OE; …

You can also make your own aliases, either globally:

```
\paper {
  #(add-text-replacements!
    '(("100" . "hundred")
      ("dpi" . "dots per inch")))
}
\markup "A 100 dpi."
```

A hundred dots per inch.

or locally:

```
\markup \replace #'(("100" . "hundred")
                    ("dpi" . "dots per inch")) "A 100 dpi."
```

A hundred dots per inch.

The replacement is not necessarily a string; it can be an arbitrary markup. On the syntax level, this requires using Scheme quasi-quoting syntax, with a backtick ‘`’ instead of a quote ‘'’ to write the alist.

```
\markup \replace
  #`(("2nd" . ,#{ \markup \concat { 2 \super nd } #})) "2nd time"
```

2nd time

Aliases themselves are not further processed for replacements.

See also

Notation Reference: Section A.14 [List of special characters], page 822.

Installed Files: `ly/text-replacements.ly`.

3.5 Controlling output

3.5.1 Extracting fragments of music

It is possible to output one or more fragments of a score by defining the explicit location of the music to be extracted within the `\layout` block of the input file using the `clip-regions` function, and then running LilyPond with the `-dclip-systems` option;

```
\layout {
  clip-regions
  = #(list
      (cons
       (make-rhythmic-location 5 1 2)
       (make-rhythmic-location 7 3 4)))
}
```

This example will extract a single fragment of the input file *starting* after a half note duration in fifth measure (`5 1 2`) and *ending* after the third quarter note in the seventh measure (`7 3 4`).

Additional fragments can be extracted by adding more pairs of `make-rhythmic-location` entries to the `clip-regions` list in the `\layout` block.

By default, each music fragment will be output as a separate `EPS` file, but other formats such as `PDF` or `PNG` can also be created if required. The extracted music is output as if had been literally 'cut' from the original printed score so if a fragment runs over one or more lines, a separate output file for each line will be generated.

See also

Notation Reference: Section 4.2.1 [The `\layout` block], page 612.

Application Usage: Section "Command-line usage" in *Application Usage*.

3.5.2 Skipping corrected music

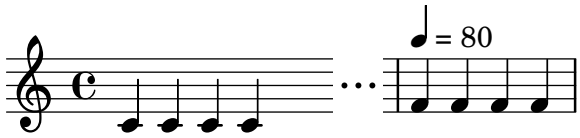
When entering or copying music, usually only the music near the end (where new notes are being added) is interesting to view and correct. To speed up this correction process, it is possible to skip typesetting of all but the last few measures. This is achieved by defining a special variable at the source file's top level, as follows:

```
showLastLength = R1*5
\score { ... }
```

In this instance, nothing will be rendered but the last five measures (assuming 4/4 time signature) of every `\score` in the input file. For longer pieces, rendering only a small part is often an order of magnitude quicker than rendering it completely. When working on the beginning of a score that has already been typeset (for example to add a new part), the `showFirstLength` property may be useful as well.

Skipping parts of a score can be controlled in a more fine-grained fashion with the property `Score.skipTypesetting`. When it is set, no typesetting is performed at all. As a property of the `Score` context, it affects all voices and staves; see [Score – the master of all contexts], page 660.

This property is also used to control output to the MIDI file. If some event in the skipped section alters some of its context properties, for example a tempo or instrument change, then that new setting will take effect only at the point in time where `skipTypesetting` is disabled again:

```
\relative c' {
  c4 c c c
  \set Score.skipTypesetting = ##t
  d4 d d d
  \tempo 4 = 80
  e4 e e e
  \set Score.skipTypesetting = ##f
  f4 f f f
}
```

Predefined commands

`showLastLength`, `showFirstLength`.

See also

Notation Reference: Section 5.1 [Interpretation contexts], page 659, [Score – the master of all contexts], page 660.

Internals Reference: Section "All context properties" in *Internals Reference*.

3.5.3 Alternative output formats

The default output formats for the printed score are Portable Document Format (PDF) and PostScript (PS). Portable Network Graphics (PNG), Scalable Vector Graphics (SVG) and Encapsulated PostScript (EPS) output formats are available through command-line options, see Section "Basic command-line options for LilyPond" in *Application Usage*.

SVG Output

SVG output can optionally contain metadata for graphical objects (grobs) like note heads, rests, etc. This metadata can be standard SVG attributes like `id` and `class`, or non-standard custom attributes. Specify the attributes and their values by overriding a grob's `output-attributes` property with a Scheme association list (alist). The values can be numbers, strings, or symbols. For example:

```
{
  \once \override NoteHead.output-attributes =
  #'((id . 123)
     (class . "this that")
     (data-whatever . something))
  c
}
```

The input above will produce the following <g> (group) tag in the SVG file:

```
<g id="123" class="this that" data-whatever="something">
  ...NoteHead grob SVG elements...
</g>
```

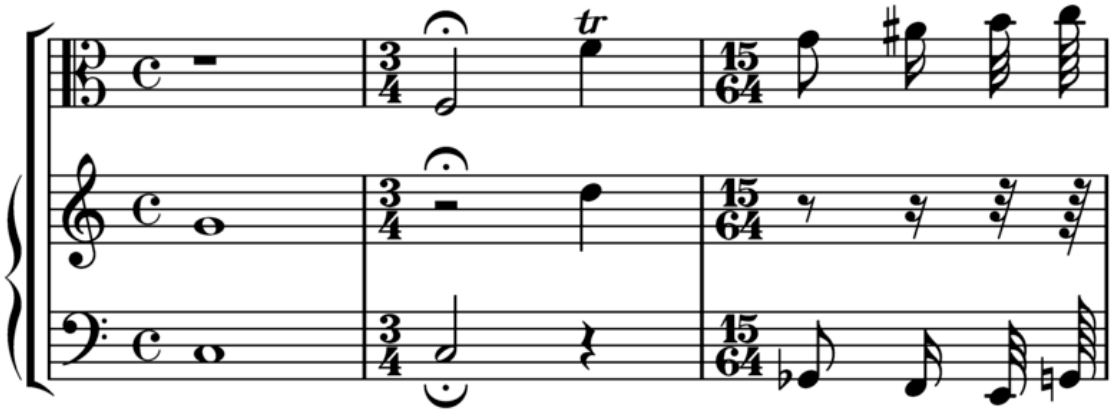
The <g> tag contains all of the SVG elements for a given grob. (Some grobs generate multiple SVG elements.) In SVG syntax the `data-` prefix is used for non-standard custom metadata attributes.

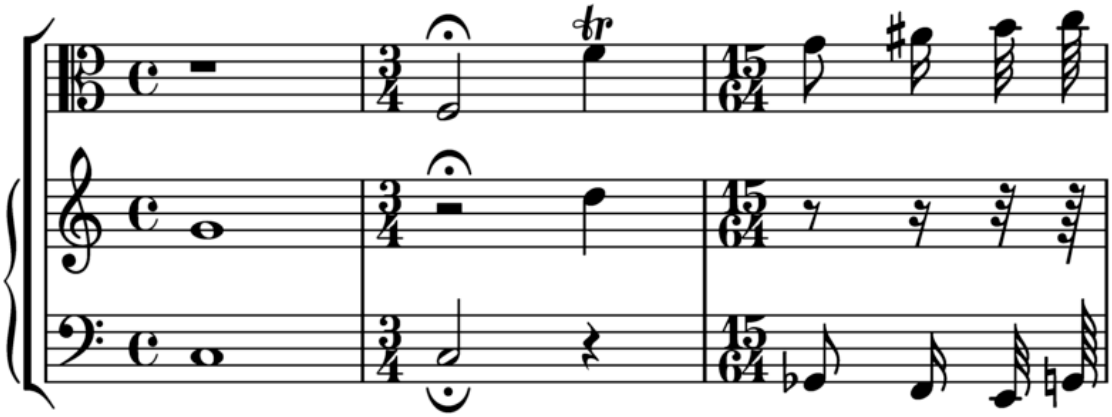
3.5.4 Replacing the notation font

Gonville is an alternative set of glyphs to *Feta* – part of the Emmentaler font – and used in LilyPond. They can be downloaded from:

`http://www.chiark.greenend.org.uk/~sgtatham/gonville/` (`http://www.chiark.greenend.org.uk/~sgtatham/gonville/`)

Here are a few sample bars of music set in Gonville:



Here are a few sample bars of music set in LilyPond's Feta glyphs:

Installation Instructions

- Download and extract the font files.
- Copy the files

```
gonville-11.otf
gonville-13.otf
gonville-14.otf
gonville-16.otf
gonville-18.otf
gonville-20.otf
gonville-23.otf
gonville-26.otf
gonville-brace.otf
```

to directory .../share/lilypond/current/fonts/otf or .../share/lilypond/*X.Y.Z*/fonts/otf.

- If you have gonville-*.svg and gonville-*.woff files, copy them to directory .../share/lilypond/current/fonts/svg or .../share/lilypond/*X.Y.Z*/fonts/svg.

For more information, see Section "Other sources of information" in *Learning Manual*.

Note: gonville-*.otf files are for ps and eps backend (for PDF and PostScript outputs). gonville-*.svg files are for svg backend without svg-woff option. gonville-*.woff files are for svg backend with svg-woff option. For more information, see Section "Advanced command-line options for LilyPond" in *Application Usage*.

The following syntax changes the notation font (general and brace) to the Gonville font.

```
\paper {
  #(define fonts
     (set-global-fonts
      #:music "gonville"
      #:brace "gonville"
    ))
}
```

Note: Each call to set-global-fonts completely resets both the main notation and text fonts. If any category is left unspecified, then the default font will be used for that category. Each call to set-global-fonts changes the fonts for each \book that follows it, whether created explicitly or implicitly. This means that each \book can have its own set of main fonts by calling set-global-fonts before it. For more information, see [Entire document fonts], page 309.

See also

Learning Manual: Section "Other sources of information" in *Learning Manual*.

Notation Reference: Section A.8 [The Emmentaler font], page 739, [Entire document fonts], page 309.

Known issues and warnings

Gonville cannot be used to typeset 'Ancient Music' notation and it is likely newer glyphs in later releases of LilyPond may not exist in the Gonville font family. Please refer to the author's website for more information on these and other specifics, including licensing of Gonville.

Other notation fonts

If you have other notation fonts like *fontname*-*.otf, *fontname*-*.svg, and *fontname*-*.woff, you can use them in the same way as Gonville.

That is, copy the *fontname*-*.otf files to .../share/lilypond/current/fonts/otf or .../share/lilypond/*X.Y.Z*/fonts/otf. If you have *fontname*-*.svg and *fontname*-*.woff files, copy them to .../share/lilypond/current/fonts/svg or .../share/lilypond/*X.Y.Z*/fonts/svg.

Note: At the moment, LilyPond expects the font file names to have the following suffixes, all of which must be present in the above installation folder(s) to work properly: -11, -13, -14, -16, -18, -20, -23, -26, -brace. For example, emmentaler-11.otf, emmentaler-20.svg, and emmentaler-brace.woff etc.

The following syntax changes the notation font (general and brace) to the *fontname* font.

```
\paper {
  #(define fonts
     (set-global-fonts
      #:music "fontname" ; font filename without suffix and extension
```

```
        #:brace "fontname" ; font filename without suffix and extension
      ))
  }
```

Note: For `music` and `brace` categories, specify the font filename without the suffix and extension.

3.6 Creating MIDI output

LilyPond can produce files that conform to the MIDI (Musical Instrument Digital Interface) standard and so allow for the checking of the music output aurally (with the help of an application or device that understands MIDI). Listening to MIDI output may also help in spotting errors such as notes that have been entered incorrectly or are missing accidentals and so on.

MIDI files do not contain sound (like AAC, MP3 or Vorbis files) but require additional software to produce sound from them.

3.6.1 Supported notation for MIDI

The following musical notation can be used with LilyPond's default capabilities to produce MIDI output;

- Breath marks
- Chords entered as chord names
- Crescendi, decrescendi over multiple notes. The volume is altered linearly between the two extremes
- Dynamic markings from `ppppp` to `fffff`, including `mp`, `mf` and `sf`
- Lyrics
- Markers: rehearsal marks, segni, coda marks, and section labels
- Microtones but *not* microtonal chords. A MIDI player that supports pitch bending will also be required.
- Pitches
- Rhythms entered as note durations, including tuplets
- 'Simple' articulations; staccato, staccatissimo, accent, marcato and portato
- Tempo changes using the `\tempo` function
- Ties
- Tremolos that are *not* entered with a ':[*number*]' value

Panning, balance, expression, reverb and chorus effects can also be controlled by setting context properties, see Section 3.6.8 [Context properties for MIDI effects], page 596.

When combined with the `articulate` script the following, additional musical notation can be output to MIDI;

- Appoggiaturas. These are made to take half the value of the note following (without taking dots into account). For example;

  ```
  \appoggiatura c8 d2.
  ```

  The c will take the value of a crotchet.
- Ornaments (i.e., mordents, trills and turns et al.)
- Rallentando, accelerando, ritardando and a tempo
- Slurs, including phrasing slurs
- Tenuto

See Section 3.6.9 [Enhancing MIDI output], page 597.

3.6.2 Unsupported notation for MIDI

The following items of musical notation cannot be output to MIDI;

- Articulations other than staccato, staccatissimo, accent, marcato and portato
- Crescendi and decrescendi over a *single* note
- Fermata
- Figured bass
- Glissandi
- Falls and doits
- Microtonal chords
- Rhythms entered as annotations, e.g., swing
- Tempo changes without `\tempo` (e.g., entered as annotations)
- Tremolos that *are* entered with a ':[*number*]' value

3.6.3 The MIDI block

To create a MIDI output file from a LilyPond input file, insert a `\midi` block, which can be empty, within the `\score` block;

```
\score {
  ... music ...
  \layout { }
  \midi { }
}
```

> **Note:** A `\score` block that, as well as the music, contains only a `\midi` block (i.e., *without* the `\layout` block), will only produce MIDI output files. No notation will be printed.

The default output file extension (`.midi`) can be changed by using the `-dmidi-extension` option with the `lilypond` command:

```
lilypond -dmidi-extension=mid MyFile.ly
```

Alternatively, add the following Scheme expression before the start of either the `\book`, `\bookpart` or `\score` blocks. See Section 3.2.5 [File structure], page 539.

```
#(ly:set-option 'midi-extension "mid")
```

See also

Notation Reference: Section 3.2.5 [File structure], page 539, Section 3.3.3 [Creating output file metadata], page 554.

Installed Files: `scm/midi.scm`.

Known issues and warnings

There are fifteen MIDI channels available and one additional channel (#10) for drums. Staves are assigned to channels in sequence, so a score that contains more than fifteen staves will result in the extra staves sharing (but not overwriting) the same MIDI channel. This may be a problem if the sharing staves have conflicting, channel-based, MIDI properties – such as different MIDI instruments – set.

3.6.4 Controlling MIDI dynamics

It is possible to control the overall MIDI volume, the relative volume of dynamic markings and the relative volume of different instruments.

Dynamic marks translate automatically into volume levels in the available MIDI volume range whereas crescendi and decrescendi vary the volume linearly between their two extremes. It is possible to control the relative volume of dynamic markings, and the overall volume levels of different instruments.

Dynamic marks in MIDI

Only the dynamic markings from ppppp to `fffff`, including `mp`, `mf` and `sf` have values assigned to them. This value is then applied to the value of the overall MIDI volume range to obtain the final volume included in the MIDI output for that particular dynamic marking. The default fractions range from 0.25 for *ppppp* to 0.95 for *fffff*. The complete set of dynamic marks and their associated fractions can be found in `scm/midi.scm`.

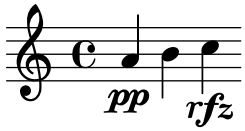
Selected Snippets

Creating custom dynamics in MIDI output

The following example shows how to create a dynamic marking, not included in the default list, and assign it a specific value so that it can be used to affect MIDI output.

The dynamic mark `\rfz` is assigned a value of `0.9`.

```
#(define (myDynamics dynamic)
    (if (equal? dynamic "rfz")
      0.9
      (default-dynamic-absolute-volume dynamic)))

\score {
  \new Staff {
    \set Staff.midiInstrument = #"cello"
    \set Score.dynamicAbsoluteVolumeFunction = #myDynamics
    \new Voice {
      \relative {
        a'4\pp b c-\rfz
      }
    }
  }
  \layout {}
  \midi {}
}
```



Installed Files: `ly/script-init.ly` `scm/midi.scm`.

Snippets: Section “MIDI” in *Snippets*.

Internals Reference: Section “Dynamic_performer” in *Internals Reference*.

Setting MIDI volume

The minimum and maximum overall volume of MIDI dynamic markings is controlled by setting the properties `midiMinimumVolume` and `midiMaximumVolume` at the `Score` level. These proper-

ties have an effect only at the start of a voice and on dynamic marks. The fraction corresponding to each dynamic mark is modified with this formula

```
midiMinimumVolume + (midiMaximumVolume - midiMinimumVolume) * fraction
```

In the following example the dynamic range of the overall MIDI volume is limited to the range 0.2–0.5.

```
\score {
  <<
    \new Staff {
      \set Staff.midiInstrument = "flute"
      ... music ...
    }
    \new Staff {
      \set Staff.midiInstrument = "clarinet"
      ... music ...
    }
  >>
  \midi {
    \context {
      \Score
      midiMinimumVolume = #0.2
      midiMaximumVolume = #0.5
    }
  }
}
```

Simple MIDI instrument equalization can be achieved by setting `midiMinimumVolume` and `midiMaximumVolume` properties within the `Staff` context.

```
\score {
  \new Staff {
    \set Staff.midiInstrument = "flute"
    \set Staff.midiMinimumVolume = #0.7
    \set Staff.midiMaximumVolume = #0.9
    ... music ...
  }
  \midi { }
}
```

For scores with multiple staves and multiple MIDI instruments, the relative volumes of each instrument can be set individually;

```
\score {
  <<
    \new Staff {
      \set Staff.midiInstrument = "flute"
      \set Staff.midiMinimumVolume = #0.7
      \set Staff.midiMaximumVolume = #0.9
      ... music ...
    }
    \new Staff {
      \set Staff.midiInstrument = "clarinet"
      \set Staff.midiMinimumVolume = #0.3
      \set Staff.midiMaximumVolume = #0.6
      ... music ...
```

```
    }
  >>
  \midi { }
}
```

In this example the volume of the clarinet is reduced relative to the volume of the flute.

If these volumes properties are not set then LilyPond still applies a 'small degree' of equalization to certain instruments. See `scm/midi.scm`.

Installed Files: `scm/midi.scm`.

See also

Notation Reference: Section 4.2 [Score layout], page 612.

Internals Reference: Section "Dynamic_performer" in *Internals Reference*.

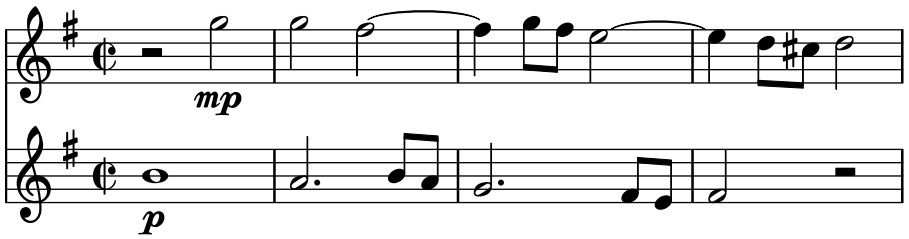
Selected Snippets

Replacing default MIDI instrument equalization

The default MIDI instrument equalizer can be replaced by setting the `instrumentEqualizer` property in the `Score` context to a user-defined Scheme procedure that uses a MIDI instrument name as its argument along with a pair of fractions indicating the minimum and maximum volumes respectively to be applied to that specific instrument.

The following example sets the minimum and maximum volumes for flute and clarinet respectively."

```
#(define my-instrument-equalizer-alist '())

#(set! my-instrument-equalizer-alist
  (append
    '(
      ("flute" . (0.7 . 0.9))
      ("clarinet" . (0.3 . 0.6)))
    my-instrument-equalizer-alist))

#(define (my-instrument-equalizer s)
  (let ((entry (assoc s my-instrument-equalizer-alist)))
    (if entry
      (cdr entry))))

\score {
  <<
    \new Staff {
      \key g \major
      \time 2/2
      \set Score.instrumentEqualizer = #my-instrument-equalizer
      \set Staff.midiInstrument = "flute"
      \new Voice \relative {
        r2 g''\mp g fis~
        4 g8 fis e2~
        4 d8 cis d2
      }
    }
    \new Staff {
```

```
      \key g \major
      \set Staff.midiInstrument = "clarinet"
      \new Voice \relative {
        b'1\p a2. b8 a
        g2. fis8 e
        fis2 r
      }
    }
  >>
  \layout { }
  \midi {  }
}
```

Known issues and warnings

Changes in the MIDI volume take place only on starting a note, so crescendi and decrescendi cannot affect the volume of a single note.

Setting MIDI block properties

The `\midi` block can contain context rearrangements, new context definitions or code that sets the values of certain properties.

```
\score {
  ... music ...
  \midi {
    \tempo 4 = 72
  }
}
```

Here the tempo is set to 72 quarter note beats per minute. The tempo mark in the `\midi` block will not appear in the printed score. Although any other `\tempo` indications specified within the `\score` block will also be reflected in the MIDI output.

In a `\midi` block the `\tempo` command is setting properties during the interpretation of the music and in the context of output definitions; so it is interpreted *as if* it were a context modification.

Context definitions follow the same syntax as those in a `\layout` block;

```
\score {
  ... music ...
  \midi {
    \context {
      \Voice
      \remove Dynamic_performer
    }
  }
}
```

This example removes the effect of dynamics from the MIDI output. Note: LilyPond's translation modules used for sound are called 'performers'.

See also

Learning Manual: Section "Other sources of information" in *Learning Manual*.

Notation Reference: Section 1.3 [Expressive marks], page 138, Section 4.2 [Score layout], page 612.

Installed Files: `ly/performer-init.ly`.

Snippets: Section "MIDI" in *Snippets*.

Internals Reference: Section "Dynamic_performer" in *Internals Reference*.

Known issues and warnings

Some MIDI players do not always correctly handle tempo changes in the midi output.

Changes to the `midiInstrument`, as well as some MIDI options, at the *beginning* of a staff may appear twice in the MIDI output.

3.6.5 Using MIDI instruments

MIDI instruments are set using the `midiInstrument` property within a `Staff` context.

```
\score {
  \new Staff {
    \set Staff.midiInstrument = "glockenspiel"
    ... music ...
  }
  \midi { }
}
```

or

```
\score {
  \new Staff \with {midiInstrument = "cello"} {
    ... music ...
  }
  \midi { }
}
```

If the instrument name does not match any of the instruments listed in the 'MIDI instruments' section, the `acoustic grand` instrument will be used instead. See Section A.6 [MIDI instruments], page 733.

See also

Learning Manual: Section "Other sources of information" in *Learning Manual*.

Notation Reference: Section A.6 [MIDI instruments], page 733, Section 4.2 [Score layout], page 612.

Installed Files: `scm/midi.scm`.

Known issues and warnings

Percussion instruments that are notated in a `DrumStaff` context will be output, correctly, to MIDI channel 10 but some pitched, percussion instruments like the xylophone, marimba, vibraphone or timpani, are treated as "normal" instruments so the music for these should be entered in a `Staff` (not `DrumStaff`) context to obtain correct MIDI output. A full list of `channel 10 drum-kits` entries can be found in `scm/midi.scm`. See Section "Other sources of information" in *Learning Manual*.

3.6.6 Using repeats with MIDI

Repeats can be represented in the MIDI output by applying the `\unfoldRepeats` command.

```
\score {
  \unfoldRepeats {
    \repeat tremolo 8 { c'32 e' }
    \repeat percent 2 { c''8 d'' }
    \repeat volta 2 { c'4 d' e' f' }
    \alternative {
      \volta 1 { g' a' a' g' }
      \volta 2 { f' e' d' c' }
    }
  }
  \midi { }
}
```

In order to restrict the effect of `\unfoldRepeats` to the MIDI output only, while also generating printable scores, it is necessary to make *two* `\score` blocks; one for MIDI (with unfolded repeats) and one for the notation (with volta, tremolo, and percent repeats);

```
\score {
  ... music ...
  \layout { }
}
\score {
  \unfoldRepeats {
    ... music ...
  }
  \midi { }
}
```

When using multiple voices, each of the voices must contain completely unfolded repeats for correct MIDI output.

See also

Notation Reference: Section 1.4 [Repeats], page 168.

3.6.7 MIDI channel mapping

When generating a MIDI file from a score, LilyPond will automatically assign every note in the score to a MIDI channel, the one on which it should be played when it is sent to a MIDI device. A MIDI channel has a number of controls available to select, for example, the instrument to be used to play the notes on that channel, or to request the MIDI device to apply various effects to the sound produced on the channel. At all times, every control on a MIDI channel can have only a single value assigned to it (which can be modified, however, for example, to switch to another instrument in the middle of a score).

The MIDI standard supports only 16 channels per MIDI device. This limit on the number of channels also limits the number of different instruments which can be played at the same time.

LilyPond creates separate MIDI tracks for each staff, (or discrete instrument or voice, depending on the value of `Score.midiChannelMapping`), and also for each lyrics context. There is no limit to the number of tracks.

To work around the limited number of MIDI channels, LilyPond supports a number of different modes for MIDI channel allocation, selected using the `Score.midiChannelMapping` context property. In each case, if more MIDI channels than the limit are required, the allocated channel

numbers wrap around back to 0, possibly causing the incorrect assignment of instruments to some notes. This context property can be set to one of the following values:

`'staff`

Allocate a separate MIDI channel to each staff in the score (this is the default). All notes in all voices contained within each staff will share the MIDI channel of their enclosing staff, and all are encoded in the same MIDI track.

The limit of 16 channels is applied to the total number of staff and lyrics contexts, even though MIDI lyrics do not take up a MIDI channel.

`'instrument`

Allocate a separate MIDI channel to each distinct MIDI instrument specified in the score. This means that all the notes played with the same MIDI instrument will share the same MIDI channel (and track), even if the notes come from different voices or staves.

In this case the lyrics contexts do not count towards the MIDI channel limit of 16 (as they will not be assigned to a MIDI instrument), so this setting may allow a better allocation of MIDI channels when the number of staves and lyrics contexts in a score exceeds 16.

`'voice`

Allocate a separate MIDI channel to each voice in the score that has a unique name among the voices in its enclosing staff. Voices in different staves are always assigned separate MIDI channels, but any two voices contained within the same staff will share the same MIDI channel if they have the same name. Because `midiInstrument` and the several MIDI controls for effects are properties of the staff context, they cannot be set separately for each voice. The first voice will be played with the instrument and effects specified for the staff, and voices with a different name from the first will be assigned the default instrument and effects.

Note: different instruments and/or effects can be assigned to several voices on the same staff by moving the `Staff_performer` from the `Staff` to the `Voice` context, and leaving `midiChannelMapping` to default to `'staff` or set to `'instrument`; see the snippet below.

For example, the default MIDI channel mapping of a score can be changed to the `'instrument` setting as shown:

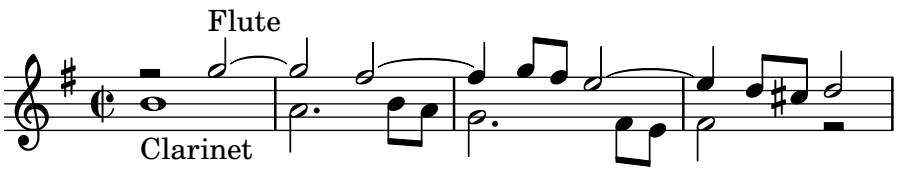
```
\score {
  ...music...
  \midi {
    \context {
      \Score
      midiChannelMapping = #'instrument
    }
  }
}
```

Selected Snippets

Changing MIDI output to one channel per voice

When outputting MIDI, the default behavior is for each staff to represent one MIDI channel, with all the voices on a staff amalgamated. This minimizes the risk of running out of MIDI channels, since there are only 16 available per track.

However, by moving the Staff_performer to the Voice context, each voice on a staff can have its own MIDI channel, as is demonstrated by the following example: despite being on the same staff, two MIDI channels are created, each with a different midiInstrument.

```
\score {
  \new Staff <<
    \new Voice \relative c''' {
      \set midiInstrument = #"flute"
      \voiceOne
      \key g \major
      \time 2/2
      r2 g-"Flute" ~
      g fis ~
      fis4 g8 fis e2 ~
      e4 d8 cis d2
    }
    \new Voice \relative c'' {
      \set midiInstrument = #"clarinet"
      \voiceTwo
      b1-"Clarinet"
      a2. b8 a
      g2. fis8 e
      fis2 r
    }
  >>
  \layout { }
  \midi {
    \context {
      \Staff
      \remove "Staff_performer"
    }
    \context {
      \Voice
      \consists "Staff_performer"
    }
    \tempo 2 = 72
  }
}
```

3.6.8 Context properties for MIDI effects

The following context properties can be used to apply various MIDI effects to notes played on the MIDI channel associated with the current staff, MIDI instrument or voice (depending on the value of the Score.midiChannelMapping context property and the context in which the Staff_performer is located; see Section 3.6.7 [MIDI channel mapping], page 594).

Changing these context properties will affect all notes played on the channel after the change, however some of the effects may even apply also to notes which are already playing (depending on the implementation of the MIDI output device).

The following context properties are supported:

`Staff.midiPanPosition`
: The pan position controls how the sound on a MIDI channel is distributed between left and right stereo outputs. The context property accepts a number between -1.0 (`#LEFT`) and 1.0 (`#RIGHT`); the value -1.0 will put all sound power to the left stereo output (keeping the right output silent), the value 0.0 (`#CENTER`) will distribute the sound evenly between the left and right stereo outputs, and the value 1.0 will move all sound to the right stereo output. Values between -1.0 and 1.0 can be used to obtain mixed distributions between left and right stereo outputs.

`Staff.midiBalance`
: The stereo balance of a MIDI channel. Similarly to the pan position, this context property accepts a number between -1.0 (`#LEFT`) and 1.0 (`#RIGHT`). It varies the relative volume sent to the two stereo speakers without affecting the distribution of the stereo signals.

`Staff.midiExpression`
: Expression level (as a fraction of the maximum available level) to apply to a MIDI channel. A MIDI device combines the MIDI channel's expression level with a voice's current dynamic level (controlled using constructs such as `\p` or `\ff`) to obtain the total volume of each note within the voice. The expression control could be used, for example, to implement crescendo or decrescendo effects over single sustained notes (not supported automatically by LilyPond).

  The expression level ranges from 0.0 (no expression, meaning zero volume) to 1.0 (full expression).

`Staff.midiReverbLevel`
: Reverb level (as a fraction of the maximum available level) to apply to a MIDI channel. This property accepts numbers between 0.0 (no reverb) and 1.0 (full effect).

`Staff.midiChorusLevel`
: Chorus level (as a fraction of the maximum available level) to apply to a MIDI channel. This property accepts numbers between 0.0 (no chorus effect) and 1.0 (full effect).

Known issues and warnings

As MIDI files do not contain any actual audio data, changes in these context properties translate only to requests for changing MIDI channel controls in the outputted MIDI files. Whether a particular MIDI device (such as a software MIDI player) can actually handle any of these requests in a MIDI file is entirely up to the implementation of the device: a device may choose to ignore some or all of these requests. Also, how a MIDI device will interpret different values for these controls (generally, the MIDI standard fixes the behavior only at the endpoints of the value range available for each control), and whether a change in the value of a control will affect notes already playing on that MIDI channel or not, is also specific to the MIDI device implementation.

When generating MIDI files, LilyPond will simply transform the fractional values within each range linearly into values in a corresponding (7-bit, or 14-bit for MIDI channel controls which support fine resolution) integer range (0-127 or 0-32767, respectively), rounding fractional values towards the nearest integer away from zero. The converted integer values are stored as-is in the generated MIDI file. Please consult the documentation of your MIDI device for information about how the device interprets these values.

3.6.9 Enhancing MIDI output

The default MIDI output is basic but can be improved by setting MIDI instruments and various `\midi` block properties.

Additional scripts allow to fine-tune the way dynamics, articulations and rhythm are rendered in MIDI: the `articulate` script and the `swing` script.

The `articulate` script

To use the `articulate` script add the appropriate `\include` command at the top of the input file;

```
\include "articulate.ly"
```

The script creates MIDI output into appropriately 'time-scaled' notes to match many articulation and tempo indications. Engraved output however, will also be altered to literally match the MIDI output.

```
\score {
  \articulate <<
    ... music ...
  >>
  \midi { }
}
```

The `\articulate` command enables abbreviatures (such as trills and turns) to be processed. A full list of supported items can be found in the script itself. See `ly/articulate.ly`.

See also

Learning Manual: Section "Other sources of information" in *Learning Manual*.

Notation Reference: Section 4.2 [Score layout], page 612.

Installed Files: `ly/articulate.ly`.

> **Note:** The `articulate` script may shorten chords, which might not be appropriate for some types of instrument, such as organ music. Notes that do not have any articulations attached to them may also be shortened; so to allow for this, restrict the use of the `\articulate` function to shorter segments of music, or modify the values of the variables defined in the `articulate` script to compensate for the note-shortening behavior.

The `swing` script

The `swing` script provides additional functions allowing for regular durations to be played with an unequal rhythm. The most obvious example is 'swing' interpretation commonly found in jazz music where binary eighth notes should be played in a ternary fashion; however additional interpretations are also supported.

This script has to be `\include`-d at the beginning of the input file:

```
\include "swing.ly"
```

Three commands are provided:

- `\tripletFeel` creates a triplet-feel swing. It takes two arguments: the durations that should be affected by it (typically `8` for eighth notes), and then the music expression to which it should be applied.
- `\applySwing` takes an additional argument prior to the music expression: a 'weight list' of *n* number ratios expressing the way regular notes should be played: for example, `#'(2 1)` indicates that every other note should be played twice as long as the following note (in fact, `\tripletFeel` *duration* {*music*} is actually a shortcut for `\applySwing` *duration* `#'(2`

1) {*music*}). Smoother swung eighths may be obtained with a weight list of `#'(3 2)`, or other values depending on taste.

That list may include more than two values, which allows for longer and more sophisticated groove patterns; for example, a samba feel for sixteenth notes may be obtained as follows:

```
\score {
  \applySwing 16 #'(3 2 2 3) {
    ... music ...
  }
  \midi { }
}
```

- `\applySwingWithOffset` adds yet another argument between the 'weight list' and the music expression: an offset length. This command should be used when the music expression has to start off-beat, with a partial swing cycle.

> **Note:** As with the `articulate` script, all swing commands are also rendered in the engraved output, which results in irregular note spacing. This can be avoided by using them only in a `\score` block dedicated to MIDI output, rather than to printed music.

Additional help and information is included in the script file: see `ly/swing.ly`.

See also

Learning Manual: Section "Other sources of information" in *Learning Manual*.

Notation Reference: Section 1.2 [Rhythms], page 48.

Installed Files: `ly/swing.ly`.

Known issues and warnings

- `\repeat` constructs in music (even `\repeat unfold`) are not taken into consideration when determining note timing. This will lead to problems unless the durations of all repeated parts are integer multiples of the swing cycle duration.
- These functions are oblivious to time signatures and measures. That is why offsets need to be supplied by using `\applySwingWithOffset` if music starts off-beat.
- Grace notes are ignored and simply left unaffected; so are tuplets.

3.7 Extracting musical information

In addition to creating graphical output and MIDI, LilyPond can display musical information as text.

3.7.1 Displaying LilyPond notation

Displaying a music expression in LilyPond notation can be done with the music function `\displayLilyMusic`. To see the output, you will typically want to call LilyPond using the command line. For example,

```
{
  \displayLilyMusic \transpose c a, { c4 e g a bes }
}
```

will display

```
{ a,4 cis4 e4 fis4 g4 }
```

By default, LilyPond will print these messages to the console along with all the other LilyPond compilation messages. To split up these messages and save the results of `\displayLilyMusic`, redirect the output to a file.

```
lilypond file.ly >display.txt
```

Note that LilyPond does not just display the music expression, but also interprets it (since `\displayLilyMusic` returns it in addition to displaying it). Just insert `\displayLilyMusic` into the existing music in order to get information about it.

To interpret and display a music section in the console but, at the same time, remove it from the output file use the `\void` command.

```
{
  \void \displayLilyMusic \transpose c a, { c4 e g a bes }
  c1
}
```

3.7.2 Displaying scheme music expressions

See Section “Displaying music expressions” in *Extending*.

3.7.3 Saving music events to a file

Music events can be saved to a file on a per-staff basis by including a file in your main score.

```
\include "event-listener.ly"
```

This creates file(s) called `FILENAME-STAFFNAME.notes` or `FILENAME-unnamed-staff.notes` for each staff. Note that if you have multiple unnamed staves, the events for all staves are mixed together in the same file. The output looks like this:

```
0.000   note     57       4   p-c 2 12
0.000   dynamic  f
0.250   note     62       4   p-c 7 12
0.500   note     66       8   p-c 9 12
0.625   note     69       8   p-c 14 12
0.750   rest     4
0.750   breathe
```

The syntax is a tab-delimited line, with two fixed fields on each line followed by optional parameters.

```
time  type  ...params...
```

This information can easily be read into other programs such as python scripts, and can be very useful for researchers wishing to perform musical analysis or playback experiments with LilyPond.

Known issues and warnings

Not all lilypond music events are supported by `event-listener.ly`. It is intended to be a well-crafted “proof of concept”. If some events that you want to see are not included, copy `event-listener.ly` into your lilypond directory and modify the file so that it outputs the information you want.

4 Spacing issues

The global paper layout is determined by three factors: the page layout, the line breaks, and the spacing. These all influence each other. The choice of spacing determines how densely each system of music is set. This influences where line breaks are chosen, and thus ultimately, how many pages a piece of music takes.

Globally speaking, this procedure happens in four steps: first, flexible distances ('springs') are chosen, based on durations. All possible line breaking combinations are tried, and a 'badness' score is calculated for each. Then the height of each possible system is estimated. Finally, a page breaking and line breaking combination is chosen so that neither the horizontal nor the vertical spacing is too cramped or stretched.

Two types of blocks can contain layout settings: `\paper {...}` and `\layout {...}`. The `\paper` block contains page layout settings that are expected to be the same for all scores in a book or book part, such as the paper height, or whether to print page numbers, etc. See Section 4.1 [Page layout], page 601. The `\layout` block contains score layout settings, such as the number of systems to use, or the space between staff groups, etc. See Section 4.2 [Score layout], page 612.

4.1 Page layout

This section discusses page layout options for the `\paper` block.

4.1.1 The \paper block

`\paper` blocks may be placed in three different places to form a descending hierarchy of `\paper` blocks:

- At the top of the input file, before all `\book`, `\bookpart`, and `\score` blocks.
- Within a `\book` block but outside all the `\bookpart` and `\score` blocks within that book.
- Within a `\bookpart` block but outside all `\score` blocks within that book part.

A `\paper` block cannot be placed within a `\score` block.

The values of the fields filter down this hierarchy, with the values set higher in the hierarchy persisting unless they are overridden by a value set lower in the hierarchy.

Several `\paper` blocks can appear at each of the levels, for example as parts of several `\included` files. If so, the fields at each level are merged, with values encountered last taking precedence if duplicated fields appear.

Settings that can appear in a `\paper` block include:

- the `set-paper-size` scheme function,
- `\paper` variables used for customizing page layout, and
- markup definitions used for customizing the layout of headers, footers, and titles.

The `set-paper-size` function is discussed in the next section, Section 4.1.2 [Paper size and automatic scaling], page 602. The `\paper` variables that deal with page layout are discussed in later sections. The markup definitions that deal with headers, footers, and titles are discussed in Section 3.3.2 [Custom titles headers and footers], page 549.

Most `\paper` variables will only work in a `\paper` block. The few that will also work in a `\layout` block are listed in Section 4.2.1 [The \layout block], page 612.

Except when specified otherwise, all `\paper` variables that correspond to distances on the page are measured in millimeters, unless a different unit is specified by the user. For example, the following declaration sets `top-margin` to ten millimeters:

```
\paper {
```

```
  top-margin = 10
}
```

To set it to `0.5` inches, use the `\in` unit suffix:

```
\paper {
  top-margin = 0.5\in
}
```

The available unit suffixes are `\mm`, `\cm`, `\in`, `\pt`, and `\bp`. These units are simple values for converting from millimeters; they are defined in `ly/paper-defaults-init.ly`. For the sake of clarity, when using millimeters, the `\mm` is typically included in the code, even though it is not technically necessary.

It is also possible to define `\paper` values using Scheme. The Scheme equivalent of the above example is:

```
\paper {
  #(define top-margin (* 0.5 in))
}
```

See also

Notation Reference: Section 4.1.2 [Paper size and automatic scaling], page 602, Section 3.3.2 [Custom titles headers and footers], page 549, Section 4.2.1 [The `\layout` block], page 612.

Installed Files: `ly/paper-defaults-init.ly`.

4.1.2 Paper size and automatic scaling

Setting the paper size

'A4' is the default value when no explicit paper size is set. However, there are two functions that can be used to change it:

`set-default-paper-size`

```
#(set-default-paper-size "quarto")
```

which must always be placed at the top-level scope, and

`set-paper-size`

```
\paper {
  #(set-paper-size "tabloid")
}
```

which must always be placed in a `\paper` block.

If the `set-default-paper-size` function is used in the top-level scope, it must come before any `\paper` block. `set-default-paper-size` sets the paper size for all pages, whereas `set-paper-size` only sets the paper size for the pages that the `\paper` block applies to. For example, if the `\paper` block is at the top of the file, then it applies the paper size to all pages. If the `\paper` block is inside a `\book`, then the paper size applies only to that book.

When the `set-paper-size` function is used, it must be placed *before* any other functions used within the same `\paper` block. See [Automatic scaling to paper size], page 603.

Paper sizes are defined in file `scm/paper.scm`; see Section A.5 [Predefined paper sizes], page 731, for a complete list.

Both `set-default-paper-size` and `set-paper-size` also accept a quoted number pair as its argument to set a custom paper size. For example,

```
#(set-default-paper-size '(cons (* 100 mm) (* 50 mm)))
```

sets the paper width and height to 100 mm and 50 mm, respectively.

Possible units are `in` (inches), `cm` (centimeters), `mm` (millimeters), `pt` (points), and `bp` (big points).

If the symbol `'landscape` is added to the paper size function as a second argument, pages are rotated by 90 degrees, and wider line widths are set accordingly.

```
#(set-default-paper-size "a6" 'landscape)
```

Swapping the paper dimensions *without* having the print rotated (like when printing to postcard size, or creating graphics for inclusion rather than a stand-alone document) can be achieved by appending '`landscape`' to the name of the paper size itself:

```
#(set-default-paper-size "a6landscape")
```

When the paper size ends with an explicit '`landscape`' or '`portrait`', the presence of a `'landscape` symbol *only* affects print orientation, not the paper dimensions used for layout.

See also

Notation Reference: [Automatic scaling to paper size], page 603, Section A.5 [Predefined paper sizes], page 731.

Installed Files: `scm/paper.scm`.

Automatic scaling to paper size

If the paper size is changed with one of the scheme functions (`set-default-paper-size` or `set-paper-size`), the values of several `\paper` variables are automatically scaled to the new size. To bypass the automatic scaling for a particular variable, set the variable after setting the paper size. Note that the automatic scaling is not triggered by setting the `paper-height` or `paper-width` variables, even though `paper-width` can influence other values (this is separate from scaling and is discussed below). The `set-default-paper-size` and `set-paper-size` functions are described in [Setting the paper size], page 602.

The vertical dimensions affected by automatic scaling are `top-margin` and `bottom-margin` (see Section 4.1.3 [Fixed vertical spacing \paper variables], page 603). The horizontal dimensions affected by automatic scaling are `left-margin`, `right-margin`, `inner-margin`, `outer-margin`, `binding-offset`, `indent`, and `short-indent` (see Section 4.1.5 [Horizontal spacing \paper variables], page 606).

The default values for these dimensions are set in `ly/paper-defaults-init.ly`, using internal variables named `top-margin-default`, `bottom-margin-default`, etc. These are the values that result at the default paper size `a4`. For reference, with `a4` paper the `paper-height` is `297\mm` and the `paper-width` is `210\mm`.

See also

Notation Reference: Section 4.1.3 [Fixed vertical spacing \paper variables], page 603, Section 4.1.5 [Horizontal spacing \paper variables], page 606.

Installed Files: `ly/paper-defaults-init.ly`, `scm/paper.scm`.

4.1.3 Fixed vertical spacing \paper variables

> **Note:** Some \paper dimensions are automatically scaled to the paper size, which may lead to unexpected behavior. See [Automatic scaling to paper size], page 603.

Default values (before scaling) are defined in file `ly/paper-defaults-init.ly`.

`paper-height`
: The height of the page, unset by default. Note that the automatic scaling of some vertical dimensions is not affected by this.

`top-margin`
: The margin between the top of the page and the top of the printable area. If the paper size is modified, this dimension's default value is scaled accordingly.

`bottom-margin`
: The margin between the bottom of the printable area and the bottom of the page. If the paper size is modified, this dimension's default value is scaled accordingly.

`ragged-bottom`
: If this is set to true, systems will be set at their natural spacing, neither compressed nor stretched vertically to fit the page.

`ragged-last-bottom`
: If this is set to false, then the last page, and the last page in each section created with a `\bookpart` block, will be vertically justified in the same way as the earlier pages.

See also

Notation Reference: [Automatic scaling to paper size], page 603.

Installed Files: `ly/paper-defaults-init.ly`.

Snippets: Section "Spacing" in *Snippets*.

Known issues and warnings

The titles (from the `\header` block) are treated as a system, so `ragged-bottom` and `ragged-last-bottom` will add space between the titles and the first system of the score.

Explicitly defined paper sizes will override any user-defined top or bottom margin settings.

4.1.4 Flexible vertical spacing \paper variables

In most cases, it is preferable for the vertical distances between certain items (such as margins, titles, systems, and separate scores) to be flexible, so that they stretch and compress nicely according to each situation. A number of `\paper` variables (listed below) are available to fine-tune the stretching behavior of these dimensions.

Note that the `\paper` variables discussed in this section do not control the spacing of staves within individual systems. Within-system spacing is controlled by grob properties, with settings typically entered inside a `\score` or `\layout` block, and not inside a `\paper` block. See Section 4.4.1 [Flexible vertical spacing within systems], page 624.

Structure of flexible vertical spacing alists

Each of the flexible vertical spacing `\paper` variables is an alist (association list) containing four *keys*:

- `basic-distance` – the vertical distance, measured in staff spaces, between the *reference points* of the two items, when no collisions would result, and no stretching or compressing is in effect. The reference point of a (title or top-level) markup is its highest point, and the reference point of a system is the vertical center of the nearest `StaffSymbol` – even if a non-staff line (such as a `Lyrics` context) is in the way. Values for `basic-distance` that are less than either `padding` or `minimum-distance` are not meaningful, since the resulting distance will never be less than either `padding` or `minimum-distance`.

- `minimum-distance` – the smallest allowable vertical distance, measured in staff spaces, between the reference points of the two items, when compressing is in effect. Values for `minimum-distance` that are less than `padding` are not meaningful, since the resulting distance will never be less than `padding`.
- `padding` – the minimum required amount of unobstructed vertical whitespace between the bounding boxes (or skylines) of the two items, measured in staff spaces.
- `stretchability` – a unitless measure of the dimension's relative propensity to stretch. If zero, the distance will not stretch (unless collisions would result). When positive, the significance of a particular dimension's `stretchability` value lies only in its relation to the `stretchability` values of the other dimensions. For example, if one dimension has twice the `stretchability` of another, it will stretch twice as easily. Values should be non-negative and finite. The value `+inf.0` triggers a `programming_error` and is ignored, but `1.0e7` can be used for an almost infinitely stretchable spring. If unset, the default value is set to `basic-distance`. Note that the dimension's propensity to *compress* cannot be directly set by the user and is equal to (`basic-distance` − `minimum-distance`).

If a page has a ragged bottom, the resulting distance is the largest of:

- `basic-distance`,
- `minimum-distance`, and
- `padding` plus the smallest distance necessary to eliminate collisions.

For multi-page scores with a ragged bottom on the last page, the last page uses the same spacing as the preceding page, provided there is enough space for that.

Specific methods for modifying alists are discussed in Section 5.3.7 [Modifying alists], page 692. The following example demonstrates the two ways these alists can be modified. The first declaration updates one key value individually, and the second completely redefines the variable:

```
\paper {
  system-system-spacing.basic-distance = #8
  score-system-spacing =
    #'((basic-distance . 12)
       (minimum-distance . 6)
       (padding . 1)
       (stretchability . 12))
}
```

List of flexible vertical spacing \paper variables

The names of these variables follow the format *upper*`-`*lower*`-spacing`, where *upper* and *lower* are the items to be spaced. Each distance is measured between the reference points of the two items (see the description of the alist structure above). Note that in these variable names, the term 'markup' refers to both *title markups* (`bookTitleMarkup` or `scoreTitleMarkup`) and *top-level markups* (see Section 3.2.5 [File structure], page 539). All distances are measured in staff spaces.

Default settings are defined in `ly/paper-defaults-init.ly`.

`markup-system-spacing`
: the distance between a (title or top-level) markup and the system that follows it.

`score-markup-spacing`
: the distance between the last system of a score and the (title or top-level) markup that follows it.

`score-system-spacing`
: the distance between the last system of a score and the first system of the score that follows it, when no (title or top-level) markup exists between them.

`system-system-spacing`
: the distance between two systems in the same score.

`markup-markup-spacing`
: the distance between two (title or top-level) markups.

`last-bottom-spacing`
: the distance from the last system or top-level markup on a page to the bottom of the printable area (i.e., the top of the bottom margin).

`top-system-spacing`
: the distance from the top of the printable area (i.e., the bottom of the top margin) to the first system on a page, when there is no (title or top-level) markup between the two.

`top-markup-spacing`
: the distance from the top of the printable area (i.e., the bottom of the top margin) to the first (title or top-level) markup on a page, when there is no system between the two.

See also

Notation Reference: Section 4.4.1 [Flexible vertical spacing within systems], page 624.

Installed Files: `ly/paper-defaults-init.ly`.

Snippets: Section "Spacing" in *Snippets*.

4.1.5 Horizontal spacing \paper variables

> **Note:** Some `\paper` dimensions are automatically scaled to the paper size, which may lead to unexpected behavior. See [Automatic scaling to paper size], page 603.

\paper variables for widths and margins

Default values (before scaling) that are not listed here are defined in file `ly/paper-defaults-init.ly`.

`paper-width`
: The width of the page, unset by default. While `paper-width` has no effect on the automatic scaling of some horizontal dimensions, it does influence the `line-width` variable. If both `paper-width` and `line-width` are set, then `left-margin` and `right-margin` will also be updated. Also see `check-consistency`.

`line-width`
: When specified in a `\paper` block this defines the horizontal extent available for the staff lines in unindented systems. If left unspecified, the paper's `line-width` is determined from (`paper-width` − `left-margin` − `right-margin`). If the paper's `line-width` is specified, and both `left-margin` and `right-margin` are not, then the margins will be updated to center the systems on the page automatically. Also see `check-consistency`.

  `line-widths` for individual scores can be specified in the scores' `\layout` blocks. These values control the width of the lines produced on a score-by-score basis. If

`line-width` is not specified for a score, it defaults to the paper's `line-width`. Setting a score's `line-width` has no effect on the paper margins. Staff lines, of a length determined by the score's `line-width`, are left-aligned within the paper area defined by the paper's `line-width`. If the score and paper `line-width`s are equal, the staff lines will extend exactly from the left margin to the right margin, but if the score's `line-width` is greater than the paper's `line-width` the staff lines will run over into the right margin.

`left-margin`
: The margin between the left edge of the page and the start of the staff lines in unindented systems. If the paper size is modified, this dimension's default value is scaled accordingly. If `left-margin` is unset, and both `line-width` and `right-margin` are set, then `left-margin` is set to `(paper-width − line-width − right-margin)`. If only `line-width` is set, then both margins are set to `((paper-width − line-width) / 2)`, and the systems are consequently centered on the page. Also see `check-consistency`.

`right-margin`
: The margin between the right edge of the page and the end of the staff lines in non-ragged systems. If the paper size is modified, this dimension's default value is scaled accordingly. If `right-margin` is unset, and both `line-width` and `left-margin` are set, then `right-margin` is set to `(paper-width − line-width − left-margin)`. If only `line-width` is set, then both margins are set to `((paper-width − line-width) / 2)`, and the systems are consequently centered on the page. Also see `check-consistency`.

`check-consistency`
: If this is true (the default value), print a warning if `left-margin`, `line-width`, and `right-margin` do not exactly add up to `paper-width`, and replace each of these (except `paper-width`) with their default values (scaled to the paper size if necessary). If set to false, ignore any inconsistencies and allow systems to run off the edge of the page.

`ragged-right`
: If set to true, systems will not fill the line width. Instead, systems end at their natural horizontal length. Default: `#t` for scores with only one system, and `#f` for scores with two or more systems. This variable can also be set in a `\layout` block.

`ragged-last`
: If set to true, the last system in the score will not fill the line width. Instead the last system ends at its natural horizontal length. Default: `#f`. This variable can also be set in a `\layout` block.

See also

Notation Reference: [Automatic scaling to paper size], page 603.

Installed Files: `ly/paper-defaults-init.ly`.

Known issues and warnings

Explicitly defined paper sizes will override any user-defined left or right margin settings.

\paper variables for two-sided mode

Default values (before scaling) are defined in `ly/paper-defaults-init.ly`.

`two-sided`
: If set to true, use `inner-margin`, `outer-margin` and `binding-offset` to determine margins depending on whether the page number is odd or even. This overrides `left-margin` and `right-margin`.

`inner-margin`
: The margin all pages have at the inner side if they are part of a book. If the paper size is modified, this dimension's default value is scaled accordingly. Works only with `two-sided` set to true.

`outer-margin`
: The margin all pages have at the outer side if they are part of a book. If the paper size is modified, this dimension's default value is scaled accordingly. Works only with `two-sided` set to true.

`binding-offset`
: The amount `inner-margin` is increased to make sure nothing will be hidden by the binding. If the paper size is modified, this dimension's default value is scaled accordingly. Works only with `two-sided` set to true.

See also

Notation Reference: [Automatic scaling to paper size], page 603.

Installed Files: `ly/paper-defaults-init.ly`.

\paper variables for shifts and indents

Default values (before scaling) that are not listed here are defined in `ly/paper-defaults-init.ly`.

`horizontal-shift`
: The amount that all systems (including titles and system separators) are shifted to the right. Default: `0.0\mm`.

`indent`
: The level of indentation for the first system in a score. If the paper size is modified, this dimension's default value is scaled accordingly. The space within `line-width` available for the first system is reduced by this amount. `indent` may also be specified in `\layout` blocks to set indents on a score-by-score basis.

`short-indent`
: The level of indentation for all systems in a score besides the first system. If the paper size is modified, this dimension's default value is scaled accordingly. The space within `line-width` available for systems other than the first is reduced by this amount. `short-indent` may also be specified in `\layout` blocks to set short indents on a score-by-score basis.

See also

Notation Reference: [Automatic scaling to paper size], page 603.

Installed Files: `ly/paper-defaults-init.ly`.

Snippets: Section "Spacing" in *Snippets*.

4.1.6 Other \paper variables

\paper variables for line breaking

`max-systems-per-page`
: The maximum number of systems that will be placed on a page. This is currently supported only by the `ly:optimal-breaking` algorithm. Default: unset.

`min-systems-per-page`
: The minimum number of systems that will be placed on a page. This may cause pages to be overfilled if it is made too large. This is currently supported only by the `ly:optimal-breaking` algorithm. Default: unset.

`systems-per-page`
: The number of systems that should be placed on each page. This is currently supported only by the `ly:optimal-breaking` algorithm. Default: unset.

`system-count`
: The number of systems to be used for a score. Default: unset. This variable can also be set in a `\layout` block.

See also

Notation Reference: Section 4.3.1 [Line breaking], page 617.

\paper variables for page breaking

Default values not listed here are defined in `ly/paper-defaults-init.ly`

`page-breaking`
: The page breaking algorithm to use. Choices are `ly:minimal-breaking`, `ly:page-turn-breaking`, `ly:one-page-breaking`, `ly:one-line-breaking`, `ly:one-line-auto-height-breaking`, and `ly:optimal-breaking`. Default: `ly:optimal-breaking`.

`page-breaking-system-system-spacing`
: Tricks the page breaker into thinking that `system-system-spacing` is set to something different than it really is. For example, if `page-breaking-system-system-spacing.padding` is set to something substantially larger than `system-system-spacing.padding`, then the page breaker will put fewer systems on each page. Default: unset.

`page-count`
: The number of pages to be used for a score. Default: unset.

`page-spacing-weight`
: When using the `ly:optimal-breaking` algorithm for page breaking, LilyPond has to make trade-offs between horizontal and vertical stretching so that the overall spacing is more acceptable. This parameter controls the relative importance of page (vertical) spacing and line (horizontal) spacing. High values will make page spacing more important. Default: `10`.

The following variables are effective only when `page-breaking` is set to `ly:page-turn-breaking`. Page breaks are then chosen to minimize the number of page turns. Since page turns are required on moving from an odd-numbered page to an even-numbered one, a layout in which the last page is odd-numbered will usually be favored. Places where page turns are preferred can be indicated manually by inserting `\allowPageTurn` or automatically by including the `Page_turn_engraver` (see [Optimal page turning], page 623).

If there are insufficient choices available for making suitable page turns, LilyPond may insert a blank page either within a score, between scores (if there are two or more scores), or by ending

a score on an even-numbered page. The values of the following three variables may be increased to make these actions less likely.

The values are penalties, i.e., the higher the value the less likely will be the associated action relative to other choices.

`blank-page-penalty`
: The penalty for having a blank page in the middle of a score. If `blank-page-penalty` is large and `ly:page-turn-breaking` is selected, then LilyPond will be less likely to insert a page in the middle of a score. Instead, it will space out the music further to fill the blank page and the following one. Default: 5.

`blank-last-page-penalty`
: The penalty for ending the score on an even-numbered page. If `blank-last-page-penalty` is large and `ly:page-turn-breaking` is selected, then LilyPond will be less likely to produce a score in which the last page is even-numbered. Instead, it will adjust the spacing in order to use one page more or one page less. Default: 0.

`blank-after-score-page-penalty`
: The penalty for having a blank page after the end of one score and before the next. By default, this is smaller than `blank-page-penalty`, so that blank pages after scores are inserted in preference to blank pages within a score. Default: 2.

See also

Notation Reference: Section 4.3.2 [Page breaking], page 621, [Optimal page breaking], page 622, [Optimal page turning], page 623, [Minimal page breaking], page 622, [One-page page breaking], page 623, [One-line page breaking], page 623, [One-line-auto-height page breaking], page 623.

Installed Files: `ly/paper-defaults-init.ly`.

\paper variables for page numbering

Default values not listed here are defined in `ly/paper-defaults-init.ly`

`auto-first-page-number`
: The page breaking algorithm is affected by the first page number being odd or even. If set to true, the page breaking algorithm will decide whether to start with an odd or even number. This will result in the first page number remaining as is or being increased by one. Default: `#f`.

`first-page-number`
: The value of the page number on the first page.

`print-first-page-number`
: If set to true, a page number is printed on the first page.

`print-page-number`
: If set to false, page numbers are not printed.

`page-number-type`
: The type of numerals used for page numbers. Choices include `'arabic`, `'roman-ij-lower`, `'roman-ij-upper`, `'roman-lower`, and `'roman-upper`. Default: `'arabic`.

`bookpart-level-page-numbering`
: If set to true, each book part has its independent sequence of page numbers, starting at `first-page-number` (1 by default).

This may also be used for one book part only. The typical use case is numbering pages of the first book part independently and in roman numerals, as may be wished for an analytical introduction to the work being published.

```
\book {
  \bookpart {
    \paper {
      bookpart-level-page-numbering = ##t
      page-number-type = #'roman-lower
    }
    \markuplist \wordwrap-lines {
      Lorem ipsum dolor sit amet.
    }
  }
  \bookpart {
    ...
  }
}
```

See also

Installed Files: `ly/paper-defaults-init.ly`.

Known issues and warnings

Odd page numbers are always on the right. If you want the music to start on page 1 there must be a blank page on the back of the cover page so that page 1 is on the right-hand side.

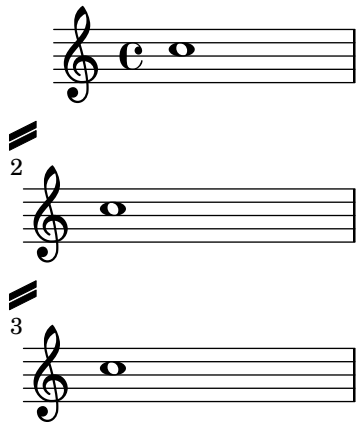
\paper variables concerning headers and markups

`print-all-headers`
: If set to true, this will print all headers for each `\score` in the output. Normally only the `piece` and `opus` header variables are printed. For use cases see Section 3.3 [Titles and headers], page 541. Default: `#f`.

`reset-footnotes-on-new-page`
: If set to true, footnote numbers are reset on each page break. For footnotes numbered consecutively across page breaks, set to `#f`. Default: `#t`.

`system-separator-markup`
: A markup object that is inserted between systems, often used for orchestral scores. Default: unset. The `\slashSeparator` markup, defined in `ly/titling-init.ly`, is provided as a sensible default, for example:

```
#(set-default-paper-size "a8")

\book {
  \paper {
    system-separator-markup = \slashSeparator
  }
  \header {
    tagline = ##f
  }
  \score {
    \relative { c''1 \break c1 \break c1 }
  }
}
```



`footnote-separator-markup`
: A markup object that is inserted above the footnote texts at the bottom of the page. Default: a centered horizontal line, defined in `ly/paper-defaults-init.ly`.

See also

Installed Files: `ly/titling-init.ly`, `ly/paper-defaults-init.ly`.

Snippets: Section "Spacing" in *Snippets*.

Known issues and warnings

The default page header puts the page number and the `instrument` field from the `\header` block on a line.

\paper variables for debugging

The variables `debug-beam-scoring`, `debug-slur-scoring` and `debug-tie-scoring` allow to print debugging output for beam, slur and tie scoring. See Section "Debugging scoring algorithms" in *Contributor's Guide* for a detailed explanation, what these variables do.

4.2 Score layout

This section discusses score layout options for the `\layout` block.

4.2.1 The \layout block

While the `\paper` block contains settings that relate to the page formatting of the whole document, the `\layout` block contains settings for score-specific layout. To set score layout options globally, enter them in a top-level `\layout` block. To set layout options for an individual score, enter them in a `\layout` block inside the `\score` block, after the music. Settings that can appear in a `\layout` block include:

- the `layout-set-staff-size` scheme function,
- context modifications in `\context` blocks, and
- `\paper` variables that affect score layout.

The `layout-set-staff-size` function is discussed in the next section, Section 4.2.2 [Setting the staff size], page 614. Context modifications are discussed in a separate chapter; see Section 5.1.4 [Modifying context plug-ins], page 667, and Section 5.1.5 [Changing context default settings], page 668.

The `\paper` variables that can appear in a `\layout` block, with default values taken from the `\paper` block are:

- `line-width`, `ragged-right` and `ragged-last` (see [\paper variables for widths and margins], page 606)

- indent and short-indent (see [\paper variables for shifts and indents], page 608)
- system-count (see [\paper variables for line breaking], page 609)

Here is an example \layout block:

```
\layout {
  indent = 2\cm
  \context {
    \StaffGroup
    \override StaffGrouper.staff-staff-spacing.basic-distance = #8
  }
  \context {
    \Voice
    \override TextScript.padding = #1
    \override Glissando.thickness = #3
  }
}
```

Multiple \layout blocks can be entered as top-level expressions. This can, for example, be useful if different settings are stored in separate files and included optionally. Internally, when a \layout block is evaluated, a copy of the current \layout configuration is made, then any changes defined within the block are applied and the result is saved as the new current configuration. From the user's perspective the \layout blocks are combined, but in conflicting situations (when the same property is changed in different blocks) the later definitions take precedence.

For example, if this block:

```
\layout {
  \context {
    \Voice
    \override TextScript.color = #magenta
    \override Glissando.thickness = #1.5
  }
}
```

is placed after the one from the preceding example the padding and color overrides for TextScript are combined, but the later thickness override for Glissando replaces (or hides) the earlier one.

\layout blocks may be assigned to variables for reuse later, but the way this works is slightly but significantly different from writing them literally.

If a variable is defined like this:

```
layoutVariable = \layout {
  \context {
    \Voice
    \override NoteHead.font-size = #4
  }
}
```

it will hold the current \layout configuration with the NoteHead.font-size override added, but this combination is *not* saved as the new current configuration. Be aware that the 'current configuration' is read when the variable is defined and not when it is used, so the content of the variable is dependent on its position in the source.

The variable can then be used inside another \layout block, for example:

```
\layout {
  \layoutVariable
```

```
    \context {
      \Voice
      \override NoteHead.color = #red
    }
  }
```

A `\layout` block containing a variable, as in the example above, does *not* copy the current configuration but instead uses the content of `\layoutVariable` as the base configuration for the further additions. This means that any changes defined between the definition and the use of the variable are lost.

If `layoutVariable` is defined (or `\included`) immediately before being used, its content is just the current configuration plus the overrides defined within it. So in the example above showing the use of `\layoutVariable` the final `\layout` block would consist of:

```
TextScript.padding = #1
TextScript.color = #magenta
Glissando.thickness = #1.5
NoteHead.font-size = #4
NoteHead.color = #red
```

plus the `indent` and the `StaffGrouper` overrides.

But if the variable had already been defined before the first `\layout` block the current configuration would now contain only

```
NoteHead.font-size = #4 % (written in the variable definition)
NoteHead.color = #red % (added after the use of the variable)
```

If carefully planned, `\layout` variables can be a valuable tool to structure the layout design of sources, and also to reset the `\layout` configuration to a known state.

See also

Notation Reference: Section 5.1.5 [Changing context default settings], page 668.

Snippets: Section "Spacing" in *Snippets*.

4.2.2 Setting the staff size

The default **staff size** is 20 points, which corresponds to a staff height of 7.03 mm (one point is equal to 100/7227 of an inch, or 2540/7227 mm). The staff size may be changed in three ways:

1. To set the staff size globally for all scores in a file (or in a `\book` block, to be precise), use `set-global-staff-size`:

   ```
   #(set-global-staff-size 14)
   ```

   The above example sets the global default staff size to 14 pt (4.92 mm) and scales all fonts accordingly.

2. To set the staff size for a single score within a book, use `layout-set-staff-size` inside that score's `\layout` block:

   ```
   \score {
     ...
     \layout {
       #(layout-set-staff-size 14)
     }
   }
   ```

3. To set the staff size for a single staff within a system, use the `\magnifyStaff` command. For example, traditionally engraved chamber music scores with piano often used 7 mm piano

staves while the other staves were typically between 3/5 and 5/7 as large (between 60% and 71%). To achieve the 5/7 proportion, use:

```
\score {
  <<
    \new Staff \with {
      \magnifyStaff #5/7
    } { ... }
    \new PianoStaff { ... }
  >>
}
```

If you happen to know which `fontSize` you wish to use, you could use the following form:

```
\score {
  <<
    \new Staff \with {
      \magnifyStaff #(magstep -3)
    } { ... }
    \new PianoStaff { ... }
  >>
}
```

To emulate the look of traditional engraving, it is best to avoid reducing the thickness of the staff lines.

Automatic font weight at different sizes

The Emmentaler font provides the set of *Feta* musical glyphs in eight different sizes; each one tuned for a different staff size. The smaller the glyph size, the "heavier" it becomes, so as to match the relatively thicker staff lines. Recommended glyphs sizes are listed in the following table:

font name	staff height (pt)	staff height (mm)	use
feta11	11.22	3.9	pocket scores
feta13	12.60	4.4	
feta14	14.14	5.0	
feta16	15.87	5.6	
feta18	17.82	6.3	song books
feta20	20	7.0	standard parts
feta23	22.45	7.9	
feta26	25.2	8.9	

See also

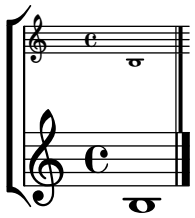
Notation Reference: [Selecting notation font size], page 250, Section A.8 [The Emmentaler font], page 739.

Snippets: Section "Spacing" in *Snippets*.

Known issues and warnings

When using `\magnifyStaff` only for some staves in a `StaffGroup`, `BarLine` grobs do not align any more, due to the changed `BarLine` properties `thick-thickness`, `hair-thickness` and `kern`.

```
\new StaffGroup
  <<
    \new Staff \with { \magnifyStaff #1/2 } { b1 \bar "|." }
    \new Staff { b }
  >>
```

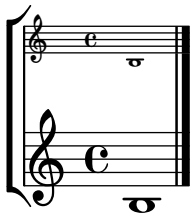


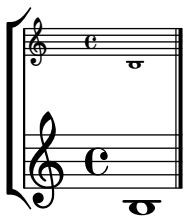
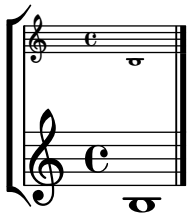
You may want to cancel magnifying BarLine grobs, mimic them on the other staves or apply intermediate values for every Staff.

```
#(define bar-line-props
  '((BarLine thick-thickness)
    (BarLine hair-thickness)
    (BarLine kern)))

mus = { b1 \bar "|."}

\markup "Cancel \\magnifyStaff for bar lines:"
\new StaffGroup
  <<
    \new Staff
      \with {
        \magnifyStaff
        #1/2 #(revert-props 'magnifyStaff 0 bar-line-props)
      }
      \mus
    \new Staff
      \mus
  >>

\markup "Mimic \\magnifyStaff on other staves:"
\new StaffGroup
  <<
    \new Staff
      \with { \magnifyStaff #1/2 }
      \mus
    \new Staff
      \with {
        #(scale-props 'magnifyStaff 1/2 #t bar-line-props)
      }
      \mus
  >>

\markup "Apply an intermediate value to all staves:"
\new StaffGroup
  <<
    \new Staff
      \with {
        \magnifyStaff #1/2
        #(scale-props 'magnifyStaff 3/2 #t bar-line-props)
      }
      \mus
    \new Staff
```

```
    \with {
      #(scale-props 'magnifyStaff 3/4 #t bar-line-props)
    }
    \mus
>>
```

Cancel \magnifyStaff for bar lines:



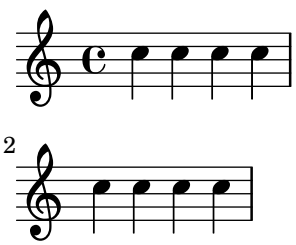
Mimic \magnifyStaff on other staves:

Apply an intermediate value to all staves:

4.3 Breaks

4.3.1 Line breaking

Line breaks are normally determined automatically. They are chosen so that lines look neither cramped nor loose, and consecutive lines have similar density.

To manually force a line break at a bar line, use the \break command:

```
\relative c'' {
  c4 c c c | \break
  c4 c c c |
}
```

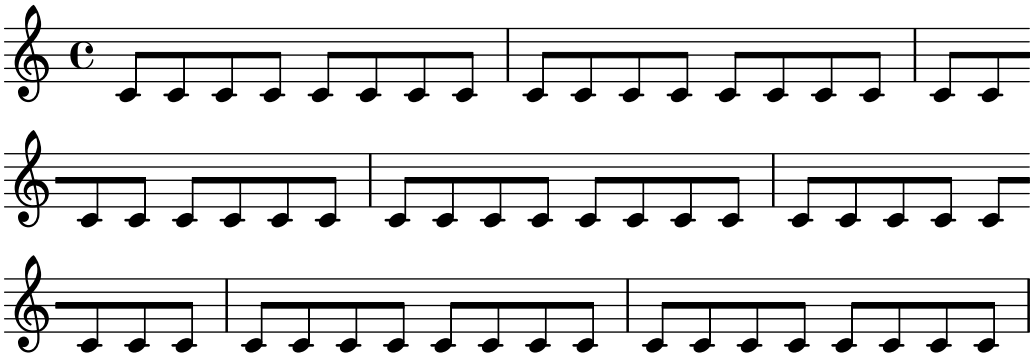


By default, breaks are only allowed at bar lines. There are also a few other factors that can prevent a break from being allowed at a certain bar line:

- a note head or rest continuing over the bar line,
- the presence of an 'unbreakable' spanner, such as a beam or a glissando, crossing the bar line.

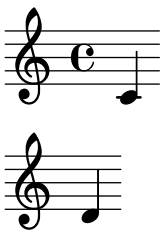
The `\break` command forces a break in all cases, regardless of the presence of a bar line or any other factor. It is also possible to bypass all these factors using the `\allowBreak` command. In the following example, breaks are allowed everywhere, even in the middle of a measure, and despite the presence of beams.

```
\repeat unfold 56 { c'8 \allowBreak }
```

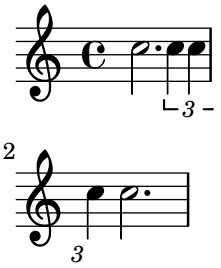


If you find yourself using `\allowBreak` often, you may want to prevent some of the factors mentioned above from disabling breaks.

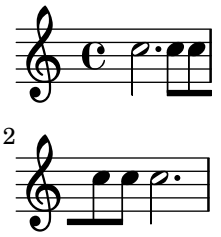
- `Bar_engraver` forbids breaks between bar lines when `forbidBreakBetweenBarLines` is set to true. To inhibit this, set the property to false.

```
\layout {
  \context {
    \Score
    forbidBreakBetweenBarLines = ##f
  }
}

\fixed c' {
  c4 d
}
```

- Note heads and rests extending over bar lines can be made not to suppress breaks by removing the `Forbid_line_break_engraver` from the `Voice` context.

```
\new Voice \with {
  \remove Forbid_line_break_engraver
} \relative {
  c''2. \tuplet 3/2 { c4 c c } c2.
}
```



- The presence of beams and other unbreakable spanners over bar lines is ignored if their `breakable` property is set to true.

```
\relative c'' {
  \override Beam.breakable = ##t
  c2. c8[ c |
  c8 c] c2. |
}
```

The `\noBreak` command will prevent a line break at the bar line where it is inserted.

Within a score, automatic line breaking is prevented within music lying between `\autoLineBreaksOff` and `\autoLineBreaksOn` commands. If automatic page breaks should also be prevented, the commands `\autoBreaksOff` and `\autoBreaksOn` should be used. Manual breaks are unaffected by these commands. Note that inhibiting automatic line breaks may cause music to run over the right margin if it cannot all be contained within one line.

Automatic line breaks (but not page breaks) may be enabled at single bar lines by using `\once \autoLineBreaksOn` at a bar line. This identifies a permitted rather than a forced line break.

The most basic settings influencing line spacing are `indent` and `line-width`. They are set in the `\layout` block. They control the indentation of the first line of music, and the lengths of the lines.

If `ragged-right` is set to true in the `\layout` block, then systems end at their natural horizontal length, instead of being spread horizontally to fill the whole line. This is useful for short fragments, and for checking how tight the natural spacing is.

The option `ragged-last` is similar to `ragged-right`, but affects only the last line of the piece.

```
\layout {
  indent = 0\mm
  line-width = 150\mm
  ragged-last = ##t
}
```

For line breaks at regular intervals use `\break` separated by skips and repeated with `\repeat`. For example, this would cause the following 28 measures (assuming 4/4 time) to be broken every 4 measures, and only there:

```
<<
  \repeat unfold 7 {
```

```
    s1 \noBreak s1 \noBreak
    s1 \noBreak s1 \break
  }
  { the actual music... }
>>
```

Predefined commands

\break, \allowBreak, \noBreak, \autoBreaksOff, \autoBreaksOn, \autoLineBreaksOff, \autoLineBreaksOn.

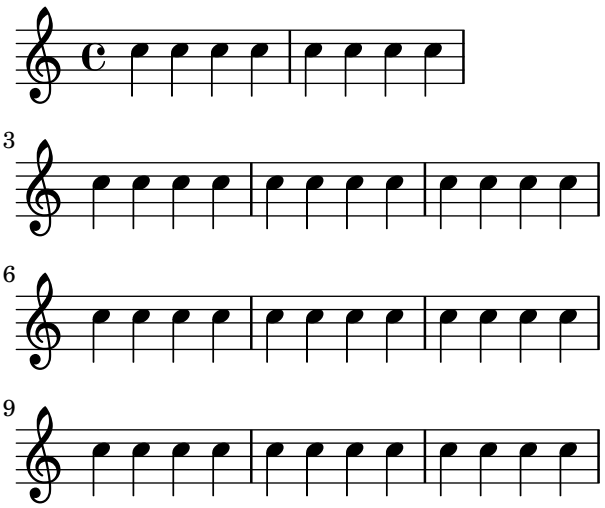
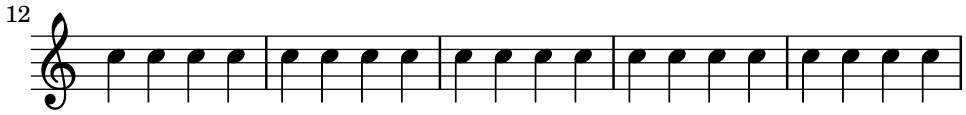
Selected Snippets

Using an extra voice for breaks

Often it is easier to manage line and page-breaking information by keeping it separate from the music by introducing an extra voice containing only skips along with the \break, pageBreak and other layout information.

This pattern becomes especially helpful when overriding line-break-system-details and the other useful but long properties of NonMusicalPaperColumnGrob.

```
music = \relative c'' { c4 c c c }

\score {
  \new Staff <<
    \new Voice {
      s1 * 2 \break
      s1 * 3 \break
      s1 * 6 \break
      s1 * 5 \break
    }
    \new Voice {
      \repeat unfold 2 { \music }
      \repeat unfold 3 { \music }
      \repeat unfold 6 { \music }
      \repeat unfold 5 { \music }
    }
  >>
}
```



See also

Notation Reference: [\paper variables for line breaking], page 609, Section 4.2.1 [The \layout block], page 612.

Snippets: Section "Spacing" in *Snippets*.

Internals Reference: Section "LineBreakEvent" in *Internals Reference*.

Known issues and warnings

Placing \autoLineBreaksOff or \autoBreaksOff before any music will cause error messages to appear. Always place these commands after some music.

4.3.2 Page breaking

This section describes the different page breaking methods, and how to modify them.

Manual page breaking

The default page breaking may be overridden by inserting \pageBreak or \noPageBreak commands. These commands are analogous to \break and \noBreak. They should be inserted at a bar line. These commands force and forbid a page break from happening at that bar line. Of course, the \pageBreak command also forces a line break.

The \pageBreak and \noPageBreak commands may also be inserted at top-level, between scores and top-level markups.

Within a score, automatic page breaks are prevented within music lying between \autoPageBreaksOff and \autoPageBreaksOn commands. Manual page breaks are unaffected by these commands.

There are also analogous settings to ragged-right and ragged-last which have the same effect on vertical spacing. If ragged-bottom is set to #t the systems will not be justified vertically. When ragged-last-bottom is set to #t, as it is by default, empty space is allowed at the bottom of the final page (or the final page in each \bookpart). See Section 4.1.3 [Fixed vertical spacing \paper variables], page 603.

Page breaks are computed by the page-breaking function. LilyPond provides several algorithms for computing page breaks, including ly:optimal-breaking, ly:page-turn-breaking and ly:minimal-breaking. The default is ly:optimal-breaking, but the value can be changed in the \paper block:

```
\paper {
  page-breaking = #ly:page-turn-breaking
}
```

When a book has many scores and pages, the page breaking problem may be difficult to solve, requiring large processing time and memory. To ease the page breaking process, \bookpart blocks are used to divide the book into several parts: the page breaking occurs separately on each part. Different page breaking functions may also be used in different book parts.

```
\bookpart {
  \header {
    subtitle = "Preface"
  }
  \paper {
     %% In a part consisting mostly of text,
```

```
      %% ly:minimal-breaking may be preferred
      page-breaking = #ly:minimal-breaking
    }
    \markup { ... }
    ...
}
\bookpart {
    %% In this part, consisting of music, the default optimal
    %% page breaking function is used.
    \header {
      subtitle = "First movement"
    }
    \score { ... }
    ...
}
```

Predefined commands

`\pageBreak`, `\noPageBreak`, `\autoPageBreaksOn`, `\autoPageBreaksOff`.

See also

Notation Reference: [`\paper` variables for page breaking], page 609.

Snippets: Section "Spacing" in *Snippets*.

Known issues and warnings

The `\once` prefix is ineffective with `\autoPageBreaksOn` and `\autoPageBreaksOff`. If automatic page breaking is off and is then turned on to permit a page break, it must remain on for a few bars (the precise number of bars depends on the score) before being turned off, else the opportunity to break the page will not be taken.

Optimal page breaking

The `ly:optimal-breaking` function is LilyPond's default method of determining page breaks. It attempts to find a page breaking that minimizes cramping and stretching, both horizontally and vertically. Unlike `ly:page-turn-breaking`, it has no concept of page turns.

See also

Snippets: Section "Spacing" in *Snippets*.

Minimal page breaking

The `ly:minimal-breaking` function performs minimal computations to calculate the page breaking: it fills a page with as many systems as possible before moving to the next one. Thus, it may be preferred for scores with many pages, where the other page breaking functions could be too slow or memory demanding, or a lot of texts. It is enabled using:

```
\paper {
  page-breaking = #ly:minimal-breaking
}
```

See also

Snippets: Section "Spacing" in *Snippets*.

One-page page breaking

The `ly:one-page-breaking` function is a special-purpose page breaking algorithm that automatically adjusts the page height to fit the music, so that everything fits on a single page. The `paper-height` variable in the paper block is ignored, but other settings work as usual. In particular, the spacing between the last system (or top level markup) and the footer can be customized with `last-bottom-spacing` in the paper block. The width of the page is left unmodified by default but can be set with `paper-width` in the paper block.

Known issues and warnings

`ly:one-page-breaking` is not currently compatible with `\bookpart`.

One-line page breaking

The `ly:one-line-breaking` function is a special-purpose page breaking algorithm that puts each score on its own page, and on a single line. No titles or margins are typeset; only the score is displayed.

The page width is adjusted so that the longest score fits on one line. In particular, `paper-width`, `line-width` and `indent` variables in the `\paper` block are ignored, although `left-margin` and `right-margin` are still honored. The height of the page is left unmodified.

One-line-auto-height page breaking

The `ly:one-line-auto-height-breaking` function works just like `ly:one-line-breaking` except the page height is automatically modified to fit the height of the music. Specifically, the `paper-height` variable in the `\paper` block is set so that it spans the height of the tallest score plus the `top-margin` and `bottom-margin`.

Note that the `top-system-spacing` setting will affect the vertical position of the music. Set it to `#f` in a paper block to simply place the music between the top and bottom margins.

Optimal page turning

Often it is necessary to find a page breaking configuration so that there is a rest at the end of every second page. This way, the musician can turn the page without having to miss notes. The `ly:page-turn-breaking` function attempts to find a page breaking minimizing cramping and stretching, but with the additional restriction that it is only allowed to introduce page turns in specified places.

There are two steps to using this page breaking function. First, you must enable it in the `\paper` block, as explained in Section 4.3.2 [Page breaking], page 621. Then you must tell the function where you would like to allow page breaks.

There are two ways to achieve the second step. First, you can specify each potential page turn manually, by inserting `\allowPageTurn` into your input file at the appropriate places.

If this is too tedious, you can add a `Page_turn_engraver` to a Staff or Voice context. The `Page_turn_engraver` will scan the context for sections without notes (note that it does not scan for rests; it scans for the absence of notes. This is so that single-staff polyphony with rests in one of the parts does not throw off the `Page_turn_engraver`). When it finds a sufficiently long section without notes, the `Page_turn_engraver` will insert an `\allowPageTurn` at the final bar line in that section, unless there is a 'special' bar line (such as a double bar), in which case the `\allowPageTurn` will be inserted at the final 'special' bar line in the section.

The `Page_turn_engraver` reads the context property `minimumPageTurnLength` to determine how long a note-free section must be before a page turn is considered. The default value for `minimumPageTurnLength` is `\musicLength 1`. If you want to disable page turns, set it to something 'very large'.

```
\new Staff \with { \consists Page_turn_engraver }
```

```
{
  a4 b c d |
  R1 | % a page turn will be allowed here
  a4 b c d |
  \set Staff.minimumPageTurnLength = \musicLength 2*5
  R1 | % a page turn will not be allowed here
  a4 b r2 |
  R1*2 | % a page turn will be allowed here
  a1
}
```

When using volta repeats, the `Page_turn_engraver` will only allow a page turn during the repeat if there is enough time at the beginning and end of the repeat to turn the page back. If the repeat is too short then the `Page_turn_engraver` can be used to *disable* page turns by setting an appropriate value for the context property `minimumRepeatLengthForPageTurn`. In this case the `Page_turn_engraver` will only allows turns in repeats whose duration is longer than the value specified.

The page turning commands, `\pageTurn`, `\noPageTurn` and `\allowPageTurn`, may also be used at top-level, in top-level markups and between scores.

Predefined commands

`\pageTurn`, `\noPageTurn`, `\allowPageTurn`.

See also

Notation Reference: [`\paper` variables for line breaking], page 609.

Snippets: Section "Spacing" in *Snippets*.

Known issues and warnings

Use only one `Page_turn_engraver` per score. If there are more, they will interfere with each other.

See also

Notation Reference: Section 4.4 [Vertical spacing], page 624.

Snippets: Section "Spacing" in *Snippets*.

4.4 Vertical spacing

Vertical spacing is controlled by three things: the amount of space available (i.e., paper size and margins), the amount of space between systems, and the amount of space between staves inside a system.

4.4.1 Flexible vertical spacing within systems

Three separate mechanisms control the flexible vertical spacing within systems, one for each of the following categories:

- *ungrouped staves*,
- *grouped staves* (staves within a staff group such as `ChoirStaff`, etc.), and
- *non-staff lines* (such as `Lyrics`, `ChordNames`, etc.).

The height of each system is determined in two steps. First, all of the staves are spaced according to the amount of space available. Then, the non-staff lines are distributed between the staves.

Note that the spacing mechanisms discussed in this section only control the vertical spacing of staves and non-staff lines within individual systems. The vertical spacing between separate systems, scores, markups, and margins is controlled by \paper variables, which are discussed in Section 4.1.4 [Flexible vertical spacing \paper variables], page 604.

Within-system spacing properties

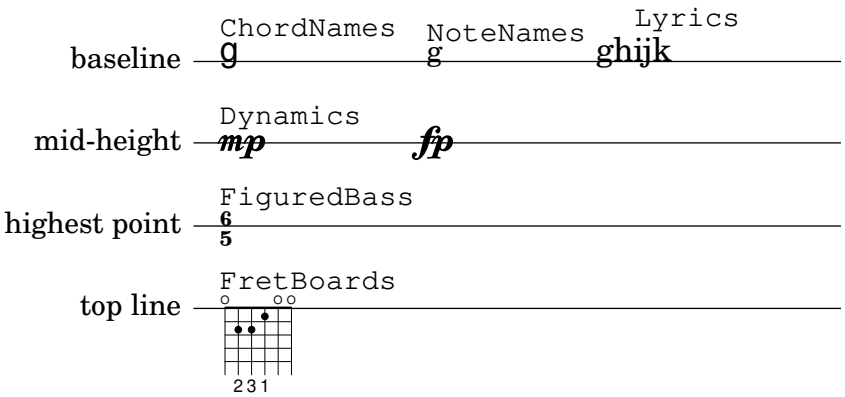
The within-system vertical spacing mechanisms are controlled by two sets of grob properties. The first set is associated with the VerticalAxisGroup grob, which is created by all staves and non-staff lines. The second set is associated with the StaffGrouper grob, which can be created by staff groups, but only if explicitly called. These properties are described individually at the end of this section.

The names of these properties (except for staff-affinity) follow the format *item1*-*item2*-spacing, where *item1* and *item2* are the items to be spaced. Note that *item2* is not necessarily below *item1*; for example, nonstaff-relatedstaff-spacing will measure upwards from the non-staff line if staff-affinity is UP.

Each distance is measured between the *reference points* of the two items. The reference point for a staff is the vertical center of its StaffSymbol (i.e., the middle line if line-count is odd; the middle space if line-count is even). The reference points for individual non-staff lines are given in the following table:

Non-staff line	Reference point
ChordNames	baseline
NoteNames	baseline
Lyrics	baseline
Dynamics	mid-height of 'm'
FiguredBass	highest point
FretBoards	top line

In the following image, horizontal lines indicate the positions of these reference points:



Each of the vertical spacing grob properties (except staff-affinity) uses the same alist structure as the \paper spacing variables discussed in Section 4.1.4 [Flexible vertical spacing \paper variables], page 604. Specific methods for modifying alists are discussed in Section 5.3.7 [Modifying alists], page 692. Grob properties should be adjusted with an \override inside a \score or \layout block, and not inside a \paper block.

The following example demonstrates the two ways these alists can be modified. The first declaration updates one key value individually, and the second completely redefines the property:

```
\new Staff \with {
  \override VerticalAxisGroup
            .default-staff-staff-spacing.basic-distance = #10
} { ... }
```

```
\new Staff \with {
  \override VerticalAxisGroup.default-staff-staff-spacing =
    #'((basic-distance . 10)
       (minimum-distance . 9)
       (padding . 1)
       (stretchability . 10))
} { ... }
```

To change any spacing settings globally, put them in the `\layout` block:

```
\layout {
  \context {
    \Staff
    \override VerticalAxisGroup
              .default-staff-staff-spacing
              .basic-distance = #10
  }
}
```

Standard settings for the vertical spacing grob properties are listed in Section "VerticalAxisGroup" in *Internals Reference* and Section "StaffGrouper" in *Internals Reference*. Default overrides for specific types of non-staff lines are listed in the relevant context descriptions in Section "Contexts" in *Internals Reference*.

Properties of the `VerticalAxisGroup` grob

`VerticalAxisGroup` properties are typically adjusted with an `\override` at the `Staff` level (or equivalent).

`staff-staff-spacing`
: Used to determine the distance between the current staff and the staff just below it in the same system, even if one or more non-staff lines (such as `Lyrics`) are placed between the two staves. Does not apply to the bottom staff of a system.

  Initially, the `staff-staff-spacing` of a `VerticalAxisGroup` is a Scheme function that applies the properties of the `StaffGrouper` if the staff is part of a group, or the `default-staff-staff-spacing` of the staff otherwise. This allows staves to be spaced differently when they are grouped. For uniform spacing regardless of grouping, this function may be replaced by a flexible-spacing alist, using the complete-redefinition form of override shown above. If only some values are specified in an override, missing values will be taken from `default-staff-staff-spacing` (if it has values for them).

`default-staff-staff-spacing`
: A flexible-spacing alist defining the `staff-staff-spacing` used for ungrouped staves, unless `staff-staff-spacing` has been explicitly set with an `\override`.

`staff-affinity`
: The direction of the staff to use for spacing the current non-staff line. Choices are `UP`, `DOWN`, and `CENTER`. If `CENTER`, the non-staff line will be placed equidistant between the two nearest staves on either side, unless collisions or other spacing constraints prevent this. Adjacent non-staff lines should have non-increasing `staff-affinity` from top to bottom, e.g., a non-staff line set to `UP` should not immediately follow one that is set to `DOWN`. Non-staff lines at the top of a system should use `DOWN`; those at the bottom should use `UP`. Setting `staff-affinity` for a staff causes it to be treated as a non-staff line. Setting `staff-affinity` to `#f` causes a non-staff line to

be treated as a staff. Setting `staff-affinity` to `UP`, `CENTER`, or `DOWN` causes a staff to be spaced as a non-staff line.

`nonstaff-relatedstaff-spacing`
: The distance between the current non-staff line and the nearest staff in the direction of `staff-affinity`, if there are no non-staff lines between the two, and `staff-affinity` is either `UP` or `DOWN`. If `staff-affinity` is `CENTER`, then `nonstaff-relatedstaff-spacing` is used for the nearest staves on *both* sides, even if other non-staff lines appear between the current one and either of the staves. This means that the placement of a non-staff line depends on both the surrounding staves and the surrounding non-staff lines. Setting the `stretchability` of one of these types of spacing to a small value will make that spacing dominate. Setting the `stretchability` to a large value will make that spacing have little effect.

`nonstaff-nonstaff-spacing`
: The distance between the current non-staff line and the next non-staff line in the direction of `staff-affinity`, if both are on the same side of the related staff, and `staff-affinity` is either `UP` or `DOWN`.

`nonstaff-unrelatedstaff-spacing`
: The distance between the current non-staff line and the staff in the opposite direction from `staff-affinity`, if there are no other non-staff lines between the two, and `staff-affinity` is either `UP` or `DOWN`. This can be used, for example, to require a minimum amount of padding between a `Lyrics` line and the staff to which it does not belong.

Properties of the `StaffGrouper` grob

`StaffGrouper` properties are typically adjusted with an `\override` at the `StaffGroup` level (or equivalent).

`staff-staff-spacing`
: The distance between consecutive staves within the current staff group. The `staff-staff-spacing` property of an individual staff's `VerticalAxisGroup` grob can be overridden with different spacing settings for that staff.

`staffgroup-staff-spacing`
: The distance between the last staff of the current staff group and the staff just below it in the same system, even if one or more non-staff lines (such as `Lyrics`) exist between the two staves. Does not apply to the bottom staff of a system. The `staff-staff-spacing` property of an individual staff's `VerticalAxisGroup` grob can be overridden with different spacing settings for that staff.

See also

Notation Reference: Section 4.1.4 [Flexible vertical spacing \paper variables], page 604, Section 5.3.7 [Modifying alists], page 692.

Installed Files: `ly/engraver-init.ly`, `scm/define-grobs.scm`.

Internals Reference: Section "Contexts" in *Internals Reference*, Section "VerticalAxisGroup" in *Internals Reference*, Section "StaffGrouper" in *Internals Reference*.

Spacing of ungrouped staves

Staves (such as `Staff`, `DrumStaff`, `TabStaff`, etc.) are contexts that can contain one or more voice contexts, but cannot contain any other staves.

The following properties affect the spacing of *ungrouped* staves:

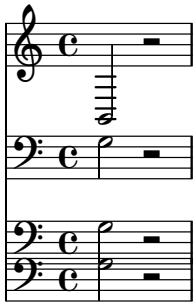
- `VerticalAxisGroup` properties:
  - `default-staff-staff-spacing`
  - `staff-staff-spacing`

These grob properties are described individually above; see [Within-system spacing properties], page 625.

Additional properties are involved for staves that are part of a staff group; see [Spacing of grouped staves], page 629.

The following example shows how the `default-staff-staff-spacing` property can affect the spacing of ungrouped staves. The same overrides applied to `staff-staff-spacing` would have the same effect, but would also apply in cases where the staves are combined in a group or groups.

```
\layout {
  \context {
    \Staff
    \override VerticalAxisGroup.default-staff-staff-spacing =
      #'((basic-distance . 8)
         (minimum-distance . 7)
         (padding . 1))
  }
}

<<
  % The very low note here needs more room than 'basic-distance
  % can provide, so the distance between this staff and the next
  % is determined by 'padding.
  \new Staff { b,2 r | }

  % Here, 'basic-distance provides enough room, and there is no
  % need to compress the space (towards 'minimum-distance) to make
  % room for anything else on the page, so the distance between
  % this staff and the next is determined by 'basic-distance.
  \new Staff { \clef bass g2 r | }

  % By setting 'padding to a negative value, staves can be made to
  % collide.  The lowest acceptable value for 'basic-distance is 0.
  \new Staff \with {
    \override VerticalAxisGroup.default-staff-staff-spacing =
      #'((basic-distance . 3.5)
         (padding . -10))
  } { \clef bass g2 r | }
  \new Staff { \clef bass g2 r | }
>>
```



See also

Installed Files: `scm/define-grobs.scm`.

Snippets: Section "Spacing" in *Snippets*.

Internals Reference: Section "VerticalAxisGroup" in *Internals Reference*.

Spacing of grouped staves

In orchestral and other large scores, it is common to place staves in groups. The space between groups is typically larger than the space between staves of the same group.

Staff-groups (such as `StaffGroup`, `ChoirStaff`, etc.) are contexts that can contain one or more staves simultaneously.

The following properties affect the spacing of staves inside staff groups:

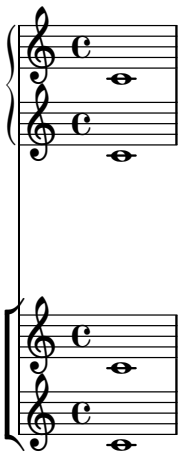
- `VerticalAxisGroup` properties:
  - `staff-staff-spacing`
- `StaffGrouper` properties:
  - `staff-staff-spacing`
  - `staffgroup-staff-spacing`

These grob properties are described individually above; see [Within-system spacing properties], page 625.

The following example shows how properties of the `StaffGrouper` grob can affect the spacing of grouped staves:

```
\layout {
  \context {
    \Score
    \override StaffGrouper.staff-staff-spacing.padding = #0
    \override StaffGrouper.staff-staff-spacing.basic-distance = #1
  }
}

<<
  \new PianoStaff \with {
    \override StaffGrouper
              .staffgroup-staff-spacing
              .basic-distance = #20
  } <<
    \new Staff { c'1 }
    \new Staff { c'1 }
  >>

  \new StaffGroup <<
```

```
    \new Staff { c'1 }
    \new Staff { c'1 }
  >>
>>
```



See also

Installed Files: `scm/define-grobs.scm`.

Snippets: Section "Spacing" in *Snippets*.

Internals Reference: Section "VerticalAxisGroup" in *Internals Reference*, Section "StaffGrouper" in *Internals Reference*.

Spacing of non-staff lines

Non-staff lines (such as `Lyrics`, `ChordNames`, etc.) are contexts whose layout objects are engraved like staves (i.e., in horizontal lines within systems). Specifically, non-staff lines are non-staff contexts that contain the Section "Axis_group_engraver" in *Internals Reference*.

The following properties affect the spacing of non-staff lines:

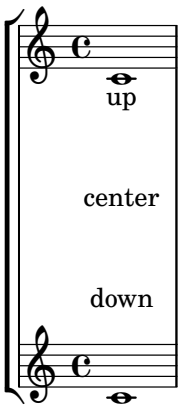
- `VerticalAxisGroup` properties:
  - `staff-affinity`
  - `nonstaff-relatedstaff-spacing`
  - `nonstaff-nonstaff-spacing`
  - `nonstaff-unrelatedstaff-spacing`

These grob properties are described individually above; see [Within-system spacing properties], page 625.

The following example shows how the `nonstaff-nonstaff-spacing` property can affect the spacing of consecutive non-staff lines. Here, by setting the `stretchability` key to a very high value, the lyrics are able to stretch much more than usual:

```
\layout {
  \context {
    \Lyrics
    \override VerticalAxisGroup
              .nonstaff-nonstaff-spacing
              .stretchability = #1000
  }
}
```

```
\new StaffGroup
<<
  \new Staff \with {
    \override VerticalAxisGroup.staff-staff-spacing =
      #'((basic-distance . 30))
  } { c'1 }
  \new Lyrics \with {
    \override VerticalAxisGroup.staff-affinity = #UP
  } \lyricmode { up }
  \new Lyrics \with {
    \override VerticalAxisGroup.staff-affinity = #CENTER
  } \lyricmode { center }
  \new Lyrics \with {
    \override VerticalAxisGroup.staff-affinity = #DOWN
  } \lyricmode { down }
  \new Staff { c'1 }
>>
```



See also

Installed Files: `ly/engraver-init.ly`, `scm/define-grobs.scm`.

Snippets: Section "Spacing" in *Snippets*.

Internals Reference: Section "Contexts" in *Internals Reference*, Section "VerticalAxisGroup" in *Internals Reference*.

4.4.2 Explicit staff and system positioning

One way to understand the flexible vertical spacing mechanisms explained above is as a collection of settings that control the amount of vertical padding between staves and systems.

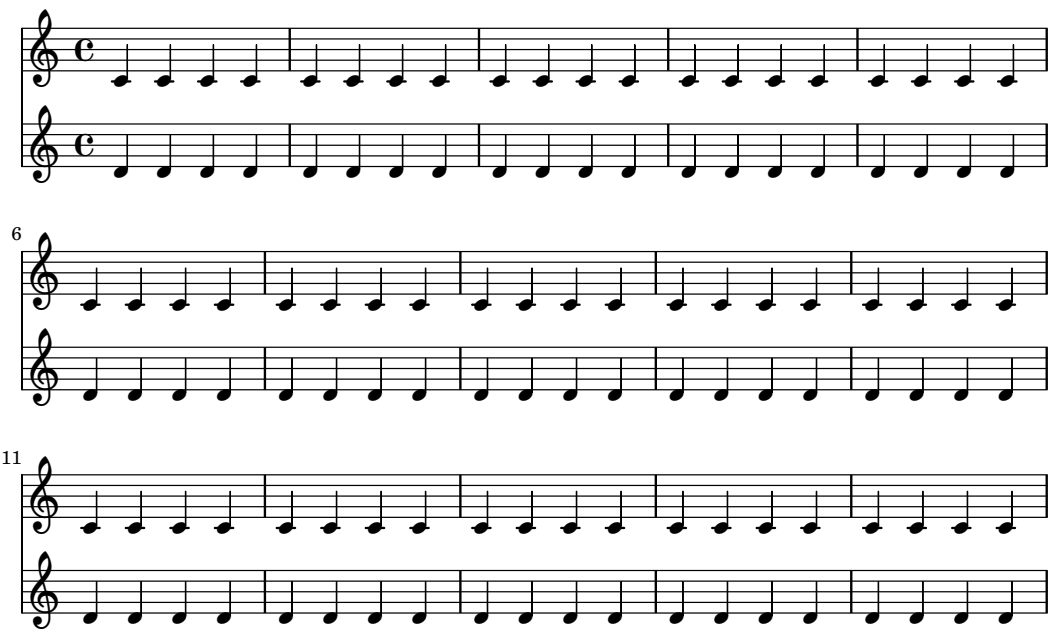
It is possible to approach vertical spacing in a different way using property `NonMusicalPaperColumn.line-break-system-details`. While the flexible vertical spacing mechanisms specify vertical padding, `NonMusicalPaperColumn.line-break-system-details` can specify exact vertical positions on the page.

`NonMusicalPaperColumn.line-break-system-details` accepts an associative list of four different settings:

- `X-offset`
- `Y-offset`
- `extra-offset`
- `alignment-distances`

```
\once \override NonMusicalPaperColumn.line-break-system-details =
  #'((X-offset . 20))

\once \override NonMusicalPaperColumn.line-break-system-details =
  #'((Y-offset . 40))

\once \override NonMusicalPaperColumn.line-break-system-details =
  #'((X-offset . 20)
     (Y-offset . 40))

\once \override NonMusicalPaperColumn.line-break-system-details =
  #'((alignment-distances . (15)))

\once \override NonMusicalPaperColumn.line-break-system-details =
  #'((X-offset . 20)
     (Y-offset . 40)
     (alignment-distances . (15)))
```

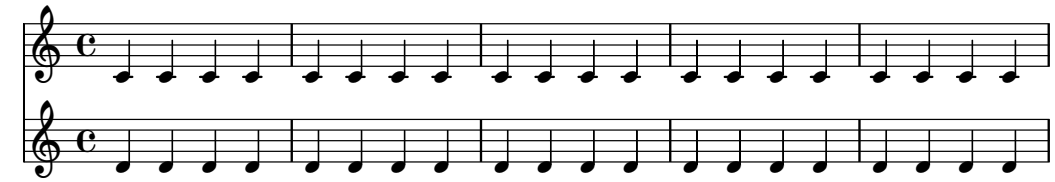
To understand how each of these different settings work, we begin by looking at an example that includes no overrides at all.

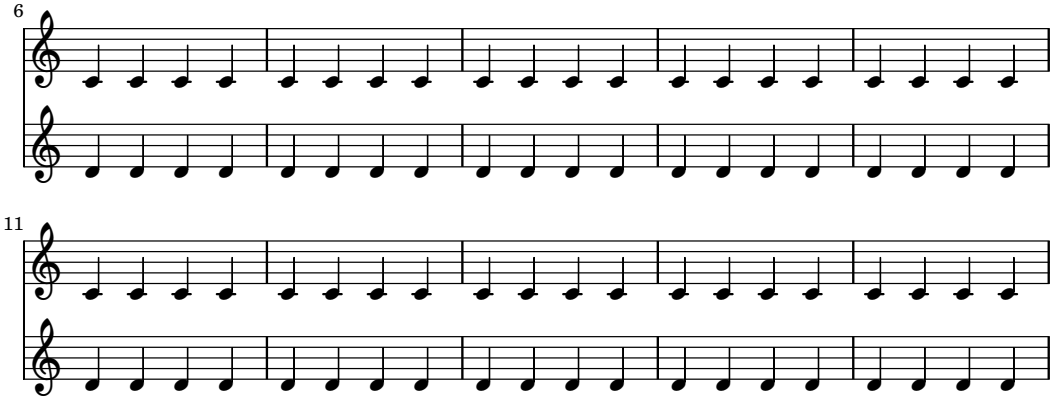
```
\header { tagline = ##f }
\paper { left-margin = 0\mm }
\book {
  \score {
    <<
      \new Staff <<
        \new Voice {
          s1*5 \break
          s1*5 \break
          s1*5 \break
        }
        \new Voice { \repeat unfold 15 { c'4 c' c' c' } }
      >>
      \new Staff {
        \repeat unfold 15 { d'4 d' d' d' }
      }
    >>
  }
}
```

This score isolates both line breaking and page breaking information in a dedicated voice. This technique of creating a breaks voice will help keep layout separate from music entry as our example becomes more complicated. Also see Section 4.3 [Breaks], page 617.

By using explicit `\break` commands, the music is divided into five measures per line. Vertical spacing is from LilyPond's own defaults but the vertical start point of each system is set explicitly using the `Y-offset` pair in the `line-break-system-details` attribute of the `NonMusicalPaperColumn` grob:

```
\header { tagline = ##f }
\paper { left-margin = 0\mm }
\book {
  \score {
    <<
      \new Staff <<
        \new Voice {
          \once \override
            Score.NonMusicalPaperColumn
                 .line-break-system-details = #'((Y-offset . 0))
          s1*5 \break
          \once \override
            Score.NonMusicalPaperColumn
                 .line-break-system-details = #'((Y-offset . 40))
          s1*5 \break
          \once \override
            Score.NonMusicalPaperColumn
                 .line-break-system-details = #'((Y-offset . 60))
          s1*5 \break
        }
        \new Voice { \repeat unfold 15 { c'4 c' c' c' } }
      >>
      \new Staff {
        \repeat unfold 15 { d'4 d' d' d' }
      }
    >>
```

```
  }
}
```

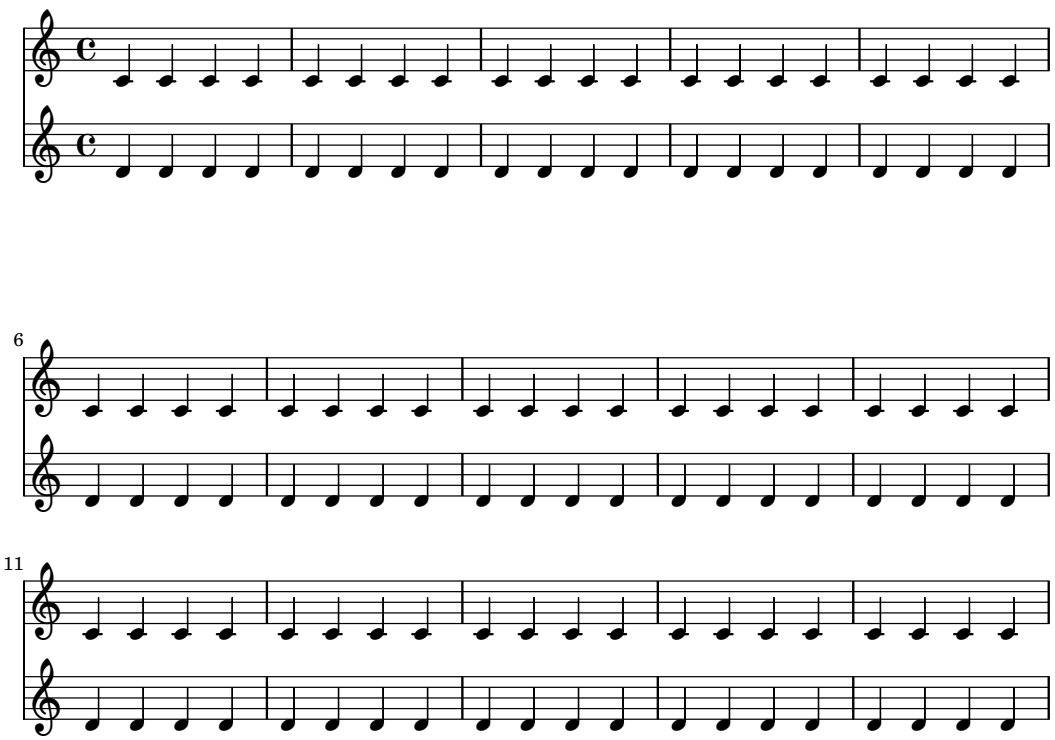




Note that `line-break-system-details` takes an associative list of potentially many values, but that we set only one value here. Note, too, that the `Y-offset` property here determines the exact vertical position on the page at which each new system will render.

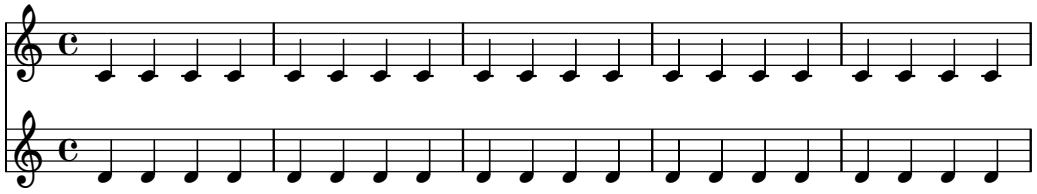
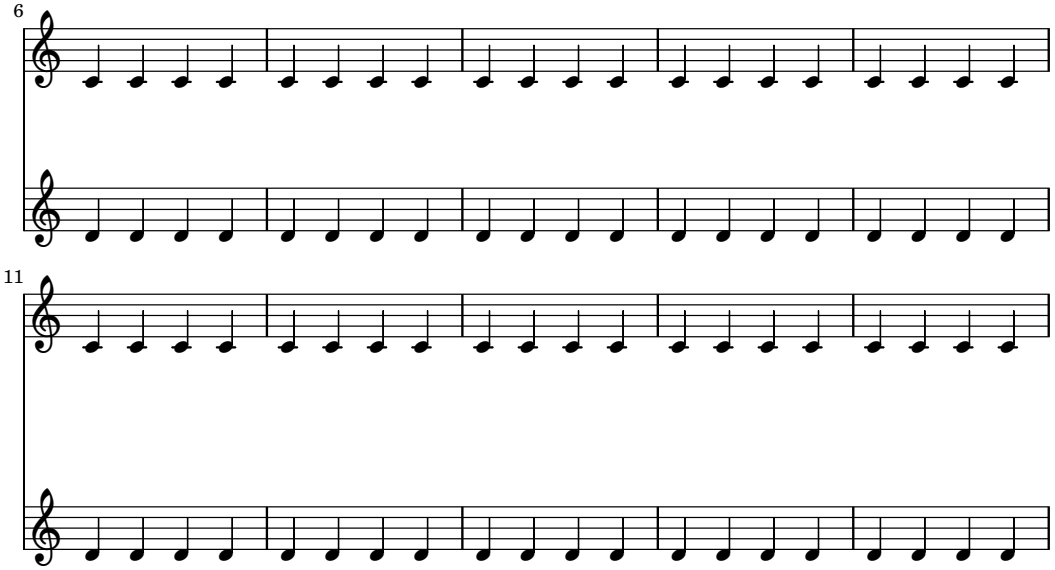
In contrast to the absolute positioning available through `Y-offset` and `X-offset`, relative positioning is possible with the `extra-offset` property of `line-break-system-details`. Placement is relative to the default layout or to the absolute positioning created by setting `X-offset` and `Y-offset`. The property `extra-offset` accepts a `pair` consisting of displacements along the X-axis and Y-axis.

```
\header { tagline = ##f }
\paper { left-margin = 0\mm }
\book {
  \score {
    <<
      \new Staff <<
        \new Voice {
          s1*5 \break
          \once \override
            Score
            .NonMusicalPaperColumn
            .line-break-system-details = #'((extra-offset . (0 . 10)))
          s1*5 \break
          \once \override
            Score
            .NonMusicalPaperColumn
            .line-break-system-details = #'((extra-offset . (0 . 10)))
```

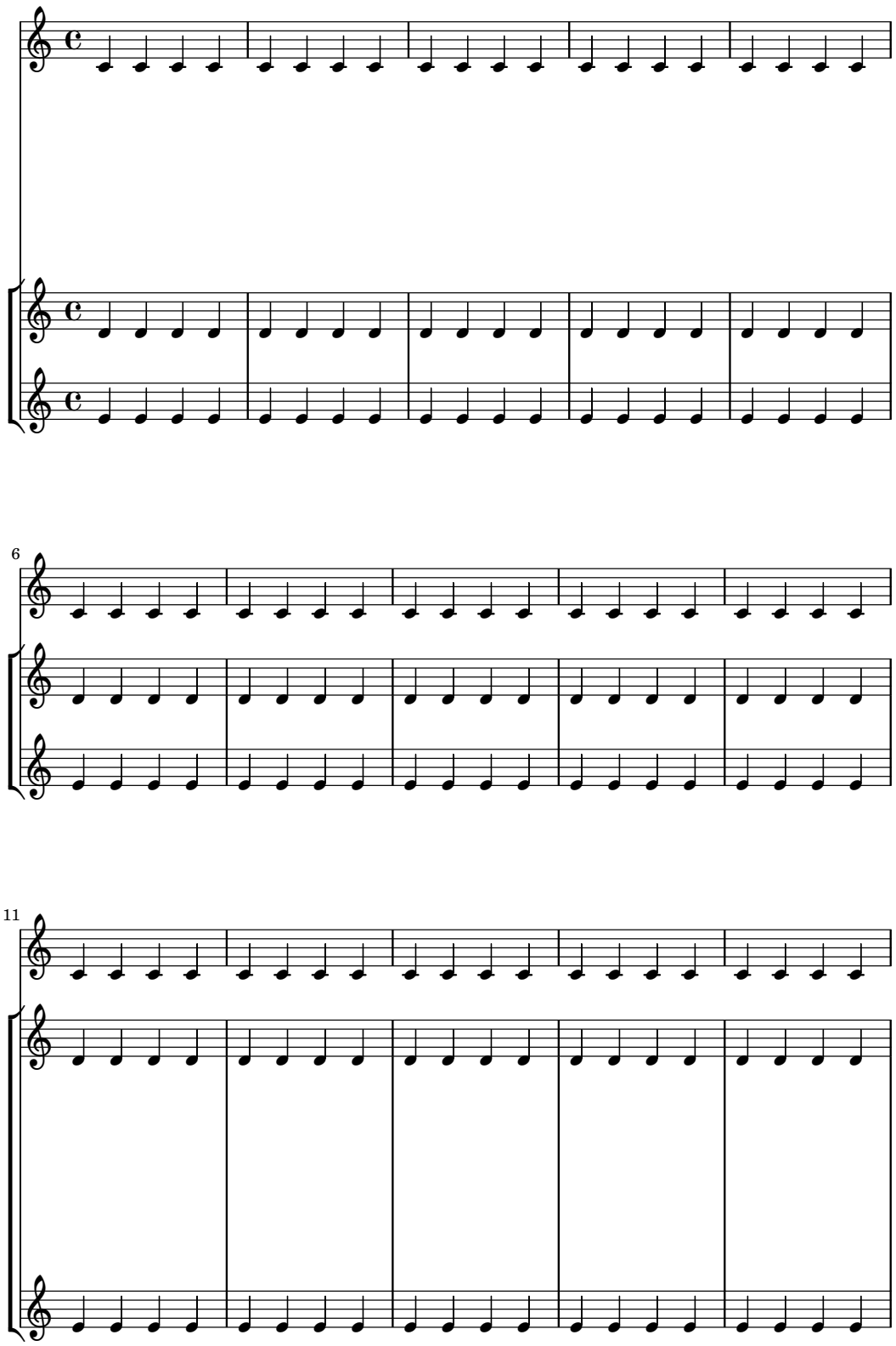
```
        s1*5 \break
      }
      \new Voice { \repeat unfold 15 { c'4 c' c' c' } }
    >>
    \new Staff {
      \repeat unfold 15 { d'4 d' d' d' }
    }
  >>
 }
}
```

Now that we have set the vertical start point of each system explicitly, we can also set the vertical distances between staves within each system manually. We do this using the `alignment-distances` subproperty of `line-break-system-details`.

```
\header { tagline = ##f }
\paper { left-margin = 0\mm }
\book {
  \score {
    <<
      \new Staff <<
        \new Voice {
          \once \override
            Score
            .NonMusicalPaperColumn
            .line-break-system-details
            = #'((Y-offset . 20)
                 (alignment-distances . (10)))
          s1*5 \break
          \once \override
            Score
```

```
            .NonMusicalPaperColumn
            .line-break-system-details
            = #'((Y-offset . 60)
                 (alignment-distances . (15)))
          s1*5 \break
          \once \override
            Score
            .NonMusicalPaperColumn
            .line-break-system-details
            = #'((Y-offset . 85)
                 (alignment-distances . (20)))
          s1*5 \break
        }
        \new Voice { \repeat unfold 15 { c'4 c' c' c' } }
      >>
      \new Staff {
        \repeat unfold 15 { d'4 d' d' d' }
      }
    >>
  }
}
```



Note that here we assign two different values to the `line-break-system-details` attribute of the `NonMusicalPaperColumn` grob. Though the `line-break-system-details` attribute alist accepts many additional spacing parameters (including, for example, a corresponding `X-offset` pair), we need only set the `Y-offset` and `alignment-distances` pairs to control the vertical start point of every system and every staff. Finally, note that `alignment-distances` specifies the vertical positioning of staves but not of staff groups.

```
\header { tagline = ##f }
\paper { left-margin = 0\mm }
\book {
  \score {
    <<
      \new Staff <<
        \new Voice {
          \once \override
            Score
            .NonMusicalPaperColumn
            .line-break-system-details
            = #'((Y-offset . 0)
                 (alignment-distances . (30 10)))
          s1*5 \break
          \once \override
            Score
            .NonMusicalPaperColumn
            .line-break-system-details
            = #'((Y-offset . 60)
                 (alignment-distances . (10 10)))
          s1*5 \break
          \once \override
            Score
            .NonMusicalPaperColumn
            .line-break-system-details
            = #'((Y-offset . 100)
                 (alignment-distances . (10 30)))
          s1*5 \break
        }
        \new Voice { \repeat unfold 15 { c'4 c' c' c' } }
      >>
      \new StaffGroup <<
        \new Staff { \repeat unfold 15 { d'4 d' d' d' } }
        \new Staff { \repeat unfold 15 { e'4 e' e' e' } }
      >>
    >>
  }
}
```

Some points to consider:

- When using `alignment-distances`, lyrics and other non-staff lines do not count as a staff.
- The units of the numbers passed to `X-offset`, `Y-offset`, `extra-offset` and `alignment-distances` are interpreted as multiples of the distance between adjacent staff lines. Positive values move staves and lyrics up, negative values move staves and lyrics down.

- Because the NonMusicalPaperColumn.line-break-system-details settings given here allow the positioning of staves and systems anywhere on the page, it is possible to violate paper or margin boundaries or even to print staves or systems on top of one another. Reasonable values passed to these different settings will avoid this.

See also

Snippets: Section "Spacing" in *Snippets*.

4.4.3 Vertical collision avoidance

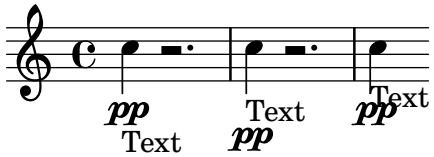
Intuitively, there are some objects in musical notation that belong to the staff and there are other objects that should be placed outside the staff. Objects belonging outside the staff include things such as rehearsal marks, text and dynamic markings (from now on, these will be called outside-staff objects). LilyPond's rule for the vertical placement of outside-staff objects is to place them as close to the staff as possible but not so close that they collide with another object.

LilyPond uses the outside-staff-priority property to determine whether a grob is an outside-staff object: if outside-staff-priority is a number, the grob is an outside-staff object. In addition, outside-staff-priority tells LilyPond in which order the objects should be placed.

First, LilyPond places all the objects that do not belong outside the staff. Then it sorts the outside-staff objects according to their outside-staff-priority (in increasing order). One by one, LilyPond takes the outside-staff objects and places them so that they do not collide with any objects that have already been placed. That is, if two outside-staff grobs are competing for the same space, the one with the lower outside-staff-priority will be placed closer to the staff.

A listing of defaults for outside-staff-priority may be found in Section A.19 [Default values for outside-staff-priority], page 833.

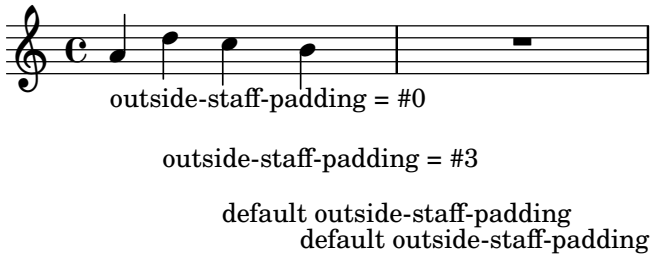
```
\relative c'' {
  c4_"Text"\pp
  r2.
  \once \override TextScript.outside-staff-priority = #1
  c4_"Text"\pp % this time the text will be closer to the staff
  r2.
  % by setting outside-staff-priority to a non-number,
  % we disable the automatic collision avoidance
  \once \override TextScript.outside-staff-priority = ##f
  \once \override DynamicLineSpanner.outside-staff-priority = ##f
  c4_"Text"\pp % now they will collide
}
```



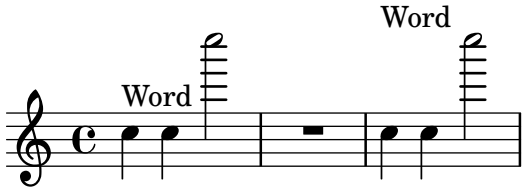
The vertical padding around outside-staff objects can be controlled with property outside-staff-padding.

```
\relative {
  \once \override TextScript.outside-staff-padding = #0
  a'4-"outside-staff-padding = #0"
  \once \override TextScript.outside-staff-padding = #3
  d-"outside-staff-padding = #3"
```

```
  c-"default outside-staff-padding"
  b-"default outside-staff-padding"
  R1
}
```



By default, outside-staff objects are placed so they avoid a horizontal collision with previously-positioned grobs. This can lead to situations in which objects are placed close to each other horizontally. As shown in the example below, setting `outside-staff-horizontal-padding` increases the horizontal spacing required, and in this case moves the text up to prevent it from getting too close to the ledger lines.

```
\relative {
  c''4^"Word" c c''2
  R1
  \once \override TextScript.outside-staff-horizontal-padding = #1
  c,,4^"Word" c c''2
}
```

See also

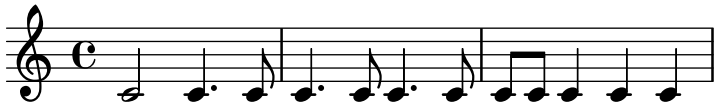
Snippets: Section “Spacing” in *Snippets*.

4.5 Horizontal spacing

4.5.1 Horizontal spacing overview

The spacing engine translates differences in durations into stretchable distances (‘springs’) of differing lengths. Longer durations get more space, shorter durations get less. The shortest durations get a fixed amount of space (which is controlled by `shortest-duration-space` in the Section “SpacingSpanner” in *Internals Reference* object). The longer the duration, the more space it gets: doubling a duration adds `spacing-increment` of space to the note.

For example, the following piece contains lots of half, quarter, and 8th notes; the eighth note is followed by 1 note head width (NHW). The quarter note is followed by 2 NHW, the half by 3 NHW, etc.

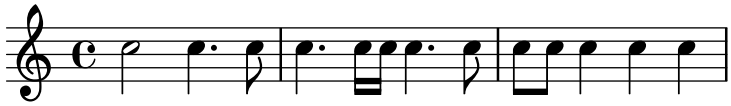
```
\relative c' {
  c2 c4. c8
  c4. c8 c4. c8
  c8 c c4 c c
}
```

Normally, `spacing-increment` is set to 1.2 staff space, which is approximately the width of a note head, and `shortest-duration-space` is set to 2.0, meaning that the shortest note gets 2.4 staff space (2.0 times the `spacing-increment`) of horizontal space. This space is counted from the left edge of the symbol, so the shortest notes are generally followed by one NHW of space.

If one would follow the above procedure exactly, then adding a single 32nd note to a score that uses 8th and 16th notes, would widen up the entire score a lot. The shortest note is no longer a 16th, but a 32nd, thus adding 1 NHW to every note. To prevent this, the shortest duration for spacing is not the shortest note in the score, but rather the one which occurs most frequently.

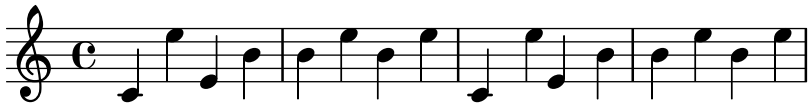
The most common shortest duration is determined as follows: in every measure, the shortest duration is determined. The most common shortest duration is taken as the basis for the spacing, with the stipulation that this shortest duration should always be equal to or shorter than an 8th note.

These durations may also be customized. If you set the `common-shortest-duration` in Section "SpacingSpanner" in *Internals Reference*, then this sets the base duration for spacing. The maximum duration for this base (normally an 8th), is set through `base-shortest-duration`.

Notes that are even shorter than the common shortest note are followed by a space that is proportional to their duration relative to the common shortest note. So if we were to add only a few 16th notes to the example above, they would be followed by half a NHW:

```
\relative { c''2 c4. c8 | c4. c16[ c] c4. c8 | c8 c c4 c c }
```

As explained in the *Essay on automated music engraving*, stem directions will influence spacing (see Section "Optical spacing" in *Essay*) and can be adjusted using the `stem-spacing-correction` property of the Section "NoteSpacing" in *Internals Reference* object (which are generated for every Section "Voice" in *Internals Reference* context).

The `StaffSpacing` object (generated in Section "Staff" in *Internals Reference* context) contains the same property for controlling the stem/bar line spacing.

The following example shows this; once with the default settings and once with an exaggerated adjustment:

Proportional notation is supported; see Section 4.5.6 [Proportional notation], page 649.

See also

Essay on automated music engraving: Section "Optical spacing" in *Essay*.

Snippets: Section "Spacing" in *Snippets*.

Internals Reference: Section "SpacingSpanner" in *Internals Reference*, Section "NoteSpacing" in *Internals Reference*, Section "StaffSpacing" in *Internals Reference*, Section "NonMusicalPaperColumn" in *Internals Reference*.

Known issues and warnings

There is no convenient mechanism to manually override spacing. The following workaround may be used to insert extra space into a score, adjusting the padding value as necessary.

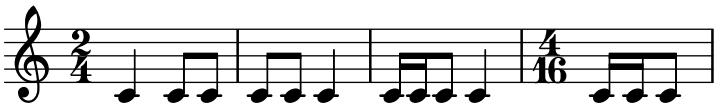
```
\override Score.NonMusicalPaperColumn.padding = #10
```

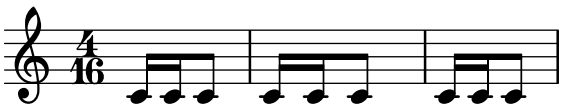
No workaround exists for decreasing the amount of space.

4.5.2 New spacing section

New sections with different spacing parameters can be started with the `newSpacingSection` command. This is useful for sections with different notions of 'long' and 'short' notes. The `\newSpacingSection` command creates a new `SpacingSpanner` object at that musical moment.

In the following example the time signature change introduces a new section, and the 16ths notes are automatically spaced slightly wider apart.

```
\relative c' {
  \time 2/4
  c4 c8 c
  c8 c c4 c16[ c c8] c4
  \newSpacingSection
  \time 4/16
  c16[ c c8]
}
```

If the automatic spacing adjustments do not give the required spacing, manual `\overrides` may be applied to its properties. These must be applied at the same musical moment as the `\newSpacingSection` command itself and will then affect the spacing of all the following music until the properties are changed in a new spacing section, for example:

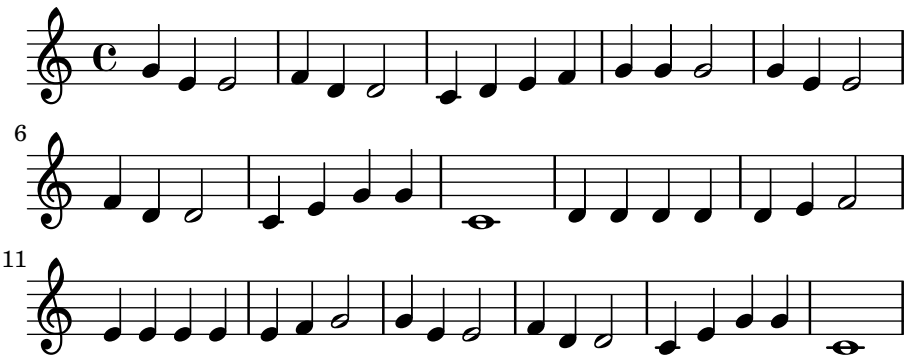
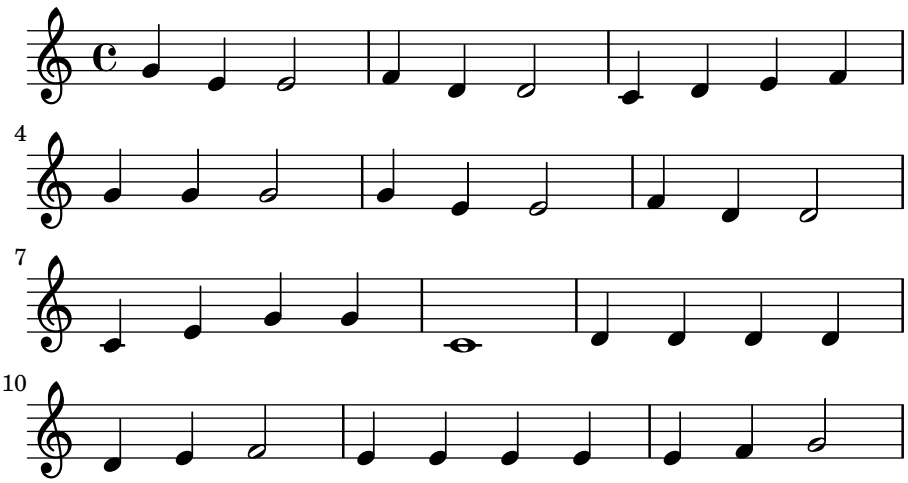
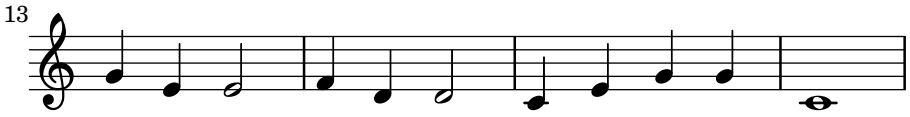
```
\relative c' {
  \time 4/16
  c16[ c c8]
  \newSpacingSection
  \override Score.SpacingSpanner.spacing-increment = #2
  c16[ c c8]
  \newSpacingSection
  \revert Score.SpacingSpanner.spacing-increment
  c16[ c c8]
}
```

See also

Snippets: Section "Spacing" in *Snippets*.

Internals Reference: Section "SpacingSpanner" in *Internals Reference*.

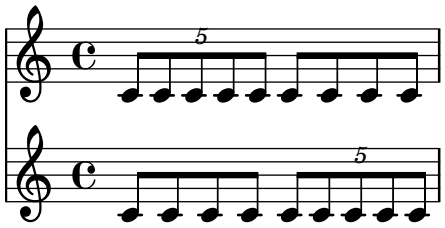
4.5.3 Changing horizontal spacing globally

Horizontal spacing may be altered with the `base-shortest-duration` property. Here we compare the same music; once without altering the property, and then altered. Larger values yield tighter spacing.

```
\score {
  \relative {
    g'4 e e2 | f4 d d2 | c4 d e f | g4 g g2 |
    g4 e e2 | f4 d d2 | c4 e g g | c,1 |
    d4 d d d | d4 e f2 | e4 e e e | e4 f g2 |
    g4 e e2 | f4 d d2 | c4 e g g | c,1 |
  }
}
```

```
\score {
  \relative {
    g'4 e e2 | f4 d d2 | c4 d e f | g4 g g2 |
    g4 e e2 | f4 d d2 | c4 e g g | c,1 |
    d4 d d d | d4 e f2 | e4 e e e | e4 f g2 |
    g4 e e2 | f4 d d2 | c4 e g g | c,1 |
  }
  \layout {
    \context {
      \Score
      \override SpacingSpanner.base-shortest-duration = \musicLength 16
    }
  }
}
```

Uniform stretching of tuplets

By default, spacing in tuplets depends on various non-duration factors (such as accidentals, clef changes, etc). To disregard such symbols and force uniform equal-duration spacing, use `Score.SpacingSpanner.uniform-stretching`. This property can only be changed at the beginning of a score,

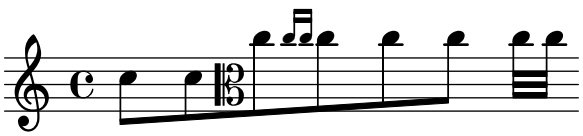
```
\score {
  <<
    \new Staff \relative c' {
      \tuplet 5/4 { c8 c c c c } c8 c c c
    }
    \new Staff \relative c' {
      c8 c c c \tuplet 5/4 { c8 c c c c }
    }
  >>
  \layout {
    \context {
      \Score
      \override SpacingSpanner.uniform-stretching = ##t
    }
  }
}
```



Strict note spacing

When `strict-note-spacing` is set, notes are spaced without regard for clefs, bar lines, and grace notes,

```
\override Score.SpacingSpanner.strict-note-spacing = ##t
\new Staff \relative {
  c''8[ c \clef alto c \grace { c16 c } c8 c c]  c32[ c] }
```



See also

Snippets: Section “Spacing” in *Snippets*.

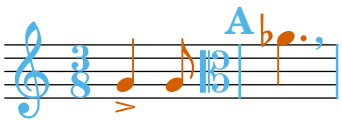
4.5.4 Adjusting horizontal spacing for specific layout objects

In addition to the general-purpose parameters of the default spacing algorithm that apply to all elements of the score or spacing section, several properties serve to operate adjustments on

a per-object-type-basis. Examples include adjusting the distance from clefs to time signatures, but not from clefs to notes when there is no time signature, or stretching notes further apart in the presence of a printed text so that it does not overlap with the next note. Tweaking these first requires identifying the type of spacing at play.

4.5.4.1 Overview of object-specific horizontal spacing tweaks

Layout objects that have a horizontally fixed position are called *items*, as opposed to *spanners*, and for the purpose of horizontal spacing, are grouped into *columns*. Note heads and rests, forming the main musical material, together with those objects that are logically linked to them – accidentals, articulations, stems, dots, etc. – are all part of 'musical column'. Prefatory items, such as clefs, time signatures and bar lines, are grouped into 'non-musical columns'. In the following example, musical items are colored red, while non-musical items are blue.

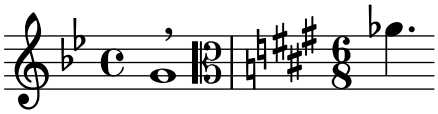


This example shows that there is an alternation between musical and non-musical columns. The first non-musical column contains a clef and a time signature. The first musical column has a note head with its stem and articulation. The second non-musical column is empty and thus is removed during the layout process. The second musical column has a note again. The third non-musical column contains a clef, a bar line and a rehearsal mark, etc.

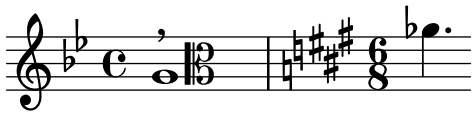
Within one column, spacing is fixed. On the other hand, the amount of space between consecutive columns is flexible. As we shall see, the methods to adjust spacing within a column and between columns are different.

4.5.4.2 Spacing between adjacent non-musical items

Within a non-musical column, items are laid out in a specific order. For instance, with the set of items in the picture below, the default order places the breathing sign first, then the clef, then the bar line, the key cancellation and key signature, and finally the time signature (this is controlled by the `BreakAlignment.break-align-orders` property).

```
\relative {
  \key g \minor
  g'1
  \breathe
  \clef alto
  \time 6/8
  \key a \major
  aes4.
}
```

The distance between two adjacent items from the same non-musical column is controlled by the value of the `space-alist` property of the leftmost one of the two. `space-alist` has the form of an associative list mapping break align symbols to `(spacing-style . value)` pairs. A breakable item's break align symbol is given by the value of its `break-align-symbol` property; standard choices are listed in Section "break-alignment-interface" in *Internals Reference*. Spacing styles are listed in Section "break-aligned-interface" in *Internals Reference*. Among the available options, only `extra-space` and `minimum-space` are relevant for tweaking the space

between non-musical items. The difference is that `extra-space` measures the padding from the right of the first object to the left of the second object while `minimum-space` counts from the left of the first object. Thus, a way to move the bar line farther from the clef is:

```
\relative {
  \key g \minor
  g'1
  \override Staff.Clef.space-alist.staff-bar = #'(extra-space . 4)
  \breathe
  \clef alto
  \time 6/8
  \key a \major
  aes4.
}
```

`space-alist` settings, not limited to the two spacing styles described above, are also possible to override the spacing between different columns. However, this kind of spacing is flexible, and does not merely depend on the types of object involved but also their shapes. Methods specific to it are documented in the next section.

See also

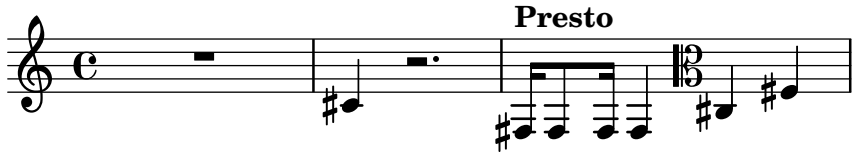
Notation Reference: [Using the `break-alignable-interface`], page 714.

Extending LilyPond: Section "Association lists (alists)" in *Extending*.

Internals Reference: Section "Break_align_engraver" in *Internals Reference*, Section "BreakAlignGroup" in *Internals Reference*, Section "BreakAlignment" in *Internals Reference*, Section "break-alignable-interface" in *Internals Reference*, Section "break-aligned-interface" in *Internals Reference*, Section "break-alignment-interface" in *Internals Reference*.

4.5.4.3 Spacing between adjacent columns

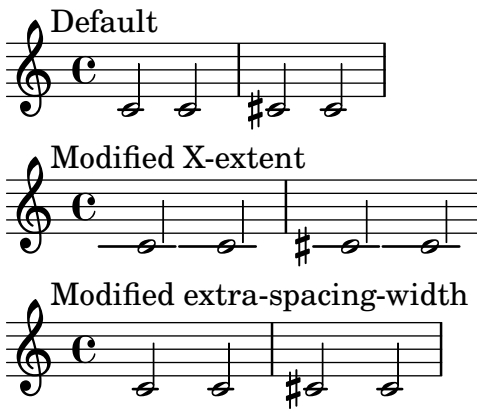
Contrary to spacing within one column, spacing between adjacent columns is flexible and stretches or compresses according to the density of music on the line. By default, columns may even overlap in some situations. The following example shows three cases. The second accidental slides behind the bar line, while the third one overlaps with the clef. Also, the tempo marking *Presto* spans several columns. Observe how the first accidental, which remains within the vertical extent of the bar line on its left, is placed further apart.



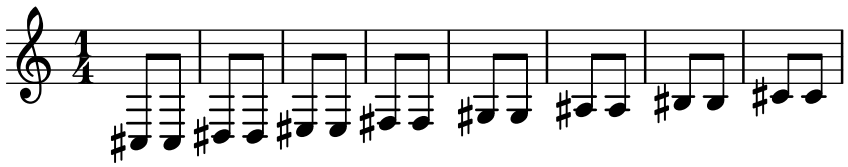
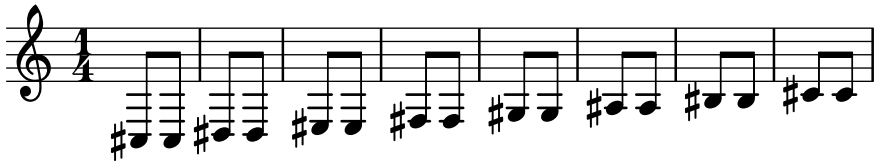
These spacing rules can be overridden. This is done by modifying the width and height that an object takes in horizontal spacing. The relevant properties are `extra-spacing-width` and `extra-spacing-height`. When unset, an object takes as much space in horizontal spacing as its `X-extent` and `Y-extent` properties allow. These are accurate values of its dimensions. The `extra-spacing-width` and `extra-spacing-height` properties make an object larger or smaller for computation of horizontal spacing between columns only, but preserve its dimensions for other spacing types.

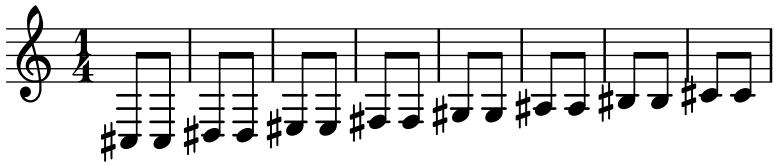
```
{
```

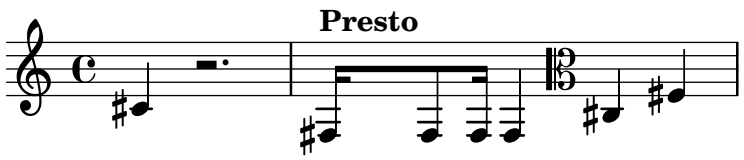
```
  \textMark "Default"
  c'2 2 cis'2 2
}

{
  \textMark "Modified X-extent"
  \override NoteHead.X-extent = #'(-2 . 2)
  c'2 2 cis'2 2
}

{
  \textMark "Modified extra-spacing-width"
  \override NoteHead.extra-spacing-width = #'(-2 . 2)
  c'2 2 cis'2 2
}
```



`extra-spacing-width` and `extra-spacing-height` are pairs of numbers, which are added to the dimensions on each axis. For instance, setting `extra-spacing-height` to `'(-2 . 3)` makes the object three units larger on the top, and two units larger on the bottom (limit lowered by 2). The following example shows how to use `extra-spacing-height` to change the limit after which accidentals no longer overlap with bar lines.

```
music = \relative {
  \time 1/4
  cis8 8 | dis8 8 | eis8 8 | fis8 8 |
  gis8 8 | ais8 8 | bis8 8 | cis8 8 |
}

{
  \music
}

{
  \override Accidental.extra-spacing-height = #'(0 . 1.0)
  \music
}
```

The value `'(+inf.0 . -inf.0)` for `extra-spacing-width` or `extra-spacing-height` removes the object's presence.

```
music = \relative {
  \time 1/4
  cis8 8 | dis8 8 | eis8 8 | fis8 8 |
  gis8 8 | ais8 8 | bis8 8 | cis8 8 |
}

{
  \override Accidental.extra-spacing-height = #'(+inf.0 . -inf.0)
  \music
}
```

Conversely, an `extra-spacing-height` of `'(-inf.0 . +inf.0)` makes the object infinitely high, preventing overlap with another column completely. The below example demonstrates this technique on `Accidental` and `MetronomeMark`. In the case of `MetronomeMark`, it is necessary to set `extra-spacing-width` to `'(0 . 0)` because the default is `'(+inf.0 . -inf.0)`, and even an infinitely high object does not take space if it has no width.

```
{
  \override Score.MetronomeMark.extra-spacing-width =
    #'(0 . 0)
  \override Score.MetronomeMark.extra-spacing-height =
    #'(-inf.0 . +inf.0)
  \override Accidental.extra-spacing-height =
    #'(-inf.0 . +inf.0)
  cis'4 r2.
  \tempo Presto
  fis16 8 16 4 \clef alto cis4 fis4
}
```

See also

Internals Reference: Section "item-interface" in *Internals Reference*, Section "separation-item-interface" in *Internals Reference*.

4.5.5 Line width

The most basic settings influencing the spacing are `indent` and `line-width`. They are set in the `\layout` block. They control the indentation of the first line of music, and the lengths of the lines.

If `ragged-right` is set to true in the `\layout` block, then systems ends at their natural horizontal length, instead of being spread horizontally to fill the whole line. This is useful for short fragments, and for checking how tight the natural spacing is. The normal default setting is false, but if the score has only one system the default value is true.

The option `ragged-last` is similar to `ragged-right`, but only affects the last line of the piece. No restrictions are put on that line. The result is similar to formatting text paragraphs. In a paragraph, the last line simply takes its natural horizontal length.

```
\layout {
  indent = #0
  line-width = #150
  ragged-last = ##t
}
```

See also

Snippets: Section “Spacing” in *Snippets*.

4.5.6 Proportional notation

LilyPond supports proportional notation, a type of horizontal spacing in which each note consumes an amount of horizontal space exactly equivalent to its rhythmic duration. This type of proportional spacing is comparable to horizontal spacing on top of graph paper. Some late 20th- and early 21st-century scores use proportional notation to clarify complex rhythmic relationships or to facilitate the placement of timelines or other graphics directly in the score.

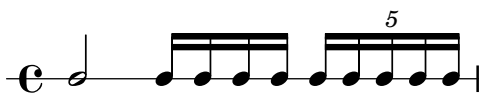
LilyPond supports five different settings for proportional notation, which may be used together or alone:

- `proportionalNotationDuration`
- `uniform-stretching`
- `strict-note-spacing`
- `\remove Separating_line_group_engraver`
- `\override PaperColumn.used = ##t`

In the examples that follow, we explore these five different proportional notation settings and examine how these settings interact.

We start with the following one-measure example, which uses classical spacing with ragged-right turned on.

```
\score {
  <<
    \new RhythmicStaff {
      c2 16 16 16 16 \tuplet 5/4 { 16 16 16 16 16 }
    }
  >>
}
```

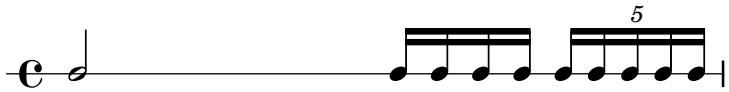


Notice that the half note which begins the measure takes up far less than half of the horizontal space of the measure. Likewise, the sixteenth notes and sixteenth-note quintuplets (or twentieth notes) which end the measure together take up far more than half the horizontal space of the measure.

In classical engraving, this spacing may be exactly what we want because we can borrow horizontal space from the half note and conserve horizontal space across the measure as a whole.

On the other hand, if we want to insert a measured timeline or other graphic above or below our score, we need proportional notation. We turn proportional notation on with the proportionalNotationDuration setting.

```
\score {
  <<
    \new RhythmicStaff {
      c2 16 16 16 16 \tuplet 5/4 { 16 16 16 16 16 }
    }
  >>
 \layout {
    \context {
      \Score
      proportionalNotationDuration = \musicLength 1*1/20
    }
  }
}
```



The half note at the beginning of the measure and the faster notes in the second half of the measure now occupy equal amounts of horizontal space. We could place a measured timeline or graphic above or below this example.

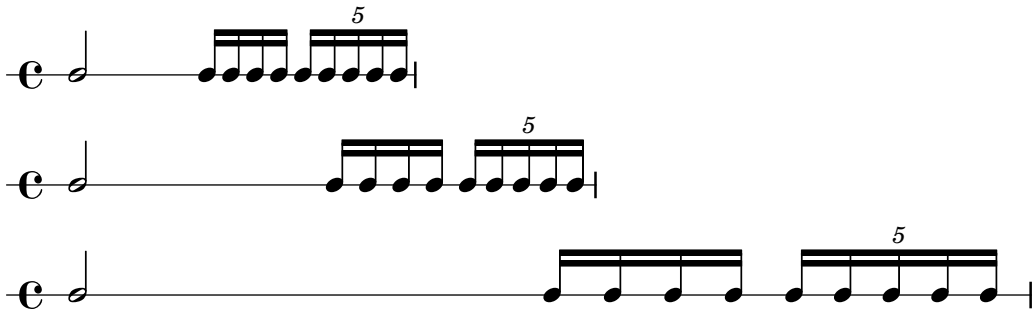
The `proportionalNotationDuration` setting is a context setting that lives in `Score`. Remember that context settings can appear in one of three locations within our input file – in a `\with` block, in a `\context` block, or directly in music entry preceded by the `\set` command. As with all context settings, users can pick which of the three different locations they would like to set `proportionalNotationDuration` in to.

The `proportionalNotationDuration` setting takes a single argument, which is the reference length against which all music will be spaced. The call `\musicLength 1*1/20` specifies one twentieth of a whole note. Values such as `\musicLength 16` and `\musicLength {2 2.}` are possible as well.

How do we select the right reference duration to pass to `proportionalNotationDuration`? Usually by a process of trial and error, beginning with a duration close to the fastest (or smallest) duration in the piece. Smaller reference durations space music loosely; larger reference durations space music tightly.

```
\score {
  <<
    \new RhythmicStaff {
      c2 16 16 16 16 \tuplet 5/4 { 16 16 16 16 16 }
    }
  >>
  \layout {
    \context {
```

```
      \Score
      proportionalNotationDuration = \musicLength 8
    }
  }
}

\score {
  <<
    \new RhythmicStaff {
      c2 16 16 16 16 \tuplet 5/4 { 16 16 16 16 16 }
    }
  >>
  \layout {
    \context {
      \Score
      proportionalNotationDuration = \musicLength 16
    }
  }
}

\score {
  <<
    \new RhythmicStaff {
      c2 16 16 16 16 \tuplet 5/4 { 16 16 16 16 16 }
    }
  >>
  \layout {
    \context {
      \Score
      proportionalNotationDuration = \musicLength 32
    }
  }
}
```



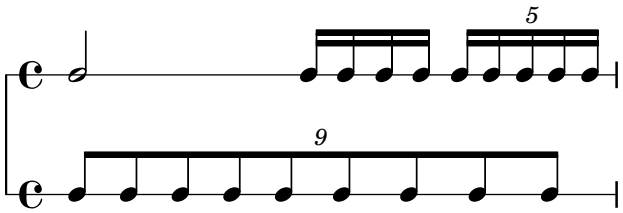
Note that too large a reference duration – such as the eighth note, above – spaces music too tightly and can cause note head collisions. Also that proportional notation in general takes up more horizontal space than classical spacing. Proportional spacing provides rhythmic clarity at the expense of horizontal space.

Next we examine how to optimally space overlapping tuplets.

We start by examining what happens to our original example, with classical spacing, when we add a second staff with a different type of tuplet.

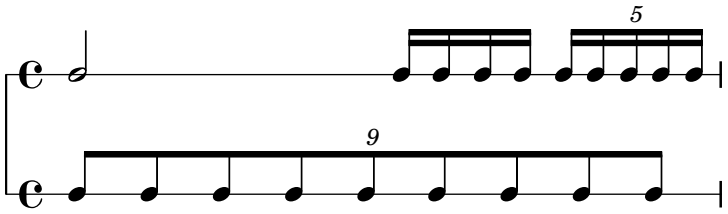
```
\score {
```

```
  <<
    \new RhythmicStaff {
      c2 16 16 16 16 \tuplet 5/4 { 16 16 16 16 16 }
    }
    \new RhythmicStaff {
      \tuplet 9/8 { c8 8 8 8 8 8 8 8 8 }
    }
  >>
}
```



The spacing is bad because the evenly spaced notes of the bottom staff do not stretch uniformly. Classical engravings include very few complex triplets and so classical engraving rules can generate this type of result. Setting `proportionalNotationDuration` fixes this.

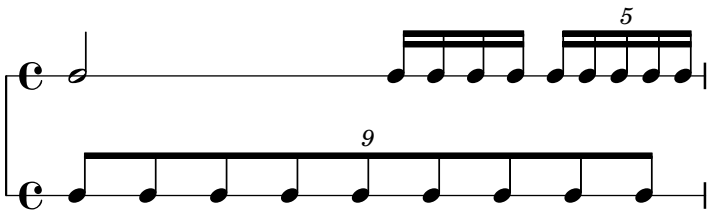
```
\score {
  <<
    \new RhythmicStaff {
      c2 16 16 16 16 \tuplet 5/4 { 16 16 16 16 16 }
    }
    \new RhythmicStaff {
      \tuplet 9/8 { c8 8 8 8 8 8 8 8 8 }
    }
  >>
  \layout {
    \context {
      \Score
      proportionalNotationDuration = \musicLength 1*1/20
    }
  }
}
```



But if we look very carefully we can see that notes of the second half of the 9-tuplet space ever so slightly more widely than the notes of the first half of the 9-tuplet. To ensure uniform stretching, we turn on `uniform-stretching`, which is a property of `SpacingSpanner`.

```
\score {
  <<
    \new RhythmicStaff {
      c2 16 16 16 16 \tuplet 5/4 { 16 16 16 16 16 }
    }
    \new RhythmicStaff {
```

```
      \tuplet 9/8 { c8 8 8 8 8 8 8 8 8 }
    }
  >>
  \layout {
    \context {
      \Score
      proportionalNotationDuration = \musicLength 1*1/20
      \override SpacingSpanner.uniform-stretching = ##t
    }
  }
}
```



Our two-staff example now spaces exactly, our rhythmic relationships are visually clear, and we can include a measured timeline or graphic if we want.

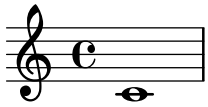
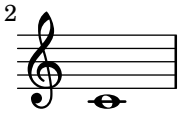
Note that the LilyPond's proportional notation package expects that all proportional scores set the SpacingSpanner's uniform-stretching attribute to #t. Setting proportional NotationDuration without also setting the SpacingSpanner's uniform-stretching attribute to #t will, for example, cause skips to consume an incorrect amount of horizontal space.

The SpacingSpanner is an abstract grob that lives in the Score context. As with our settings of proportionalNotationDuration, overrides to the SpacingSpanner can occur in any of three different places in our input file – in the Score's \with block, in a Score's \context block, or in note entry directly.

There is by default only one SpacingSpanner per Score. This means that, by default, uniform-stretching is either turned on for the entire score or turned off for the entire score. We can, however, override this behavior and turn on different spacing features at different places in the score. We do this with the command \newSpacingSection. See Section 4.5.2 [New spacing section], page 642, for more info.

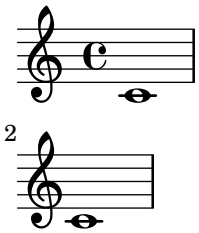
Next we examine the effects of the Separating_line_group_engraver and see why proportional scores frequently remove this engraver. The following example shows that there is a small amount of "prefatory" space just before the first note in each system.

```
\paper {
  indent = #0
}

\new Staff {
  c'1
  \break
  c'1
}
```



The amount of this prefatory space is the same whether after a time signature, a key signature or a clef. `Separating_line_group_engraver` is responsible for this space. Removing `Separating_line_group_engraver` reduces this space to zero.

```
\paper {
  indent = #0
}

\new Staff \with {
  \remove Separating_line_group_engraver
} {
  c'1
  \break
  c'1
}
```

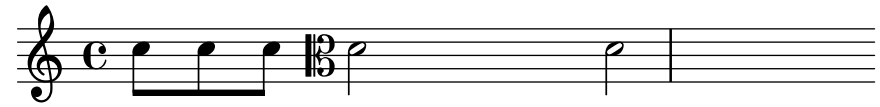


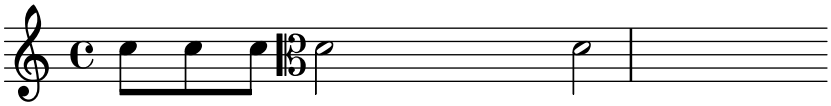
non-musical elements like time signatures, key signatures, clefs and accidentals are problematic in proportional notation. None of these elements has rhythmic duration. But all of these elements consume horizontal space. Different proportional scores approach these problems differently.

It may be possible to avoid spacing problems with key signatures simply by not having any. This is a valid option since most proportional scores are contemporary music. The same may be true of time signatures, especially for those scores that include a measured timeline or other graphic. But these scores are exceptional and most proportional scores include at least some time signatures. Clefs and accidentals are even more essential.

So what strategies exist for spacing non-musical elements in a proportional context? One good option is the `strict-note-spacing` property of `SpacingSpanner`. Compare the two scores below:

```
\new Staff {
  \set Score.proportionalNotationDuration = \musicLength 16
  c''8 8 8 \clef alto d'2 2
}

\new Staff {
  \set Score.proportionalNotationDuration = \musicLength 16
  \override Score.SpacingSpanner.strict-note-spacing = ##t
  c''8 8 8 \clef alto d'2 2
}
```





Both scores are proportional, but the spacing in the first score is too loose because of the clef change. The spacing of the second score remains strict, however, because strict-note-spacing is turned on. Turning on strict-note-spacing causes the width of time signatures, key signatures, clefs and accidentals to play no part in the spacing algorithm.

In addition to the settings given here, there are other settings that frequently appear in proportional scores. These include:

- `\override SpacingSpanner.strict-grace-spacing = ##t`
- `\set tupletFullLength = ##t`
- `\override Beam.breakable = ##t`
- `\override Glissando.breakable = ##t`
- `\override TextSpanner.breakable = ##t`
- `\remove Forbid_line_break_engraver in the Voice context`

These settings space grace notes strictly, extend tuplet brackets to mark both rhythmic start and stop points, and allow spanning elements to break across systems and pages. See the respective parts of the manual for these related settings.

See also

Notation Reference: Section 4.5.2 [New spacing section], page 642.

Snippets: Section “Spacing” in *Snippets*.

4.6 Fitting music onto fewer pages

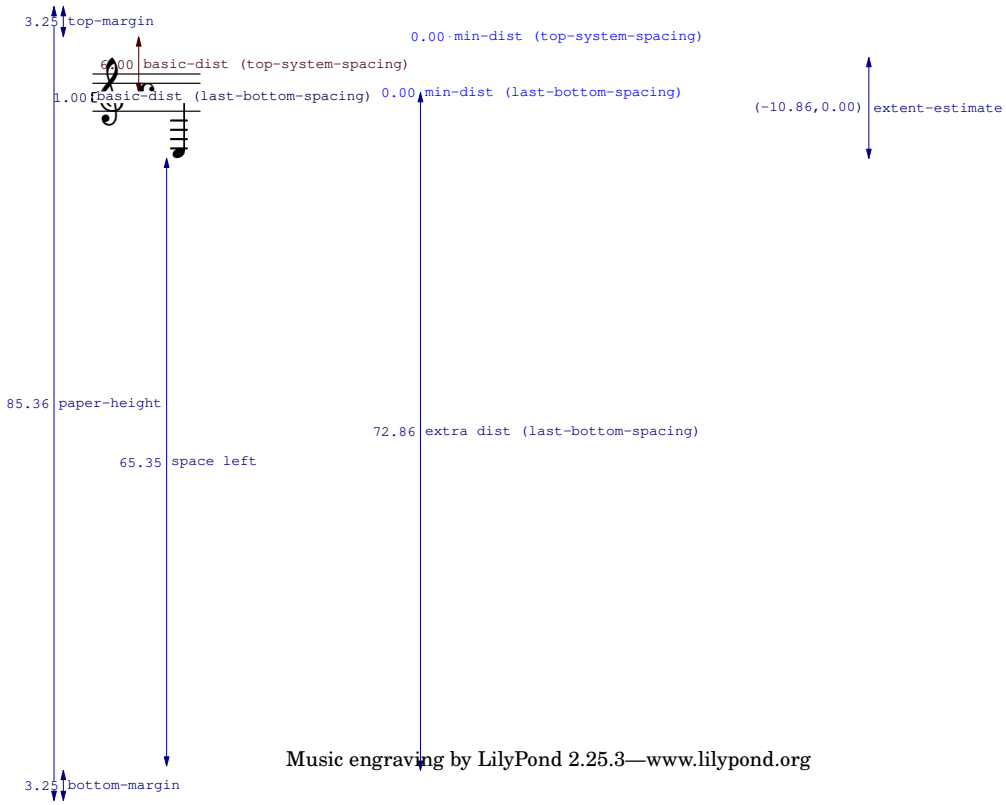
Sometimes you can end up with one or two staves on a second (or third, or fourth. . .) page. This is annoying, especially if you look at previous pages and it looks like there is plenty of room left on those.

When investigating layout issues, `annotate-spacing` is an invaluable tool. This command prints the values of various layout spacing variables; for more details see the following section, Section 4.6.1 [Displaying spacing], page 655.

4.6.1 Displaying spacing

To graphically display the dimensions of vertical layout variables that may be altered for page formatting, set `annotate-spacing` in the `\paper` block:

```
\book {
  \score { { c4 } }
  \paper { annotate-spacing = ##t }
}
```



All layout dimensions are displayed in staff spaces, regardless of the units specified in the `\paper` or `\layout` block. In the above example, `paper-height` has a value of 59.75 staff spaces, and the `staff-size` is 20 points (the default value). Note that:

1 point = (25.4/72.27) mm

1 staff space = (`staff-size`)/4 pts
= (`staff-size`)/4 * (25.4/72.27) mm

In this case, one staff space is approximately equal to 1.757 mm. Thus the `paper-height` measurement of 59.75 staff spaces is equivalent to 105 millimeters, the height of `a6` paper in landscape orientation. The pairs (a,b) are intervals, where a is the lower edge and b the upper edge of the interval.

See also

Notation Reference: Section 4.2.2 [Setting the staff size], page 614.

Snippets: Section "Spacing" in *Snippets*.

4.6.2 Changing spacing

The output of `annotate-spacing` reveals vertical dimensions in great detail. For details about modifying margins and other layout variables, see Section 4.1 [Page layout], page 601.

Other than margins, there are a few other options to save space:

- Force systems to move as close together as possible (to fit as many systems as possible onto a page) while being spaced so that there is no blank space at the bottom of the page.

```
\paper {
  system-system-spacing = #'((basic-distance . 0.1) (padding . 0))
  ragged-last-bottom = ##f
```

```
  ragged-bottom = ##f
}
```

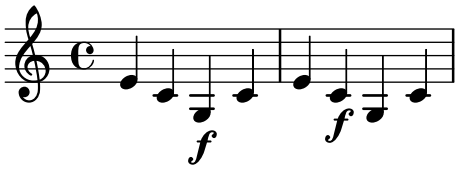
- Force the number of systems. This can help in two ways. Just setting a value, even the same value as the number of systems being typeset by default, will sometimes cause more systems to be fitted onto each page, as an estimation step is then bypassed, giving a more accurate fit to each page. Also, forcing an actual reduction in the number of systems may save a further page. For example, if the default layout has 11 systems, the following assignment will force a layout with 10 systems.

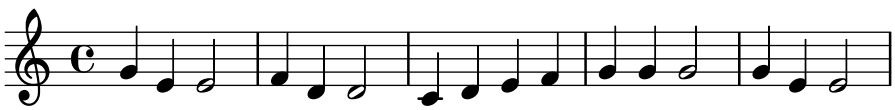
```
\paper {
  system-count = #10
}
```

- Force the number of pages. For example, the following assignment will force a layout with 2 pages.

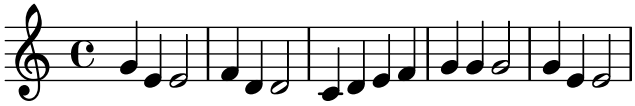
```
\paper {
  page-count = #2
}
```

- Avoid (or reduce) objects that increase the vertical size of a system. For example, volta brackets for alternative repeat endings require extra space. If these endings are spread over two systems, they take up more space than if they were on the same system. As another example, dynamics that 'stick out' of a system can be moved closer to the staff:

```
\relative e' {
  e4 c g\f c
  e4 c g-\tweak X-offset #-2.7 \f c
}
```

- Alter the horizontal spacing via SpacingSpanner. For more details, see Section 4.5.3 [Changing horizontal spacing globally], page 643. The following example illustrates the default spacing:

```
\score {
  \relative {
    g'4 e e2 |
    f4 d d2 |
    c4 d e f |
    g4 g g2 |
    g4 e e2 |
  }
}
```

The next example modifies common-shortest-duration from a value of 1/4 to 1/2. The quarter note is the most common and shortest duration in this example, so by making this duration longer, a 'squeezing' effect occurs:

```
\score {
```

```
\relative {
  g'4 e e2 |
  f4 d d2 |
  c4 d e f |
  g4 g g2 |
  g4 e e2 |
}
\layout {
  \context {
    \Score
    \override SpacingSpanner.common-shortest-duration =
      \musicLength 2
  }
}
```

The `common-shortest-duration` property cannot be modified dynamically, so it must always be placed in a `\context` block so that it applies to the whole score.

See also

Notation Reference: Section 4.1 [Page layout], page 601, Section 4.5.3 [Changing horizontal spacing globally], page 643.

Snippets: Section "Spacing" in *Snippets*.

5 Changing defaults

The purpose of LilyPond's design is to provide the finest quality output by default. Nevertheless, it may happen that you need to change this default layout. The layout is controlled through a large number of 'knobs and switches' collectively called 'properties'. A tutorial introduction to accessing and modifying these properties can be found in the Learning Manual, see Section "Tweaking output" in *Learning Manual*. This should be read first. This chapter covers similar ground, but in a style more appropriate to a reference manual.

The definitive description of the controls available for tuning can be found in a separate document: Section "the Internals Reference" in *Internals Reference*. That manual lists all the variables, functions and options available in LilyPond. It is written as a HTML document, which is available on-line (`https://lilypond.org/doc/stable/Documentation/internals/`), and is also included with the LilyPond documentation package.

Internally, LilyPond uses Scheme (a LISP dialect) to provide infrastructure. Overriding layout decisions in effect accesses the program internals, which requires Scheme input. Scheme elements are introduced in a `.ly` file with the hash mark #.[1]

5.1 Interpretation contexts

This section describes what contexts are, and how to modify them.

See also

Learning Manual: Section "Contexts and engravers" in *Learning Manual*.

Installed Files: `ly/engraver-init.ly`, `ly/performer-init.ly`.

Snippets: Section "Contexts and engravers" in *Snippets*.

Internals Reference: Section "Contexts" in *Internals Reference*, Section "Engravers and Performers" in *Internals Reference*.

5.1.1 Contexts explained

Contexts are arranged hierarchically:

Output definitions – blueprints for contexts

This section explains the relevance of output definitions when working with contexts. Examples for actual output definitions are given later (see [Changing all contexts of the same type], page 668).

While music written in a file may refer to context types and names, contexts are created only when the music is actually being interpreted. LilyPond interprets music under control of an 'output definition' and may do so for several different output definitions, resulting in different output. The output definition relevant for printing music is specified using `\layout`.

A much simpler output definition used for producing Midi output is specified using `\midi`. Several other output definitions are used by LilyPond internally, like when using the part combiner ([Automatic part combining], page 208) or creating music quotes ([Quoting other voices], page 239).

Output definitions define the relation between contexts as well as their respective default settings. While most changes will usually be made inside of a `\layout` block, Midi-related settings will only have an effect when made within a `\midi` block.

Some settings affect several outputs: for example, if `autoBeaming` is turned off in some context, beams count as melismata for the purpose of matching music to lyrics as described in

[1] Section "Scheme tutorial" in *Extending*, contains a short tutorial on entering numbers, lists, strings, and symbols in Scheme.

[Automatic syllable durations], page 317. This matching is done both for printed output as well as for Midi. If changes made to `autoBeaming` within a context definition of a `\layout` block are not repeated in the corresponding `\midi` block, lyrics and music will get out of sync in Midi.

See also

Installed Files: `ly/engraver-init.ly`. `ly/performer-init.ly`.

Score – the master of all contexts

This is the top level notation context. No other context can contain a Score context. By default the Score context handles the administration of time signatures and makes sure that items such as clefs, time signatures, and key signatures are aligned across staves.

A Score context is instantiated implicitly when a `\score {...}` block is processed.

Top-level contexts – staff containers

StaffGroup

Groups staves while adding a bracket on the left side, grouping the staves together. The bar lines of the contained staves are connected vertically. `StaffGroup` only consists of a collection of staves, with a bracket in front and spanning bar lines.

ChoirStaff

Identical to `StaffGroup` except that the bar lines of the contained staves are not connected vertically.

GrandStaff

A group of staves, with a brace on the left side, grouping the staves together. The bar lines of the contained staves are connected vertically.

PianoStaff

Just like `GrandStaff`, but with support for instrument names to the left of each system.

Intermediate-level contexts – staves

Staff

Handles clefs, bar lines, keys, accidentals. It can contain `Voice` contexts.

RhythmicStaff

Like `Staff` but for printing rhythms. Pitches are ignored when engraving; the notes are printed on one line. The MIDI rendition retains pitches unchanged.

TabStaff

Context for generating tablature. By default lays the music expression out as a guitar tablature, printed on six lines.

DrumStaff

Handles typesetting for percussion. Can contain `DrumVoice`.

VaticanaStaff

Same as `Staff`, except that it is designed for typesetting a piece in Gregorian style.

MensuralStaff

Same as `Staff`, except that it is designed for typesetting a piece in mensural style.

Bottom-level contexts – voices

`Voice`-level contexts initialize certain properties and start appropriate engravers. A bottom-level context is one without `defaultchild`. While it is possible to let it accept/contain subcontexts, they can only be created and entered explicitly.

Voice

Corresponds to a voice on a staff. This context handles the conversion of dynamic signs, stems, beams, super- and subscripts, slurs, ties, and rests. You have to instantiate this explicitly if you require multiple voices on the same staff.

VaticanaVoice

Same as `Voice`, except that it is designed for typesetting a piece in Gregorian style.

MensuralVoice

Same as `Voice`, with modifications for typesetting a piece in mensural style.

Lyrics

Corresponds to a voice with lyrics. Handles the printing of a single line of lyrics.

DrumVoice

The voice context used in a percussion staff.

FiguredBass

The context in which `BassFigure` objects are created from input entered in `\figuremode` mode.

TabVoice

The voice context used within a `TabStaff` context. Usually left to be created implicitly.

CueVoice

A voice context used to render notes of a reduced size, intended primarily for adding cue notes to a staff, see [Formatting cue notes], page 243. Usually left to be created implicitly.

ChordNames

Typesets chord names.

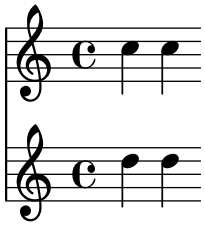
5.1.2 Creating and referencing contexts

LilyPond will create lower-level contexts automatically if a music expression is encountered before a suitable context exists, but this is usually successful only for simple scores or music fragments like the ones in the documentation. For more complex scores it is advisable to specify all contexts explicitly with either the `\new` or `\context` command. The syntax of these two commands is very similar:

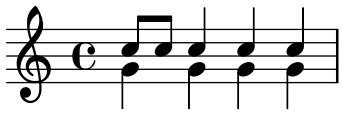
`[\new | \context] Context [ = name] [music-expression]`

where either `\new` or `\context` may be specified. *Context* is the type of context which is to be created, *name* is an optional name to be given to the particular context being created and *music-expression* is a single music expression that is to be interpreted by the engravers and performers in this context.

The `\new` prefix without a name is commonly used to create scores with many staves:

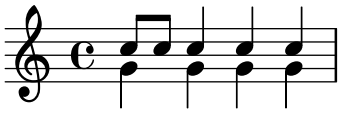
```
<<
  \new Staff \relative {
    % leave the Voice context to be created implicitly
    c''4 c
  }
  \new Staff \relative {
    d''4 d
```

```
  }
>>
```

and to place several voices into one staff:

```
\new Staff <<
  \new Voice \relative {
    \voiceOne
    c''8 c c4 c c
  }
  \new Voice \relative {
    \voiceTwo
    g'4 g g g
  }
>>
```

\new should always be used to specify unnamed contexts.

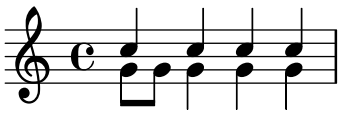
The difference between \new and \context is in the action taken:

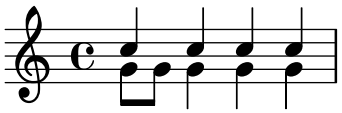
- \new with or without a name will always create a fresh, distinct, context, even if one with the same name already exists:

```
\new Staff <<
  \new Voice = "A" \relative {
    \voiceOne
    c''8 c c4 c c
  }
  \new Voice = "A" \relative {
    \voiceTwo
    g'4 g g g
  }
>>
```

- \context with a name specified will create a distinct context only if a context of the same type with the same name in the same context hierarchy does not already exist. Otherwise it will be taken as a reference to that previously created context, and its music expression will be passed to that context for interpretation.

  Named contexts may be useful in special cases such as lyrics or figured bass, as demonstrated in [Working with lyrics and variables], page 326, and Section "Vocal ensembles templates" in *Learning Manual* for the former and [Displaying figured bass], page 488, for the latter.

More generally, one application of named contexts is in separating the score layout from the musical content. Either of these two forms is valid:

```
\score {
  <<
    % score layout
    \new Staff <<
      \new Voice = "one" {
        \voiceOne
      }
      \new Voice = "two" {
        \voiceTwo
      }
    >>

    % musical content
    \context Voice = "one" {
      \relative {
        c''4 c c c
      }
    }
    \context Voice = "two" {
      \relative {
        g'8 g g4 g g
      }
    }
  >>
}
```

```
\score {
  <<
    % score layout
    \new Staff <<
      \context Voice = "one" {
        \voiceOne
      }
      \context Voice = "two" {
        \voiceTwo
      }
    >>

    % musical content
    \context Voice = "one" {
      \relative {
        c''4 c c c
      }
    }
    \context Voice = "two" {
      \relative {
```

```
        g'8 g g4 g g
      }
    }
  >>
}
```

Alternatively, variables may be employed to similar effect. See Section "Organizing pieces with variables" in *Learning Manual*.

- `\context` with no name will match the first of any previously created contexts of the same type in the same context hierarchy, even one that has been given a name, and its music expression will be passed to that context for interpretation. This form is rarely useful. However, `\context` with no name and no music expression is used to set the context in which a Scheme procedure specified with `\applyContext` is executed:

```
\new Staff \relative {
  c'1
  \context Timing
  \applyContext #(lambda (ctx)
                   (newline)
                   (display (ly:context-current-moment ctx)))
  c1
}
```

A context must be named if it is to be referenced later, for example when lyrics are associated with music:

```
\new Voice = "tenor" music
...
\new Lyrics \lyricsto "tenor" lyrics
```

For details of associating lyrics with music see [Automatic syllable durations], page 317.

The properties of all contexts of a particular type can be modified in a `\layout` block (with a different syntax), see [Changing all contexts of the same type], page 668. This construct also provides a means of keeping layout instructions separate from the musical content. If a single context is to be modified, a `\with` block must be used, see [Changing just one specific context], page 671.

See also

Learning Manual: Section "Organizing pieces with variables" in *Learning Manual*.

Notation Reference: [Changing just one specific context], page 671, [Automatic syllable durations], page 317.

5.1.3 Keeping contexts alive

Contexts are usually terminated at the first musical moment in which they have nothing to do. So `Voice` contexts die as soon as they contain no events, `Staff` contexts die as soon as all the `Voice` contexts within them contain no events, etc. This can cause difficulties if earlier contexts which have died have to be referenced, for example, when changing staves with `\change` commands, associating lyrics with a voice with `\lyricsto` commands, or when adding further musical events to an earlier context.

There is an exception to this general rule: inside of an `{...}` construct (sequential music), the construct's notion of the "current context" will descend whenever an element of the sequence

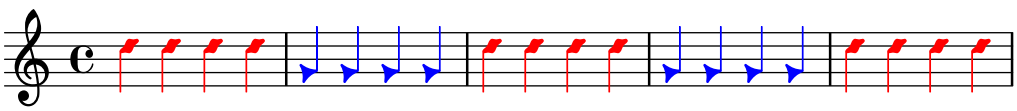
ends in a subcontext of the previous current context. This avoids spurious creation of implicit contexts in a number of situations but means that the first context descended into will be kept alive until the end of the expression.

In contrast, the contexts of a <<...>> construct's (simultaneous music) expression are not carried forth, so enclosing a context creating command in an extra pair of <<...>> will keep the context from persisting through all of the enclosing {...} sequence.

Any context can be kept alive by ensuring it has something to do at every musical moment. `Staff` contexts are kept alive by ensuring one of their voices is kept alive. One way of doing this is to add spacer rests to a voice in parallel with the real music. These need to be added to every `Voice` context which needs to be kept alive. If several voices are to be used sporadically it is safest to keep them all alive rather than attempting to rely on the exceptions mentioned above.

In the following example, both voice A and voice B are kept alive in this way for the duration of the piece:

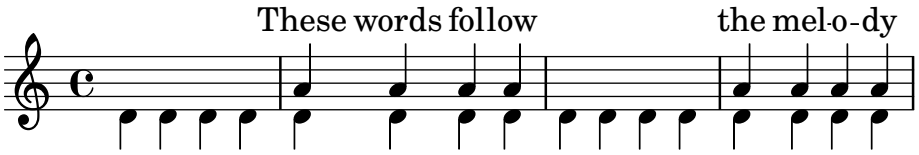
```
musicA = \relative { d''4 d d d }
musicB = \relative { g'4 g g g }
keepVoicesAlive = {
  <<
    \new Voice = "A" { s1*5 }  % Keep Voice "A" alive for 5 bars
    \new Voice = "B" { s1*5 }  % Keep Voice "B" alive for 5 bars
  >>
}

music = {
  \context Voice = "A" {
    \voiceOneStyle
    \musicA
  }
  \context Voice = "B" {
    \voiceTwoStyle
    \musicB
  }
  \context Voice = "A" { \musicA }
  \context Voice = "B" { \musicB }
  \context Voice = "A" { \musicA }
}

\score {
  \new Staff <<
    \keepVoicesAlive
    \music
  >>
}
```



The following example shows how a sporadic melody line with lyrics might be written using this approach. In a real situation the melody and accompaniment would consist of several different sections, of course.

```
melody = \relative { a'4 a a a }
```

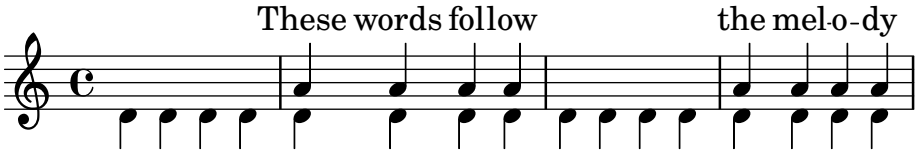
```
accompaniment = \relative { d'4 d d d }
words = \lyricmode { These words fol -- low the mel -- o -- dy }
\score {
  <<
    \new Staff = "music" {
      <<
        \new Voice = "melody" {
          \voiceOne
          s1*4  % Keep Voice "melody" alive for 4 bars
        }
        {
          \new Voice = "accompaniment" {
            \voiceTwo
            \accompaniment
          }
          <<
            \context Voice = "melody" { \melody }
            \context Voice = "accompaniment" { \accompaniment }
          >>
          \context Voice = "accompaniment" { \accompaniment }
          <<
            \context Voice = "melody" { \melody }
            \context Voice = "accompaniment" { \accompaniment }
          >>
        }
      >>
    }
    \new Lyrics \with { alignAboveContext = "music" }
    \lyricsto "melody" { \words }
  >>
}
```



An alternative way, which may be better in many circumstances, is to keep the melody line alive by simply including spacer notes to line it up correctly with the accompaniment:

```
melody = \relative {
  s1  % skip a bar
  a'4 a a a
  s1  % skip a bar
  a4 a a a
}
accompaniment = \relative {
  d'4 d d d
  d4 d d d
  d4 d d d
  d4 d d d
}
words = \lyricmode { These words fol -- low the mel -- o -- dy }
```

```
\score {
  <<
    \new Staff = "music" {
      <<
        \new Voice = "melody" {
          \voiceOne
          \melody
        }
        \new Voice = "accompaniment" {
          \voiceTwo
          \accompaniment
        }
      >>
    }
    \new Lyrics \with { alignAboveContext = "music" }
    \lyricsto "melody" { \words }
  >>
}
```



5.1.4 Modifying context plug-ins

Notation contexts (like `Score` and `Staff`) not only store properties, they also contain plug-ins called 'engravers' that create notation elements. For example, the `Voice` context contains a `Note_heads_engraver` and the `Staff` context contains a `Key_engraver`.

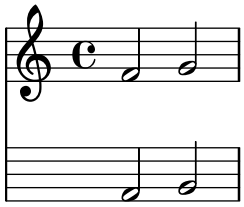
For a full a description of each plug-in, see Internals Reference ↦ Translation ↦ Engravers. Every context described in Internals Reference ↦ Translation ↦ Context. lists the engravers used for that context.

It can be useful to shuffle around these plug-ins. This is done by starting a new context with `\new` or `\context`, and modifying it,

```
\new context \with {
  \consists ...
  \consists ...
  \remove ...
  \remove ...
  etc.
}
{
  ...music...
}
```

where each `...` should be the name of an engraver. Here is a simple example which removes `Time_signature_engraver` and `Clef_engraver` from a `Staff` context,

```
<<
  \new Staff \relative {
    f'2 g
  }
  \new Staff \with {
```

```
      \remove Time_signature_engraver
      \remove Clef_engraver
    } \relative {
      f'2 g2
    }
>>
```

In the second staff there are no time signature or clef symbols. This is a rather crude method of making objects disappear since it will affect the entire staff. This method also influences the spacing, which may or may not be desirable. More sophisticated methods of blanking objects are shown in Section "Visibility and color of objects" in *Learning Manual*.

Known issues and warnings

The order in which the engravers are specified is the order in which they are called to carry out their processing. Usually the order in which the engravers are specified does not matter, but in a few special cases the order is important, for example where one engraver writes a property and another reads it, or where one engraver creates a grob and another must process it.

The following orderings are important:

- the `Bar_engraver` must normally be first,
- the `New_fingering_engraver` must come before the `Script_column_engraver`,
- the `Timing_translator` must come before the `Bar_number_engraver`.

See also

Installed Files: `ly/engraver-init.ly`.

5.1.5 Changing context default settings

Context and grob properties can be changed with `\set` and `\override` commands, as described in Section 5.3 [Modifying properties], page 681. These commands create music events, making the changes take effect at the point in time the music is being processed.

In contrast, this section explains how to change the *default* values of context and grob properties at the time the context is created. There are two ways of doing this. One modifies the default values in all contexts of a particular type, the other modifies the default values in just one particular instance of a context.

Changing all contexts of the same type

The default context settings which are to be used for typesetting in `Score`, `Staff`, `Voice` and other contexts may be specified in a `\context` block within any `\layout` block.

Settings for Midi output as opposed to typesetting will have to be separately specified in `\midi` blocks (see [Output definitions – blueprints for contexts], page 659).

The `\layout` block should be placed within the `\score` block to which it is to apply, after the music.

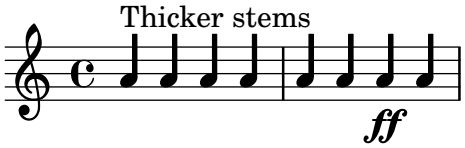
```
\layout {
  \context {
```

```
    \Voice
    [context settings for all Voice contexts]
  }
  \context {
    \Staff
    [context settings for all Staff contexts]
  }
}
```

The following types of settings may be specified:

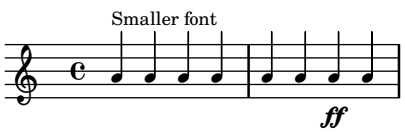
- An `\override` command, but with the context name omitted

```
\score {
  \relative {
    a'4^"Thicker stems" a a a
    a4 a a\ff a
  }
  \layout {
    \context {
      \Staff
      \override Stem.thickness = #4.0
    }
  }
}
```



- Directly setting a context property

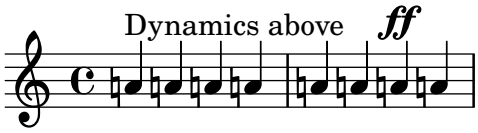
```
\score {
  \relative {
    a'4^"Smaller font" a a a
    a4 a a\ff a
  }
  \layout {
    \context {
      \Staff
      fontSize = #-4
    }
  }
}
```



- A predefined command such as `\dynamicUp` or a music expression like `\accidentalStyle dodecaphonic`

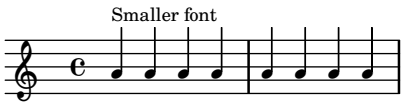
```
\score {
  \relative {
    a'4^"Dynamics above" a a a
    a4 a a\ff a
```

```
  }
  \layout {
    \context {
      \Voice
      \dynamicUp
    }
    \context {
      \Staff
      \accidentalStyle dodecaphonic
    }
  }
}
```



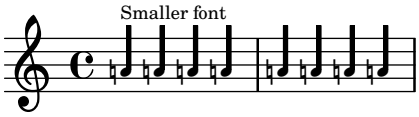
- A user-defined variable containing a `\with` block; for details of the `\with` block see [Changing just one specific context], page 671.

```
StaffDefaults = \with {
  fontSize = #-4
}

\score {
  \new Staff {
    \relative {
      a'4^"Smaller font" a a a
      a4 a a a
    }
  }
  \layout {
    \context {
      \Staff
      \StaffDefaults
    }
  }
}
```



Property-setting commands can be placed in a `\layout` block without being enclosed in a `\context` block. Such settings are equivalent to including the same property-setting commands at the start of every context of the type specified. If no context is specified *every* bottom-level context is affected (see [Bottom-level contexts – voices], page 661). The syntax of a property-setting command in a `\layout` block is the same as the same command written in the music stream.

```
\score {
  \new Staff {
    \relative {
      a'4^"Smaller font" a a a
```

```
      a4 a a a
    }
  }
  \layout {
    \accidentalStyle dodecaphonic
    \set fontSize = #-4
    \override Voice.Stem.thickness = #4.0
  }
}
```

Changing just one specific context

The context properties of just one specific context instance can be changed in a `\with` block. All other context instances of the same type retain the default settings built into LilyPond and modified by any `\layout` block within scope. The `\with` block must be placed immediately after the `\new` *context-type* command:

```
\new Staff \with {
  [context settings for this context instance only]
} {
  ...
}
```

Alternatively, if the music is being entered using the short form of the input mode-specifying commands, e.g. `\chords` rather than `\chordmode`, the `\with` command must be placed immediately after the mode-specifying command:

```
\chords \with {
  [context settings for this (implicit) context instance only]
} {
  ...
}
```

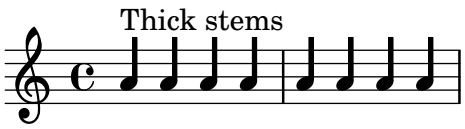
as it is the implicit context created by these short forms which should be modified. The same consideration applies to the other input mode-specifying short forms (`\drums`, `\figures`), see Section 3.1 [Input modes], page 534.

Since context modifications specified in `\with` blocks are inside music, they will affect *all* outputs (typesetting *and* Midi) as opposed to changes within an output definition.

The following types of settings may be specified:

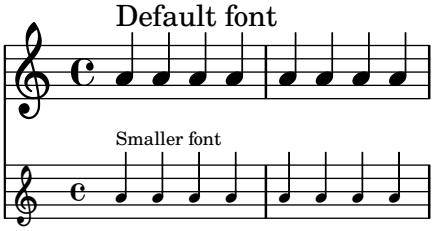
- An `\override` command, but with the context name omitted

```
\score {
  \new Staff {
    \new Voice \with { \override Stem.thickness = #4.0 }
    {
      \relative {
        a'4^"Thick stems" a a a
        a4 a a a
      }
    }
  }
}
```



- Directly setting a context property

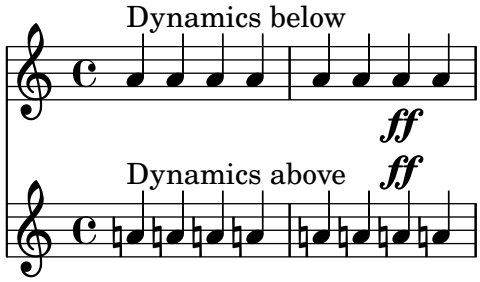
```
\score {
  <<
    \new Staff {
      \relative {
        a'4^"Default font" a a a
        a4 a a a
      }
    }
    \new Staff \with { fontSize = #-4 }
    {
      \relative {
        a'4^"Smaller font" a a a
        a4 a a a
      }
    }
  >>
}
```



- A predefined command such as \dynamicUp

```
\score {
  <<
    \new Staff {
      \new Voice {
        \relative {
          a'4^"Dynamics below" a a a
          a4 a a\ff a
        }
      }
    }
    \new Staff \with { \accidentalStyle dodecaphonic }
    {
      \new Voice \with { \dynamicUp }
      {
        \relative {
          a'4^"Dynamics above" a a a
          a4 a a\ff a
        }
      }
    }
  >>
```

```
}
```



See also

Notation Reference: Section 3.1 [Input modes], page 534.

Order of precedence

The value of a property which applies at a particular time is determined as follows:

- if an `\override` or `\set` command in the input stream is in effect that value is used,
- otherwise the default value taken from a `\with` statement on the context initiation statement is used,
- otherwise the default value taken from the most recent appropriate `\context` block in the `\layout` or `\midi` blocks is used,
- otherwise the LilyPond built-in default is used.

See also

Learning Manual: Section "Modifying context properties" in *Learning Manual*.

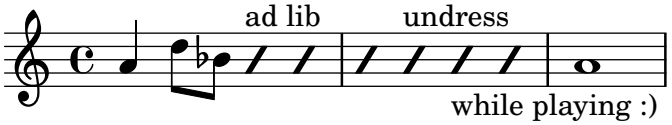
Notation Reference: Section 5.1.1 [Contexts explained], page 659, [Bottom-level contexts – voices], page 661, Section 5.3.2 [The `\set` command], page 681, Section 5.3.3 [The `\override` command], page 683, Section 4.2.1 [The `\layout` block], page 612.

5.1.6 Defining new contexts

Context definition overview

Specific contexts, like `Staff` and `Voice`, are made from simple building blocks. It is possible to create new types of contexts with different combinations of engraver plug-ins.

The next example shows how to build a different type of `Voice` context from scratch. It will be similar to `Voice`, but only prints centered slash note heads. It can be used to indicate improvisation in jazz pieces,



These settings are defined within a `\context` block inside a `\layout` block,

```
\layout {
  \context {
    ...
  }
}
```

In the following discussion, the example input shown should go in place of the ... in the previous fragment.

First it is necessary to define a name for the new context:

```
\name ImproVoice
```

Since it is similar to the `Voice` context, we want commands that work in (existing) `Voice` contexts to continue working. This is achieved by giving the new context an alias of `Voice`,

```
\alias Voice
```

The context will print notes and instructive texts, so we need to add the engravers which provide this functionality, plus the engraver which groups notes, stems and rests which occur at the same musical moment into columns,

```
\consists Note_heads_engraver
\consists Text_engraver
\consists Rhythmic_column_engraver
```

The note heads should all be placed on the center line,

```
\consists Pitch_squash_engraver
squashedPosition = #0
```

The `Pitch_squash_engraver` modifies note heads (created by the `Note_heads_engraver`) and sets their vertical position to the value of `squashedPosition`, in this case `0`, the center line.

The notes look like a slash, and have no stem,

```
\override NoteHead.style = #'slash
\hide Stem
```

All these plug-ins have to communicate under the control of the context. The mechanisms with which contexts communicate are established by declaring the context `\type`. Within a `\layout` block, most contexts will be of type `Engraver_group`. Some special contexts use other context types. Copying and modifying an existing context definition will also fill in the type. Since this example creates a definition from scratch, it needs to be specified explicitly.

```
\type Engraver_group
```

Put together, we get

```
\context {
  \name ImproVoice
  \type Engraver_group
  \consists Note_heads_engraver
  \consists Text_engraver
  \consists Rhythmic_column_engraver
  \consists Pitch_squash_engraver
  squashedPosition = #0
  \override NoteHead.style = #'slash
  \hide Stem
  \alias Voice
}
```

Contexts form hierarchies. We want to place the `ImproVoice` context within the `Staff` context, just like normal `Voice` contexts. Therefore, we modify the `Staff` definition with the `\accepts` command,

```
\context {
  \Staff
  \accepts ImproVoice
}
```

Often when reusing an existing context definition, the resulting context can be used anywhere where the original context would have been useful.

```
\layout {
```

```
  ...
  \inherit-acceptability to from
}
```

will arrange to have contexts of type *to* accepted by all contexts also accepting *from*. For example, using

```
\layout {
  ...
  \inherit-acceptability ImproVoice Voice
}
```

will add an `\accepts` for `ImproVoice` to both `Staff` and `RhythmicStaff` definitions.

The opposite of `\accepts` is `\denies`, which is sometimes needed when reusing existing context definitions.

Arranging the required pieces into a `\layout` block leaves us with

```
\layout {
  \context {
    \name ImproVoice
    ...
  }
  \inherit-acceptability ImproVoice Voice
}
```

Then the output at the start of this subsection can be entered as

```
\relative {
  a'4 d8 bes8
  \new ImproVoice {
    c4^"ad lib" c
    c4 c^"undress"
    c c_"while playing :)"
  }
  a1
}
```

See also

Internals Reference: Section “Contexts” in *Internals Reference*, Section “Engravers and Performers” in *Internals Reference*.

New contexts in MIDI

In MIDI output, the syntax for defining new context types is the same, except that the `\context` block should be placed inside a `\midi` block, and the `\type` should normally be `Performer_group` rather than `Engraver_group`. The term “engraver” refers to a context plug-in that creates visual output. A “performer”, on the other hand, is relevant in MIDI output only. When plug-ins have “translator” in their name rather than “engraver” or “performer”, they are relevant for both graphical and audio output. Thus, when adapting a context definition for the `\midi` block, you need to

- copy it in a `\midi` block,
- change `Engraver_group` to `Performer_group`,
- remove `\consists` for engravers (they are not relevant), and possibly add `\consists` for performers.

Please note that, in order to maintain consistent interpretation between graphical and MIDI output, it is recommended to copy any custom context definition in a `\midi` block. It should

at the minimum include those commands that specify the context hierarchy, such as \accepts, \defaultchild and \inherit-acceptability. Copying aliases is advised as well.

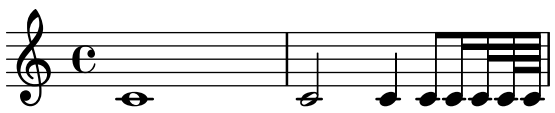
Thus, to complete the example above, the following can be added:

```
\midi {
  \context {
    \name ImproVoice
    \type Performer_group
    \alias Voice
    \consists Note_performer
    \consists Beam_performer
    \consists Dynamic_performer
    \consists Tie_performer
    \consists Slur_performer
  }
  \context {
    \Staff
    \accepts ImproVoice
  }
}
```

This makes the ImproVoice context also work in MIDI output.

Replacing the Score context

In order to write a context MyScore that acts as the topmost context, as the Score context usually does, use \inherit-acceptability MyScore Score. The following example defines a ProportionalScore context where proportional notation is enabled (see Section 4.5.6 [Proportional notation], page 649).

```
\layout {
  \context {
    \Score
    \name ProportionalScore
    \alias Score
    proportionalNotationDuration = \musicLength 4
  }
  \inherit-acceptability ProportionalScore Score
}

\new ProportionalScore { c'1 2 4 8 16 32 64 64 }
```

Since the topmost context needs to contain a number of fundamental engravers, inheriting settings with \Score is easiest in most cases. If you nevertheless define a score-level context from scratch without inheriting the Score definition, the argument to \type should be Score_engraver (or Score_performer in \midi) rather than Engraver_group. Furthermore, giving the topmost context the Score alias is strongly recommended given that a number of engravers need to access the topmost context using its alias.

5.1.7 Context layout order

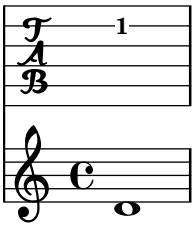
Contexts are normally positioned in a system from top to bottom in the order in which they are encountered in the input file. When contexts are nested, the outer context will include inner

nested contexts as specified in the input file, provided the inner contexts are included in the outer context's "accepts" list. Nested contexts which are not included in the outer context's "accepts" list will be repositioned below the outer context rather than nested within it.

The "accepts" list of a context can be changed with the `\accepts` or `\denies` commands. `\accepts` adds a context to the "accepts" list and `\denies` removes a context from the list.

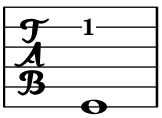
For example, a `TabStaff` by default `\accepts` `TabVoice` contexts and `\denies` `Voice` contexts. If a `Voice` context is written within the `TabStaff`, it would be set on a separate staff.

```
\score {
  \new TabStaff <<
    \new TabVoice { c'1 }
    \new Voice { d'1 }
    >>
}
```



However, by using the `\accepts` command, the `Voice` context can be forced onto the `TabStaff`

```
\score {
  \new TabStaff <<
    \new TabVoice { c'1 }
    \new Voice { d'1 }
    >>
    \layout {
      \context {
        \TabStaff
        \accepts Voice
      }
    }
}
```



`\denies` is mainly used when a new context is being based on another, but the required nesting differs. For example, the `VaticanaStaff` context is based on the `Staff` context, but with the `VaticanaVoice` context substituted for the `Voice` context in the "accepts" list.

Note that a context will be silently created implicitly if a command is encountered when there is no suitable context available to contain it.

Within a context definition, the type of subcontext to be implicitly created is specified using `\defaultchild`. A number of music events require a '`Bottom`' context: when such an event is encountered, subcontexts are created recursively until reaching a context with no '`defaultchild`' setting.

Implicit context creation can at times give rise to unexpected new staves or scores. Using `\new` to create contexts explicitly avoids those problems.

Sometimes a context is required to exist for just a brief period, a good example being the staff context for an ossia. This is usually achieved by introducing the context definition at the appropriate place in parallel with corresponding section of the main music. By default, the temporary context will be placed below all the existing contexts. To reposition it above the context called "main", it should be defined like this:

```
\new Staff \with { alignAboveContext = "main" }
```

A similar situation arises when positioning a temporary lyrics context within a multi-staff layout such as a `ChoirStaff`, for example, when adding a second verse to a repeated section. By default the temporary lyrics context will be placed beneath the lower staves. By defining the temporary lyrics context with `alignBelowContext` it can be positioned correctly beneath the (named) lyrics context containing the first verse.

Examples showing this repositioning of temporary contexts can be found elsewhere – see Section "Nesting music expressions" in *Learning Manual*, Section 1.6.2 [Modifying single staves], page 224, and Section 2.1.2 [Techniques specific to lyrics], page 326.

See also

Learning Manual: Section "Nesting music expressions" in *Learning Manual*.

Notation Reference: Section 1.6.2 [Modifying single staves], page 224, Section 2.1.2 [Techniques specific to lyrics], page 326.

Application Usage: Section "An extra staff appears" in *Application Usage*.

Installed Files: `ly/engraver-init.ly`.

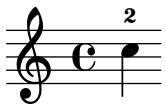
5.2 Explaining the Internals Reference

See also

Notation Reference: Section A.23 [Naming conventions], page 851.

5.2.1 Navigating the program reference

Suppose we want to move the fingering indication in the fragment below:

```
c''-2
```

If you visit the documentation on fingering instructions (in [Fingering instructions], page 254), you will notice:

> **See also**
>
> Internals Reference: Section "Fingering" in *Internals Reference*.

The programmer's reference is available as an HTML document. It is highly recommended that you read it in HTML form, either online or by downloading the HTML documentation. This section will be much more difficult to understand if you are using the PDF manual.

Follow the link to Section "Fingering" in *Internals Reference*. At the top of the page, you will see

> Fingering objects are created by: Section "Fingering_engraver" in *Internals Reference* and Section "New_fingering_engraver" in *Internals Reference*.

By following related links inside the program reference, we can follow the flow of information within the program:

- Section "Fingering" in *Internals Reference*: Section "Fingering" in *Internals Reference* objects are created by: Section "Fingering_engraver" in *Internals Reference*

- Section "Fingering_engraver" in *Internals Reference*: Music types accepted: Section "fingering-event" in *Internals Reference*
- Section "fingering-event" in *Internals Reference*: Music event type `fingering-event` is in Music expressions named Section "FingeringEvent" in *Internals Reference*

This path goes against the flow of information in the program: it starts from the output, and ends at the input event. You could also start at an input event, and read with the flow of information, eventually ending up at the output object(s).

The program reference can also be browsed like a normal document. It contains chapters on `Music definitions` on Section "Translation" in *Internals Reference*, and the Section "Backend" in *Internals Reference*. Every chapter lists all the definitions used and all properties that may be tuned.

5.2.2 Layout interfaces

The HTML page that we found in the previous section describes the layout object called Section "Fingering" in *Internals Reference*. Such an object is a symbol within the score. It has properties that store numbers (like thicknesses and directions), but also pointers to related objects. A layout object is also called a *Grob*, which is short for Graphical Object. For more details about Grobs, see Section "grob-interface" in *Internals Reference*.

The page for `Fingering` lists the definitions for the `Fingering` object. For example, the page says

> `padding` (dimension, in staff space):
>
> `0.5`

which means that the number will be kept at a distance of at least 0.5 of the note head.

Each layout object may have several functions as a notational or typographical element. For example, the Fingering object has the following aspects

- Its size is independent of the horizontal spacing, unlike slurs or beams.
- It is a piece of text. Granted, it is usually a very short text.
- That piece of text is typeset with a font, unlike slurs or beams.
- Horizontally, the center of the symbol should be aligned to the center of the note head.
- Vertically, the symbol is placed next to the note and the staff.
- The vertical position is also coordinated with other superscript and subscript symbols.

Each of these aspects is captured in so-called *interface*s, which are listed on the Section "Fingering" in *Internals Reference* page at the bottom

> This object supports the following interfaces: Section "item-interface" in *Internals Reference*, Section "self-alignment-interface" in *Internals Reference*, Section "side-position-interface" in *Internals Reference*, Section "text-interface" in *Internals Reference*, Section "text-script-interface" in *Internals Reference*, Section "font-interface" in *Internals Reference*, Section "finger-interface" in *Internals Reference*, and Section "grob-interface" in *Internals Reference*.

Clicking any of the links will take you to the page of the respective object interface. Each interface has a number of properties. Some of them are not user-serviceable ('Internal properties'), but others can be modified.

We have been talking of *the* `Fingering` object, but actually it does not amount to much. The initialization file (see Section "Other sources of information" in *Learning Manual*) `scm/define-grobs.scm` shows the soul of the 'object',

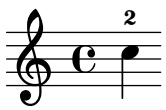
```
(Fingering
  . ((padding . 0.5)
```

```
(avoid-slur . around)
(slur-padding . 0.2)
(staff-padding . 0.5)
(self-alignment-X . 0)
(self-alignment-Y . 0)
(script-priority . 100)
(stencil . ,ly:text-interface::print)
(direction . ,ly:script-interface::calc-direction)
(font-encoding . fetaText)
(font-size . -5)  ; don't overlap when next to heads.
(meta . ((class . Item)
(interfaces . (finger-interface
               font-interface
               text-script-interface
               text-interface
               side-position-interface
               self-alignment-interface
               item-interface))))))
```

As you can see, the `Fingering` object is nothing more than a bunch of variable settings, and the web page in the Internals Reference is directly generated from this definition.

5.2.3 Determining the grob property

Recall that we wanted to change the position of the **2** in

```
c''-2
```

Since the **2** is vertically positioned next to its note, we have to meddle with the interface associated with this positioning. This is done using `side-position-interface`. The page for this interface says

> `side-position-interface`
>
> Position a victim object (this one) next to other objects (the support). The property `direction` signifies where to put the victim object relative to the support (left or right, up or down?)

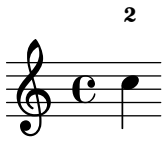
Below this description, the variable `padding` is described as

> `padding` (dimension, in staff space)
>
> Add this much extra space between objects that are next to each other.

By increasing the value of `padding`, we can move the fingering away from the note head. The following command will insert "three staff spaces" worth of distance between the note and a fingering mark:

```
\once \override Voice.Fingering.padding = #3
```

Inserting the padding before the fingering object is created results in the following:

```
\once \override Voice.Fingering.padding = #3
c''-2
```

In this case, the context for this tweak is `Voice`. See Section "Fingering_engraver" in *Internals Reference* plug-in, which says:

> Fingering_engraver is part of contexts: ... Section "Voice" in *Internals Reference*

5.3 Modifying properties

5.3.1 Overview of modifying properties

Each context is responsible for creating certain types of graphical objects. The settings used for printing these objects are also stored by context. By changing these settings, the appearance of objects can be altered.

There are two different kinds of properties stored in contexts: context properties and grob properties. Context properties are properties that apply to the context as a whole and control how the context itself is displayed. In contrast, grob properties apply to specific grob types that will be displayed in the context.

The `\set` and `\unset` commands are used to change values for context properties. The `\override` and `\revert` commands are used to change values for grob properties.

See also

Internals Reference: Section "Backend" in *Internals Reference*, Section "All layout objects" in *Internals Reference*, Section "OverrideProperty" in *Internals Reference*, Section "RevertProperty" in *Internals Reference*, Section "PropertySet" in *Internals Reference*.

5.3.2 The `\set` command

Each context has a set of *properties*, variables contained in that context. Context properties are changed with the `\set` command, which has the following syntax:

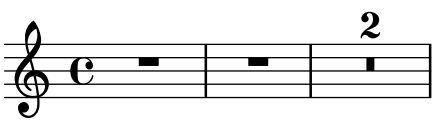
```
\set context.property = #value
```

value is a Scheme object, which is why it must be preceded by the `#` character.

Contexts properties are usually named in `studlyCaps`. They mostly control the translation from music to notation, e.g., `localAlterations` (for determining whether to print accidentals), or `measurePosition` (for determining when to print a bar line). Context properties can change value over time while interpreting a piece of music; `measurePosition` is an obvious example of this. Context properties are modified with `\set`.

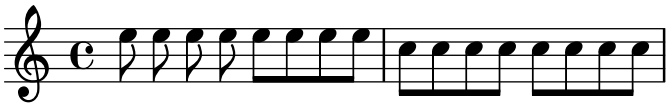
For example, multi-measure rests will be combined into a single bar (as explained in [Compressing empty measures], page 248) if the context property `skipBars` is set to `#t`:

```
R1*2
\set Score.skipBars = ##t
R1*2
```

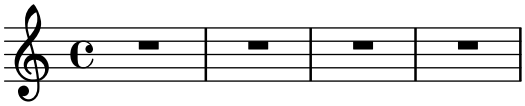


If the *context* argument is left out, then the property will be set in the current bottom context (typically `ChordNames`, `Voice`, `TabVoice`, or `Lyrics`).

```
\set Score.autoBeaming = ##f
\relative {
  e''8 e e e
  \set autoBeaming = ##t
  e8 e e e
```

```
} \\
\relative {
  c''8 c c c c8 c c c
}
```

The change is applied 'on-the-fly', during the music, so that the setting only affects the second group of eighth notes.

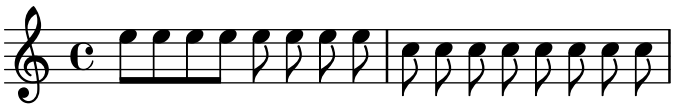
Note that the bottommost context does not always contain the property that you wish to change – for example, attempting to set the `skipBars` property of the default bottom context, in this case `Voice`, will have no effect, because skipBars is a property of the `Score` context.

```
R1*2
\set skipBars = ##t
R1*2
```

Contexts are hierarchical, so if an enclosing context was specified, for example `Staff`, then the change would also apply to all `Voice`s in the current staff.

The `\unset` command:

```
\unset context.property
```

is used to remove the definition of *property* from *context*. This command removes the definition only if it is set in *context*. Properties that have been set in enclosing contexts will not be altered by an unset in an enclosed context:

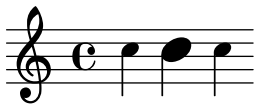
```
\set Score.autoBeaming = ##t
\relative {
  \unset autoBeaming
  e''8 e e e
  \unset Score.autoBeaming
  e8 e e e
} \\
\relative {
  c''8 c c c c8 c c c
}
```

Like `\set`, the *context* argument does not have to be specified for a bottom context, so the two statements

```
\set Voice.autoBeaming = ##t
\set autoBeaming = ##t
```

are equivalent if the current bottom context is `Voice`.

Preceding a `\set` or `\unset` command by `\once` makes the setting apply to only a single time step:

```
c''4
```

```
\once \set fontSize = #4.7
c''4
c''4
```

A full description of all available context properties is in the internals reference, see Translation ↦ Tunable context properties.

See also

Internals Reference: Section "Tunable context properties" in *Internals Reference*.

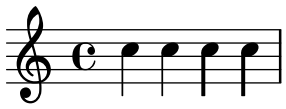
5.3.3 The `\override` command

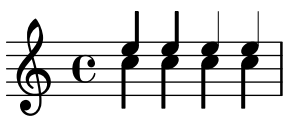
There is a special type of context property: the grob description. Grob descriptions are named in `StudlyCaps` (starting with capital letters). They contain the 'default settings' for a particular kind of grob as an association list. See `scm/define-grobs.scm` to see the settings for each grob description. Grob descriptions are modified with `\override`.

The syntax for the `\override` command is

```
\override [context.]GrobName.property = #value
```

For example, we can increase the thickness of a note stem by overriding the `thickness` property of the `Stem` object:

```
c''4 c''
\override Voice.Stem.thickness = #3.0
c''4 c''
```

If no context is specified in an `\override`, the bottom context is used:

```
\override Staff.Stem.thickness = #3.0
<<
  \relative {
    e''4 e
    \override Stem.thickness = #0.5
    e4 e
  } \\
  \relative {
    c''4 c c c
  }
>>
```

Some tweakable options are called 'subproperties' and reside inside properties. To tweak those, use commands in the form

```
\override Stem.details.beamed-lengths = #'(4 4 3)
```

or to modify the ends of spanners, use a form like these

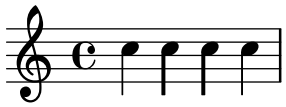
```
\override TextSpanner.bound-details.left.text = "left text"
\override TextSpanner.bound-details.right.text = "right text"
```

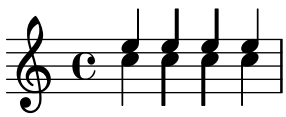
The effects of \override can be undone by \revert.

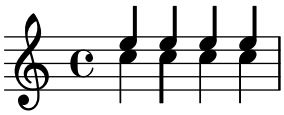
The syntax for the \revert command is

```
\revert [context.]GrobName.property
```

For example,

```
\relative {
  c''4
  \override Voice.Stem.thickness = #3.0
  c4 c
  \revert Voice.Stem.thickness
  c4
}
```

The effects of \override and \revert apply to all grobs in the affected context from the current time forward:

```
<<
  \relative {
    e''4
    \override Staff.Stem.thickness = #3.0
    e4 e e
  } \\
  \relative {
    c''4 c c
    \revert Staff.Stem.thickness
    c4
  }
>>
```

\once can be used with \override or \revert to affect only the current time step:

```
<<
  \relative c {
    \override Stem.thickness = #3.0
    e''4 e e e
  } \\
  \relative {
    c''4
    \once \override Stem.thickness = #3.0
    c4 c c
  }
>>
```

See also

Internals Reference: Section “Backend” in *Internals Reference*.

5.3.4 The \tweak command

Changing grob properties with \override causes the changes to apply to all of the given grobs in the context at the moment the change applies. Sometimes, however, it is desirable to have changes apply to just one grob, rather than to all grobs in the affected context. This is accomplished with the \tweak command, which has the following syntax:

```
\tweak [layout-object.]grob-property value
```

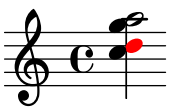
Specifying *layout-object* is optional. The \tweak command applies to the music object that immediately follows *value* in the music stream.

For an introduction to the syntax and uses of the tweak command see Section “Tweaking methods” in *Learning Manual*.

When several similar items are placed at the same musical moment, the \override command cannot be used to modify just one of them – this is where the \tweak command must be used. Items which may appear more than once at the same musical moment include the following:

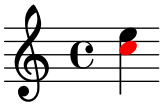
- note heads of notes inside a chord
- articulation signs on a single note
- ties between notes in a chord
- tuplet brackets starting at the same time

In this example, the color of one note head and the type of another note head are modified within a single chord:

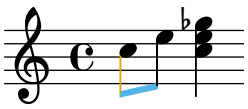
```
< c''
  \tweak color #red
  d''
  g''
  \tweak duration-log #1
  a''
> 4
```

\tweak can be used to modify slurs:

```
\relative { c'-\tweak thickness #5 ( d e f) }
```

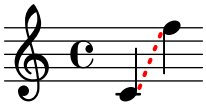
For the \tweak command to work, it must remain immediately adjacent to the object to which it is to apply after the input file has been converted to a music stream. Tweaking a whole chord tweaks all the contained notes:

```
{ <\tweak color #red c'' e''>4 }
```

The simple \tweak command cannot be used to modify any object that is not directly created from the input. In particular it will not affect stems, automatic beams or accidentals, since these are generated later by NoteHead layout objects rather than by music elements in the input stream.

Such indirectly created layout objects can be tweaked using the form of the \tweak command in which the grob name is specified explicitly:

```
\tweak Stem.color #(universal-color 'orange)
\tweak Beam.color #(universal-color 'skyblue) c''8 e''
<c'' e'' \tweak Accidental.font-size #-3 ges''>4
```

\tweak cannot be used to modify clefs or time signatures, since these become separated from any preceding \tweak command in the input stream by the automatic insertion of extra elements required to specify the context.

Several \tweak commands may be placed before a notational element – all affect it:

```
c'
  -\tweak style #'dashed-line
  -\tweak dash-fraction #0.2
  -\tweak thickness #3
  -\tweak color #red
  \glissando
f''
```

The music stream which is generated from a section of an input file, including any automatically inserted elements, may be examined, see Section “Displaying music expressions” in *Extending*. This may be helpful in determining what may be modified by a \tweak command, or in determining how to adjust the input to make a \tweak apply.

See also

Learning Manual: Section “Tweaking methods” in *Learning Manual*.

Extending LilyPond: Section “Displaying music expressions” in *Extending*.

Known issues and warnings

The \tweak command cannot be used to modify the control points of just one of several ties in a chord, other than the first one encountered in the input file.

5.3.5 \set vs. \override

The \set and \override commands manipulate properties associated with contexts. In both cases, the properties follow a *hierarchy of contexts*; properties that are not set themselves in a context will still show the values of their respective parent’s context.

The lifetime and value of a context property is dynamic and only available when music is being interpreted (i.e., 'iterated'). At the time of the context's creation, properties are initialized from its corresponding definitions (along with any other modifications) of that context. Any subsequent changes are achieved with any 'property-setting' commands that are within the music itself.

Graphical Object (or "grob") definitions are a *special* category of context properties as their structure and use is different from that of normal context properties. Unlike normal context properties, grob definitions are subdivided into *grob properties*.

Also, in contrast to normal context properties, grob definitions have their own internal 'bookkeeping' used to keep track of their own individual grob properties and any subproperties. This means that it is possible to define those parts within different contexts and yet still have the overall grob definition at the time of grob creation from all the pieces provided amongst the current context and its parent(s).

A grob is usually created by an engraver at the time of interpreting a music expression and receives its initial properties from the current grob definition of the engraver's context. The engraver (or other 'backend' parts of LilyPond) can then change (or add to) the grob's initial properties. However, this does not affect the context's own grob definition.

What LilyPond calls *grob properties* in the context of 'user-level' tweaks are really the properties of a *context's* own grob definition.

Grob definitions are accessed with a different set of commands and are manipulated using `\override` and `\revert` and have a name starting with a capital letter (e.g., '`NoteHead`'); whereas normal context properties are manipulated using `\set` and `\unset` and are named starting with a lowercase letter.

The commands `\tweak` and `\overrideProperty` change grob properties by bypassing all context properties completely and, instead, catch grobs as they are being created, setting properties on them for a music event (`\tweak`) or, in the case of `\overrideProperty` for a specific override.

5.3.6 The `\offset` command

While it is possible to set grob properties to new values with the `\override`, `\tweak`, and `\overrideProperty` commands, it is often more convenient to modify such properties relative to a default value. The `\offset` command is available for this purpose.

The syntax for `\offset` is

```
[-]\offset property offsets item
```

The command works by adding the contents of *offsets* to the default setting of the property *property* of the grob indicated by *item*.

Depending on the formulation of the command, `\offset` may act as either a `\tweak` or `\override`. The variations in usage are discussed after consideration is given to grob properties that may be used with `\offset`.

Properties which may be offset

Many, but not all, grob properties may be offset. If *property* cannot be offset, the object will remain unchanged and a warning will be issued. In such cases, `\override` or `\tweak` should be used to modify the object instead.

One can work by trial and error and let the warnings be the guide to what may or may not be offset. A more systematic approach is possible, however.

The following criteria determine whether a property can be modified with `\offset`:

- The property has a 'default setting' in the grob's description. Such properties are listed for each grob in Section "All layout objects" in *Internals Reference*. (They are also found in `scm/define-grobs.scm`.)

- The property takes a numerical value. Numerical values include `number`, list of `numbers`, `number-pair`, and `number-pair-list`. The pages at Section "All layout objects" in *Internals Reference* list the type of data characteristic to each property. It is immaterial whether the default setting is a function.
- The property cannot be a 'subproperty' – a property residing within another property.
- Properties set to infinite values cannot be offset. There is no sensible way to offset positive and negative infinity.

The following examples consider several grob properties against the criteria outlined above.

- Properties that may be offset

  `Hairpin.height`
  : This property is not a subproperty, and it is listed at Section "Hairpin" in *Internals Reference*. For a value, it takes 'dimension, in staff space' set to `0.6666` – clearly a non-infinite `number`.

  `Arpeggio.positions`
  : The page Section "Arpeggio" in *Internals Reference* lists a `positions` property which accepts a 'pair of numbers'. It defaults to `ly:arpeggio::positions` – a callback which will be evaluated during the typesetting phase to yield a pair of numbers for any given `Arpeggio` object.

- Properties that may not be offset

  `Hairpin.color`
  : There is no listing for `color` at Section "Hairpin" in *Internals Reference*.

  `Hairpin.circled-tip`
  : The listing for `Hairpin.circled-tip` at Section "Hairpin" in *Internals Reference* shows that it takes a `boolean` value. Booleans are non-numerical.

  `Stem.details.lengths`
  : Though listed at Section "Stem" in *Internals Reference* and defaulting to a list of `numbers`, this is a 'subproperty'. There is currently no support for 'nested properties'.

`\offset` *as an override*

If *item* is a grob name like `Arpeggio` or `Staff.OttavaBracket`, the result is an `\override` of the specified grob type.

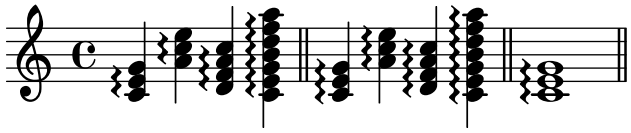
`\offset` *property offsets* `[`*context*`.]`*GrobName*

Note that the leading hyphen is *never* used with the 'override' form, just as it is never used with the `\override` command itself.

The following example uses the 'override' form to lengthen the default arpeggios shown in the first measure to cover the extent of the chords more fully. The arpeggios are stretched by a half staff space to top and bottom. Also shown is the same operation done on the first chord with an ordinary override of the `positions` property. This method is not at all expressive of the task of 'stretching by a half staff space', as the endpoints must be specified with absolute rather than relative coordinates. Furthermore, individual overrides would be needed for the other chords, as they vary in size and position.

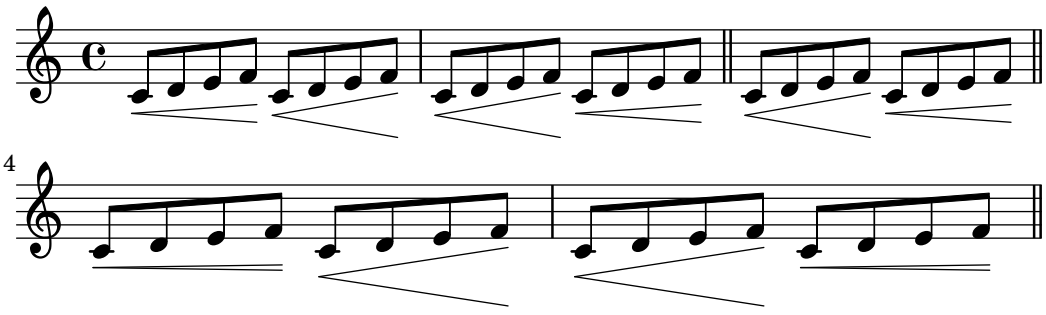
```
arpeggioMusic = {
  <c' e' g'>\arpeggio <a' c'' e''>\arpeggio
  <d' f' a' c''>\arpeggio <c' e' g' b' d'' f'' a''>\arpeggio
}
```

```
{
  \arpeggioMusic
  \bar "||"
  \offset positions #'(-0.5 . 0.5) Arpeggio
  \arpeggioMusic
  \bar "||"
  \once \override Arpeggio.positions = #'(-3.5 . -0.5)
  <c' e' g'>1\arpeggio
  \bar "||"
}
```



In its 'override' usage, \offset may be prefaced with \once or \temporary and reverted using \revert with *property* (see Section "Intermediate substitution functions" in *Extending*). This follows from the fact that \offset actually creates an \override of *property*.

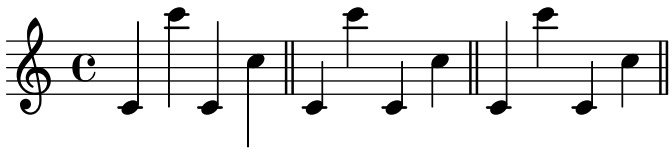
```
music = { c'8\< d' e' f'\! }

{
  \music
  \offset height 1 Hairpin
  \music
  \music
  \revert Hairpin.height
  \music
  \bar "||"
  \once \offset height 1 Hairpin
  \music \music
  \bar "||"
  \override Hairpin.height = 0.2
  \music
  \temporary \offset height 2 Hairpin
  \music
  \music
  \revert Hairpin.height
  \music
  \bar "||"
}
```



Also like \override, the 'override' form of \offset may be used with \undo and \single.

```
longStem = \offset length 6 Stem
```

```
{
 \longStem c'4 c''' c' c''
 \bar "||"
 \undo \longStem c'4 c''' c' c''
 \bar "||"
 \single \longStem c'4 c''' c' c''
 \bar "||"
}
```



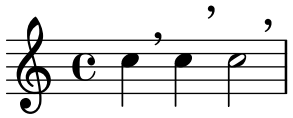
\offset *as a tweak*

If *item* is a music expression such as (or \arpeggio, the result is the same music expression with a tweak applied.

[-]\offset [*GrobName*.]*property offsets music-expression*

The syntax of \offset in its 'tweak' form is analogous to the \tweak command itself, both in ordering and in the presence or absence of the leading hyphen.

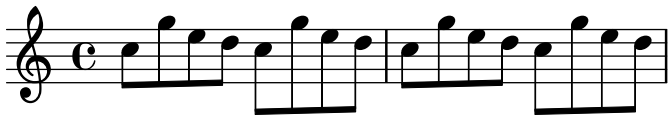
The following example uses the 'tweak' form to adjust the vertical position of the BreathingSign object. Compare this with the ordinary \tweak command also demonstrated. The syntax is equivalent; however, the output of \tweak is less intuitive, since BreathingSign.Y-offset is calculated from the middle staff line. It is not necessary to know how Y-offset is calculated when using \offset.

```
{
  c''4
  \breathe
  c''4
  \offset Y-offset 2 \breathe
  c''2
  \tweak Y-offset 3 \breathe
}
```

In the previous example, the tweaked objects were created directly from the user input: the \breathe command was an explicit instruction to return a BreathingSign object. Since the focus of the command was unambiguous, there was no need to specify the object's name. When an object is *indirectly* created, however, it is necessary to include the grob's name. This is the same as for the \tweak command.

In the following example, the Beam object is lowered two staff spaces by applying \offset to the positions property.

The first application of \offset requires that the grob's name be included, because nothing in the input explicitly creates the beam. In the second application, the beam is created manually with the music expression [; therefore, the grob's name is not needed. (Also illustrated is a shorthand: a single number will be applied to both members of a number-pair.)

```
{
```

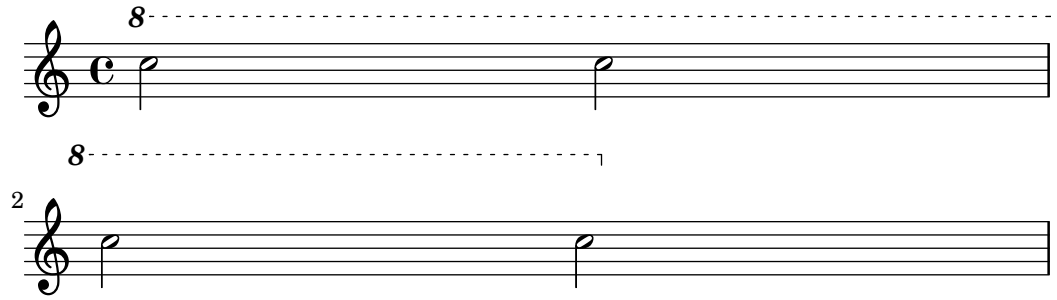
```
  c''8 g'' e'' d''
  \offset Beam.positions #'(-2 . -2)
  c''8 g'' e'' d''
  c''8 g'' e'' d''
  c''8-\offset positions #-2 [ g'' e'' d'']
}
```

\offset *with broken spanners*

Independently modifying segments of a spanner extending over a line break or breaks is also possible. In this case, *offsets* takes a list of values of the property's required data type.

The `\offset` command used in this manner is similar to the `\alterBroken` command. (See [Modifying broken spanners], page 697.) In contrast with `\alterBroken`, however, the values given to `\offset` are relative, not absolute.

The following example displaces the 'broken' `OttavaBracket` object through its `staff-padding` property. Since the property takes a `number`, *offsets* is provided with a list of `numbers` to account for the two segments created by the line break. The bracket piece on the first line is effectively untouched since `0` is added to its default value of `staff-padding`. The segment on the second line is raised three staff spaces from its default height. The default height happens to be 2, though it is not necessary to know this to achieve the desired positioning.

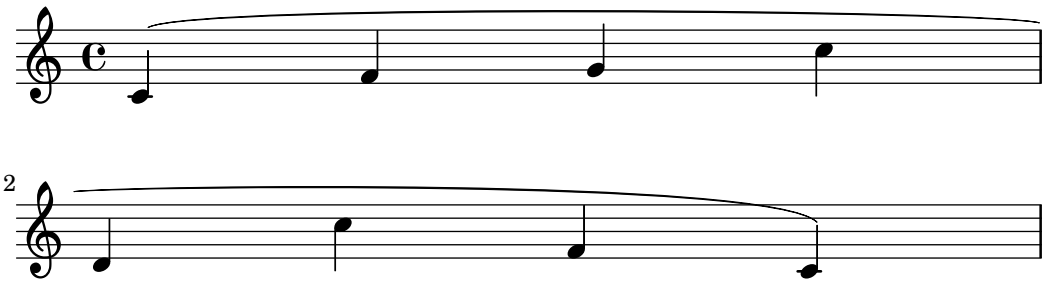
```
{
  \offset staff-padding #'(0 3) Staff.OttavaBracket
  \ottava #1
  c'''2 c'''
  \break
  c'''2 c'''
}
```



The following example mimics the effect of the `\shape` command by offsetting the `control-points` property of the `Slur` object. Here, *offsets* is a list of `number-pair-lists`, one for each slur segment. This example achieves a result identical to the corresponding illustration at Section 5.4.11 [Modifying shapes], page 717.

```
{
  c'4-\offset control-points #'(
              ((0 . 0) (0 . 0) (0 . 0) (0 . 1))
              ((0.5 . 1.5) (1 . 0) (0 . 0) (0 . -1.5))
             ) ( f'4 g' c''
  \break
```

```
  d'4 c'' f' c')
}
```



5.3.7 Modifying alists

Some user-configurable properties are internally represented as *alists* (association lists), which store pairs of *keys* and *values*. The structure of an alist is:

```
'((key1 . value1)
  (key2 . value2)
  (key3 . value3)
  ...)
```

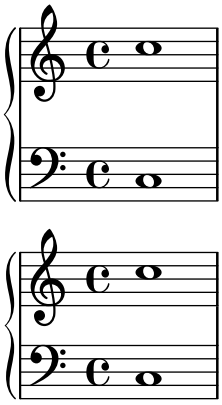
If an alist is a grob property or \paper variable, its keys can be modified individually without affecting other keys.

For example, to reduce the space between adjacent staves in a staff group, use the staff-staff-spacing property of the StaffGrouper grob. The property is an alist with four keys: basic-distance, minimum-distance, padding, and stretchability. The standard settings for this property are listed in the "Backend" section of the Internals Reference (see Section "StaffGrouper" in *Internals Reference*):

```
'((basic-distance . 9)
  (minimum-distance . 7)
  (padding . 1)
  (stretchability . 5))
```

One way to bring the staves closer together is by reducing the value of the basic-distance key (9) to match the value of minimum-distance (7). To modify a single key individually, use a *nested declaration*:

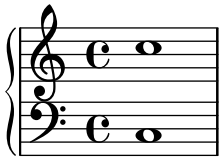
```
% default space between staves
\new PianoStaff <<
  \new Staff { \clef treble c''1 }
  \new Staff { \clef bass   c1   }
>>

% reduced space between staves
\new PianoStaff \with {
  % this is the nested declaration
  \override StaffGrouper.staff-staff-spacing.basic-distance = #7
} <<
  \new Staff { \clef treble c''1 }
  \new Staff { \clef bass   c1   }
>>
```



Using a nested declaration will update the specified key (such as `basic-distance` in the above example) without altering any other keys already set for the same property.

Now suppose we want the staves to be as close as possible without overlapping. The simplest way to do this is to set all four alist keys to zero. However, it is not necessary to enter four nested declarations, one for each key. Instead, the property can be completely redefined with one declaration, as an alist:

```
\new PianoStaff \with {
  \override StaffGrouper.staff-staff-spacing =
    #'((basic-distance . 0)
       (minimum-distance . 0)
       (padding . 0)
       (stretchability . 0))
} <<
  \new Staff { \clef treble c''1 }
  \new Staff { \clef bass   c1   }
>>
```



Note that any keys not explicitly listed in the alist definition will be reset to their *default-when-unset* values. In the case of `staff-staff-spacing`, any unset key values would be reset to zero (except `stretchability`, which takes the value of `basic-distance` when unset). Thus the following two declarations are equivalent:

```
\override StaffGrouper.staff-staff-spacing =
  #'((basic-distance . 7))

\override StaffGrouper.staff-staff-spacing =
  #'((basic-distance . 7)
     (minimum-distance . 0)
     (padding . 0)
     (stretchability . 7))
```

One (possibly unintended) consequence of this is the removal of any standard settings that are set in an initialization file and loaded each time an input file is compiled. In the above example, the standard settings for `padding` and `minimum-distance` (defined in `scm/define-grobs.scm`) are reset to their default-when-unset values (zero for both keys). Defining a property or variable as an alist (of any size) will always reset all unset key values to their default-when-unset values.

Unless this is the intended result, it is safer to update key values individually with a nested declaration.

> **Note:** Nested declarations will not work for context property alists (such as `beamExceptions`, `keyAlterations`, `timeSignatureSettings`, etc.). These properties can only be modified by completely redefining them as alists.

5.4 Useful concepts and properties

This section discusses various common layout issues and the tweaking methods related to them.

See also

Learning Manual: Section "Tweaking output" in *Learning Manual*, Section "Other sources of information" in *Learning Manual*.

Notation Reference: Section 5.2 [Explaining the Internals Reference], page 678, Section 5.3 [Modifying properties], page 681.

Extending LilyPond: Section "Interfaces for programmers" in *Extending*.

Installed Files: `scm/define-grobs.scm`.

Snippets: Section "Tweaks and overrides" in *Snippets*.

Internals Reference: Section "All layout objects" in *Internals Reference*.

5.4.1 Direction and placement

In typesetting music the direction and placement of many items is a matter of choice. For example, the stems of notes can be directed up or down; lyrics, dynamics, and other expressive marks may be placed above or below the staff; text may be aligned left, right or center; etc. Most of these choices may be left to be determined automatically by LilyPond, but in some cases it may be desirable to force a particular direction or placement.

Articulation direction indicators

By default some directions are always up or always down (e.g., dynamics or fermata), while other things can alternate between up or down based on the stem direction (like slurs or accents).

The default action may be overridden by prefixing the articulation by a *direction indicator*. Three direction indicators are available: `^` (meaning "up"), `_` (meaning "down") and `-` (meaning "use default direction"). The direction indicator can usually be omitted, in which case `-` is assumed, but a direction indicator is **always** required before

- `\tweak` commands
- `\markup` commands
- `\tag` commands
- string markups, e.g., `-"string"`
- fingering instructions, e.g., `-1`
- articulation shortcuts, e.g., `-.`, `->`, `--`

Direction indicators affect only the next note:

```
\relative {
  c''2( c)
  c2_( c)
  c2( c)
```

```
  c2^( c)
}
```

The direction property

The position or direction of many layout objects is controlled by the `direction` property.

The value of the `direction` property may be set to `1`, meaning "up" or "above", or to `-1`, meaning "down" or "below". The symbols `UP` and `DOWN` may be used instead of `1` and `-1` respectively. The default direction may be specified by setting `direction` to `0` or `CENTER`. Alternatively, in many cases predefined commands exist to specify the direction. These are of the form

```
\xxxUp, \xxxDown or \xxxNeutral
```

where `\xxxNeutral` means "use the default" direction. See Section "Within-staff objects" in *Learning Manual*.

In a few cases, arpeggio for example, the value of the `direction` property can specify whether the object is to be placed to the right or left of the parent. In this case `-1` or `LEFT` means "to the left" and `1` or `RIGHT` means "to the right". `0` or `CENTER` means "use the default" direction.

These indications affect all notes until they are canceled.

```
\relative {
  c''2( c)
  \slurDown
  c2( c)
  c2( c)
  \slurNeutral
  c2( c)
}
```

In polyphonic music, it is generally better to specify an explicit `voice` than change an object's direction. For more information, see Section 1.5.2 [Multiple voices], page 197.

See also

Learning Manual: Section "Within-staff objects" in *Learning Manual*.

Notation Reference: Section 1.5.2 [Multiple voices], page 197.

5.4.2 Distances and measurements

Distances in LilyPond are of two types: absolute and scaled.

Absolute distances are used for specifying margins, indents, and other page layout details, and are by default specified in millimeters. In general, distance units may be specified by appending `\mm` (millimeter), `\cm` (centimeter), `\in` (inches), `\pt` (points), or `\bp` (big points).

	mm	**cm**	**in**	**pt**	**bp**
mm	1	0.1	0.0394	2.8453	2.8346
cm	10	1	0.3937	28.4528	28.3465
in	25.4	2.54	1	72.27	72

pt	0.3515	0.0351	0.0138	1	0.996
bp	0.3538	0.0354	0.0139	1.0038	1

Page layout distances can also be specified in scalable units (see the following paragraph) by appending `\staff-space` to the quantity. See Section 4.1 [Page layout], page 601, for a detailed description of LilyPond's page layout.

Scaled distances are always specified in units of the staff space or, rarely, the half staff space. The staff space is the distance between two adjacent staff lines. The default value can be changed globally by setting the global staff size, or it can be overridden locally by changing the `staff-space` property of `StaffSymbol`. Scaled distances automatically scale with any change to the either the global staff size or the `staff-space` property of `StaffSymbol`, but fonts scale automatically only with changes to the global staff size. The global staff size thus enables the overall size of a rendered score to be easily varied. For the methods of setting the global staff size see Section 4.2.2 [Setting the staff size], page 614.

If just a section of a score needs to be rendered to a different scale, for example an ossia section or a footnote, the global staff size cannot simply be changed as this would affect the entire score. In such cases the change in size is made by overriding both the `staff-space` property of `StaffSymbol` and the size of the fonts. A Scheme function, `magstep`, is available to convert from a font size change to the equivalent change in `staff-space`. For an explanation and an example of its use, see Section "Length and thickness of objects" in *Learning Manual*.

See also

Learning Manual: Section "Length and thickness of objects" in *Learning Manual*.

Notation Reference: Section 4.1 [Page layout], page 601, Section 4.2.2 [Setting the staff size], page 614.

5.4.3 Dimensions

The dimensions of a graphical object specify the positions of the left and right edges and the bottom and top edges of the objects' bounding box as distances from the objects' reference point in units of staff spaces. These positions are usually coded as two Scheme pairs. For example, the text markup command `\with-dimensions` takes three arguments, the first two of which are a Scheme pair giving the left and right edge positions and a Scheme pair giving the bottom and top edge positions:

```
\with-dimensions #'(-5 . 10) #'(-3 . 15) arg
```

This specifies a bounding box for *arg* with its left edge at -5, its right edge at 10, its bottom edge at -3 and its top edge at 15, all measured from the objects' reference point in units of staff spaces.

See also

Notation Reference: Section A.12.8 [Other markup commands], page 811, (documentation for commands similar to `\with-dimensions`, such as `\with-dimension` or `\with-dimension-from`), Section 5.4.2 [Distances and measurements], page 695.

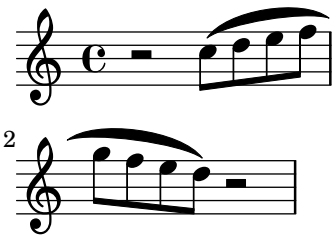
5.4.4 Spanners

Many objects of musical notation extend over several notes or even several bars. Examples are slurs, beams, tuplet brackets, volta repeat brackets, crescendi, trills, and glissandi. Such objects are collectively called "spanners", and have special properties to control their appearance and behavior, as well as special tweaking methods related to the fact that they can be broken across systems.

Modifying broken spanners

When a spanner crosses a line break or breaks, each piece inherits the attributes of the original spanner. Thus, ordinary tweaking of a broken spanner applies the same modifications to each of its segments. In the example below, overriding `thickness` affects the slur on either side of the line break.

```
\relative c'' {
  r2
  \once\override Slur.thickness = 10
  c8( d e f
  \break
  g8 f e d) r2
}
```



Independently modifying the appearance of individual pieces of a broken spanner is possible with the `\alterBroken` command. This command can produce either an `\override` or a `\tweak` of a spanner property.

The syntax for `\alterBroken` is

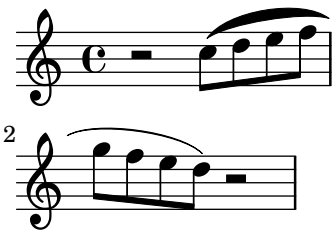
```
[-]\alterBroken property values target
```

The argument *values* is a list of values, one for each broken piece. If *target* is a grob name like `Slur` or `Staff.PianoPedalBracket`, the result is an `\override` of the specified grob type. If *target* is a music expression such as '`(`' or '`[`' the result is the same music expression with an appropriate tweak applied.

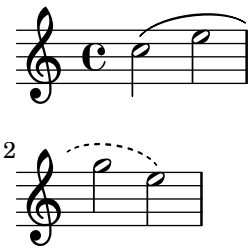
The leading hyphen must be used with the `\tweak` form. Do not add it when `\alterBroken` is used as an `\override`.

In its `\override` usage, `\alterBroken` may be prefaced by `\once` or `\temporary` and reverted by using `\revert` with *property* (see Section "Intermediate substitution functions" in *Extending*).

The following code applies an independent `\override` to each of the slur segments in the previous example:

```
\relative c'' {
  r2
  \alterBroken thickness #'(10 1) Slur
  c8( d e f
  \break
  g8 f e d) r2
}
```

The \alterBroken command may be used with any spanner object, including Tie, PhrasingSlur, Beam and TextSpanner. For example, an editor preparing a scholarly edition may wish to indicate the absence of part of a phrasing slur in a source by dashing only the segment which has been added. The following example illustrates how this can be done, in this case using the \tweak form of the command:

```
% The empty list is conveniently used below, because it is the
% default setting of dash-definition, resulting in a solid curve.
\relative {
  c''2-\alterBroken dash-definition #'(() ((0 1.0 0.4 0.75))) \(e
  \break
  g2 e\)
}
```



It is important to understand that \alterBroken sets each piece of a broken spanner to the corresponding value in *values*. When there are fewer values than pieces, any additional piece will be assigned the empty list. This may lead to undesired results if the layout property is not set to the empty list by default. In such cases, each segment should be assigned an appropriate value.

Known issues and warnings

Line breaks may occur in different places following changes in layout. Settings chosen for \alterBroken may be unsuitable for a spanner that is no longer broken or is split into more segments than before. Explicit use of \break can guard against this situation.

The \alterBroken command is ineffective for spanner properties accessed before line breaking such as direction.

See also

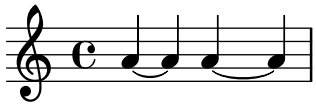
Extending LilyPond: Section “Difficult tweaks” in *Extending*.

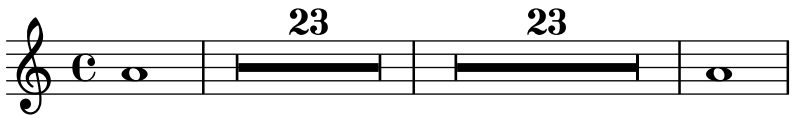
Setting minimum lengths for spanners

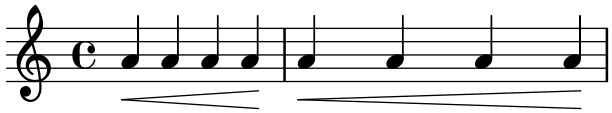
The spanner-interface interface provides three properties that apply to several spanners.

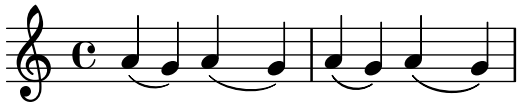
The minimum-length *property*

The minimum length of the spanner is specified by the minimum-length property. Increasing this usually has the necessary effect of increasing the spacing of the notes between the two end points. However, this override has no effect on many spanners, as their length is determined by other considerations. A few examples where it is effective are shown below.

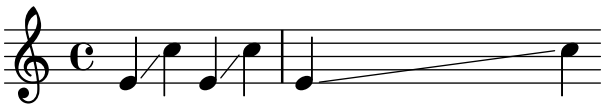
```
a'~ a'
a'
% increase the length of the tie
-\tweak minimum-length #5
~ a'
```

```
\relative \compressMMRests {
  a'1
  R1*23
  % increase the length of the rest bar
  \once \override MultiMeasureRest.minimum-length = #20
  R1*23
  a1
}
```

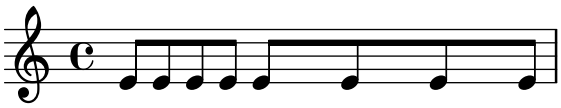



```
\relative {
  a' \< a a a \!
  % increase the length of the hairpin
  \override Hairpin.minimum-length = #20
  a \< a a a \!
}
```

This override can also be used to increase the length of slurs and phrasing slurs:

```
\relative {
  a'( g)
  a
  -\tweak minimum-length #5
  ( g)

  a\( g\)
  a
  -\tweak minimum-length #5
  \( g\)
}
```

For some layout objects, the `minimum-length` property becomes effective only if the `set-spacing-rods` procedure is called explicitly. To do this, the `springs-and-rods` property should be set to `ly:spanner::set-spacing-rods`. For example, the minimum length of a glissando has no effect unless the `springs-and-rods` property is set:

```
% default
e' \glissando c''

% not effective alone
\once \override Glissando.minimum-length = #20
```

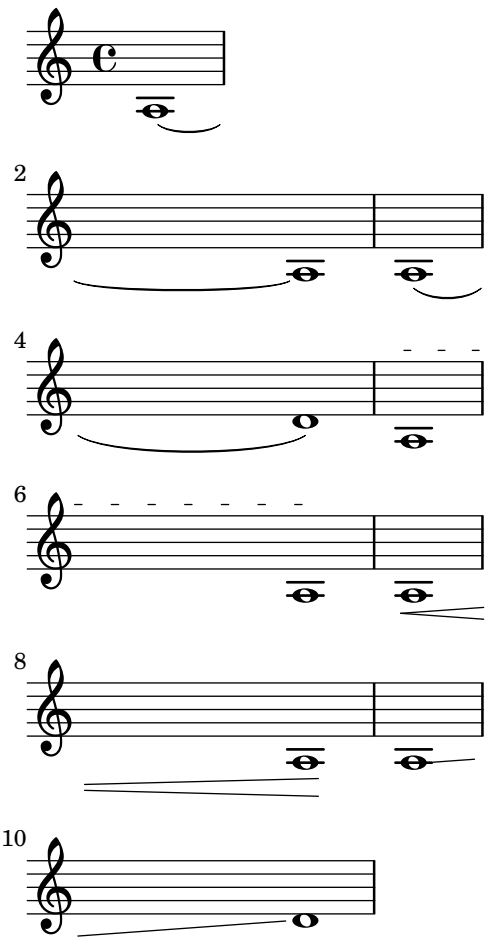
```
e' \glissando c''

% effective only when both overrides are present
\once \override Glissando.minimum-length = #20
\once \override Glissando.springs-and-rods =
                  #ly:spanner::set-spacing-rods
e' \glissando c''
```

The same is true of the Beam object:

```
% not effective alone
\once \override Beam.minimum-length = #20
e'8 e' e' e'

% effective only when both overrides are present
\once \override Beam.minimum-length = #20
\once \override Beam.springs-and-rods =
                  #ly:spanner::set-spacing-rods
e'8 e' e' e'
```

The minimum-length-after-break *property*

The property minimum-length-after-break can be used to stretch broken spanners starting after a line break. As for the minimum-length property, it is often needed to set the springs-and-rods property to ly:spanner::set-spacing-rods.

```
{
  \once \override Tie.minimum-length-after-break = 20
  a1~
  \break
  a1

  \once \override Slur.minimum-length-after-break = 20
  a1(
  \break
  d'1)

  \once \override TextSpanner.springs-and-rods =
    #ly:spanner::set-spacing-rods
  \once \override TextSpanner.minimum-length-after-break = 20
  a1\startTextSpan
  \break
  a1\stopTextSpan

  \once \override Hairpin.after-line-breaking = ##t
  \once \override Hairpin.to-barline = ##f
  \once \override Hairpin.minimum-length-after-break = 20
```

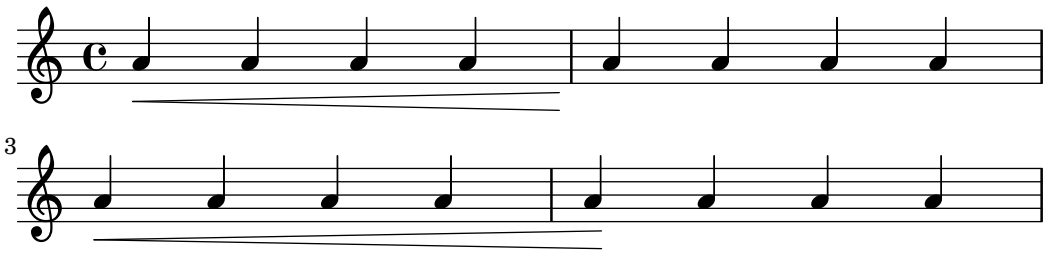
```
  a1\<
  \break
  a1\!

  \once \override Glissando.springs-and-rods =
    #ly:spanner::set-spacing-rods
  \once \override Glissando.breakable = ##t
  \once \override Glissando.after-line-breaking = ##t
  \once \override Glissando.minimum-length-after-break = 20
  a1\glissando
  \break
  d'1
}
```



Controlling spanner end points

The `to-barline` property of the `spanner-interface`, usually defaulting to true, causes hairpins and other spanners that are terminated on the first note of a measure to end instead on the immediately preceding bar line. If set to false, the spanner extends beyond the bar line and end on the note itself:

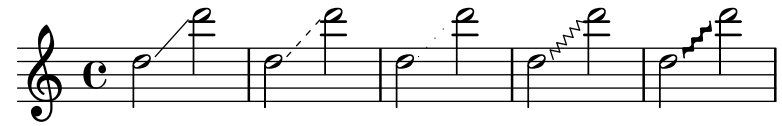
```
\relative {
  a' \< a a a a \! a a a \break
  \override Hairpin.to-barline = ##f
  a \< a a a a \! a a a
}
```



This property is not effective for all spanners. For example, setting it to `#t` has no effect on slurs or phrasing slurs or on other spanners for which terminating on the bar line would not be meaningful.

5.4.5 Line styles

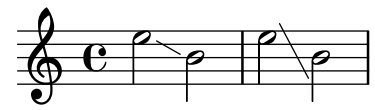
The Section "line-interface" in *Internals Reference* groups all objects printing lines. All objects supporting these interfaces can be printed using different line styles. Here is an example showing the available values.

```
\relative {
  d''2 \glissando d'2
  \once \override Glissando.style = #'dashed-line
  d,2 \glissando d'2
  \override Glissando.style = #'dotted-line
  d,2 \glissando d'2
  \override Glissando.style = #'zigzag
  d,2 \glissando d'2
  \override Glissando.style = #'trill
  d,2 \glissando d'2
}
```

Some objects may support specific additional styles.

5.4.6 Line spanners

Some performance indications, e.g., *rallentando* and *accelerando* and trills are written as text and are extended over many measures with lines, sometimes dotted or wavy.

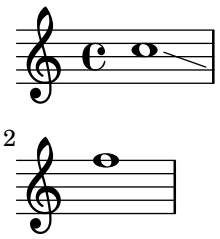
The locations of the two end points of the spanner are computed on the fly, but it is possible to override their Y-coordinates. The properties that need to be specified are nested two levels down within the property hierarchy, but the syntax of the `\override` command is quite simple:

```
e''2 \glissando b'
\once \override Glissando.bound-details.left.Y = #3
\once \override Glissando.bound-details.right.Y = #-2
e''2 \glissando b'
```

The units for the `Y` property are *staff spaces*, with the center line of the staff being the zero point. For the glissando, this is the value for `Y` at the X-coordinate corresponding to the center point of each note head, if the line is imagined to be extended to there.

If `Y` is not set, the value is computed from the vertical position of the corresponding attachment point of the spanner.

In case of a line break, the values for the end points are specified by the `left-broken` and `right-broken` sublists of `bound-details`. For example:

```
\override Glissando.breakable = ##t
\override Glissando.bound-details.right-broken.Y = #-3
c''1 \glissando \break
f''1
```



A number of further properties of the `left` and `right` sublists of the `bound-details` property may be modified in the same way as `Y`:

`Y` This sets the Y-coordinate of the end point, measured in staff spaces from the staff center line. By default, it is the center of the bound object, so a glissando points to the vertical center of the note head.

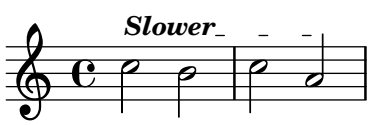
For horizontal spanners, such as text spanners and trill spanners, it is hard-coded to 0.

`attach-dir`
This determines where the line starts and ends in the X-direction, relative to the bound object. So, a value of `-1` (or `LEFT`) makes the line start/end at the left side of the note head it is attached to.

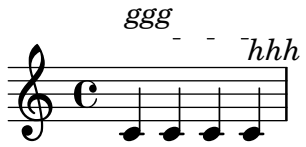
`X` This is the absolute X-coordinate of the end point. It is usually computed on the fly, and overriding it has little useful effect.

`stencil` Line spanners may have symbols at the beginning or end, which is contained in this subproperty. This is for internal use; it is recommended that `text` be used instead.

`text` This is a markup that is evaluated to yield the stencil. It is used to put *cresc.*, *tr*, and other text on horizontal spanners.

```
\override TextSpanner.bound-details.left.text
   = \markup { \small \bold Slower }
\relative { c''2\startTextSpan b c a\stopTextSpan }
```

`stencil-align-dir-y`
`stencil-offset`
Without setting one of these, the stencil is simply put at the end point, centered on the line, as defined by the `X` and `Y` subproperties. Setting either `stencil-align-dir-y` or `stencil-offset` will move the symbol at the edge vertically relative to the end point of the line:

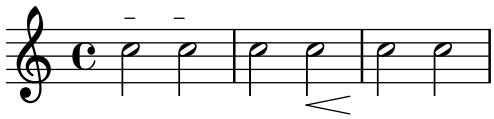
```
\override TextSpanner.bound-details
          .left.stencil-align-dir-y = #-2
```

```
\override TextSpanner.bound-details
          .right.stencil-align-dir-y = #UP

\override TextSpanner.bound-details.left.text = "ggg"
\override TextSpanner.bound-details.right.text = "hhh"

\relative { c'4^\startTextSpan c c c \stopTextSpan }
```

Note that negative values move the text *up*, contrary to the effect that might be expected, as a value of `-1` or `DOWN` means align the *bottom* edge of the text with the spanner line. A value of `1` or `UP` aligns the top edge of the text with the spanner line.

`arrow` Setting this subproperty to `#t` produces an arrowhead at the end points of the line.

`padding` This subproperty controls the space between the specified end point of the line and the actual end. Without padding, a glissando would start and end in the center of each note head.

The music function `\endSpanners` terminates the spanner which starts on the immediately following note prematurely. It is terminated after exactly one note, or at the following bar line if `to-barline` is true and a bar line occurs before the next note.

```
\relative c'' {
  \endSpanners
  c2 \startTextSpan c2 c2
  \endSpanners
  c2 \< c2 c2
}
```

When using `\endSpanners` it is not necessary to close \startTextSpan with \stopTextSpan, nor is it necessary to close hairpins with `\!`.

See also

Internals Reference: Section “TextSpanner” in *Internals Reference*, Section “Glissando” in *Internals Reference*, Section “VoiceFollower” in *Internals Reference*, Section “TrillSpanner” in *Internals Reference*, Section “line-spanner-interface” in *Internals Reference*.

5.4.7 Visibility of objects

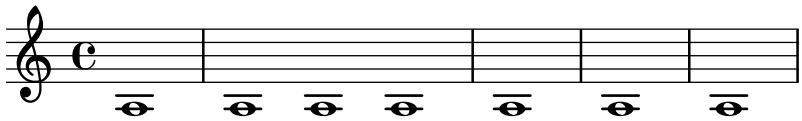
There are four main ways in which the visibility of layout objects can be controlled: their stencil can be removed, they can be made transparent, they can be colored white, or their `break-visibility` property can be overridden. The first three apply to all layout objects; the last to just a few – the *breakable* objects. The Learning Manual introduces these four techniques, see Section “Visibility and color of objects” in *Learning Manual*.

There are also a few other techniques which are specific to certain layout objects. These are covered under Special considerations.

Removing the stencil

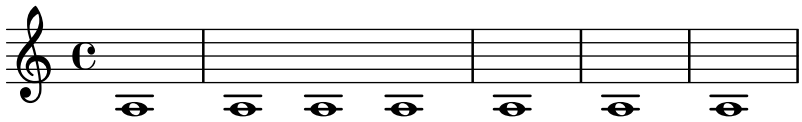
Every layout object has a stencil property. By default this is set to the specific function which draws that object. If this property is overridden to `#f` no function will be called and the object will not be drawn. The default action can be recovered with `\revert`.

```
a1 a
\override Score.BarLine.stencil = ##f
a a
\revert Score.BarLine.stencil
a a a
```



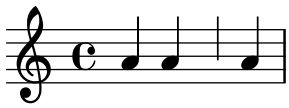
This rather common operation has a shortcut `\omit`:

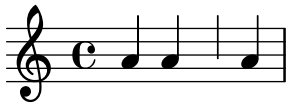
```
a1 a
\omit Score.BarLine
a a
\undo \omit Score.BarLine
a a a
```



Making objects transparent

Every layout object has a transparent property which by default is set to `#f`. If set to `#t` the object still occupies space but is made invisible.

```
a'4 a'
\once \override NoteHead.transparent = ##t
a' a'
```

This rather common operation has a shortcut `\hide`:

```
a'4 a'
\once \hide NoteHead
a' a'
```

Painting objects white

Every layout object has a color property which by default is set to `black`. If this is overridden to `white` the object will be indistinguishable from the white background. However, if the object crosses other objects the color of the crossing points will be determined by the order in which they are drawn, and this may leave a ghostly image of the white object, as shown here:

```
\override Staff.Clef.color = #white
```

```
a'1
```

This may be avoided by changing the order of printing the objects. All layout objects have a `layer` property which should be set to an integer. Objects with the lowest value of `layer` are drawn first, then objects with progressively higher values are drawn, so objects with higher values overwrite objects with lower values. By default most objects are assigned a `layer` value of `1`, although a few objects, including `StaffSymbol` and `BarLine`, are assigned a value of `0`. The order of printing objects with the same value of `layer` is indeterminate.

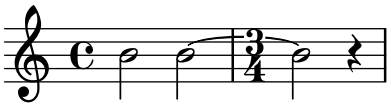
In the example above the white clef, with a default `layer` value of `1`, is drawn after the staff lines (default `layer` value `0`), so overwriting them. To change this, the `Clef` object must be given in a lower value of `layer`, say `-1`, so that it is drawn earlier:

```
\override Staff.Clef.color = #white
\override Staff.Clef.layer = #-1
a'1
```

Selected Snippets

Using the whiteout property

Any graphical object can be printed over a white background to mask parts of objects that lie beneath. This can be useful to improve the appearance of collisions in complex situations when repositioning objects is impractical. It is necessary to explicitly set the `layer` property to control which objects are masked by the white background. In this example the collision of the tie with the time signature is improved by masking out the part of the tie that crosses the time signature by setting the `whiteout` property of `TimeSignature`. To do this `TimeSignature` is moved to a layer above `Tie`, which is left in the default layer of 1, and `StaffSymbol` is moved to a layer above `TimeSignature` so it is not masked.

```
{
  \override Score.StaffSymbol.layer = #4
  \override Staff.TimeSignature.layer = #3
  b'2 b'~
  \once \override Staff.TimeSignature.whiteout = ##t
  \time 3/4
  b' r4
}
```

Using `break-visibility`

Most layout objects are printed only once, but some like bar lines, clefs, time signatures and key signatures, may need to be printed twice when a line break occurs – once at the end of the line and again at the start of the next line. Such objects are called *breakable*, and have a property, the `break-visibility` property to control their visibility at the three positions in which they

may appear – at the start of a line, within a line if they are changed, and at the end of a line if a change takes place there.

For example, the time signature by default will be printed at the start of the first line, but nowhere else unless it changes, when it will be printed at the point at which the change occurs. If this change occurs at the end of a line the new time signature will be printed at the start of the next line and a cautionary time signature will be printed at the end of the previous line as well.

This behavior is controlled by the `break-visibility` property, which is explained in Section "Visibility and color of objects" in *Learning Manual*. This property takes a vector of three Booleans which, in order, determine whether the object is printed at the end of, within the body of, or at the beginning of a line. Or to be more precise, before a line break, where there is no line break, or after a line break.

Alternatively, these eight combinations may be specified by predefined functions, defined in `scm/output-lib.scm`, where the last three columns indicate whether the layout objects will be visible in the positions shown at the head of the columns:

Function form	**Vector form**	**Before break**	**At no break**	**After break**
`all-visible`	`#(#t #t #t)`	yes	yes	yes
`begin-of-line-visible`	`#(#f #f #t)`	no	no	yes
`center-visible`	`#(#f #t #f)`	no	yes	no
`end-of-line-visible`	`#(#t #f #f)`	yes	no	no
`begin-of-line-invisible`	`#(#t #t #f)`	yes	yes	no
`center-invisible`	`#(#t #f #t)`	yes	no	yes
`end-of-line-invisible`	`#(#f #t #t)`	no	yes	yes
`all-invisible`	`#(#f #f #f)`	no	no	no

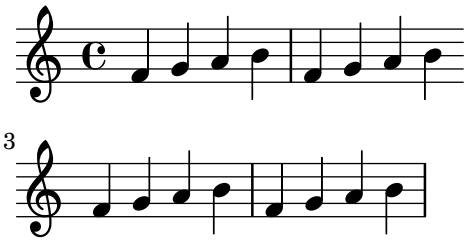
The default settings of `break-visibility` depend on the layout object. The following table shows all the layout objects of interest which are affected by `break-visibility` and the default setting of this property:

Layout object	**Usual context**	**Default setting**
`BarLine`	`Score`	calculated
`BarNumber`	`Score`	`begin-of-line-visible`
`BreathingSign`	`Voice`	`begin-of-line-invisible`
`Clef`	`Staff`	`begin-of-line-visible`
`Custos`	`Staff`	`end-of-line-visible`
`Divisio`	`Staff`	`begin-of-line-invisible`
`DoublePercentRepeat`	`Voice`	`begin-of-line-invisible`
`KeyCancellation`	`Staff`	`begin-of-line-invisible`
`KeySignature`	`Staff`	`begin-of-line-visible`
`ClefModifier`	`Staff`	`begin-of-line-visible`
`RehearsalMark`	`Score`	`end-of-line-invisible`
`TimeSignature`	`Staff`	`all-visible`

The example below shows the use of the vector form to control the visibility of bar lines:

```
\relative {
  f'4 g a b
  f4 g a b
  % Remove bar line at the end of the current line
  \once \override Score.BarLine.break-visibility = ##(#f #t #t)
  \break
```

```
  f4 g a b
  f4 g a b
}
```



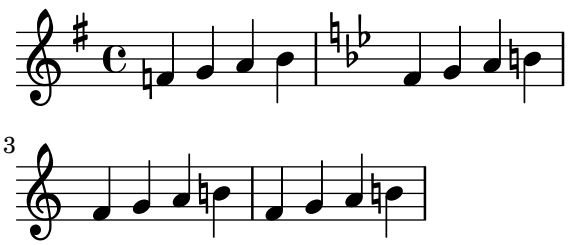
Although all three components of the vector used to override `break-visibility` must be present, not all of them are effective with every layout object, and some combinations may even give errors. The following limitations apply:

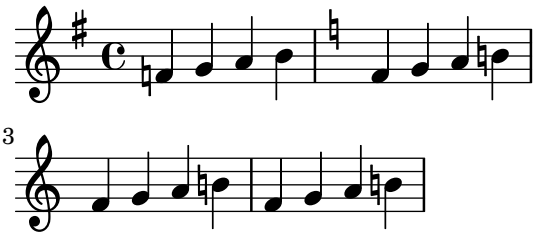
- Bar lines cannot be printed at the start of line.
- A bar number cannot be printed at the start of the *first* line unless it is set to be different from `1`.
- Clef – see the next section.
- Double percent repeats are either *all printed* or *all suppressed*. Use `begin-of-line-invisible` to print them and `all-invisible` to suppress them.
- Key signature – see the next section.
- ClefModifier – see the next section.

Special considerations

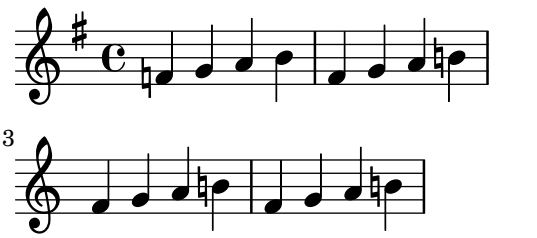
Visibility following explicit changes

The `break-visibility` property controls the visibility of key signatures and changes of clef only at the start of lines, i.e., after a break. It has no effect on the visibility of the key signature or clef following an explicit key change or an explicit clef change within or at the end of a line. In the following example the key signature following the explicit change to B-flat major is still visible, even though `all-invisible` is set.

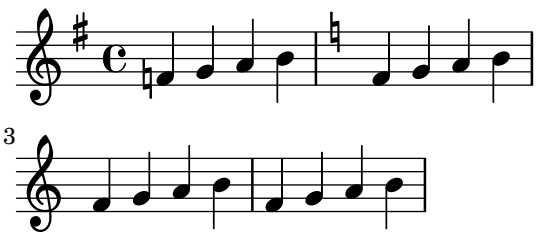
```
\relative {
  \key g \major
  f'4 g a b
  % Try to remove all key signatures
  \override Staff.KeySignature.break-visibility = #all-invisible
  \key bes \major
  f4 g a b
  \break
  f4 g a b
  f4 g a b
}
```

The visibility of such explicit key signature and clef changes is controlled by the `explicitKeySignatureVisibility` and `explicitClefVisibility` properties. These are the equivalent of the `break-visibility` property and both take a vector of three Booleans or the predefined functions listed above, exactly like `break-visibility`. Both are properties of the Staff context, not the layout objects themselves, and so they are set using the `\set` command. Both are set by default to `all-visible`. These properties control only the visibility of key signatures and clefs resulting from explicit changes and do not affect key signatures and clefs at the beginning of lines; `break-visibility` must still be overridden in the appropriate object to remove these.

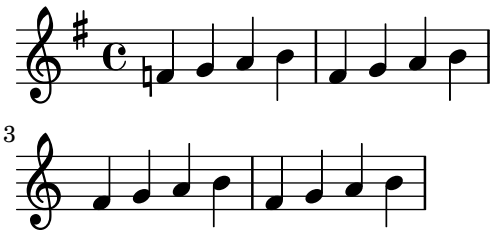
```
\relative {
  \key g \major
  f'4 g a b
  \set Staff.explicitKeySignatureVisibility = #all-invisible
  \override Staff.KeySignature.break-visibility = #all-invisible
  \key bes \major
  f4 g a b \break
  f4 g a b
  f4 g a b
}
```

Visibility of cancelling accidentals

To remove the cancelling accidentals printed at an explicit key change, set the Staff context property `printKeyCancellation` to `#f`:

```
\relative {
  \key g \major
  f'4 g a b
  \set Staff.explicitKeySignatureVisibility = #all-invisible
  \set Staff.printKeyCancellation = ##f
  \override Staff.KeySignature.break-visibility = #all-invisible
  \key bes \major
  f4 g a b \break
  f4 g a b
  f4 g a b
}
```

With these overrides only the accidentals before the notes remain to indicate the change of key.

Note that when changing the key to C major or A minor the cancelling accidentals would be the *only* indication of the key change. In this case setting `printKeyCancellation` to `#f` has no effect:

```
\relative {
  \key g \major
  f'4 g a b
  \set Staff.explicitKeySignatureVisibility = #all-invisible
  \set Staff.printKeyCancellation = ##f
  \key c \major
  f4 g a b \break
  f4 g a b
  f4 g a b
}
```

To suppress the cancelling accidentals even when the key is changed to C major or A minor, override the visibility of the `KeyCancellation` grob instead:

```
\relative {
  \key g \major
  f'4 g a b
  \set Staff.explicitKeySignatureVisibility = #all-invisible
  \override Staff.KeyCancellation.break-visibility = #all-invisible
  \key c \major
  f4 g a b \break
  f4 g a b
  f4 g a b
}
```

Transposed clefs

The small transposition symbol on transposed clefs is produced by the `ClefModifier` layout object. Its visibility is automatically inherited from the `Clef` object, so it is not necessary to apply any required `break-visibility` overrides to the `ClefModifier` layout objects to suppress transposition symbols for invisible clefs.

For explicit clef changes, the `explicitClefVisibility` property controls both the clef symbol and any transposition symbol associated with it.

See also

Learning Manual: Section “Visibility and color of objects” in *Learning Manual*.

5.4.8 Rotating objects

Both layout objects and elements of markup text can be rotated by any angle about any point, but the method of doing so differs.

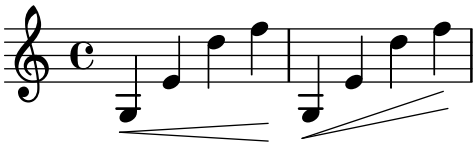
Rotating layout objects

All layout objects which support the `grob-interface` can be rotated by setting their `rotation` property. This takes a list of three items: the angle of rotation counter-clockwise, and the x and y coordinates of the point relative to the object's reference point about which the rotation is to be performed. The angle of rotation is specified in degrees and the coordinates in staff spaces.

The angle of rotation and the coordinates of the rotation point must be determined by trial and error.

There are only a few situations where the rotation of layout objects is useful; the following example shows one situation where they may be:

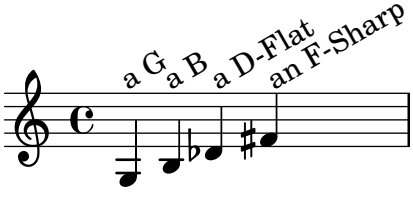
```
g4\< e' d'' f''\!
\override Hairpin.rotation = #'(15 -1 0)
g4\< e' d'' f''\!
```



Rotating markup

All markup text can be rotated to lie at any angle by prefixing it with the `\rotate` command. The command takes two arguments: the angle of rotation in degrees counter-clockwise and the text to be rotated. The extents of the text are not rotated: they take their values from the extremes of the x and y coordinates of the rotated text. In the following example the `outside-staff-priority` property for text is set to `#f` to disable the automatic collision avoidance, which would push some of the text too high.

```
\override TextScript.outside-staff-priority = ##f
g4^\markup { \rotate #30 "a G" }
b^\markup { \rotate #30 "a B" }
des'^\markup { \rotate #30 "a D-Flat" }
fis'^\markup { \rotate #30 "an F-Sharp" }
```



5.4.9 Aligning objects

Graphical objects which support the `self-alignment-interface` and/or the `side-position-interface` can be aligned to a previously placed object in a variety of ways. For a list of these objects, see Section "self-alignment-interface" in *Internals Reference* and Section "side-position-interface" in *Internals Reference*.

All graphical objects have a reference point, a horizontal extent and a vertical extent. The horizontal extent is a pair of numbers giving the displacements from the reference point of the left and right edges, displacements to the left being negative. The vertical extent is a pair of numbers

giving the displacement from the reference point to the bottom and top edges, displacements down being negative.

An object's position on a staff is given by the values of the `X-offset` and `Y-offset` properties. The value of `X-offset` gives the displacement from the X coordinate of the reference point of the parent object, and the value of `Y-offset` gives the displacement from the center line of the staff. The values of `X-offset` and `Y-offset` may be set directly or may be set to be calculated by procedures in order to achieve alignment with the parent object.

> **Note:** Many objects have special positioning considerations which cause any setting of `X-offset` or `Y-offset` to be ignored or modified, even though the object supports the `self-alignment-interface`. Overriding the `X-offset` or `Y-offset` properties to a fixed value causes the respective `self-alignment` property to be disregarded.

For example, an accidental can be repositioned vertically by setting `Y-offset` but any changes to `X-offset` have no effect.

Rehearsal marks may be aligned with breakable objects such as bar lines, clef symbols, time signature symbols and key signatures. There are special properties to be found in the `break-aligned-interface` for positioning rehearsal marks on such objects.

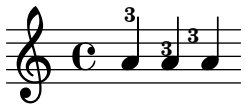
See also

Notation Reference: [Using the `break-alignable-interface`], page 714.

Extending LilyPond: Section "Callback functions" in *Extending*.

Setting `X-offset` and `Y-offset` directly

Numerical values may be given to the `X-offset` and `Y-offset` properties of many objects. The following example shows three notes with the default fingering position and the positions with `X-offset` and `Y-offset` modified.

```
a'-3
a'
-\tweak X-offset #0
-\tweak Y-offset #0
-3
a'
-\tweak X-offset #-1
-\tweak Y-offset #1
-3
```

Using the `side-position-interface`

An object which supports the `side-position-interface` can be placed next to its parent object so that the specified edges of the two objects touch. The object may be placed above, below, to the right or to the left of the parent. The parent cannot be specified; it is determined by the order of elements in the input stream. Most objects have the associated note head as their parent.

The values of the `side-axis` and `direction` properties determine where the object is to be placed, as follows:

`side-axis` **property**	`direction` **property**	**Placement**
`0`	`-1`	left
`0`	`1`	right
`1`	`-1`	below
`1`	`1`	above

When `side-axis` is `0`, `X-offset` should be set to the procedure `ly:side-position-interface::x-aligned-side`. This procedure will return the correct value of `X-offset` to place the object to the left or right side of the parent according to value of `direction`.

When `side-axis` is `1`, `Y-offset` should be set to the procedure `ly:side-position-interface::y-aligned-side`. This procedure will return the correct value of `Y-offset` to place the object to the top or bottom of the parent according to value of `direction`.

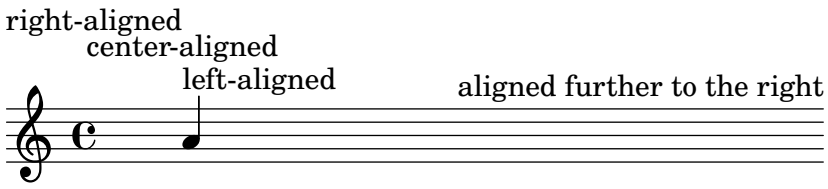
Using the `self-alignment-interface`

Self-aligning objects horizontally

The horizontal alignment of an object which supports the `self-alignment-interface` is controlled by the value of the `self-alignment-X` property, provided the object's `X-offset` property is set to `ly:self-alignment-interface::x-aligned-on-self`. `self-alignment-X` may be given any real value, in units of half the total X extent of the object. Negative values move the object to the right, positive to the left. A value of `0` centers the object on the reference point of its parent, a value of `-1` aligns the left edge of the object on the reference point of its parent, and a value of `1` aligns the right edge of the object on the reference point of its parent. The symbols `LEFT`, `CENTER`, and `RIGHT` may be used instead of the values `-1`, `0`, and `1`, respectively.

Normally the `\override` command would be used to modify the value of `self-alignment-X`, but the `\tweak` command can be used to separately align several annotations on a single note:

```
a'
-\tweak self-alignment-X #-1
^"left-aligned"
-\tweak self-alignment-X #0
^"center-aligned"
-\tweak self-alignment-X #RIGHT
^"right-aligned"
-\tweak self-alignment-X #-2.5
^"aligned further to the right"
```



Self-aligning objects vertically

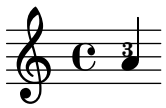
Objects may be aligned vertically in an analogous way to aligning them horizontally if the `Y-offset` property is set to `ly:self-alignment-interface::y-aligned-on-self`. However, other mechanisms are often involved in vertical alignment: the value of `Y-offset` is just one variable taken into account. This may make adjusting the value of some objects tricky. The units are just half the vertical extent of the object, which is usually quite small, so quite large numbers may be required. A value of `-1` aligns the lower edge of the object with the reference point of the parent object, a value of `0` aligns the center of the object with the reference point

of the parent, and a value of 1 aligns the top edge of the object with the reference point of the parent. The symbols DOWN, CENTER, and UP may be substituted for -1, 0, and 1, respectively.

Self-aligning objects in both directions

By setting both X-offset and Y-offset, an object may be aligned in both directions simultaneously.

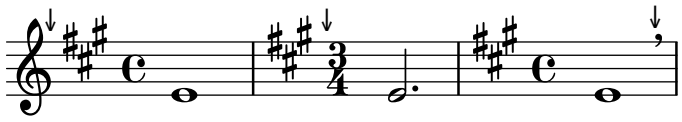
The following example shows how to adjust a fingering mark so that it nestles close to the note head.

```
a'
-\tweak self-alignment-X #0.5  % move horizontally left
-\tweak Y-offset #ly:self-alignment-interface::y-aligned-on-self
-\tweak self-alignment-Y #-1  % move vertically up
-3  % third finger
```

Using the break-alignable-interface

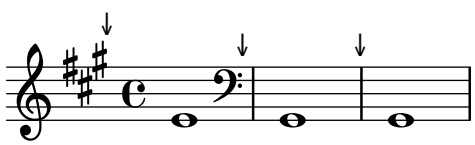
Rehearsal marks, text marks, bar numbers, and more generally all objects with Section "break-alignable-interface" in *Internals Reference*, collectively referred to as "break-alignable objects", may be aligned with notation objects such as bar lines, key signatures, time signatures, and generally any object with Section "break-aligned-interface" in *Internals Reference*. To be more precise, break-aligned items have a break-align-symbol property, providing symbols that can be used as 'anchor points' for other objects via the break-align-symbols property. See Section "break-alignment-interface" in *Internals Reference*, for a complete list of available symbols.

Each type of object has its own default reference point, to which break-alignable items are aligned:

```
\override Score.TextMark.self-alignment-X = #CENTER
% The text mark will be aligned
% to the right edge of the clef
\override Score.TextMark.break-align-symbols =
            #'(clef)
\key a \major
\clef treble
\textMark "↓"
e'1
% The text mark will be aligned
% to the left edge of the time signature
\override Score.TextMark.break-align-symbols =
            #'(time-signature)
\key a \major
\clef treble
\time 3/4
\textMark "↓"
e'2.
% The text mark will be centered
% above the breathing mark
\override Score.TextMark.break-align-symbols =
            #'(breathing-sign)
\key a \major
```

```
\clef treble
\time 4/4
e'1
\breathe
\textEndMark "↓"
```

A list of possible target alignment objects may be specified. If some of the objects are invisible at that point due to the setting of `break-visibility` or the explicit visibility settings for keys and clefs, the rehearsal mark or bar number is aligned to the first object in the list which is visible. If no objects in the list are visible the object is aligned to the bar line. If the bar line is invisible the object is aligned to the place where the bar line would be.

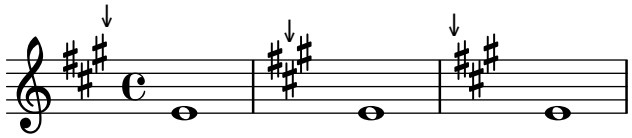
```
\override Score.TextMark.self-alignment-X = #CENTER
% The text mark will be aligned
% to the right edge of the key signature
\override Score.TextMark.break-align-symbols =
           #'(key-signature clef)
\key a \major
\clef treble
\textMark "↓"
e'1
% The text mark will be aligned
% to the right edge of the clef
\set Staff.explicitKeySignatureVisibility = #all-invisible
\override Score.TextMark.break-align-symbols =
           #'(key-signature clef)
\key a \major
\clef bass
\textMark "↓"
gis,1
% The text mark will be centered
% above the bar line
\set Staff.explicitKeySignatureVisibility = #all-invisible
\set Staff.explicitClefVisibility = #all-invisible
\override Score.TextMark.break-align-symbols =
           #'(key-signature clef)
\key a \major
\clef treble
\textMark "↓"
e'1
```



The alignment of the break-alignable item relative to the notation object can be changed, as shown in the following example. In a score with multiple staves, this setting should be done for all the staves.

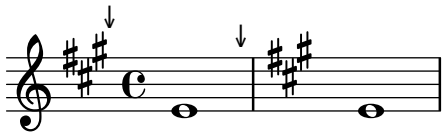
```
\override Score.TextMark.self-alignment-X = #CENTER
```

```
% The text mark will be aligned
% with the right edge of the key signature
\override Score.TextMark.break-align-symbols =
           #'(key-signature)
\key a \major
\clef treble
\time 4/4
\textMark "↓"
e'1
% The text mark will be centered
% above the key signature
\once \override Score.KeySignature.break-align-anchor-alignment =
                  #CENTER
\textMark "↓"
\key a \major
e'1
% The text mark will be aligned
% with the left edge of the key signature
\once \override Score.KeySignature.break-align-anchor-alignment =
                  #LEFT
\key a \major
\textMark "↓"
e'1
```



The break-alignable item can also be offset to the right or left of the left edge by an arbitrary amount. The units are staff spaces:

```
\override Score.TextMark.self-alignment-X = #CENTER
% The text mark will be aligned
% with the left edge of the key signature
% and then shifted right by 3.5 staff spaces
\override Score.TextMark.break-align-symbols =
           #'(key-signature)
\once \override Score.KeySignature.break-align-anchor = #3.5
\key a \major
\textMark "↓"
e'1
% The text mark will be aligned
% with the left edge of the key signature
% and then shifted left by 2 staff spaces
\once \override Score.KeySignature.break-align-anchor = #-2
\key a \major
\textMark "↓"
e'1
```



5.4.10 Modifying stencils

All layout objects have a `stencil` property which is part of the `grob-interface`. By default, this property is usually set to a function specific to the object that is tailor-made to render the symbol which represents it in the output. For example, the standard setting for the `stencil` property of the `MultiMeasureRest` object is `ly:multi-measure-rest::print`.

The standard symbol for any object can be replaced by modifying the `stencil` property to reference a different, specially-written, procedure. This requires a high level of knowledge of the internal workings of LilyPond, but there is an easier way which can often produce adequate results.

This is to set the `stencil` property to the procedure which prints text – `ly:text-interface::print` – and to add a `text` property to the object which is set to contain the markup text which produces the required symbol. Due to the flexibility of markup, much can be achieved – see in particular [Graphic notation inside markup], page 300.

The following example demonstrates this by changing the note head symbol to a cross within a circle.

```
XinO = {
  \once \override NoteHead.stencil = #ly:text-interface::print
  \once \override NoteHead.text = \markup {
    \combine
      \halign #-0.7 \draw-circle #0.85 #0.2 ##f
      \musicglyph "noteheads.s2cross"
  }
}
\relative {
  a' a \XinO a a
}
```

Any of the *Feta* glyphs used in the Emmentaler font can be supplied to the `\musicglyph` markup command – see Section A.8 [The Emmentaler font], page 739.

`EPS` files and Postscript commands can both be inserted inline using the `\epsfile` and `\postscript` markup commands respectively – see Section A.12.3 [Graphical markup], page 785.

See also

Notation Reference: [Graphic notation inside markup], page 300, Section 1.8.2 [Formatting text], page 289, Section A.12 [Text markup commands], page 758, Section A.8 [The Emmentaler font], page 739, Section A.12.3 [Graphical markup], page 785.

5.4.11 Modifying shapes

Modifying ties and slurs

`Ties`, `Slurs`, `PhrasingSlurs`, `LaissezVibrerTies` and `RepeatTies` are all drawn as third-order Bézier curves. If the shape of the tie or slur which is calculated automatically is not optimum, the shape may be modified manually in two ways:

a. by specifying the displacements to be made to the control points of the automatically calculated Bézier curve, or

b. by explicitly specifying the positions of the four control points required to define the wanted curve.

Both methods are explained below. The first method is more suitable if only slight adjustments to the curve are required; the second may be better for creating curves which are related to just a single note.

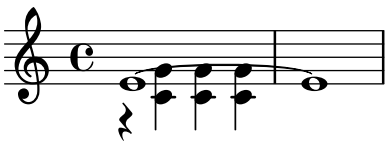
Cubic Bézier curves

Third-order or cubic Bézier curves are defined by four control points. The first and fourth control points are precisely the starting and ending points of the curve. The intermediate two control points define the shape. Animations showing how the curve is drawn can be found on the web, but the following description and image may be helpful. The curve starts from the first control point heading directly towards the second, gradually bending over to head towards the third and continuing to bend over to head towards the fourth, arriving there traveling directly from the third control point. The curve is entirely contained in the quadrilateral defined by the four control points.

Translations, rotations and scaling of the control points all result in exactly the same operations on the curve.

Specifying displacements from current control points

In this example the automatic placement of the tie is not optimum, and `\tieDown` would not help.

```
<<
  { e'1~ 1 }
\\
  \relative { r4 <g' c,> <g c,> <g c,> }
>>
```

Adjusting the control points of the tie with `\shape` allows the collisions to be avoided.

The syntax of `\shape` is

`[-]\shape` *`displacements item`*

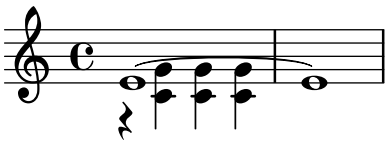
This will reposition the control points of *item* by the amounts given by *displacements*. The *displacements* argument is a list of number pairs or a list of such lists. Each element of a pair represents the displacement of one of the coordinates of a control point. If *item* is a string, the result is `\once\override` for the specified grob type. If *item* is a music expression, the result is the same music expression with an appropriate tweak applied.

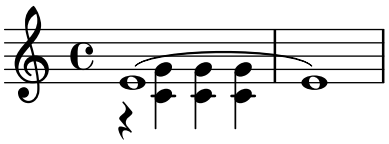
In other words, the `\shape` function can act as either a `\once\override` command or a `\tweak` command depending on whether the *item* argument is a grob name, like "Slur", or a music expression, like "(". The *displacements* argument specifies the displacements of the four control points as a list of four pairs of (dx . dy) values in units of staff spaces (or a list of such lists if the curve has more than one segment).

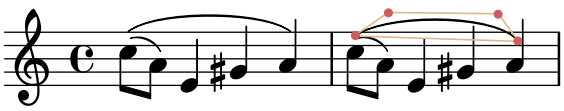
The leading hyphen is required if and only if the `\tweak` form is being used.

So, using the same example as above and the `\once\override` form of `\shape`, this will raise the tie by half a staff space:

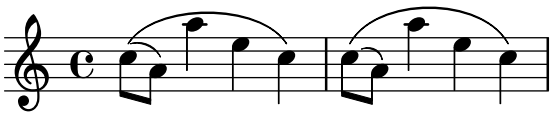
```
<<
```

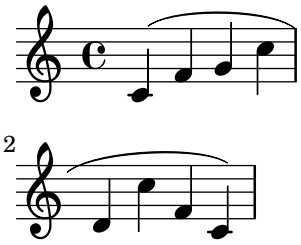
```
  {
    \shape #'((0 . 0.5) (0 . 0.5) (0 . 0.5) (0 . 0.5)) Tie
    e'1~ 1
  }
\\
  \relative { r4 <g' c,> <g c,> <g c,> }
>>
```

This positioning of the tie is better, but maybe it should be raised more in the center. The following example does this, this time using the alternative \tweak form:

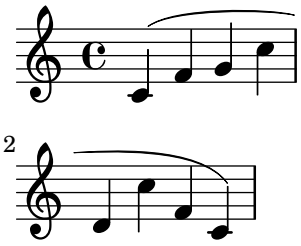
```
<<
  {
    e'1-\shape #'((0 . 0.5) (0 . 1) (0 . 1) (0 . 0.5)) ~ e'
  }
\\
  \relative { r4 <g' c,> <g c,> <g c,> }
>>
```

To aid the tweaking process, the \vshape function is provided. Its name means *visual shape*: it acts exactly like \shape, except that the control points and polygon are additionally displayed.

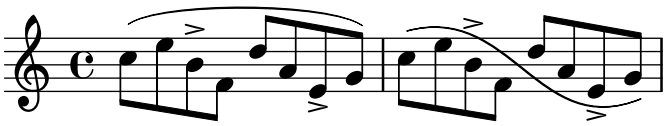
```
\relative {
  c''8(\( a) e4 gis a\)
  \vshape #'((0 . -0.3) (0.5 . -0.2)
             (0.5 . -0.3) (0 . -0.7)) PhrasingSlur
  c8(\( a) e4 gis a\)
}
```

It is advisable to start with \vshape and adjust until a satisfactory curve is obtained, then simply remove the "v" letter in \vshape.

Two different curves starting at the same musical moment may also be shaped:

```
\relative {
  c''8(\( a) a'4 e c\)
  \shape #'((0.7 . -0.4) (0.5 . -0.4)
            (0.3 . -0.3) (0 . -0.2)) Slur
  \shape #'((0 . 0) (0 . 0.5)
            (0 . 0.5) (0 . 0)) PhrasingSlur
  c8(\( a) a'4 e c\)
}
```

The \shape function can also displace the control points of curves which stretch across line breaks. Each piece of the broken curve can be given its own list of offsets. If changes to a particular segment are not needed, the empty list can serve as a placeholder. In this example the line break makes the single slur look like two:

```
\relative {
  c'4( f g c
  \break
  d,4 c' f, c)
}
```

Changing the shapes of the two halves of the slur makes it clearer that the slur continues over the line break:

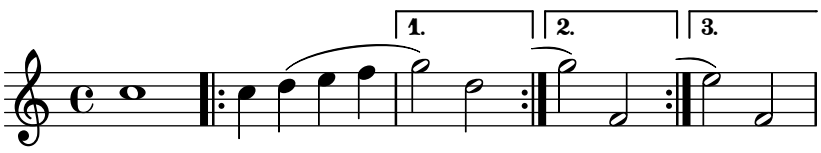
```
% () may be used as a shorthand for ((0 . 0) (0 . 0) (0 . 0) (0 . 0))
% if any of the segments does not need to be changed
\relative c' {
  \shape #'(
             (( 0 . 0) (0 . 0) (0 . 0) (0 . 1))
             ((0.5 . 1.5) (1 . 0) (0 . 0) (0 . -1.5))
           ) Slur
  c4( f g c
  \break
  d,4 c' f, c)
}
```

If an S-shaped curve is required the control points must always be adjusted manually – LilyPond will never select such shapes automatically.

```
\relative c'' {
  c8( e b-> f d' a e-> g)
  \shape #'((0 . -1) (5.5 . -0.5) (-5.5 . -10.5) (0 . -5.5))
         PhrasingSlur
  c8\( e b-> f d' a e-> g\)
}
```

Specifying control points explicitly

The coordinates of the Bézier control points are specified in units of staff spaces. The X coordinate is relative to the reference point of the note to which the tie or slur is attached, and the Y coordinate is relative to the staff center line. The coordinates are specified as a list of four pairs of decimal numbers (reals). One approach is to estimate the coordinates of the two end points, and then guess the two intermediate points. The optimum values are then found by trial and error. Be aware that these values may need to be manually adjusted if any further changes are made to the music or the layout.

One situation where specifying the control points explicitly is preferable to specifying displacements is when they need to be specified relative to a single note. Here is an example of this. It shows one way of indicating a slur extending into alternative sections of a volta repeat.

```
\relative {
  c''1
  \repeat volta 3 { c4 d( e f }
  \alternative {
    \volta 1 { g2) d }
    \volta 2 {
      g2
        % create a slur and move it to a new position
        % the <> is just an empty chord to carry the slur termination
        -\tweak control-points
                  #'((-2 . 3.8) (-1 . 3.9) (0 . 4) (1 . 3.4)) ( <> )
      f,
    }
    \volta 3 {
      e'2
        % create a slur and move it to a new position
        -\tweak control-points
                  #'((-2 . 3) (-1 . 3.1) (0 . 3.2) (1 . 2.4)) ( <> )
      f,
    }
  }
}
```



Known issues and warnings

It is not possible to modify shapes of ties or slurs by changing the `control-points` property if there are multiple ties or slurs at the same musical moment – the `\tweak` command will also not work in this case. However, the `tie-configuration` property of `TieColumn` can be overridden to set start line and direction as required.

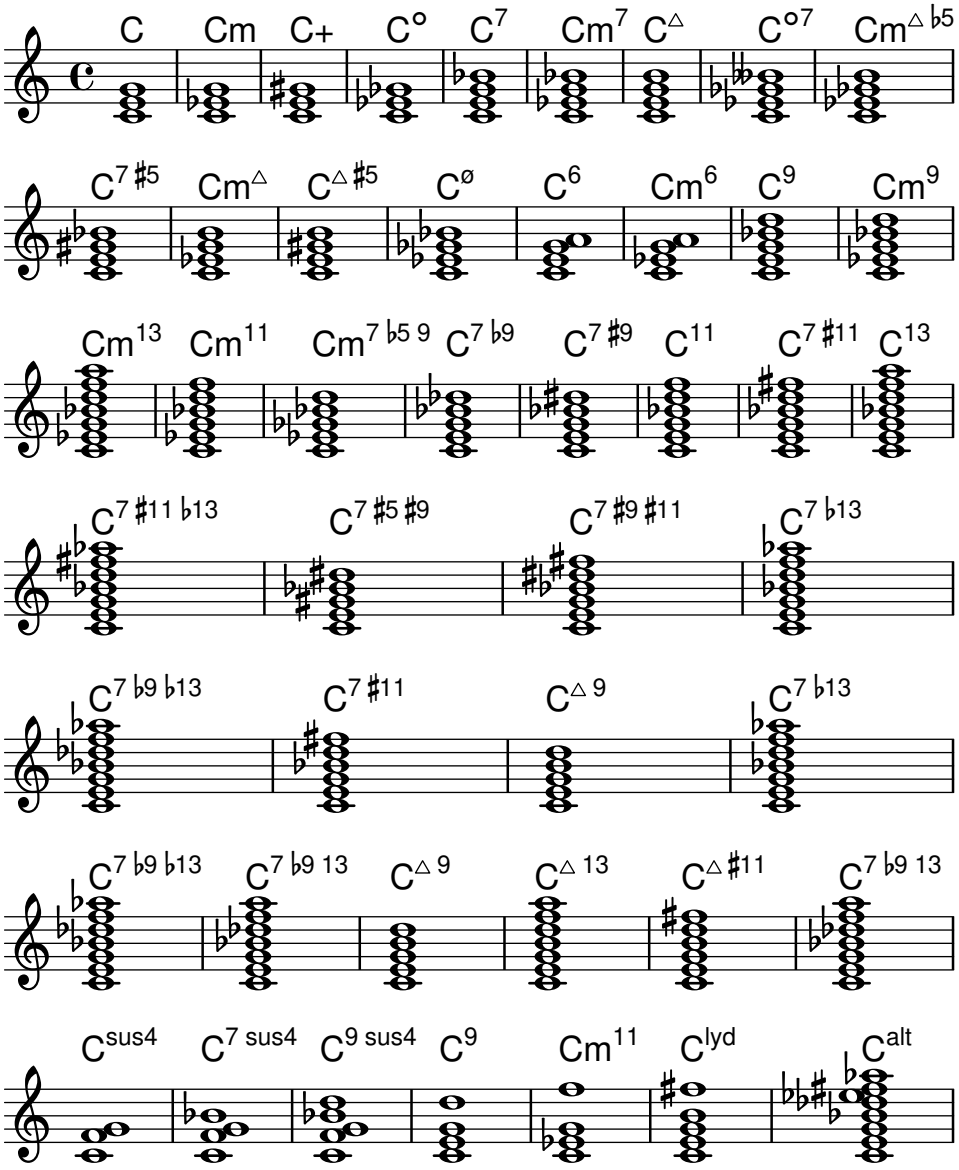
See also

Internals Reference: Section “TieColumn” in *Internals Reference*.

Appendix A Notation manual tables

A.1 Chord name chart

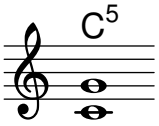
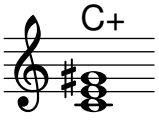
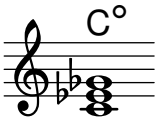
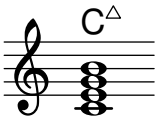
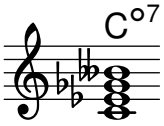
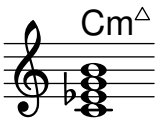
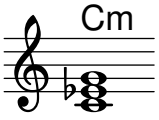
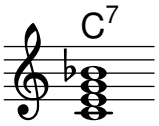
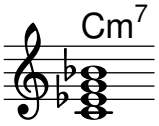
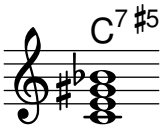
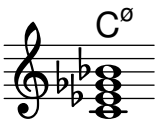
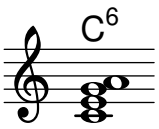
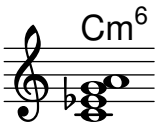
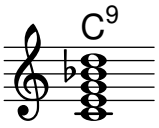
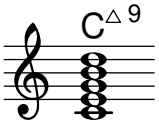
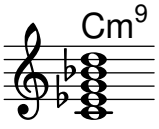
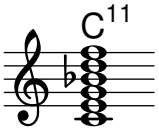
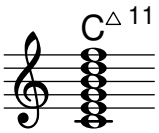
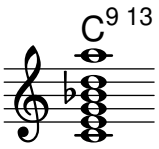
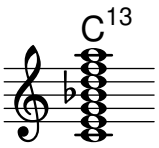
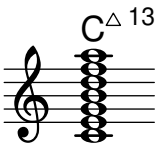
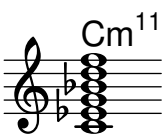
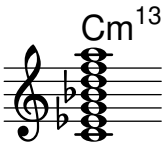
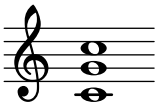
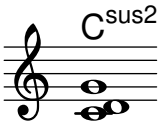
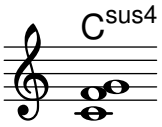
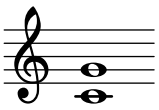
The following chart shows LilyPond's standard system for printing chord names, along with the pitches they represent. Additional (unsupported) naming systems are also demonstrated in the "Chord names alternative" snippet in Section "Chords" in *Snippets*, including the notation inspired by Harald Banter (1982) that was used by default in early LilyPond releases (up to version 1.7).



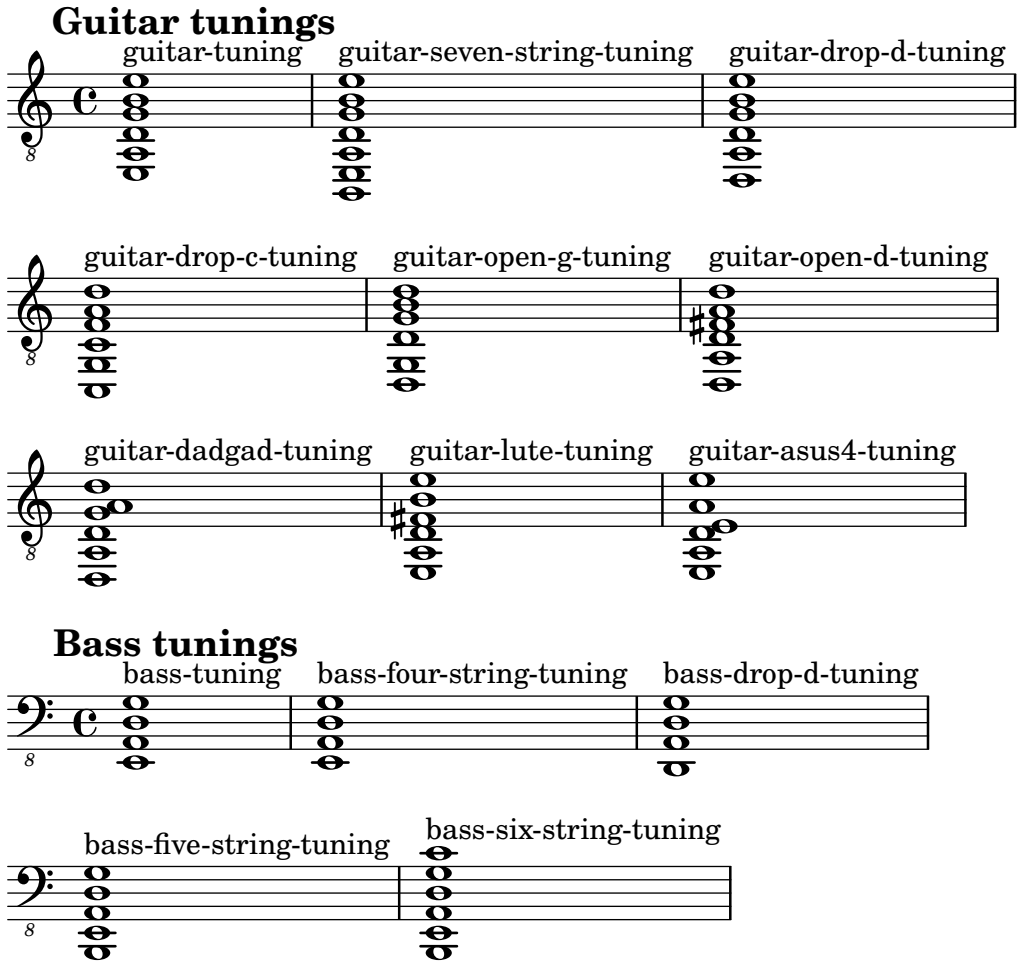
A.2 Common chord modifiers

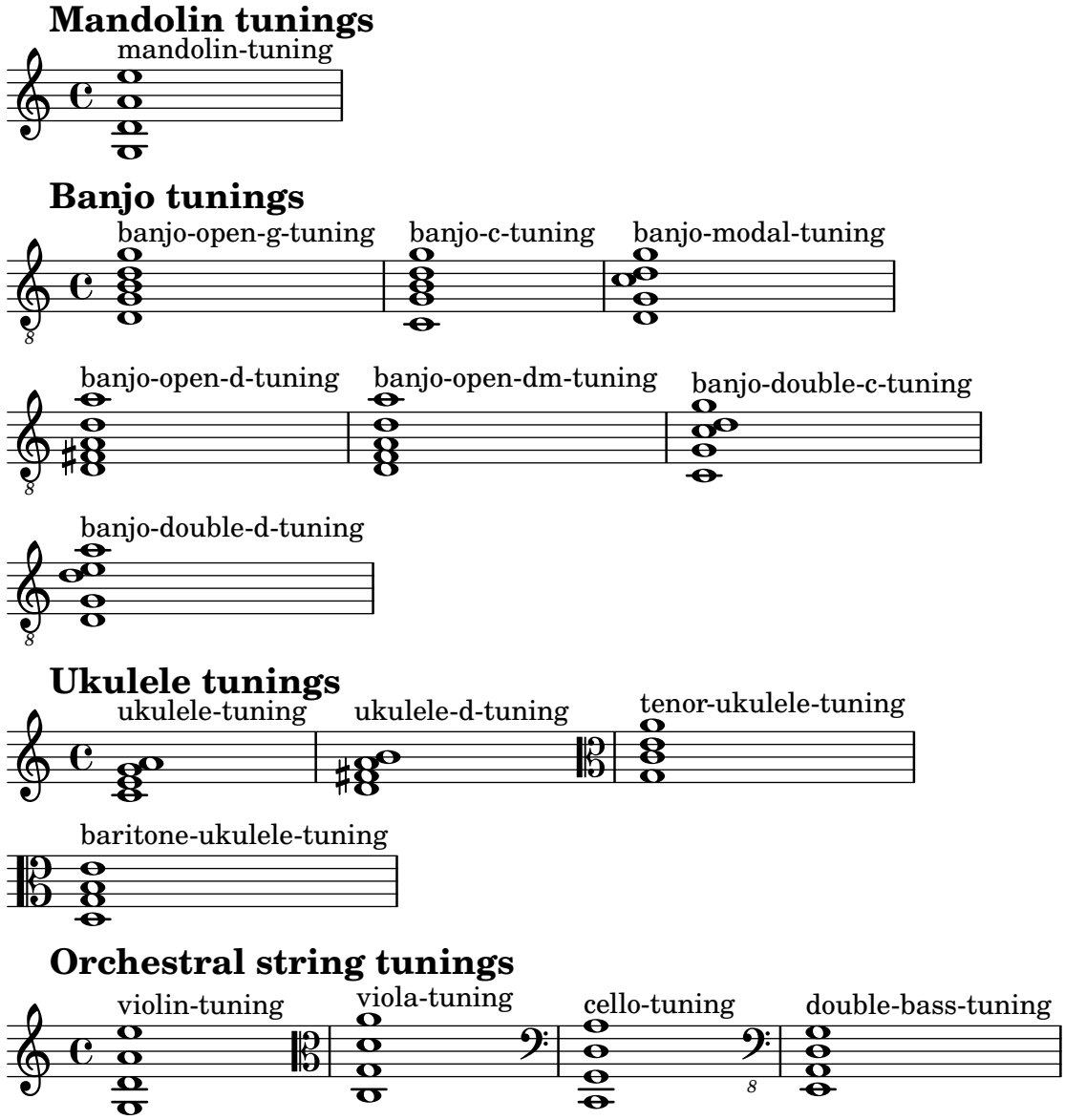
The following table shows chord modifiers that can be used to generate standard chord structures.

Type	Interval	Modifier	Example	Output

Major	Major third, perfect fifth	`5` or nothing	`c1:5`	
Minor	Minor third, perfect fifth	`m` or `m5`	`c1:m`	
Augmented	Major third, augmented fifth	`aug`	`c1:aug`	
Diminished	Minor third, diminished fifth	`dim`	`c1:dim`	
Dominant seventh	Major triad, minor seventh	`7`	`c1:7`	
Major seventh	Major triad, major seventh	`maj7` or `maj`	`c1:maj7`	
Minor seventh	Minor triad, minor seventh	`m7`	`c1:m7`	
Diminished seventh	Diminished triad, diminished seventh	`dim7`	`c1:dim7`	
Augmented seventh	Augmented triad, minor seventh	`aug7`	`c1:aug7`	
Half-diminished seventh	Diminished triad, minor seventh	`m7.5-`	`c1:m7.5-`	
Minor-major seventh	Minor triad, major seventh	`m7+`	`c1:m7+`	

Major sixth	Major triad, sixth	`6`	`c1:6`	
Minor sixth	Minor triad, sixth	`m6`	`c1:m6`	
Dominant ninth	Dominant seventh, major ninth	`9`	`c1:9`	
Major ninth	Major seventh, major ninth	`maj9`	`c1:maj9`	
Minor ninth	Minor seventh, major ninth	`m9`	`c1:m9`	
Dominant eleventh	Dominant ninth, perfect eleventh	`11`	`c1:11`	
Major eleventh	Major ninth, perfect eleventh	`maj11`	`c1:maj11`	
Minor eleventh	Minor ninth, perfect eleventh	`m11`	`c1:m11`	
Dominant thirteenth	Dominant ninth, major thirteenth	`13`	`c1:13`	
Dominant thirteenth	Dominant eleventh, major thirteenth	`13.11`	`c1:13.11`	
Major thirteenth	Major eleventh, major thirteenth	`maj13.11`	`c1:maj13.11`	

Minor thirteenth	Minor eleventh, major thirteenth	`m13.11`	`c1:m13.11`	
Suspended second	Major second, perfect fifth	`sus2`	`c1:sus2`	
Suspended fourth	Perfect fourth, perfect fifth	`sus4`	`c1:sus4`	
Power chord (two-voiced)	Perfect fifth	`1.5`	`c1:5`	
Power chord (three-voiced)	Perfect fifth, octave	`1.5.8`	`c1:5.8`	

A.3 Predefined string tunings

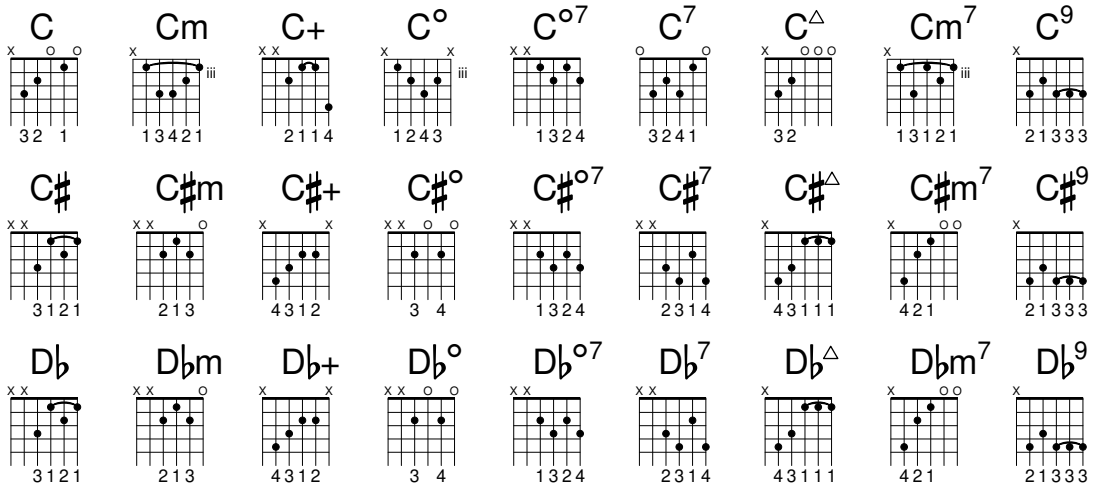
The chart below shows the predefined string tunings.

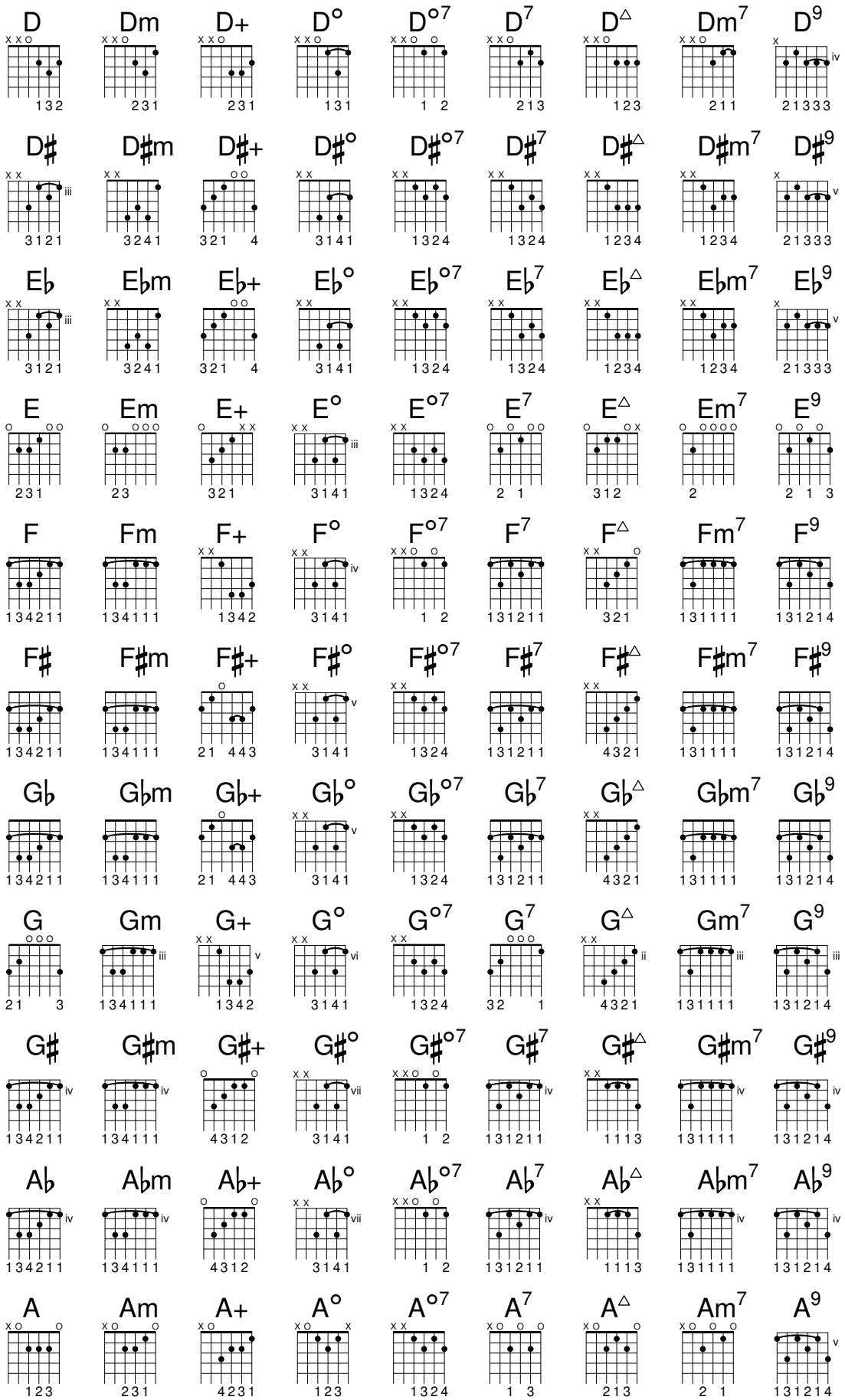


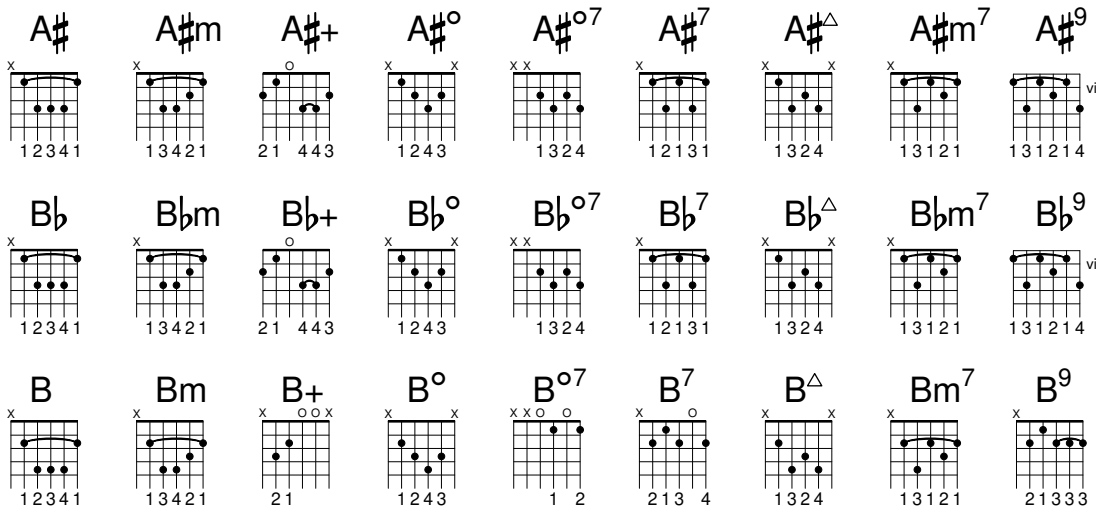


A.4 Predefined fretboard diagrams

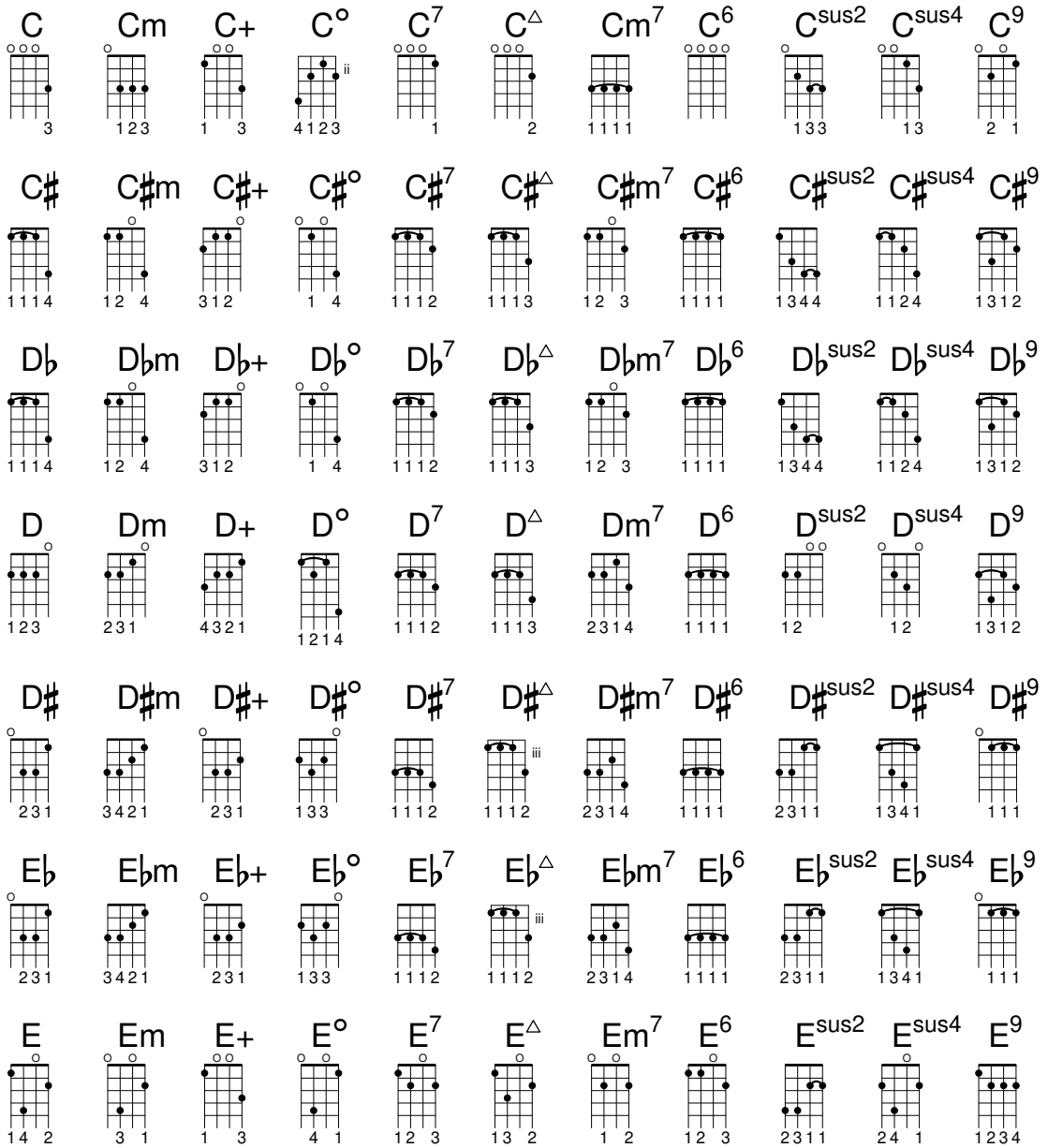
Diagrams for Guitar

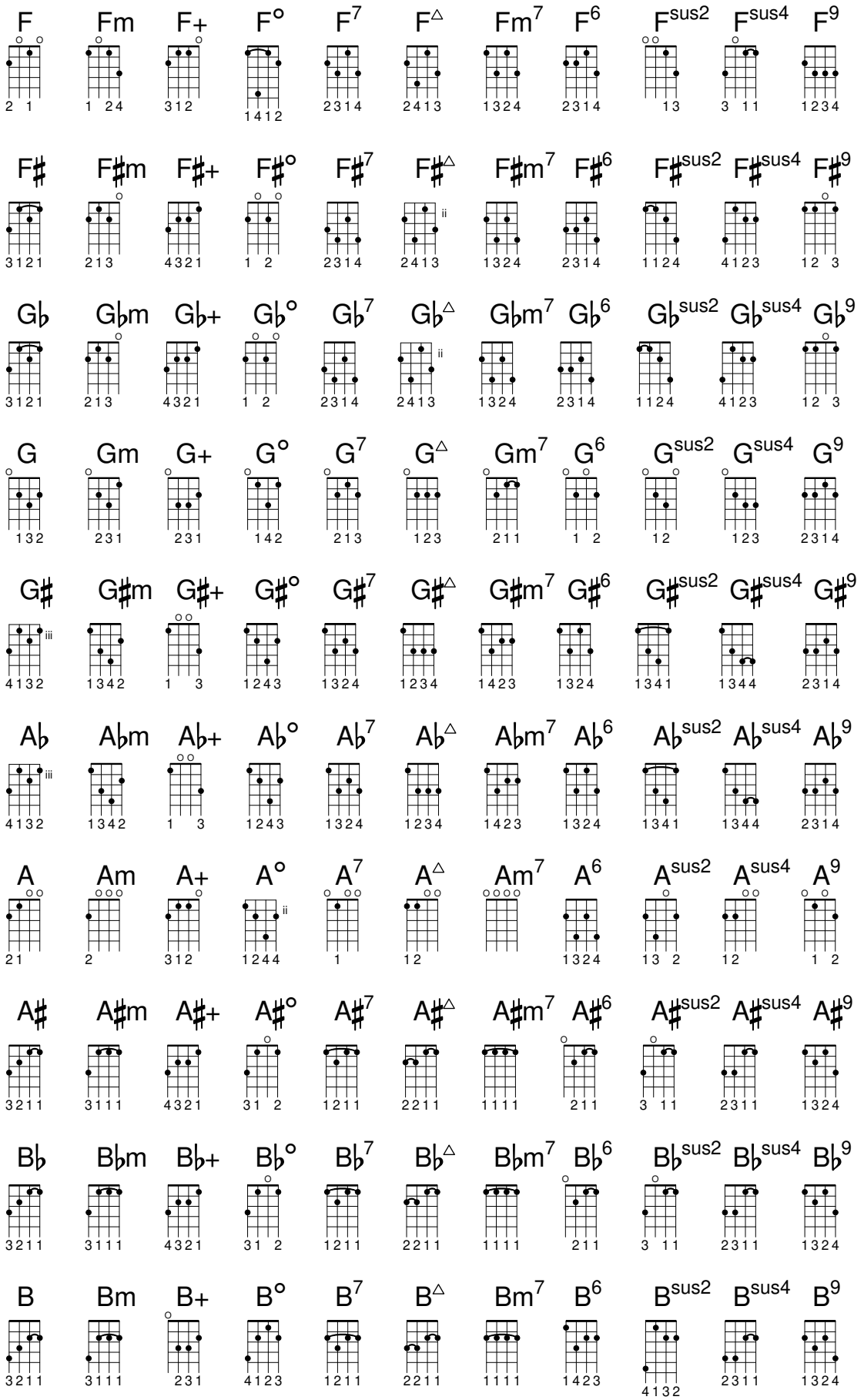



D Dm D+ D° D°7 D7 D△ Dm7 D9
D♯ D♯m D♯+ D♯° D♯°7 D♯7 D♯△ D♯m7 D♯9
E♭ E♭m E♭+ E♭° E♭°7 E♭7 E♭△ E♭m7 E♭9
E Em E+ E° E°7 E7 E△ Em7 E9
F Fm F+ F° F°7 F7 F△ Fm7 F9
F♯ F♯m F♯+ F♯° F♯°7 F♯7 F♯△ F♯m7 F♯9
G♭ G♭m G♭+ G♭° G♭°7 G♭7 G♭△ G♭m7 G♭9
G Gm G+ G° G°7 G7 G△ Gm7 G9
G♯ G♯m G♯+ G♯° G♯°7 G♯7 G♯△ G♯m7 G♯9
A♭ A♭m A♭+ A♭° A♭°7 A♭7 A♭△ A♭m7 A♭9
A Am A+ A° A°7 A7 A△ Am7 A9

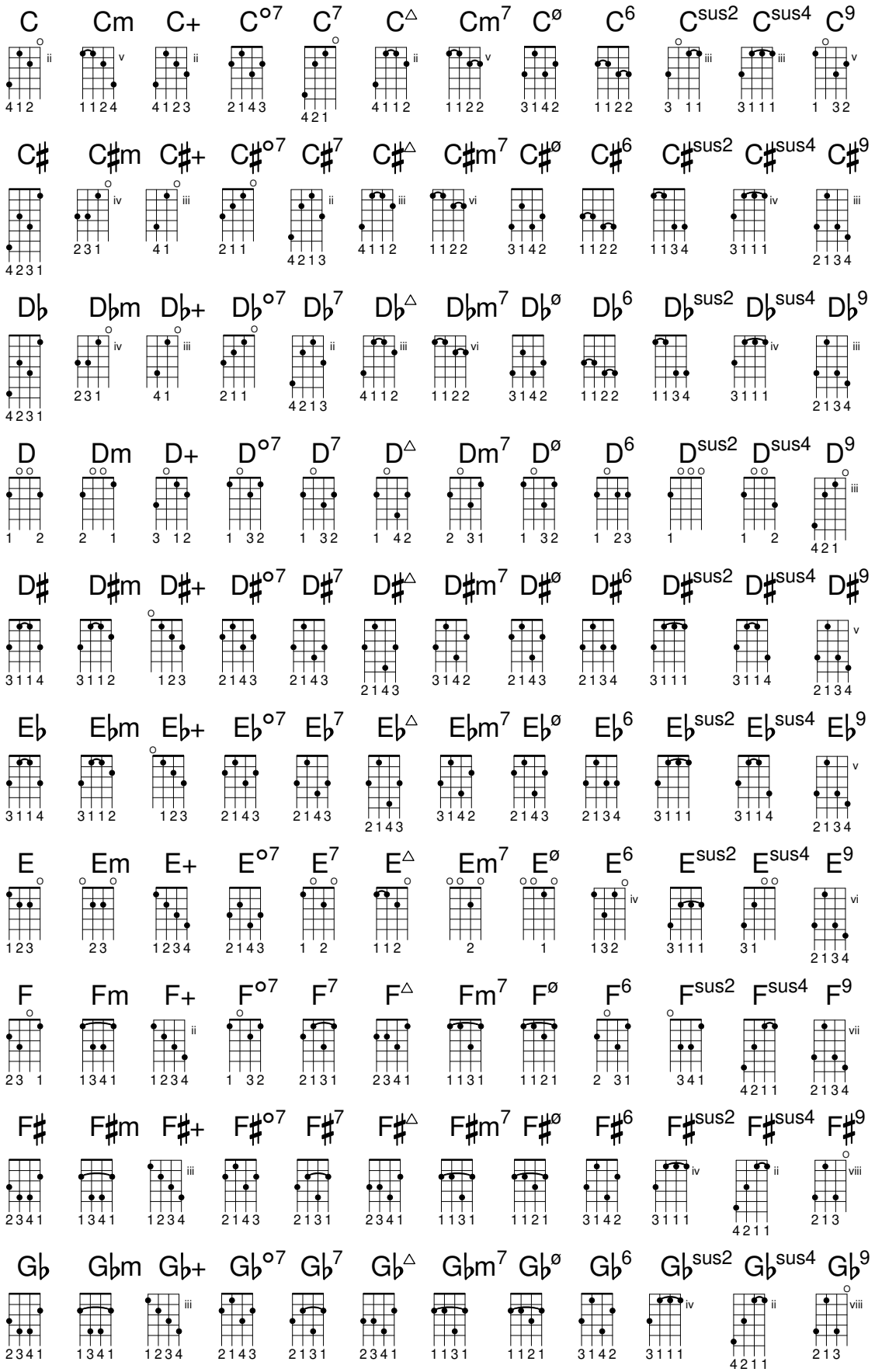


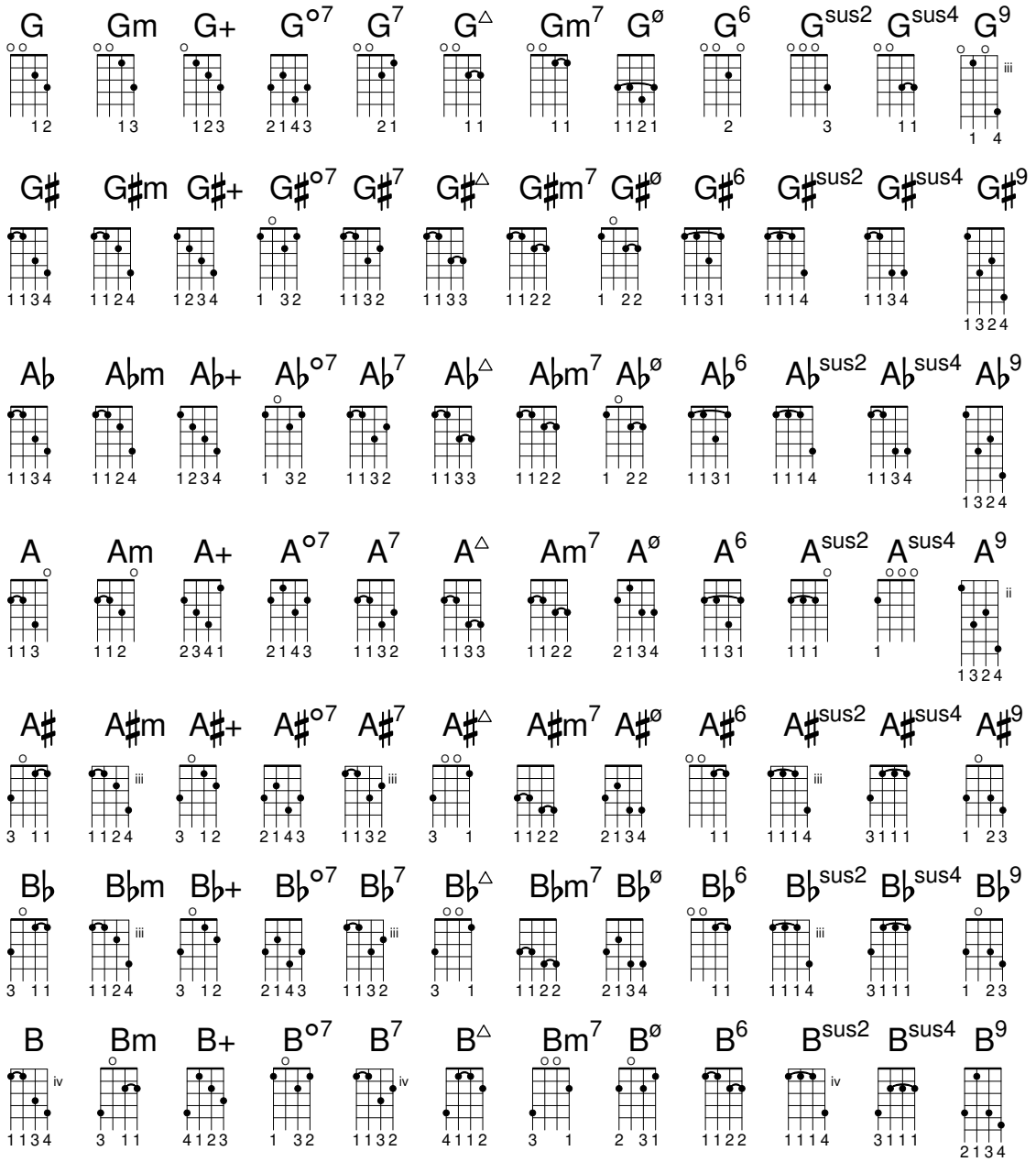
Diagrams for Ukulele




F Fm F+ F° F7 F△ Fm7 F6 Fsus2 Fsus4 F9
2 1 1 24 312 1412 2314 2413 1324 2314 13 3 11 1234
F♯ F♯m F♯+ F♯° F♯7 F♯△ F♯m7 F♯6 F♯sus2 F♯sus4 F♯9
3121 213 4321 1 2 2314 2413 ii 1324 2314 1124 4123 12 3
G♭ G♭m G♭+ G♭° G♭7 G♭△ G♭m7 G♭6 G♭sus2 G♭sus4 G♭9
3121 213 4321 1 2 2314 2413 ii 1324 2314 1124 4123 12 3
G Gm G+ G° G7 G△ Gm7 G6 Gsus2 Gsus4 G9
132 231 231 142 213 123 211 1 2 12 123 2314
G♯ G♯m G♯+ G♯° G♯7 G♯△ G♯m7 G♯6 G♯sus2 G♯sus4 G♯9
iii 4132 1342 1 3 1243 1324 1234 1423 1324 1341 1344 2314
A♭ A♭m A♭+ A♭° A♭7 A♭△ A♭m7 A♭6 A♭sus2 A♭sus4 A♭9
iii 4132 1342 1 3 1243 1324 1234 1423 1324 1341 1344 2314
A Am A+ A° A7 A△ Am7 A6 Asus2 Asus4 A9
21 2 312 ii 1244 1 12 1324 13 2 12 1 2
A♯ A♯m A♯+ A♯° A♯7 A♯△ A♯m7 A♯6 A♯sus2 A♯sus4 A♯9
3211 3111 4321 31 2 1211 2211 1111 211 3 11 2311 1324
B♭ B♭m B♭+ B♭° B♭7 B♭△ B♭m7 B♭6 B♭sus2 B♭sus4 B♭9
3211 3111 4321 31 2 1211 2211 1111 211 3 11 2311 1324
B Bm B+ B° B7 B△ Bm7 B6 Bsus2 Bsus4 B9
3211 3111 231 4123 1211 2211 1111 1423 4132 2311 1324

Diagrams for Mandolin





A.5 Predefined paper sizes

Paper sizes are defined in file `scm/paper.scm`.

ISO 216, A series

`"a10"`	26 mm x 37 mm (1.02 in x 1.46 in)
`"a9"`	37 mm x 52 mm (1.46 in x 2.05 in)
`"a8"`	52 mm x 74 mm (2.05 in x 2.91 in)
`"a7"`	74 mm x 105 mm (2.91 in x 4.13 in)
`"a6"`	105 mm x 148 mm (4.13 in x 5.83 in)
`"a5"`	148 mm x 210 mm (5.83 in x 8.27 in)
`"a4"`	210 mm x 297 mm (8.27 in x 11.69 in)
`"a3"`	297 mm x 420 mm (11.69 in x 16.54 in)
`"a2"`	420 mm x 594 mm (16.54 in x 23.39 in)
`"a1"`	594 mm x 841 mm (23.39 in x 33.11 in)
`"a0"`	841 mm x 1189 mm (33.11 in x 46.81 in)

Two extended sizes as defined in DIN 476

`"2a0"`	1189 mm x 1682 mm (46.81 in x 66.22 in)
`"4a0"`	1682 mm x 2378 mm (66.22 in x 93.62 in)

ISO 216, B series

`"b10"`	31 mm x 44 mm (1.22 in x 1.73 in)
`"b9"`	44 mm x 62 mm (1.73 in x 2.44 in)
`"b8"`	62 mm x 88 mm (2.44 in x 3.46 in)
`"b7"`	88 mm x 125 mm (3.46 in x 4.92 in)
`"b6"`	125 mm x 176 mm (4.92 in x 6.93 in)
`"b5"`	176 mm x 250 mm (6.93 in x 9.84 in)
`"b4"`	250 mm x 353 mm (9.84 in x 13.90 in)
`"b3"`	353 mm x 500 mm (13.90 in x 19.69 in)
`"b2"`	500 mm x 707 mm (19.69 in x 27.83 in)
`"b1"`	707 mm x 1000 mm (27.83 in x 39.37 in)
`"b0"`	1000 mm x 1414 mm (39.37 in x 55.67 in)

ISO 269, C series

`"c10"`	28 mm x 40 mm (1.10 in x 1.57 in)
`"c9"`	40 mm x 57 mm (1.57 in x 2.24 in)
`"c8"`	57 mm x 81 mm (2.24 in x 3.19 in)
`"c7"`	81 mm x 114 mm (3.19 in x 4.49 in)
`"c6"`	114 mm x 162 mm (4.49 in x 6.38 in)
`"c5"`	162 mm x 229 mm (6.38 in x 9.02 in)
`"c4"`	229 mm x 324 mm (9.02 in x 12.76 in)
`"c3"`	324 mm x 458 mm (12.76 in x 18.03 in)
`"c2"`	458 mm x 648 mm (18.03 in x 25.51 in)
`"c1"`	648 mm x 917 mm (25.51 in x 36.10 in)
`"c0"`	917 mm x 1297 mm (36.10 in x 51.06 in)

North American paper sizes

`"junior-legal"`	5.0 in x 8.0 in (127 mm x 203 mm)
`"legal"`	8.5 in x 14.0 in (216 mm x 356 mm)
`"ledger"`	17.0 in x 11.0 in (432 mm x 279 mm)
`"17x11"`	17.0 in x 11.0 in (432 mm x 279 mm)
`"letter"`	8.5 in x 11.0 in (216 mm x 279 mm)
`"tabloid"`	11.0 in x 17.0 in (279 mm x 432 mm)
`"11x17"`	11.0 in x 17.0 in (279 mm x 432 mm)

Sizes by IEEE Printer Working Group, for children's writing

`"government-letter"`	8.0 in x 10.5 in (203 mm x 267 mm)
`"government-legal"`	8.5 in x 13.0 in (216 mm x 330 mm)
`"philippine-legal"`	8.5 in x 13.0 in (216 mm x 330 mm)

ANSI sizes

`"ansi a"`	8.5 in x 11.0 in (216 mm x 279 mm)
`"ansi b"`	11.0 in x 17.0 in (279 mm x 432 mm)
`"ansi c"`	17.0 in x 22.0 in (432 mm x 559 mm)
`"ansi d"`	22.0 in x 34.0 in (559 mm x 864 mm)
`"ansi e"`	34.0 in x 44.0 in (864 mm x 1118 mm)
`"engineering f"`	28.0 in x 40.0 in (711 mm x 1016 mm)

North American architectural sizes

`"arch a"`	9.0 in x 12.0 in (229 mm x 305 mm)
`"arch b"`	12.0 in x 18.0 in (305 mm x 457 mm)

`"arch c"`	18.0 in x 24.0 in (457 mm x 610 mm)
`"arch d"`	24.0 in x 36.0 in (610 mm x 914 mm)
`"arch e"`	36.0 in x 48.0 in (914 mm x 1219 mm)
`"arch e1"`	30.0 in x 42.0 in (762 mm x 1067 mm)

Other sizes, including antique sizes still used in the United Kingdom

`"statement"`	5.5 in x 8.5 in (140 mm x 216 mm)
`"half letter"`	5.5 in x 8.5 in (140 mm x 216 mm)
`"quarto"`	8.0 in x 10.0 in (203 mm x 254 mm)
`"octavo"`	6.75 in x 10.5 in (171 mm x 267 mm)
`"executive"`	7.25 in x 10.5 in (184 mm x 267 mm)
`"monarch"`	7.25 in x 10.5 in (184 mm x 267 mm)
`"foolscap"`	8.27 in x 13.0 in (210 mm x 330 mm)
`"folio"`	8.27 in x 13.0 in (210 mm x 330 mm)
`"super-b"`	13.0 in x 19.0 in (330 mm x 483 mm)
`"post"`	15.5 in x 19.5 in (394 mm x 495 mm)
`"crown"`	15.0 in x 20.0 in (381 mm x 508 mm)
`"large post"`	16.5 in x 21.0 in (419 mm x 533 mm)
`"demy"`	17.5 in x 22.5 in (445 mm x 572 mm)
`"medium"`	18.0 in x 23.0 in (457 mm x 584 mm)
`"broadsheet"`	18.0 in x 24.0 in (457 mm x 610 mm)
`"royal"`	20.0 in x 25.0 in (508 mm x 635 mm)
`"elephant"`	23.0 in x 28.0 in (584 mm x 711 mm)
`"double demy"`	22.5 in x 35.0 in (572 mm x 889 mm)
`"quad demy"`	35.0 in x 45.0 in (889 mm x 1143 mm)
`"atlas"`	26.0 in x 34.0 in (660 mm x 864 mm)
`"imperial"`	22.0 in x 30.0 in (559 mm x 762 mm)
`"antiquarian"`	31.0 in x 53.0 in (787 mm x 1346 mm)

PA4-based sizes

`"pa10"`	26 mm x 35 mm (1.02 in x 1.38 in)
`"pa9"`	35 mm x 52 mm (1.38 in x 2.05 in)
`"pa8"`	52 mm x 70 mm (2.05 in x 2.76 in)
`"pa7"`	70 mm x 105 mm (2.76 in x 4.13 in)
`"pa6"`	105 mm x 140 mm (4.13 in x 5.51 in)
`"pa5"`	140 mm x 210 mm (5.51 in x 8.27 in)
`"pa4"`	210 mm x 280 mm (8.27 in x 11.02 in)
`"pa3"`	280 mm x 420 mm (11.02 in x 16.54 in)
`"pa2"`	420 mm x 560 mm (16.54 in x 22.05 in)
`"pa1"`	560 mm x 840 mm (22.05 in x 33.07 in)
`"pa0"`	840 mm x 1120 mm (33.07 in x 44.09 in)

Additional format for use in Southeast Asia and Australia

`"f4"`	210 mm x 330 mm (8.27 in x 12.99 in)

A.6 MIDI instruments

The following is a list of names that can be used for the `midiInstrument` property. Each is presented with its number among the General MIDI Standard's 128 Program Numbers.

1	`acoustic grand`	2	`bright acoustic`	3	`electric grand`
4	`honky-tonk`	5	`electric piano 1`	6	`electric piano 2`
7	`harpsichord`	8	`clav`	9	`celesta`
10	`glockenspiel`	11	`music box`	12	`vibraphone`
13	`marimba`	14	`xylophone`	15	`tubular bells`
16	`dulcimer`	17	`drawbar organ`	18	`percussive organ`

19	rock organ	20	church organ	21	reed organ
22	accordion	23	harmonica	24	concertina
25	acoustic guitar (nylon)	26	acoustic guitar (steel)	27	electric guitar (jazz)
28	electric guitar (clean)	29	electric guitar (muted)	30	overdriven guitar
31	distorted guitar	32	guitar harmonics	33	acoustic bass
34	electric bass (finger)	35	electric bass (pick)	36	fretless bass
37	slap bass 1	38	slap bass 2	39	synth bass 1
40	synth bass 2	41	violin	42	viola
43	cello	44	contrabass	45	tremolo strings
46	pizzicato strings	47	orchestral harp	48	timpani
49	string ensemble 1	50	string ensemble 2	51	synthstrings 1
52	synthstrings 2	53	choir aahs	54	voice oohs
55	synth voice	56	orchestra hit	57	trumpet
58	trombone	59	tuba	60	muted trumpet
61	french horn	62	brass section	63	synthbrass 1
64	synthbrass 2	65	soprano sax	66	alto sax
67	tenor sax	68	baritone sax	69	oboe
70	english horn	71	bassoon	72	clarinet
73	piccolo	74	flute	75	recorder
76	pan flute	77	blown bottle	78	shakuhachi
79	whistle	80	ocarina	81	lead 1 (square)
82	lead 2 (sawtooth)	83	lead 3 (calliope)	84	lead 4 (chiff)
85	lead 5 (charang)	86	lead 6 (voice)	87	lead 7 (fifths)
88	lead 8 (bass+lead)	89	pad 1 (new age)	90	pad 2 (warm)
91	pad 3 (polysynth)	92	pad 4 (choir)	93	pad 5 (bowed)
94	pad 6 (metallic)	95	pad 7 (halo)	96	pad 8 (sweep)
97	fx 1 (rain)	98	fx 2 (soundtrack)	99	fx 3 (crystal)
100	fx 4 (atmosphere)	101	fx 5 (brightness)	102	fx 6 (goblins)
103	fx 7 (echoes)	104	fx 8 (sci-fi)	105	sitar
106	banjo	107	shamisen	108	koto
109	kalimba	110	bagpipe	111	fiddle
112	shanai	113	tinkle bell	114	agogo
115	steel drums	116	woodblock	117	taiko drum
118	melodic tom	119	synth drum	120	reverse cymbal
121	guitar fret noise	122	breath noise	123	seashore
124	bird tweet	125	telephone ring	126	helicopter
127	applause	128	gunshot		

The drum kits listed below are also possible.

1	standard kit	9	room kit	17	power kit
25	electronic kit	26	tr-808 kit	33	jazz kit
41	brush kit	49	orchestra kit	57	sfx kit
128	mt-32 kit/cm-64 kit				

A.7 List of colors

Normal colors

See [Coloring objects], page 260, for detailed usage syntax.

black	white	red	green
blue	cyan	magenta	yellow
grey	darkred	darkgreen	darkblue
darkcyan	darkmagenta	darkyellow	

CSS color names

CSS color names may be used as-is in string arguments.

aliceblue	antiquewhite	aqua
aquamarine	azure	beige
bisque	black	blanchedalmond
blue	blueviolet	brown

burlywood
chocolate
cornsilk
darkblue
darkgray
darkkhaki
darkorange
darksalmon
darkslategray
darkviolet
dimgray
firebrick
fuchsia
gold
green
honeydew
indigo
lavender
lemonchiffon
lightcyan
lightgreen
lightsalmon
lightslategray
lightyellow
linen
mediumaquamarine
mediumpurple
mediumspringgreen
midnightblue
moccasin
oldlace
orange
palegoldenrod
palevioletred
peru
powderblue
red
saddlebrown
seagreen
silver
slategray
springgreen
teal
turquoise
white
yellowgreen

cadetblue
coral
crimson
darkcyan
darkgreen
darkmagenta
darkorchid
darkseagreen
darkslategrey
deeppink
dimgrey
floralwhite
gainsboro
goldenrod
greenyellow
hotpink
ivory
lavenderblush
lightblue
lightgoldenrodyellow
lightgrey
lightseagreen
lightslategrey
lime
magenta
mediumblue
mediumseagreen
mediumturquoise
mintcream
navajowhite
olive
orangered
palegreen
papayawhip
pink
purple
rosybrown
salmon
seashell
skyblue
slategrey
steelblue
thistle
violet
whitesmoke

chartreuse
cornflowerblue
cyan
darkgoldenrod
darkgrey
darkolivegreen
darkred
darkslateblue
darkturquoise
deepskyblue
dodgerblue
forestgreen
ghostwhite
gray
grey
indianred
khaki
lawngreen
lightcoral
lightgray
lightpink
lightskyblue
lightsteelblue
limegreen
maroon
mediumorchid
mediumslateblue
mediumvioletred
mistyrose
navy
olivedrab
orchid
paleturquoise
peachpuff
plum
rebeccapurple
royalblue
sandybrown
sienna
slateblue
snow
tan
tomato
wheat
yellow

CSS color definitions differ from X color names for the following colors: `green`, `grey`, `maroon`, `purple`.

X color names

X11 color names (`https://en.wikipedia.org/wiki/X11_color_names`) offer a wider choice than CSS names. They come in several variants:

- Any name that is spelled as a single word with capitalization (e.g., 'LightSlateBlue') can also be spelled as space-separated words with or without capitalization (e.g., 'light slate blue').
- The word 'grey' can always be spelled 'gray' (e.g., 'DarkSlateGray'), without any difference in the output.
- Some names can take a numerical suffix (e.g., 'LightSalmon4').

Use the Scheme function `x11-color` to access them.

Color Names without a numerical suffix

The following table presents all color names that may be used without a numerical suffix.

aliceblue	antiquewhite	aquamarine
azure	beige	bisque
black	blanchedalmond	blue
blueviolet	brown	burlywood
cadetblue	chartreuse	chocolate
coral	cornflowerblue	cornsilk
cyan	darkblue	darkcyan
darkgoldenrod	darkgray	darkgreen
darkgrey	darkkhaki	darkmagenta
darkolivegreen	darkorange	darkorchid
darkred	darksalmon	darkseagreen
darkslateblue	darkslategray	darkslategrey
darkturquoise	darkviolet	deeppink
deepskyblue	dimgray	dimgrey
dodgerblue	firebrick	floralwhite
forestgreen	gainsboro	ghostwhite
gold	goldenrod	gray
green	greenyellow	grey
honeydew	hotpink	indianred
ivory	khaki	lavender
lavenderblush	lawngreen	lemonchiffon
lightblue	lightcoral	lightcyan
lightgoldenrod	lightgoldenrodyellow	lightgray
lightgreen	lightgrey	lightpink
lightsalmon	lightseagreen	lightskyblue
lightslateblue	lightslategray	lightslategrey
lightsteelblue	lightyellow	limegreen
linen	magenta	maroon
mediumaquamarine	mediumblue	mediumorchid
mediumpurple	mediumseagreen	mediumslateblue
mediumspringgreen	mediumturquoise	mediumvioletred
midnightblue	mintcream	mistyrose
moccasin	navajowhite	navy
navyblue	oldlace	olivedrab
orange	orangered	orchid
palegoldenrod	palegreen	paleturquoise

palevioletred papayawhip peachpuff
peru pink plum
powderblue purple red
rosybrown royalblue saddlebrown
salmon sandybrown seagreen
seashell sienna skyblue
slateblue slategray slategrey
snow springgreen steelblue
tan thistle tomato
turquoise violet violetred
wheat white whitesmoke
yellow yellowgreen

Color names with a numerical suffix

A subset of the X11 color names may be used with a numerical suffix in the range 1 to 4 to get darker shades. Note that for such colors, color `foo` is identical to color `foo1`.

antiquewhite1 antiquewhite2 antiquewhite3 antiquewhite4
aquamarine1 aquamarine2 aquamarine3 aquamarine4
azure1 azure2 azure3 azure4
bisque1 bisque2 bisque3 bisque4
blue1 blue2 blue3 blue4
brown1 brown2 brown3 brown4
burlywood1 burlywood2 burlywood3 burlywood4
cadetblue1 cadetblue2 cadetblue3 cadetblue4
chartreuse1 chartreuse2 chartreuse3 chartreuse4
chocolate1 chocolate2 chocolate3 chocolate4
coral1 coral2 coral3 coral4
cornsilk1 cornsilk2 cornsilk3 cornsilk4
cyan1 cyan2 cyan3 cyan4
darkgoldenrod1 darkgoldenrod2 darkgoldenrod3 darkgoldenrod4
darkolivegreen1 darkolivegreen2 darkolivegreen3 darkolivegreen4
darkorange1 darkorange2 darkorange3 darkorange4
darkorchid1 darkorchid2 darkorchid3 darkorchid4
darkseagreen1 darkseagreen2 darkseagreen3 darkseagreen4
darkslategray1 darkslategray2 darkslategray3 darkslategray4
deeppink1 deeppink2 deeppink3 deeppink4
deepskyblue1 deepskyblue2 deepskyblue3 deepskyblue4
dodgerblue1 dodgerblue2 dodgerblue3 dodgerblue4
firebrick1 firebrick2 firebrick3 firebrick4
gold1 gold2 gold3 gold4
goldenrod1 goldenrod2 goldenrod3 goldenrod4
green1 green2 green3 green4
honeydew1 honeydew2 honeydew3 honeydew4
hotpink1 hotpink2 hotpink3 hotpink4
indianred1 indianred2 indianred3 indianred4
ivory1 ivory2 ivory3 ivory4
khaki1 khaki2 khaki3 khaki4
lavenderblush1 lavenderblush2 lavenderblush3 lavenderblush4
lemonchiffon1 lemonchiffon2 lemonchiffon3 lemonchiffon4
lightblue1 lightblue2 lightblue3 lightblue4

lightcyan1	lightcyan2	lightcyan3	lightcyan4
lightgoldenrod1	lightgoldenrod2	lightgoldenrod3	lightgoldenrod4
lightpink1	lightpink2	lightpink3	lightpink4
lightsalmon1	lightsalmon2	lightsalmon3	lightsalmon4
lightskyblue1	lightskyblue2	lightskyblue3	lightskyblue4
lightsteelblue1	lightsteelblue2	lightsteelblue3	lightsteelblue4
lightyellow1	lightyellow2	lightyellow3	lightyellow4
magenta1	magenta2	magenta3	magenta4
maroon1	maroon2	maroon3	maroon4
mediumorchid1	mediumorchid2	mediumorchid3	mediumorchid4
mediumpurple1	mediumpurple2	mediumpurple3	mediumpurple4
mistyrose1	mistyrose2	mistyrose3	mistyrose4
navajowhite1	navajowhite2	navajowhite3	navajowhite4
olivedrab1	olivedrab2	olivedrab3	olivedrab4
orange1	orange2	orange3	orange4
orangered1	orangered2	orangered3	orangered4
orchid1	orchid2	orchid3	orchid4
palegreen1	palegreen2	palegreen3	palegreen4
paleturquoise1	paleturquoise2	paleturquoise3	paleturquoise4
palevioletred1	palevioletred2	palevioletred3	palevioletred4
peachpuff1	peachpuff2	peachpuff3	peachpuff4
pink1	pink2	pink3	pink4
plum1	plum2	plum3	plum4
purple1	purple2	purple3	purple4
red1	red2	red3	red4
rosybrown1	rosybrown2	rosybrown3	rosybrown4
royalblue1	royalblue2	royalblue3	royalblue4
salmon1	salmon2	salmon3	salmon4
seagreen1	seagreen2	seagreen3	seagreen4
seashell1	seashell2	seashell3	seashell4
sienna1	sienna2	sienna3	sienna4
skyblue1	skyblue2	skyblue3	skyblue4
slateblue1	slateblue2	slateblue3	slateblue4
slategray1	slategray2	slategray3	slategray4
snow1	snow2	snow3	snow4
springgreen1	springgreen2	springgreen3	springgreen4
steelblue1	steelblue2	steelblue3	steelblue4
tan1	tan2	tan3	tan4
thistle1	thistle2	thistle3	thistle4
tomato1	tomato2	tomato3	tomato4
turquoise1	turquoise2	turquoise3	turquoise4
violetred1	violetred2	violetred3	violetred4
wheat1	wheat2	wheat3	wheat4
yellow1	yellow2	yellow3	yellow4

Grey Scale

The set of X11 colors also contains a palette of 101 gray shades.

gray0	gray1	gray2	gray3	gray4
gray5	gray6	gray7	gray8	gray9
gray10	gray11	gray12	gray13	gray14

gray15	gray16	gray17	gray18	gray19
gray20	gray21	gray22	gray23	gray24
gray25	gray26	gray27	gray28	gray29
gray30	gray31	gray32	gray33	gray34
gray35	gray36	gray37	gray38	gray39
gray40	gray41	gray42	gray43	gray44
gray45	gray46	gray47	gray48	gray49
gray50	gray51	gray52	gray53	gray54
gray55	gray56	gray57	gray58	gray59
gray60	gray61	gray62	gray63	gray64
gray65	gray66	gray67	gray68	gray69
gray70	gray71	gray72	gray73	gray74
gray75	gray76	gray77	gray78	gray79
gray80	gray81	gray82	gray83	gray84
gray85	gray86	gray87	gray88	gray89
gray90	gray91	gray92	gray93	gray94
gray95	gray96	gray97	gray98	gray99
gray100				

The table for color names `grey`*N* looks the same.

Color-blind-safe colors

The Scheme function `universal-color` provides a set of eight colors (`https://jfly.uni-koeln.de/color`) designed to be unambiguous to people with dichromatism.

black	orange	skyblue	bluegreen
yellow	blue	vermillion	redpurple

A.8 The Emmentaler font

The Emmentaler font consists of two *subsets* of glyphs. “Feta”, used for classical notation and “Parmesan”, used for Ancient notation.

Any glyph within the Emmentaler font can be accessed directly by using text markup along with the name of the glyph (as shown in the tables below). For example;

```
g^\markup {\musicglyph "scripts.segno" }
```

or

```
\markup {\musicglyph "five"}
```

For more information see Section 1.8.2 [Formatting text], page 289.

Clef glyphs

`clefs.C`		`clefs.C_change`	
`clefs.varC`		`clefs.varC_change`	
`clefs.F`		`clefs.F_change`	
`clefs.G`		`clefs.G_change`	
`clefs.GG`		`clefs.GG_change`	

clefs.tenorG		clefs.tenorG_change	
clefs.percussion		clefs.percussion_change	
clefs.varpercussion		clefs .varpercussion_change	
clefs.tab		clefs.tab_change	

Time Signature glyphs

timesig.C44		timesig.C22	

Number glyphs

plus	+	comma	,
hyphen	-	period	.
zero	0	one	1
two	2	three	3
four	4	four.alt	4
five	5	six	6
seven	7	seven.alt	7
eight	8	nine	9
fixedwidth.zero	0	fixedwidth.one	1
fixedwidth.two	2	fixedwidth.three	3
fixedwidth.four	4	fixedwidth.four.alt	4
fixedwidth.five	5	fixedwidth.six	6
fixedwidth.seven	7	fixedwidth.seven.alt	7
fixedwidth.eight	8	fixedwidth.nine	9
fattened.zero	0	fattened.one	1
fattened.two	2	fattened.three	3
fattened.four	4	fattened.four.alt	4
fattened.five	5	fattened.six	6
fattened.seven	7	fattened.seven.alt	7

fattened.eight	8	fattened.nine	9
fattened.fixedwidth.zero	0	fattened.fixedwidth.one	1
fattened.fixedwidth.two	2	fattened .fixedwidth.three	3
fattened.fixedwidth.four	4	fattened.fixedwidth .four.alt	4
fattened.fixedwidth.five	5	fattened.fixedwidth.six	6
fattened .fixedwidth.seven	7	fattened.fixedwidth .seven.alt	7
fattened .fixedwidth.eight	8	fattened.fixedwidth.nine	9

Figured bass symbol glyphs

figbass.twoplus	2+	figbass.fourplus	4+
figbass.fiveplus	5+	figbass.sixstroked	6
figbass.sevenstroked	7	figbass.ninestroked	9

Accidental glyphs

accidentals.sharp	♯	accidentals .sharp.figbass	♯
accidentals .sharp.arrowup	♯	accidentals .sharp.arrowdown	♯
accidentals .sharp.arrowboth	♯	accidentals.sharp .slashslash.stem	♯
accidentals.sharp .slashslashslash.stemstem	♯	accidentals.sharp .slashslashslash.stem	♯
accidentals .sharp.slash.stem	♯	accidentals.sharp .slashslash.stemstemstem	♯
accidentals.doublesharp	𝄪	accidentals .doublesharp.figbass	𝄪
accidentals.natural	♮	accidentals .natural.figbass	♮
accidentals .natural.arrowup	♮	accidentals .natural.arrowdown	♮
accidentals .natural.arrowboth	♮	accidentals.flat	♭
accidentals.flat.figbass	♭	accidentals.flat.arrowup	♭
accidentals .flat.arrowdown	♭	accidentals .flat.arrowboth	♭
accidentals.flat.slash	♭	accidentals.flat .slashslash	♭
accidentals .mirroredflat.flat	𝄫	accidentals.mirroredflat	𝄫
accidentals .mirroredflat.backslash	𝄫	accidentals.flatflat	𝄫

accidentals .flatflat.figbass		accidentals .flatflat.slash	
accidentals.sharp.sori		accidentals.flat.koron	
accidentals.rightparen		accidentals.leftparen	

Default note head glyphs

noteheads.uM2		noteheads.dM2	
noteheads.sM1		noteheads.s0	
noteheads.s1		noteheads.s2	

Special note head glyphs

noteheads.sM1double		noteheads.s0diamond	
noteheads.s1diamond		noteheads.s2diamond	
noteheads.s0triangle		noteheads.s1triangle	
noteheads.s2triangle		noteheads.s0slash	
noteheads.s1slash		noteheads.s2slash	
noteheads.s0cross		noteheads.s1cross	
noteheads.s2cross		noteheads.s2xcircle	
noteheads.s0harmonic		noteheads.s2harmonic	

Note head glyphs for shape notes

noteheads.s0do		noteheads.s1do	
noteheads.s2do		noteheads.s0doThin	
noteheads.s1doThin		noteheads.s2doThin	
noteheads.s0re		noteheads.s1re	
noteheads.s2re		noteheads.s0reThin	
noteheads.s1reThin		noteheads.s2reThin	
noteheads.s0mi		noteheads.s1mi	
noteheads.s2mi		noteheads.s0miMirror	
noteheads.s1miMirror		noteheads.s2miMirror	

noteheads.s0miThin		noteheads.s1miThin	
noteheads.s2miThin		noteheads.u0fa	
noteheads.d0fa		noteheads.u1fa	
noteheads.d1fa		noteheads.u2fa	
noteheads.d2fa		noteheads.u0faThin	
noteheads.d0faThin		noteheads.u1faThin	
noteheads.d1faThin		noteheads.u2faThin	
noteheads.d2faThin		noteheads.s0sol	
noteheads.s1sol		noteheads.s2sol	
noteheads.s0la		noteheads.s1la	
noteheads.s2la		noteheads.s0laThin	
noteheads.s1laThin		noteheads.s2laThin	
noteheads.s0ti		noteheads.s1ti	
noteheads.s2ti		noteheads.s0tiThin	
noteheads.s1tiThin		noteheads.s2tiThin	
noteheads.u0doFunk		noteheads.d0doFunk	
noteheads.u1doFunk		noteheads.d1doFunk	
noteheads.u2doFunk		noteheads.d2doFunk	
noteheads.u0reFunk		noteheads.d0reFunk	
noteheads.u1reFunk		noteheads.d1reFunk	
noteheads.u2reFunk		noteheads.d2reFunk	
noteheads.u0miFunk		noteheads.d0miFunk	
noteheads.u1miFunk		noteheads.d1miFunk	
noteheads.s2miFunk		noteheads.u0faFunk	
noteheads.d0faFunk		noteheads.u1faFunk	
noteheads.d1faFunk		noteheads.u2faFunk	
noteheads.d2faFunk		noteheads.s0solFunk	

noteheads.s1solFunk		noteheads.s2solFunk	
noteheads.s0laFunk		noteheads.s1laFunk	
noteheads.s2laFunk		noteheads.u0tiFunk	
noteheads.d0tiFunk		noteheads.u1tiFunk	
noteheads.d1tiFunk		noteheads.u2tiFunk	
noteheads.d2tiFunk		noteheads.s0doWalker	
noteheads.u1doWalker		noteheads.d1doWalker	
noteheads.u2doWalker		noteheads.d2doWalker	
noteheads.s0reWalker		noteheads.u1reWalker	
noteheads.d1reWalker		noteheads.u2reWalker	
noteheads.d2reWalker		noteheads.s0miWalker	
noteheads.s1miWalker		noteheads.s2miWalker	
noteheads.s0faWalker		noteheads.u1faWalker	
noteheads.d1faWalker		noteheads.u2faWalker	
noteheads.d2faWalker		noteheads.s0laWalker	
noteheads.s1laWalker		noteheads.s2laWalker	
noteheads.s0tiWalker		noteheads.u1tiWalker	
noteheads.d1tiWalker		noteheads.u2tiWalker	
noteheads.d2tiWalker			

Rest glyphs

rests.0		rests.1	
rests.0o		rests.1o	
rests.M3		rests.M2	
rests.M1		rests.M1o	
rests.2		rests.2classical	
rests.2z		rests.3	

rests.4		rests.5	
rests.6		rests.7	
rests.8		rests.9	
rests.10			

Flag glyphs

flags.u3		flags.u4	
flags.u5		flags.u6	
flags.u7		flags.u8	
flags.u9		flags.u10	
flags.d3		flags.d4	
flags.d5		flags.d6	
flags.d7		flags.d8	
flags.d9		flags.d10	
flags.ugrace		flags.dgrace	

Dot glyphs

dots.dot	

Dynamic glyphs

space		f	
m		n	

p		r	
s		z	

Script glyphs

scripts.ufermata		scripts.dfermata	
scripts.uhenzeshortfermata		scripts.dhenzeshortfermata	
scripts.uhenzelongfermata		scripts.dhenzelongfermata	
scripts.ushortfermata		scripts.dshortfermata	
scripts.uveryshortfermata		scripts.dveryshortfermata	
scripts.ulongfermata		scripts.dlongfermata	
scripts.uverylongfermata		scripts.dverylongfermata	
scripts.thumb		scripts.sforzato	
scripts.espr		scripts.staccato	
scripts.ustaccatissimo		scripts.dstaccatissimo	
scripts.tenuto		scripts.uportato	
scripts.dportato		scripts.umarcato	
scripts.dmarcato		scripts.open	
scripts.halfopen		scripts.halfopenvertical	
scripts.stopped		scripts.upbow	
scripts.downbow		scripts.reverseturn	
scripts.turn		scripts.slashturn	
scripts.haydnturn		scripts.trill	
scripts.upedalheel		scripts.dpedalheel	
scripts.upedaltoe		scripts.dpedaltoe	
scripts.flageolet		scripts.segno	
scripts.varsegno		scripts.coda	
scripts.varcoda		scripts.rcomma	

scripts.lcomma		scripts.rvarcomma	
scripts.lvarcomma		scripts.raltcomma	
scripts.laltcomma		scripts.arpeggio	
scripts.trill_element		scripts.arpeggio.arrow.M1	
scripts.arpeggio.arrow.1		scripts.prall	
scripts.mordent		scripts.prallprall	
scripts.prallmordent		scripts.upprall	
scripts.upmordent		scripts.prallup	
scripts.downprall		scripts.downmordent	
scripts.pralldown		scripts.lineprall	
scripts.caesura.curved		scripts.caesura.straight	
scripts.tickmark		scripts.snappizzicato	
scripts.ictus		scripts.uaccentus	
scripts.daccentus		scripts.usemicirculus	
scripts.dsemicirculus		scripts.circulus	
scripts.usignumcongruentiae		scripts.dsignumcongruentiae	

Arrowhead glyphs

arrowheads.open.01		arrowheads.open.0M1	
arrowheads.open.11		arrowheads.open.1M1	
arrowheads.close.01		arrowheads.close.0M1	
arrowheads.close.11		arrowheads.close.1M1	

Bracket-tip glyphs

brackettips.up		brackettips.down	

Pedal glyphs

pedal.*		pedal.M	
pedal..		pedal.P	

pedal.d

pedal.e

pedal.Ped

Accordion glyphs

accordion.discant

accordion.dot

accordion.freebass

accordion.stdbass

accordion.bayanbass

accordion.oldEE

accordion.push

accordion.pull

Tie glyphs

ties.lyric.short

ties.lyric.default

Vaticana glyphs

clefs.vaticana.do

clefs.vaticana.do_change

clefs.vaticana.fa

clefs.vaticana.fa_change

custodes.vaticana.u0

custodes.vaticana.u1

custodes.vaticana.u2

custodes.vaticana.d0

custodes.vaticana.d1

custodes.vaticana.d2

accidentals.vaticanaM1

accidentals.vaticana0

dots.dotvaticana

noteheads.svaticana.punctum

noteheads.svaticana.punctum.cavum

noteheads.svaticana.linea.punctum

noteheads.svaticana.linea.punctum.cavum

noteheads.svaticana.inclinatum

noteheads.svaticana.lpes

noteheads.svaticana.vlpes

noteheads.svaticana.upes

noteheads.svaticana.vupes

noteheads.svaticana.plica

noteheads.svaticana.vplica

noteheads.svaticana.epiphonus

noteheads.svaticana.vepiphonus

noteheads.svaticana.reverse.plica

noteheads.svaticana.reverse.vplica

noteheads.svaticana.inner.cephalicus

noteheads.svaticana.cephalicus

noteheads.svaticana.quilisma

Medicaea glyphs

clefs.medicaea.do

clefs.medicaea.do_change

clefs.medicaea.fa

clefs.medicaea.fa_change

custodes.medicaea.u0

custodes.medicaea.u1

custodes.medicaea.u2

custodes.medicaea.d0

custodes.medicaea.d1

custodes.medicaea.d2

accidentals.medicaeaM1

noteheads.smedicaea.inclinatum

noteheads.smedicaea.punctum

noteheads.smedicaea.rvirga

noteheads.smedicaea.virga

Hufnagel glyphs

clefs.hufnagel.do

clefs.hufnagel.do_change

clefs.hufnagel.fa

clefs.hufnagel.fa_change

clefs.hufnagel.do.fa

clefs.hufnagel.do.fa_change

custodes.hufnagel.u0

custodes.hufnagel.u1

custodes.hufnagel.u2

custodes.hufnagel.d0

custodes.hufnagel.d1

custodes.hufnagel.d2

accidentals.hufnagelM1

noteheads.shufnagel.punctum

noteheads.shufnagel.virga

noteheads.shufnagel.lpes

Mensural glyphs

rests.M3mensural

rests.M2mensural

rests.M1mensural

rests.0mensural

rests.1mensural

rests.2mensural

rests.3mensural

rests.4mensural

clefs.mensural.c

clefs.mensural.c_change

clefs.blackmensural.c

clefs.blackmensural.c_change

clefs.mensural.f

clefs.mensural.f_change

clefs.mensural.g

clefs.mensural.g_change

custodes.mensural.u0

custodes.mensural.u1

custodes.mensural.u2

custodes.mensural.d0

custodes.mensural.d1

custodes.mensural.d2

accidentals.mensural1

accidentals.mensuralM1

flags.mensuralu03

flags.mensuralu13

flags.mensuralu23

flags.mensurald03

flags.mensurald13

flags.mensurald23

flags.mensuralu04

flags.mensuralu14

flags.mensuralu24

flags.mensurald04

flags.mensurald14

flags.mensurald24

flags.mensuralu05

flags.mensuralu15

flags.mensuralu25

flags.mensurald05

flags.mensurald15

flags.mensurald25

flags.mensuralu06

flags.mensuralu16

flags.mensuralu26

flags.mensurald06

flags.mensurald16

flags.mensurald26

timesig.mensural44

timesig.mensural22

timesig.mensural32

timesig.mensural64

timesig.mensural94

timesig.mensural34

timesig.mensural68

timesig.mensural98

timesig.mensural48

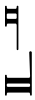
timesig.mensural68alt

timesig.mensural24

noteheads.uM3mensural

noteheads.dM3mensural

noteheads.sM3ligmensural

noteheads.uM2mensural		noteheads.dM2mensural	
noteheads.sM2ligmensural		noteheads.sM1mensural	
noteheads.urM3mensural		noteheads.drM3mensural	
noteheads.srM3ligmensural		noteheads.urM2mensural	
noteheads.drM2mensural		noteheads.srM2ligmensural	
noteheads.srM1mensural		noteheads.uM3semimensural	
noteheads.dM3semimensural		noteheads.sM3semiligmensural	
noteheads.uM2semimensural		noteheads.dM2semimensural	
noteheads.sM2semiligmensural		noteheads.sM1semimensural	
noteheads.urM3semimensural		noteheads.drM3semimensural	
noteheads.srM3semiligmensural		noteheads.urM2semimensural	
noteheads.drM2semimensural		noteheads.srM2semiligmensural	
noteheads.srM1semimensural		noteheads.uM3blackmensural	
noteheads.dM3blackmensural		noteheads.sM3blackligmensural	
noteheads.uM2blackmensural		noteheads.dM2blackmensural	
noteheads.sM2blackligmensural		noteheads.sM1blackmensural	
noteheads.s0mensural		noteheads.s1mensural	
noteheads.s2mensural		noteheads.s0blackmensural	

Neomensural glyphs

rests.M3neomensural		rests.M2neomensural	
rests.M1neomensural		rests.0neomensural	
rests.1neomensural		rests.2neomensural	
rests.3neomensural		rests.4neomensural	
clefs.neomensural.c		clefs.neomensural.c_change	
timesig.neomensural44		timesig.neomensural22	
timesig.neomensural32		timesig.neomensural64	

timesig.neomensural94		timesig.neomensural34	
timesig.neomensural68		timesig.neomensural98	
timesig.neomensural48		timesig.neomensural68alt	
timesig.neomensural24		noteheads.uM3neomensural	
noteheads.dM3neomensural		noteheads.uM2neomensural	
noteheads.dM2neomensural		noteheads.sM1neomensural	
noteheads .urM3neomensural		noteheads .drM3neomensural	
noteheads .urM2neomensural		noteheads .drM2neomensural	
noteheads .srM1neomensural		noteheads.s0neomensural	
noteheads.s1neomensural		noteheads.s2neomensural	

Petrucci glyphs

clefs.petrucci.c1		clefs.petrucci.c1_change	
clefs.petrucci.c2		clefs.petrucci.c2_change	
clefs.petrucci.c3		clefs.petrucci.c3_change	
clefs.petrucci.c4		clefs.petrucci.c4_change	
clefs.petrucci.c5		clefs.petrucci.c5_change	
clefs.petrucci.f		clefs.petrucci.f_change	
clefs.petrucci.g		clefs.petrucci.g_change	
noteheads.s0petrucci		noteheads.s1petrucci	
noteheads.s2petrucci		noteheads .s0blackpetrucci	
noteheads .s1blackpetrucci		noteheads .s2blackpetrucci	

Solesmes glyphs

noteheads.ssolesmes .incl.parvum		noteheads .ssolesmes.auct.asc	
noteheads .ssolesmes.auct.desc		noteheads.ssolesmes .incl.auctum	
noteheads .ssolesmes.stropha		noteheads.ssolesmes .stropha.aucta	

noteheads
.ssolesmes.oriscus

Kievan Notation glyphs

clefs.kievan.do

clefs.kievan.do_change

accidentals.kievan1

accidentals.kievanM1

scripts.barline.kievan

dots.dotkievan

noteheads.sM2kievan

noteheads.sM1kievan

noteheads.s0kievan

noteheads.d2kievan

noteheads.u2kievan

noteheads.s1kievan

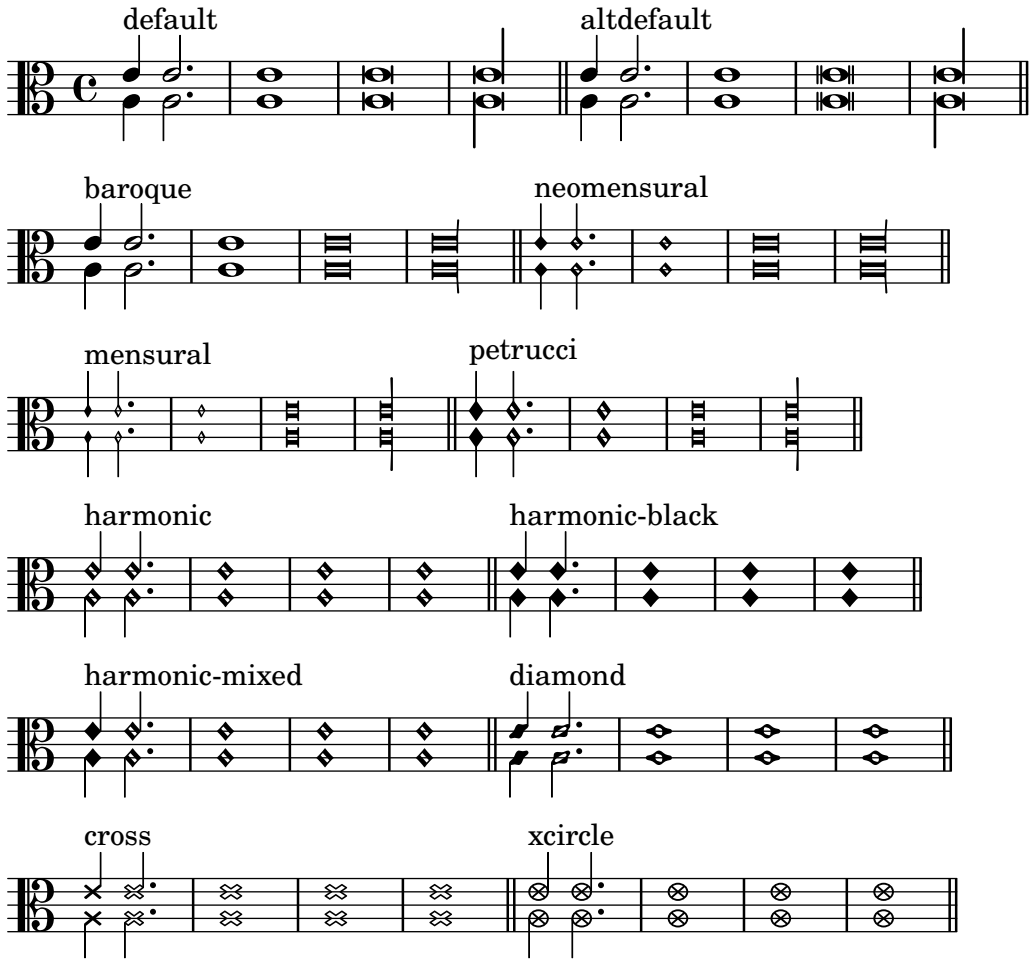
noteheads.sr1kievan

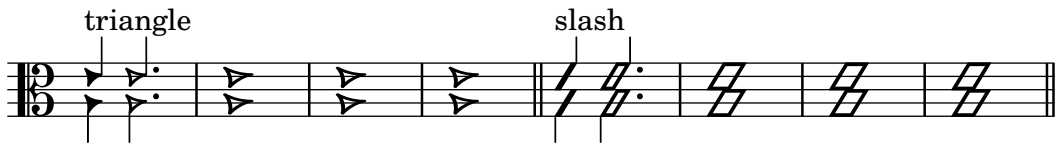
noteheads.d3kievan

noteheads.u3kievan

A.9 Note head styles

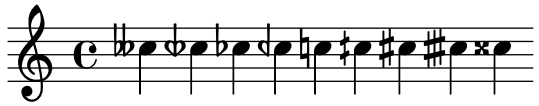
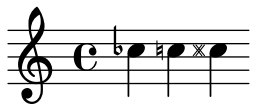
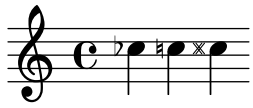
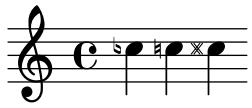
The following styles may be used for note heads.





A.10 Accidental glyph sets

The following sets of accidental glyphs are available.

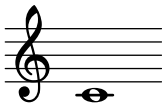
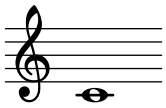
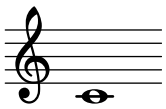
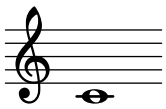
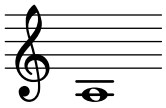
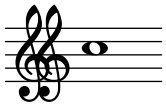
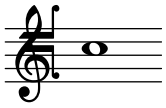
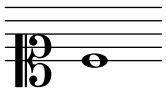
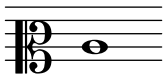
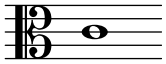
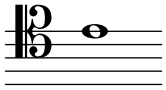
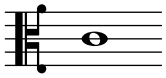
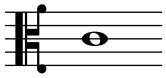
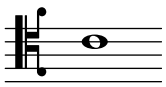
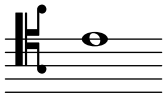
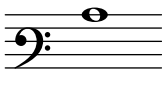
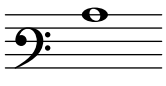
`standard-alteration-glyph-name-alist`

`alteration-hufnagel-glyph-name-alist`

`alteration-medicaea-glyph-name-alist`

`alteration-vaticana-glyph-name-alist`

`alteration-mensural-glyph-name-alist`

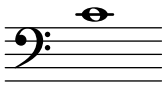
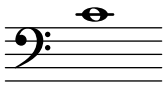
`alteration-kievan-glyph-name-alist`

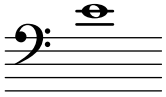
A.11 Clef styles

The following table shows all the clef styles possible (including the cases where *middle C* sits relative to the clef). For more modification possibilities like ottavation digits, see [Clef], page 17.

Standard clefs

Example	Output	Example	Output
`\clef G`		`\clef "G2"`	
`\clef treble`		`\clef violin`	
`\clef french`		`\clef GG`	
`\clef tenorG`			
`\clef soprano`		`\clef mezzosoprano`	
`\clef C`		`\clef alto`	
`\clef tenor`		`\clef baritone`	
`\clef varC`		`\clef altovarC`	
`\clef tenorvarC`		`\clef baritonevarC`	
`\clef varbaritone`		`\clef baritonevarF`	

```
\clef F
```

```
\clef bass
```

```
\clef subbass
```



Percussion staff clef

Example

```
\clef percussion
```

Output

Example

```
\clef varpercussion
```

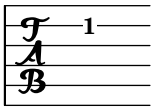
Output

Tab staff clefs

Example

```
 \new TabStaff {
   \clef tab
}
```

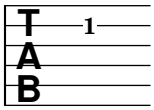
Output



Example

```
 \new TabStaff {
   \clef moderntab
}
```

Output



Ancient music clefs

Gregorian

Example

```
\clef "vaticana-do1"
```

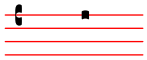
Output

Example

```
\clef "vaticana-do2"
```

Output

```
\clef "vaticana-do3"
```

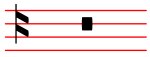


```
\clef "vaticana-fa1"
```

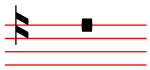
```
\clef "vaticana-fa2"
```

```
\clef "medicaea-do1"
```

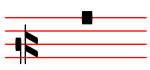
```
\clef "medicaea-do2"
```



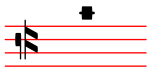
```
\clef "medicaea-do3"
```



```
\clef "medicaea-fa1"
```

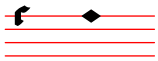


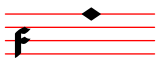
```
\clef "medicaea-fa2"
```



\clef "hufnagel-do1"

\clef "hufnagel-do2"

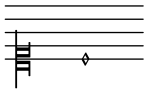
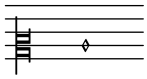
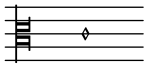
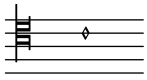
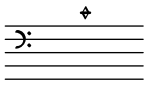
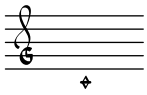
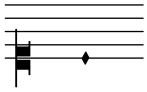
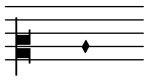
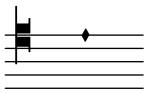
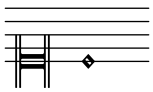
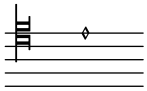
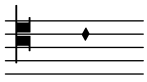
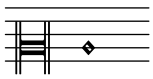
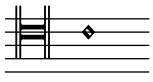
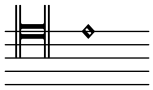
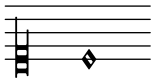
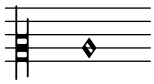
\clef "hufnagel-do3" 

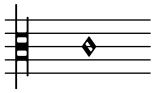
\clef "hufnagel-fa1" 

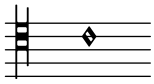
\clef "hufnagel-fa2"

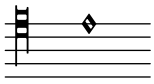
\clef "hufnagel-do-fa"

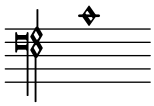
Mensural

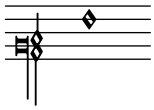
Example	Output	Example	Output
\clef "mensural-c1"		\clef "mensural-c2"	
\clef "mensural-c3"		\clef "mensural-c4"	
\clef "mensural-c5"			
\clef "mensural-f"		\clef "mensural-g"	
\clef "blackmensural-c1"		\clef "blackmensural-c2"	
\clef "blackmensural-c3"		\clef "blackmensural-c4"	
\clef "blackmensural-c5"			
\clef "neomensural-c1"		\clef "neomensural-c2"	
\clef "neomensural-c3"		\clef "neomensural-c4"	

\clef "neomensural-c5"

\clef "petrucci-c1"

\clef "petrucci-c2"

\clef "petrucci-c3"

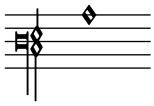
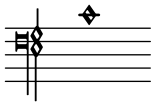


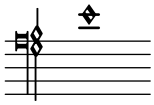
\clef "petrucci-c4"

\clef "petrucci-c5"

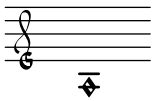
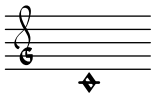


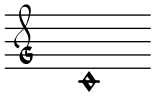
\clef "petrucci-f"

\clef "petrucci-f2"



\clef "petrucci-f3"

\clef "petrucci-f4"

\clef "petrucci-f5"

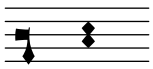


\clef "petrucci-g1"

\clef "petrucci-g2"

\clef "petrucci-g"



Kievan

Example **Output**

\clef "kievan-do"

A.12 Text markup commands

The following commands can all be used inside \markup { }.

A.12.1 Font markup

\abs-fontsize *size* (number) *arg* (markup)
: Use *size* as the absolute font size (in points) to display *arg*. Adjusts `baseline-skip` and `word-space` accordingly.

```
\markup {
  default text font size
  \hspace #2
  \abs-fontsize #16 { text font size 16 }
  \hspace #2
  \abs-fontsize #12 { text font size 12 }
}
```

Used properties:

- `baseline-skip` (3)
- `word-space` (0.6)

\bold *arg* (markup)
: Switch to bold font-series.

```
\markup {
  default
  \hspace #2
  \bold
  bold
}
```

\box *arg* (markup)
: Draw a box round *arg*. Looks at `thickness`, `box-padding` and `font-size` properties to determine line thickness and padding around the markup.

```
\markup {
  \override #'(box-padding . 0.5)
  \box
  \line { V. S. }
}
```

Used properties:

- `box-padding` (0.2)
- `font-size` (0)
- `thickness` (1)

\caps *arg* (markup)
: Copy of the `\smallCaps` command.

```
\markup {
  default
  \hspace #2
  \caps {
    Text in small caps
```

```
  }
}
```

default TEXT IN SMALL CAPS

\dynamic *arg* (markup)
: Use the dynamic font. This font only contains **s**, **f**, **m**, **z**, **p**, and **r**. When producing phrases, like 'più **f**', the normal words (like 'più') should be done in a different font. The recommended font for this is bold and italic.

```
\markup {
  \dynamic {
    sfzp
  }
}
```

sfzp

\figured-bass *arg* (markup)
: Set *arg* as small numbers for figured bass. Specially slashed digits can be achieved with a trailing backslashes (for numbers 6, 7, and 9) or a trailing plus (for numbers 2, 4, and 5).[1]

  The use of a backslash is in analogy to \figuremode (see [Entering figured bass], page 484). Note that to get a backslash character in markup it must be escaped by doubling it. Additionally, it must be put into double quotes.

```
\markup {
  \figured-bass {
    2 3 4+ 7 "9\\"
  }
}
```

2 3 4+ 7 9

\finger *arg* (markup)
: Set *arg* as small numbers for fingering instructions.

```
\markup {
  \finger {
    1 2 3 4 5
  }
}
```

1 2 3 4 5

\fontCaps *arg* (markup)
: Set font-shape to caps

  Note: \fontCaps requires the installation and selection of fonts which support the caps font shape.

\fontsize *increment* (number) *arg* (markup)
: Add *increment* to the font-size. Adjusts baseline-skip accordingly.

```
\markup {
  default
  \hspace #2
```

[1] Internally, this works by activating the 'dlig' OpenType feature of the Emmentaler font.

```
  \fontsize #-1.5
  smaller
}
```

default smaller

Used properties:

- `baseline-skip` (2)
- `word-space` (1)
- `font-size` (0)

`\huge` *arg* (markup)
: Set font size to +2.

```
\markup {
  default
  \hspace #2
  \huge
  huge
}
```

default huge

`\italic` *arg* (markup)
: Use italic `font-shape` for *arg*.

```
\markup {
  default
  \hspace #2
  \italic
  italic
}
```

default *italic*

`\large` *arg* (markup)
: Set font size to +1.

```
\markup {
  default
  \hspace #2
  \large
  large
}
```

default large

`\larger` *arg* (markup)
: Increase the font size relative to the current setting.

```
\markup {
  default
  \hspace #2
  \larger
  larger
}
```

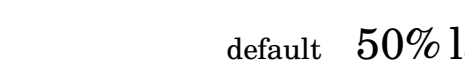
default larger

\magnify *sz* (number) *arg* (markup)
: Set the font magnification for its argument. In the following example, the middle A is 10% larger:

```
A \magnify #1.1 { A } A
```

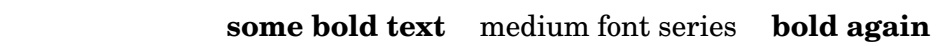
Note: Magnification only works if a font name is explicitly selected. Use \fontsize otherwise.

```
\markup {
  default
  \hspace #2
  \magnify #1.5 {
    50% larger
  }
}
```



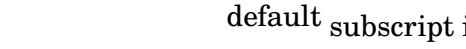
\medium *arg* (markup)
: Switch to medium font-series (in contrast to bold).

```
\markup {
  \bold {
    some bold text
    \hspace #2
    \medium {
      medium font series
    }
    \hspace #2
    bold again
  }
}
```



\normal-size-sub *arg* (markup)
: Set *arg* in subscript with a normal font size.

```
\markup {
  default
  \normal-size-sub {
    subscript in standard size
  }
}
```



Used properties:

- font-size (0)

\normal-size-super *arg* (markup)
: Set *arg* in superscript with a normal font size.

```
\markup {
  default
  \normal-size-super {
    superscript in standard size
```

```
  }
}
```

default superscript in standard size

Used properties:

- `font-size` (0)

\normal-text *arg* (markup)
: Set all font related properties (except the size) to get the default normal text font, no matter what font was used earlier.

```
\markup {
  \huge \bold \sans \caps {
    huge bold sans caps
    \hspace #2
    \normal-text {
      huge normal
    }
    \hspace #2
    as before
  }
}
```

HUGE BOLD SANS CAPS HUGE NORMAL **AS BEFORE**

\normalsize *arg* (markup)
: Set font size to default.

```
\markup {
  \teeny {
    this is very small
    \hspace #2
    \normalsize {
      normal size
    }
    \hspace #2
    teeny again
  }
}
```

this is very small normal size teeny again

\number *arg* (markup)
: Set font family to `number`, which yields the font used for digits. This font also contains some punctuation; it has no letters.

  The appearance of digits in the Emmentaler font can be controlled with four OpenType features: 'tnum', 'cv47', 'ss01', and 'kern', which can be arbitrarily combined.

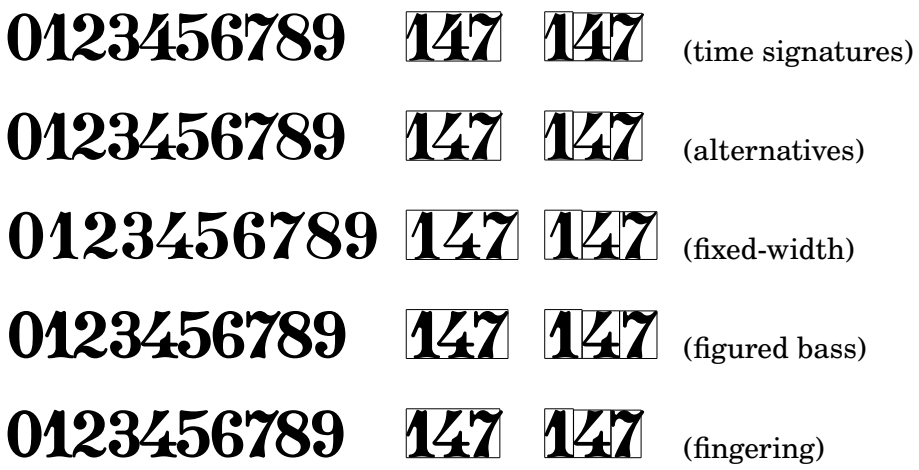
  tnum
  : If off (which is the default), glyphs 'zero' to 'nine' have no left and right side bearings. If on, the glyphs all have the same advance width by making the bearings non-zero.

  cv47
  : If on, glyphs 'four' and 'seven' have shorter vertical strokes. Default is off.

  ss01
  : If on, glyphs 'zero' to 'nine' have a fatter design, making them more readable at small sizes. Default is off.

kern If on (which is the default), provide pairwise kerning between (most) glyphs.

```
\markuplist
  \number
  \fontsize #5
  \override #'((padding . 2)
               (baseline-skip . 4)
               (box-padding . 0)
               (thickness . 0.1))
  \table #'(-1 -1 -1 -1) {
      0123456789 \box 147 \concat { \box 1 \box 4 \box 7 }
    \normal-text \normalsize "(time signatures)"
    \override #'(font-features .("cv47")) {
      0123456789 \box 147 \concat { \box 1 \box 4 \box 7 } }
    \normal-text \normalsize "(alternatives)"
    \override #'(font-features .("tnum" "cv47" "-kern")) {
      0123456789 \box 147 \concat { \box 1 \box 4 \box 7 } }
    \normal-text \normalsize "(fixed-width)"
    \override #'(font-features . ("tnum" "cv47" "ss01")) {
      0123456789 \box 147 \concat { \box 1 \box 4 \box 7 } }
    \normal-text \normalsize "(figured bass)"
    \override #'(font-features . ("cv47" "ss01")) {
      0123456789 \box 147 \concat { \box 1 \box 4 \box 7 } }
    \normal-text \normalsize "(fingering)"
  }
```



See also the markup commands `\figured-bass` and `\finger`, which set the font features accordingly.

`\overtie` *arg* (markup)
Overtie *arg*.

```
\markup \line {
  \overtie "overtied"
  \override #'((offset . 5) (thickness . 1))
  \overtie "overtied"
  \override #'((offset . 1) (thickness . 5))
  \overtie "overtied"
}
```

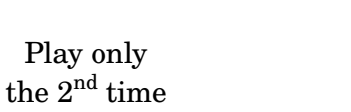
Used properties:

- `shorten-pair` (`(0 . 0)`)
- `height-limit` (`0.7`)
- `direction` (`1`)
- `offset` (`2`)
- `thickness` (`1`)

\replace *replacements* (list) *arg* (markup)

Used to automatically replace a string by another in the markup *arg*. Each pair of the alist *replacements* specifies what should be replaced. The `key` is the string to be replaced by the `value` markup. Note the quasiquoting syntax with a backquote in the second example.

```
\markup \replace #'(("2nd" . "Second"))
  "2nd time"
\markup \replace
  #`(("2nd" . ,#{ \markup \concat { 2 \super nd } #}))
  \center-column {
    \line { Play only }
    \line { the 2nd time }
  }
```



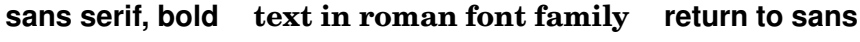
Used properties:

- `replacement-alist`

\roman *arg* (markup)

Set font family to `roman`.

```
\markup {
  \sans \bold {
    sans serif, bold
    \hspace #2
    \roman {
      text in roman font family
    }
    \hspace #2
    return to sans
  }
}
```



\sans *arg* (markup)

Switch to the sans serif font family.

```
\markup {
  default
  \hspace #2
```

```
\sans {
  sans serif
}
```

default sans serif

\simple *str* (string)
: \markup \simple "x" is equivalent to \markup "x". This command was previously used internally, but no longer is, and is being kept for backwards compatibility only.

\small *arg* (markup)
: Set font size to -1.

```
\markup {
  default
  \hspace #2
  \small
  small
}
```

default small

\smallCaps *arg* (markup)
: Emit *arg* as small caps.

```
\markup {
  default
  \hspace #2
  \smallCaps {
    Text in small caps
  }
}
```

default TEXT IN SMALL CAPS

\smaller *arg* (markup)
: Decrease the font size relative to the current setting.

```
\markup {
  \fontsize #3.5 {
    large text
    \hspace #2
    \smaller { smaller text }
    \hspace #2
    large text
  }
}
```

large text smaller text large text

\sub *arg* (markup)
: Set *arg* in subscript.

```
\markup {
  \concat {
    H
    \sub {
```

```
      2
    }
    0
  }
}
```

H_2O

Used properties:

- `font-size` (0)

`\super` *arg* (markup)
Set *arg* in superscript.

```
\markup {
  E =
  \concat {
    mc
    \super
    2
  }
}
```

$E = mc^2$

Used properties:

- `font-size` (0)

`\teeny` *arg* (markup)
Set font size to -3.

```
\markup {
  default
  \hspace #2
  \teeny
  teeny
}
```

default teeny

`\text` *arg* (markup)
Use a text font instead of music symbol or music alphabet font.

```
\markup {
  \number {
    1, 2,
    \text {
      three, four,
    }
    5
  }
}
```

1, 2, three, four, **5**

`\tie` *arg* (markup)
Adds a horizontal bow created with `make-tie-stencil` at bottom or top of *arg*. Looks at `thickness` to determine line thickness, and `offset` to determine y-offset.

The added bow fits the extent of *arg*, `shorten-pair` may be used to modify this. *direction* may be set using an `override` or direction-modifiers or `voiceOne`, etc.

```
\markup {
  \override #'(direction . 1)
  \tie "above"
  \override #'(direction . -1)
  \tie "below"
}
```

Used properties:

- `shorten-pair` (`(0 . 0)`)
- `height-limit` (`0.7`)
- `direction` (`1`)
- `offset` (`2`)
- `thickness` (`1`)

`\tiny` *arg* (markup)

Set font size to -2.

```
\markup {
  default
  \hspace #2
  \tiny
  tiny
}
```

`\typewriter` *arg* (markup)

Use `font-family` typewriter for *arg*.

```
\markup {
  default
  \hspace #2
  \typewriter
  typewriter
}
```

`\underline` *arg* (markup)

Underline *arg*. Looks at `thickness` to determine line thickness, `offset` to determine line y-offset from *arg* and `underline-skip` to determine the distance of additional lines from the others. `underline-shift` is used to get subsequent calls correct. Overriding it makes little sense, it would end up adding the provided value to the one of `offset`.

```
\markup \justify-line {
  \underline "underlined"
  \override #'(offset . 5)
  \override #'(thickness . 1)
  \underline "underlined"
  \override #'(offset . 1)
```

```
  \override #'(thickness . 5)
  \underline "underlined"
  \override #'(offset . 5)
  \override #'(underline-skip . 4)
  \underline \underline \underline "multiple underlined"
}
```

underlined underlined underlined multiple underlined

Used properties:

- `underline-skip` (2)
- `underline-shift` (0)
- `offset` (2)
- `thickness` (1)

`\undertie` *arg* (markup)

```
\markup \line {
  \undertie "undertied"
  \override #'((offset . 5) (thickness . 1))
  \undertie "undertied"
  \override #'((offset . 1) (thickness . 5))
  \undertie "undertied"
}
```

undertied undertied undertied

Used properties:

- `shorten-pair` (`(0 . 0)`)
- `height-limit` (0.7)
- `direction` (1)
- `offset` (2)
- `thickness` (1)

`\upright` *arg* (markup)

Set `font-shape` to `upright`. This is the opposite of `italic`.

```
\markup {
  \italic {
    italic text
    \hspace #2
    \upright {
      upright text
    }
    \hspace #2
    italic again
  }
}
```

italic text upright text *italic again*

`\with-string-transformer` *transformer* (procedure) *arg* (markup)

Interpret the markup *arg* with a string transformer installed. Whenever a string is interpreted inside *arg*, the transformer is first called, and it is the result that is

interpreted. The arguments passed to the transformer are the output definition, the property alist chain, and the string. See Section "New markup command definition" in *Extending* about the two first arguments.

```
\markup \with-string-transformer
  #(lambda (layout props str)
     (string-upcase str))
  "abc"
```

ABC

A.12.2 Markup for text alignment

\align-on-other *axis* (non-negative, exact integer) *other-dir* (number) *other* (markup) *self-dir* (number) *self* (markup)

Align markup *self* on markup *other* along axis *axis*, using *self-dir* and *other-dir* for mutual alignment of *self* and *other*, respectively. This command translates *self* as requested relative to its surroundings; *other* is not printed.

```
\markup \column {
  1
  12
  \align-on-other #X #RIGHT 12
                     #LEFT 12345
  123
}
```

1
12
12345
123

\center-align *arg* (markup)

Align arg to its X center.

```
\markup {
  \column {
    one
    \center-align
    two
    three
  }
}
```

one
two
three

\center-column *args* (markup list)

Put args in a centered column.

```
\markup {
  \center-column {
    one
    two
    three
  }
```

```
}
```

one
two
three

Used properties:

- `baseline-skip`

`\column` *args* (markup list)

Stack the markups in *args* vertically. The property `baseline-skip` determines the space between markups in *args*.

```
\markup {
  \column {
    one
    two
    three
  }
}
```

one
two
three

Used properties:

- `baseline-skip`

`\combine` *arg1* (markup) *arg2* (markup)

Print two markups on top of each other.

Note: `\combine` cannot take a list of markups enclosed in curly braces as an argument; for this purpose use `\overlay` instead.

```
\markup {
  \fontsize #5
  \override #'(thickness . 2)
  \combine
    \draw-line #'(0 . 4)
    \arrow-head #Y #DOWN ##f
}
```

`\concat` *args* (markup list)

Concatenate *args* in a horizontal line, without spaces in between. Strings are concatenated on the input level, allowing ligatures. For example, `\concat { "f" "i" }` is equivalent to `"fi"`.

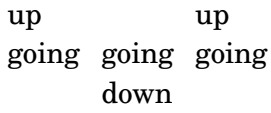
```
\markup {
  \concat {
    one
    two
    three
  }
}
```

onetwothree

`\dir-column` *args* (markup list)

Make a column of *args*, going up or down, depending on the setting of the `direction` layout property.

```
\markup {
  \override #`(direction . ,UP)
  \dir-column {
    going up
  }
  \hspace #1
  \dir-column {
    going down
  }
  \hspace #1
  \override #'(direction . 1)
  \dir-column {
    going up
  }
}
```



Used properties:

- `baseline-skip`
- `direction`

`\fill-line` *args* (markup list)

Put *markups* in a horizontal line of width *line-width*. The markups are spaced or flushed to fill the entire line. If there are no arguments, return an empty stencil.

```
\markup {
  \column {
    \fill-line {
      Words evenly spaced across the page
    }
    \null
    \fill-line {
      \line { Text markups }
      \line {
        \italic { evenly spaced }
      }
      \line { across the page }
    }
    \null
    \override #'(line-width . 50)
    \fill-line {
      Width explicitly specified
    }
  }
}
```

Words evenly spaced across the page

Text markups *evenly spaced* across the page

Width explicitly specified

Used properties:

- `line-width` (`#f`)
- `word-space` (`0.6`)
- `text-direction` (`1`)

`\fill-with-pattern` *space* (number) *dir* (direction) *pattern* (markup) *left* (markup) *right* (markup)

Put *left* and *right* in a horizontal line of width `line-width` with a line of markups *pattern* in between. Patterns are spaced apart by *space*. Patterns are aligned to the *dir* markup.

```
\markup \column {
  "right-aligned :"
  \fill-with-pattern #1 #RIGHT . first right
  \fill-with-pattern #1 #RIGHT . second right
  \null
  "center-aligned :"
  \fill-with-pattern #1.5 #CENTER - left right
  \null
  "left-aligned :"
  \override #'(line-width . 50)
  \fill-with-pattern #2 #LEFT : left first
  \override #'(line-width . 50)
  \fill-with-pattern #2 #LEFT : left second
}
```

right-aligned :
first . . . . . right
second . . . . . right

center-aligned :
left - right

left-aligned :
left : : : : : : : : : : : : : : : : : first
left : : : : : : : : : : : : : : : : : second

Used properties:

- `line-width`
- `word-space`

`\general-align` *axis* (integer) *dir* (number) *arg* (markup)

Align *arg* in *axis* direction to the *dir* side.

```
\markup {
  \column {
    one
```

```
\general-align #X #LEFT
two
three
\null
one
\general-align #X #CENTER
two
three
\null
\line {
  one
  \general-align #Y #UP
  two
  three
}
\null
\line {
  one
  \general-align #Y #3.2
  two
  three
}
}
}
```

one
two
three

one
two
three

one two three

one three
two

\halign *dir* (number) *arg* (markup)
: Set horizontal alignment. If *dir* is `-1`, then it is left-aligned, while `+1` is right. Values in between interpolate alignment accordingly.

```
\markup {
 \column {
   one
   \halign #LEFT
   two
   three
   \null
   one
   \halign #CENTER
   two
```

```
    three
    \null
    one
    \halign #RIGHT
    two
    three
    \null
    one
    \halign #-5
    two
    three
  }
}
```

one
two
three

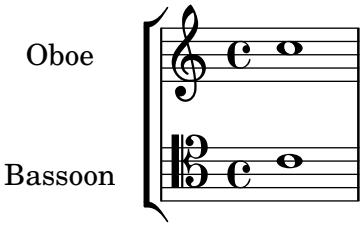
one
two
three

one
two
three

one
two
three

\hcenter-in *length* (number) *arg* (markup)
: Center *arg* horizontally within a box of extending *length*/2 to the left and right.

```
\new StaffGroup <<
  \new Staff {
    \set Staff.instrumentName = \markup {
      \hcenter-in #12
      Oboe
    }
    c''1
  }
  \new Staff {
    \set Staff.instrumentName = \markup {
      \hcenter-in #12
      Bassoon
    }
    \clef tenor
    c'1
  }
>>
```



\hspace *amount* (number)
: Create an invisible object taking up horizontal space *amount*.

```
\markup {
  one
  \hspace #2
  two
  \hspace #8
  three
}
```

one two three

\justify *args* (markup list)
: Like \wordwrap, but with lines stretched to justify the margins. Use \override #'(line-width . *X*) to set the line width; *X* is the number of staff spaces.

```
\markup {
  \justify {
    Lorem ipsum dolor sit amet, consectetur adipisicing elit,
    sed do eiusmod tempor incididunt ut labore et dolore
    magna aliqua.  Ut enim ad minim veniam, quis nostrud
    exercitation ullamco laboris nisi ut aliquip ex ea
    commodo consequat.
  }
}
```

Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

Used properties:

- text-direction (1)
- word-space
- line-width (#f)
- baseline-skip

\justify-field *symbol* (symbol)
: Justify the data which has been assigned to *symbol*.

```
\header {
  title = "My title"
  myText = "Lorem ipsum dolor sit amet, consectetur
    adipisicing elit, sed do eiusmod tempor incididunt
    ut labore et dolore magna aliqua.  Ut enim ad minim
    veniam, quis nostrud exercitation ullamco laboris
    nisi ut aliquip ex ea commodo consequat."
```

```
}

\paper {
  bookTitleMarkup = \markup {
    \column {
      \fill-line { \fromproperty #'header:title }
      \null
      \justify-field #'header:myText
    }
  }
}

\markup {
  \null
}
```

My title

Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

`\justify-line` *args* (markup list)

Put *markups* in a horizontal line of width *line-width*. The markups are spread to fill the entire line and separated by equal space. If there are no arguments, return an empty stencil.

```
\markup {
  \justify-line {
    Constant space between neighboring words
  }
}
```

Constant space between neighboring words

Used properties:

- `line-width` (`#f`)
- `word-space` (`0.6`)
- `text-direction` (`1`)

`\justify-string` *arg* (string)

Justify a string. Paragraphs may be separated with double newlines

```
\markup {
  \override #'(line-width . 40)
  \justify-string #"Lorem ipsum dolor sit amet, consectetur
      adipisicing elit, sed do eiusmod tempor incididunt ut
      labore et dolore magna aliqua.


      Ut enim ad minim veniam, quis nostrud exercitation
```

```
        ullamco laboris nisi ut aliquip ex ea commodo
        consequat.

        Excepteur sint occaecat cupidatat non proident, sunt
        in culpa qui officia deserunt mollit anim id est
        laborum"
}
```

Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.
Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum

Used properties:

- `text-direction` (1)
- `word-space`
- `line-width`
- `baseline-skip`

`\left-align` *arg* (markup)
: Align *arg* on its left edge.

```
\markup {
  \column {
    one
    \left-align
    two
    three
  }
}
```

one
two
three

`\left-column` *args* (markup list)
: Put args in a left-aligned column.

```
\markup {
  \left-column {
    one
    two
    three
  }
}
```

one
two
three

Used properties:

- `baseline-skip`

`\line` *args* (markup list)
: Put *args* in a horizontal line. The property `word-space` determines the space between markups in *args*.

```
\markup {
  \line {
    one two three
  }
}
```

one two three

Used properties:

- `text-direction` (1)
- `word-space`

`\lower` *amount* (number) *arg* (markup)
: Lower *arg* by the distance *amount*. A negative *amount* indicates raising; see also `\raise`.

```
\markup {
  one
  \lower #3
  two
  three
}
```

one three
two

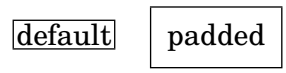
`\overlay` *args* (markup list)
: Takes a list of markups combining them.

```
\markup {
  \fontsize #5
  \override #'(thickness . 2)
  \overlay {
    \draw-line #'(0 . 4)
    \arrow-head #Y #DOWN ##f
    \translate #'(0 . 4)\arrow-head #Y #UP ##f
  }
}
```

`\pad` *amount* (number) *arg* (markup)
: Add space around a markup object. Identical to `pad-around`.

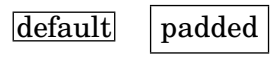
```
\markup {
  \box {
```

```
    default
  }
  \hspace #2
  \box {
    \pad-markup #1 {
      padded
    }
  }
}
```



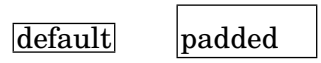
\pad-around *amount* (number) *arg* (markup)
: Add padding *amount* all around *arg*.

```
\markup {
  \box {
    default
  }
  \hspace #2
  \box {
    \pad-around #0.5 {
      padded
    }
  }
}
```



\pad-to-box *x-ext* (pair of numbers) *y-ext* (pair of numbers) *arg* (markup)
: Make *arg* take at least *x-ext*, *y-ext* space.

```
\markup {
  \box {
    default
  }
  \hspace #4
  \box {
    \pad-to-box #'(0 . 10) #'(0 . 3) {
      padded
    }
  }
}
```



\pad-x *amount* (number) *arg* (markup)
: Add padding *amount* around *arg* in the X direction.

```
\markup {
  \box {
    default
  }
  \hspace #4
```

```
\box {
  \pad-x #2 {
    padded
  }
}
```

`\put-adjacent` *axis* (integer) *dir* (direction) *arg1* (markup) *arg2* (markup)
: Put *arg2* next to *arg1*, without moving *arg1*.

`\raise` *amount* (number) *arg* (markup)
: Raise *arg* by the distance *amount*. A negative *amount* indicates lowering, see also `\lower`.

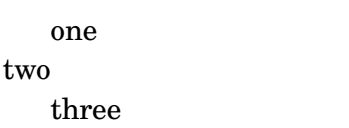
  The argument to `\raise` is the vertical displacement amount, measured in (global) staff spaces. `\raise` and `\super` raise objects in relation to their surrounding markups.

  If the text object itself is positioned above or below the staff, then `\raise` cannot be used to move it, since the mechanism that positions it next to the staff cancels any shift made with `\raise`. For vertical positioning, use the `padding` and/or `extra-offset` properties.

```
\markup {
  C
  \small
  \bold
  \raise #1.0
  9/7+
}
```

`\right-align` *arg* (markup)
: Align *arg* on its right edge.

```
\markup {
  \column {
    one
    \right-align
    two
    three
  }
}
```



`\right-column` *args* (markup list)
: Put `args` in a right-aligned column.

```
\markup {
  \right-column {
    one
    two
```

```
    three
  }
}
```

one
two
three

Used properties:

- `baseline-skip`

`\rotate` *ang* (number) *arg* (markup)
: Rotate object with *ang* degrees around its center.

```
\markup {
  default
  \hspace #2
  \rotate #45
  \line {
    rotated 45°
  }
}
```

default rotated 45°

`\translate` *offset* (pair of numbers) *arg* (markup)
: Translate *arg* relative to its surroundings. *offset* is a pair of numbers representing the displacement in the X and Y axis.

```
\markup {
  *
  \translate #'(2 . 3)
  \line { translated two spaces right, three up }
}
```

translated two spaces right, three up
*

`\translate-scaled` *offset* (pair of numbers) *arg* (markup)
: Translate *arg* by *offset*, scaling the offset by the `font-size`.

```
\markup {
  \fontsize #5 {
    * \translate #'(2 . 3) translate
    \hspace #2
    * \translate-scaled #'(2 . 3) translate-scaled
  }
}
```

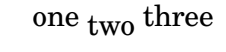
* translate * translate-scaled

Used properties:

- `font-size` (0)

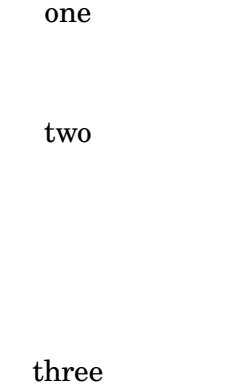
\vcenter *arg* (markup)
Align arg to its Y center.

```
\markup {
  one
  \vcenter
  two
  three
}
```



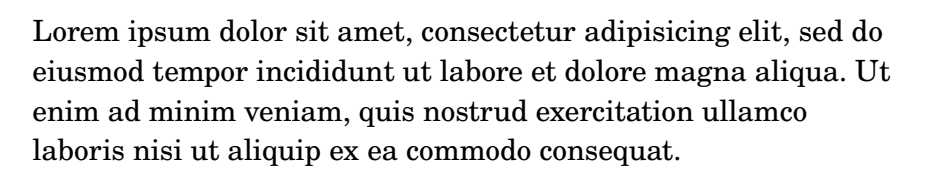
\vspace *amount* (number)
Create an invisible object taking up vertical space of *amount* multiplied by 3.

```
\markup {
    \center-column {
    one
    \vspace #2
    two
    \vspace #5
    three
  }
}
```



\wordwrap *args* (markup list)
Simple wordwrap. Use \override #'(line-width . *X*) to set the line width, where *X* is the number of staff spaces.

```
\markup {
  \wordwrap {
    Lorem ipsum dolor sit amet, consectetur adipisicing elit,
    sed do eiusmod tempor incididunt ut labore et dolore
    magna aliqua.  Ut enim ad minim veniam, quis nostrud
    exercitation ullamco laboris nisi ut aliquip ex ea
    commodo consequat.
  }
}
```



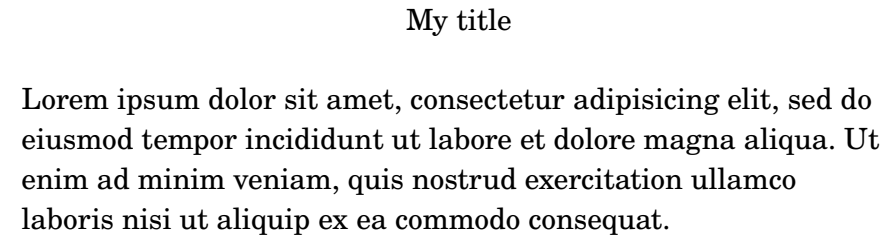
Used properties:

- `text-direction` (`1`)
- `word-space`
- `line-width` (`#f`)
- `baseline-skip`

`\wordwrap-field` *symbol* (symbol)

Wordwrap the data which has been assigned to *symbol*.

```
\header {
  title = "My title"
  myText = "Lorem ipsum dolor sit amet, consectetur
    adipisicing elit, sed do eiusmod tempor incididunt ut
    labore et dolore magna aliqua.  Ut enim ad minim
    veniam, quis nostrud exercitation ullamco laboris nisi
    ut aliquip ex ea commodo consequat."
}

\paper {
  bookTitleMarkup = \markup {
    \column {
      \fill-line { \fromproperty #'header:title }
      \null
      \wordwrap-field #'header:myText
    }
  }
}

\markup {
  \null
}
```



`\wordwrap-string` *arg* (string)

Wordwrap a string. Paragraphs may be separated with double newlines.

```
\markup {
  \override #'(line-width . 40)
  \wordwrap-string #"Lorem ipsum dolor sit amet,
      consectetur adipisicing elit, sed do eiusmod tempor
      incididunt ut labore et dolore magna aliqua.


      Ut enim ad minim veniam, quis nostrud exercitation
      ullamco laboris nisi ut aliquip ex ea commodo
      consequat.
```

```
      Excepteur sint occaecat cupidatat non proident,
      sunt in culpa qui officia deserunt mollit anim id
      est laborum"
}
```

Lorem ipsum dolor sit amet,
consectetur adipisicing elit, sed do
eiusmod tempor incididunt ut labore et
dolore magna aliqua.
Ut enim ad minim veniam, quis
nostrud exercitation ullamco laboris
nisi ut aliquip ex ea commodo
consequat.
Excepteur sint occaecat cupidatat non
proident, sunt in culpa qui officia
deserunt mollit anim id est laborum

Used properties:

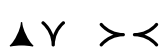
- `text-direction` (1)
- `word-space`
- `line-width`
- `baseline-skip`

A.12.3 Graphical markup

`\arrow-head` *axis* (integer) *dir* (direction) *filled* (boolean)

Produce an arrow head in specified direction and axis. Use the filled head if *filled* is specified.

```
\markup {
  \fontsize #5 {
    \general-align #Y #DOWN {
      \arrow-head #Y #UP ##t
      \arrow-head #Y #DOWN ##f
      \hspace #2
      \arrow-head #X #RIGHT ##f
      \arrow-head #X #LEFT ##f
    }
  }
}
```



`\beam` *width* (number) *slope* (number) *thickness* (number)

Create a beam with the specified parameters.

```
\markup {
  \beam #5 #1 #2
}
```

\bracket *arg* (markup)

Draw vertical brackets around *arg*.

```
\markup {
  \bracket {
    \note {2.} #UP
  }
}
```

\circle *arg* (markup)

Draw a circle around *arg*. Use `thickness`, `circle-padding` and `font-size` properties to determine line thickness and padding around the markup.

```
\markup {
  \circle {
    Hi
  }
}
```

Used properties:

- `circle-padding` (`0.2`)
- `font-size` (`0`)
- `thickness` (`1`)

\draw-circle *radius* (number) *thickness* (number) *filled* (boolean)

A circle of radius *radius* and thickness *thickness*, optionally filled.

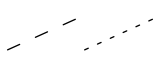
```
\markup {
  \draw-circle #2 #0.5 ##f
  \hspace #2
  \draw-circle #2 #0 ##t
}
```

\draw-dashed-line *dest* (pair of numbers)

A dashed line.

If `full-length` is set to #t (default) the dashed-line extends to the whole length given by *dest*, without white space at beginning or end. `off` will then be altered to fit. To insist on the given (or default) values of `on`, `off` use `\override #'(full-length . #f)` Manual settings for `on`,`off` and `phase` are possible.

```
\markup {
  \draw-dashed-line #'(5.1 . 2.3)
  \override #'((on . 0.3) (off . 0.5))
  \draw-dashed-line #'(5.1 . 2.3)
}
```



Used properties:

- `full-length` (`#t`)

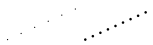
- phase (0)
- off (1)
- on (1)
- thickness (1)

\draw-dotted-line *dest* (pair of numbers)

A dotted line.

The dotted-line always extends to the whole length given by *dest*, without white space at beginning or end. Manual settings for off are possible to get larger or smaller space between the dots. The given (or default) value of off will be altered to fit the line-length.

```
\markup {
  \draw-dotted-line #'(5.1 . 2.3)
  \override #'((thickness . 2) (off . 0.2))
  \draw-dotted-line #'(5.1 . 2.3)
}
```



Used properties:

- phase (0)
- off (1)
- thickness (1)

\draw-hline

Draws a line across a page, where the property span-factor controls what fraction of the page is taken up.

```
\markup {
  \column {
    \draw-hline
    \override #'(span-factor . 1/3)
    \draw-hline
  }
}
```

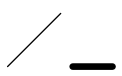
Used properties:

- span-factor (1)
- line-width
- draw-line-markup

\draw-line *dest* (pair of numbers)

A simple line.

```
\markup {
  \draw-line #'(4 . 4)
  \override #'(thickness . 5)
  \draw-line #'(-3 . 0)
}
```



Used properties:

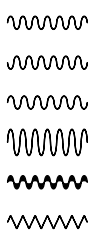
- thickness (1)

\draw-squiggle-line *sq-length* (number) *dest* (pair of numbers) *eq-end?* (boolean)

A squiggled line.

If eq-end? is set to #t, it is ensured the squiggled line ends with a bow in same direction as the starting one. sq-length is the length of the first bow. dest is the end point of the squiggled line. To match dest the squiggled line is scaled accordingly. Its appearance may be customized by overrides for thickness, angularity, height and orientation.

```
\markup
  \column {
    \draw-squiggle-line #0.5 #'(6 . 0) ##t
    \override #'(orientation . -1)
    \draw-squiggle-line #0.5 #'(6 . 0) ##t
    \draw-squiggle-line #0.5 #'(6 . 0) ##f
    \override #'(height . 1)
    \draw-squiggle-line #0.5 #'(6 . 0) ##t
    \override #'(thickness . 5)
    \draw-squiggle-line #0.5 #'(6 . 0) ##t
    \override #'(angularity . 2)
    \draw-squiggle-line #0.5 #'(6 . 0) ##t
  }
```



Used properties:

- orientation (1)
- height (0.5)
- angularity (0)
- thickness (0.5)

\ellipse *arg* (markup)

Draw an ellipse around *arg*. Use thickness, x-padding, y-padding and font-size properties to determine line thickness and padding around the markup.

```
\markup {
  \ellipse {
    Hi
  }
}
```

Used properties:

- y-padding (0.2)
- x-padding (0.2)
- font-size (0)

- `thickness` (1)

`\epsfile` *axis* (number) *size* (number) *file-name* (string)
: See `\image` for details on this command. `\markup \epsfile` *axis size file-name* is the same as `\markup \override #'(background-color . #f) \image` *axis size file-name*.

`\filled-box` *xext* (pair of numbers) *yext* (pair of numbers) *blot* (number)
: Draw a box with rounded corners of dimensions *xext* and *yext*. For example,

  ```
  \filled-box #'(-.3 . 1.8) #'(-.3 . 1.8) #0
  ```

  creates a box extending horizontally from -0.3 to 1.8 and vertically from -0.3 up to 1.8, with corners formed from a circle of diameter 0 (i.e., sharp corners).

  ```
  \markup {
    \filled-box #'(0 . 4) #'(0 . 4) #0
    \filled-box #'(0 . 2) #'(-4 . 2) #0.4
    \combine
    \filled-box #'(1 . 8) #'(0 . 7) #0.2
    \with-color #white
    \filled-box #'(3.6 . 5.6) #'(3.5 . 5.5) #0.7
  }
  ```

`\hbracket` *arg* (markup)
: Draw horizontal brackets around *arg*.

  ```
  \markup {
    \hbracket {
      \line {
        one two three
      }
    }
  }
  ```

  one two three

`\image` *axis* (number) *size* (number) *file-name* (string)
: Inline an image, scaled along *axis* to *size*.

  The image format is determined based on the file extension, which should be `.png` for a PNG image, or `.eps` for an EPS image (`.PNG` and `.EPS` are allowed as well).

  EPS files are only supported in the PostScript backend – for all output formats –, and in the Cairo backend – when creating PostScript or EPS output.

  If the image has transparency, it will appear over a colored background with the color specified by the `background-color` property, which defaults to `"white"`.

  To disable the colored background, set `background-color` to `#f`. For EPS images, this always works (where EPS images work in the first place). On the other hand, for PNG images, it works in the Cairo backend (which can output all supported formats), as well as in the SVG backend, but *not* in the PostScript backend, which is the default. See Section “Advanced command-line options for LilyPond” in *Application Usage* for how to activate the Cairo backend.

Used properties:

- `background-color` (`"white"`)

`\oval` *arg* (markup)

Draw an oval around *arg*. Use `thickness`, `x-padding`, `y-padding` and `font-size` properties to determine line thickness and padding around the markup.

```
\markup {
  \oval {
    Hi
  }
}
```

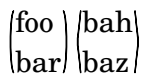
Used properties:

- `y-padding` (`0.75`)
- `x-padding` (`0.75`)
- `font-size` (`0`)
- `thickness` (`1`)

`\parenthesize` *arg* (markup)

Draw parentheses around *arg*. This is useful for parenthesizing a column containing several lines of text.

```
\markup {
  \parenthesize
  \column {
    foo
    bar
  }
  \override #'(angularity . 2)
  \parenthesize
  \column {
    bah
    baz
  }
}
```



Used properties:

- `width` (`0.25`)
- `line-thickness` (`0.1`)
- `thickness` (`1`)
- `size` (`1`)
- `padding`
- `angularity` (`0`)

`\path` *thickness* (number) *commands* (list)

Draws a path with line *thickness* according to the directions given in *commands*. *commands* is a list of lists where the `car` of each sublist is a drawing command and the `cdr` comprises the associated arguments for each command.

There are seven commands available to use in the list `commands`: `moveto`, `rmoveto`, `lineto`, `rlineto`, `curveto`, `rcurveto`, and `closepath`. Note that the commands that begin with *r* are the relative variants of the other three commands. You may also use the standard SVG single-letter equivalents: `moveto` = `M`, `lineto` = `L`, `curveto` = `C`, `closepath` = `Z`. The relative commands are written lowercase: `rmoveto` = `r`, `rlineto` = `l`, `rcurveto` = `c`.

The commands `moveto`, `rmoveto`, `lineto`, and `rlineto` take 2 arguments; they are the X and Y coordinates for the destination point.

The commands `curveto` and `rcurveto` create cubic Bézier curves, and take 6 arguments; the first two are the X and Y coordinates for the first control point, the second two are the X and Y coordinates for the second control point, and the last two are the X and Y coordinates for the destination point.

The `closepath` command takes zero arguments and closes the current subpath in the active path.

Line-cap styles and line-join styles may be customized by overriding the `line-cap-style` and `line-join-style` properties, respectively. Available line-cap styles are `'butt`, `'round`, and `'square`. Available line-join styles are `'miter`, `'round`, and `'bevel`.

The property `filled` specifies whether or not the path is filled with color.

```
samplePath =
  #'((lineto -1 1)
     (lineto 1 1)
     (lineto 1 -1)
     (curveto -5 -5 -5 5 -1 0)
     (closepath))

\markup {
  \path #0.25 #samplePath

  \override #'(line-join-style . miter)
  \path #0.25 #samplePath

  \override #'(filled . #t)
  \path #0.25 #samplePath
}
```

Used properties:

- `filled` (`#f`)
- `line-join-style` (`round`)
- `line-cap-style` (`round`)

\polygon *points* (list of number pairs)

A polygon delimited by the list of *points*. *extroversion* defines how the shape of the polygon is adapted to its thickness. If it is 0, the polygon is traced as-is. If -1, the outer side of the line is just on the given points. If 1, the line has its inner side on the points. The *thickness* property controls the thickness of the line; for filled polygons, this means the diameter of the blot.

```
regularPentagon =
```

```
  #'((1 . 0) (0.31 . 0.95) (-0.81 . 0.59)
     (-0.81 . -0.59) (0.31 . -0.95))

\markup {
  \polygon #'((-1 . -1) (0 . -3) (2 . 2) (1 . 2))
  \override #'(filled . #f)
    \override #'(thickness . 2)
      \combine
        \with-color #(universal-color 'blue)
          \polygon #regularPentagon
        \with-color #(universal-color 'vermillion)
          \override #'(extroversion . 1)
            \polygon #regularPentagon
}
```

Used properties:

- `thickness` (1)
- `filled` (#t)
- `extroversion` (0)

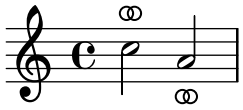
`\postscript` *str* (string)

Insert *str* directly into the output as a PostScript command string.

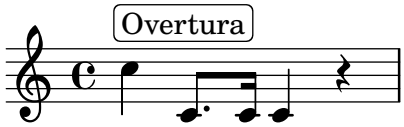
This command is meant as a *last resort*. Almost all needs are better fulfilled by other markup commands (see, for example, `\path` and `\draw-line`). If you do use this command, keep the following points in mind:

- `\postscript` does not work in SVG output.
- There are no stability guarantees on the details of how LilyPond produces its own output (i.e., the context into which the PostScript code is inserted). They may change substantially across versions.
- LilyPond cannot understand the shape of the drawing, leading to suboptimal spacing.
- Depending on how you install LilyPond, the version of the PostScript interpreter (GhostScript) can vary, and some of its features may be disabled.

```
ringsps = #"
  0.15 setlinewidth
  0.9 0.6 moveto
  0.4 0.6 0.5 0 361 arc
  stroke
  1.0 0.6 0.5 0 361 arc
  stroke
  "

rings = \markup {
  \with-dimensions #'(-0.2 . 1.6) #'(0 . 1.2)
  \postscript #ringsps
}

\relative c'' {
```

```
  c2^\rings
  a2_\rings
}
```

\rounded-box *arg* (markup)

Draw a box with rounded corners around *arg*. Looks at `thickness`, `box-padding` and `font-size` properties to determine line thickness and padding around the markup; the `corner-radius` property makes it possible to define another shape for the corners (default is 1).

```
c4^\markup {
  \rounded-box {
    Overtura
  }
}
c,8. c16 c4 r
```

Used properties:

- `box-padding` (0.5)
- `font-size` (0)
- `corner-radius` (1)
- `thickness` (1)

\scale *factor-pair* (pair of numbers) *arg* (markup)

Scale *arg*. *factor-pair* is a pair of numbers representing the scaling-factor in the X and Y axes. Negative values may be used to produce mirror images.

```
\markup {
  \line {
    \scale #'(2 . 1)
    stretched
    \scale #'(1 . -1)
    mirrored
  }
}
```

\triangle *filled* (boolean)

A triangle, either filled or empty.

```
\markup {
  \triangle ##t
  \hspace #2
  \triangle ##f
}
```

▲ △

Used properties:

- `thickness` (1)
- `font-size` (0)
- `extroversion` (0)

`\with-url` *url* (string) *arg* (markup)
Add a link to URL *url* around *arg*. This only works in the PDF backend.

```
\markup {
  \with-url #"https://lilypond.org/" {
    LilyPond ... \italic {
      music notation for everyone
    }
  }
}
```

LilyPond ... *music notation for everyone*

A.12.4 Markup for music and musical symbols

`\accidental` *alteration* (an exact rational number)
Select an accidental glyph from an alteration, given as rational number.

```
\markup \accidental #1/2
```

♯

Used properties:

- `alteration-glyph-name-alist`

`\coda` Draw a coda sign.

```
\markup {
  \coda
}
```

𝄌

`\compound-meter` *time-sig* (number or pair)
Draw a numeric time signature.

```
\markup {
  \column {
    \line { Single number:
            \compound-meter #3 }
    \line { Conventional:
            \compound-meter #'(4 . 4) or
            \compound-meter #'(4 4) }
    \line { Compound:
            \compound-meter #'(2 3 8) }
    \line { Single-number compound:
            \compound-meter #'((2) (3)) }
    \line { Complex compound:
            \compound-meter #'((2 3 8) (3 4)) }
  }
```

```
}
```

Single number: 3
Conventional: 4/4 or 4/4
Compound: 2+3/8
Single-number compound: 2+3
Complex compound: 2+3+3/8 4

`\customTabClef` *num-strings* (integer) *staff-space* (number)
: Draw a tab clef sans-serif style.

`\doubleflat`
: Draw a double flat symbol.

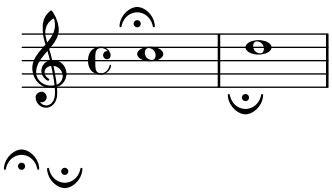
```
\markup {
  \doubleflat
}
```

`\doublesharp`
: Draw a double sharp symbol.

```
\markup {
  \doublesharp
}
```

`\fermata` Create a fermata glyph. When *direction* is `DOWN`, use an inverted glyph. Note that within music, one would usually use the `\fermata` articulation instead of a markup.

```
{ c''1^\markup \fermata d''1_\markup \fermata }

\markup { \fermata \override #`(direction . ,DOWN) \fermata }
```



Used properties:

- `direction` (1)

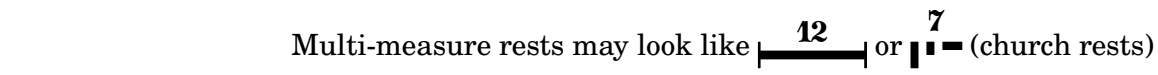
`\flat` Draw a flat symbol.

```
\markup {
  \flat
}
```

`\multi-measure-rest-by-number` *duration-scale* (non-negative, exact integer)
: Returns a multi-measure rest symbol.

If the number of measures is greater than the number given by `expand-limit` a horizontal line is printed. For every multi-measure rest lasting more than one measure a number is printed on top.

```
\markup {
  Multi-measure rests may look like
  \multi-measure-rest-by-number #12
  or
  \multi-measure-rest-by-number #7
  (church rests)
}
```



Used properties:

- `multi-measure-rest-number` (`#t`)
- `width` (`8`)
- `expand-limit` (`10`)
- `hair-thickness` (`2.0`)
- `thick-thickness` (`6.6`)
- `word-space`
- `style` (`()`)
- `font-size` (`0`)

`\musicglyph` *glyph-name* (string)

glyph-name is converted to a musical symbol; for example, `\musicglyph #"accidentals.natural"` selects the natural sign from the music font. See Section "The Emmentaler font" in *Notation Reference* for a complete listing of the possible glyphs.

```
\markup {
  \musicglyph #"f"
  \musicglyph #"rests.2"
  \musicglyph #"clefs.G_change"
}
```

`\natural` Draw a natural symbol.

```
\markup {
  \natural
}
```

`\note` *duration* (duration) *dir* (number)

This produces a note with a stem pointing in *dir* direction, with the *duration* for the note head type and augmentation dots. For example, `\note {4.} #-0.75` creates a dotted quarter note, with a shortened down stem.

```
\markup {
  \override #'(style . cross)
```

```
  \note {4..} #UP
  \hspace #2
  \note {\breve} #0
}
```

Used properties:

- `style` (`()`)
- `dots-direction` (`0`)
- `flag-style` (`()`)
- `font-size` (`0`)

`\note-by-number` *log* (number) *dot-count* (number) *dir* (number)

Construct a note symbol, with stem and flag. By using fractional values for *dir*, longer or shorter stems can be obtained. Supports all note-head-styles. Ancient note-head-styles will get mensural-style-flags. `flag-style` may be overridden independently. Supported flag-styles are `default`, `old-straight-flag`, `modern-straight-flag`, `flat-flag`, `mensural` and `neomensural`. The latter two flag-styles will both result in mensural-flags. Both are supplied for convenience.

```
\markup {
  \note-by-number #3 #0 #DOWN
  \hspace #2
  \note-by-number #1 #2 #0.8
}
```

Used properties:

- `style` (`()`)
- `dots-direction` (`0`)
- `flag-style` (`()`)
- `font-size` (`0`)

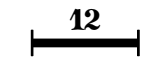
`\rest` *duration* (duration)

Returns a rest symbol.

If `multi-measure-rest` is set to true, a multi-measure rest symbol my be returned. In this case the duration needs to be entered as `{ 1*2 }`to get a multi-measure rest for two bars. Actually, it's only the scaling factor that determines the length, the basic duration is disregarded.

```
\markup {
  Rests:
  \hspace #2
  \rest { 4.. }
  \hspace #2
  \rest { \breve }
  \hspace #2
  Multi-measure rests:
  \override #'(multi-measure-rest . #t)
  {
```

```
  \hspace #2
  \override #'(multi-measure-rest-number . #f)
  \rest { 1*7 }
  \hspace #2
  \rest { 1*12 }
  }
}
```

Rests: Multi-measure rests: 

Used properties:

- `multi-measure-rest-number` (`#t`)
- `width` (`8`)
- `expand-limit` (`10`)
- `hair-thickness` (`2.0`)
- `thick-thickness` (`6.6`)
- `word-space`
- `style` (`()`)
- `font-size` (`0`)
- `style` (`()`)
- `ledgers` (`(-1 0 1)`)
- `font-size` (`0`)

`\rest-by-number` *log* (integer) *dot-count* (integer)

A rest symbol.

For duration logs specified with property `ledgers`, rest symbols with ledger lines are selected.

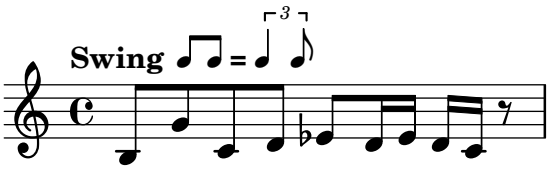
```
\markup {
  \rest-by-number #3 #2
  \hspace #2
  \rest-by-number #0 #1
}
```

Used properties:

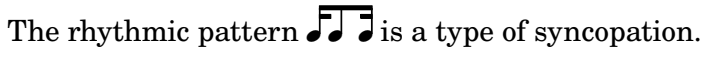
- `style` (`()`)
- `ledgers` (`(-1 0 1)`)
- `font-size` (`0`)

`\rhythm` *music* (music)

An embedded rhythmic pattern.

```
\relative {
  \tempo \markup {
    Swing
    \hspace #0.4
    \rhythm { 8[ 8] } = \rhythm { \tuplet 3/2 { 4 8 } }
  }
  b8 g' c, d ees d16 ees d c r8
}
```

Within \rhythm, there is no time signature and no division in measures (as with \cadenzaOn, see [Unmetered music], page 81). Beaming must be added explicitly with the syntax explained in [Manual beams], page 102.

```
\markup {
  The rhythmic pattern \rhythm { 16[ 8 16] } is
  a type of syncopation.
}
```



\stemDown can be used to flip the stems.

```
\markup \rhythm { \stemDown 8 16 8 }
```

\rhythm works by creating a StandaloneRhythmVoice context. The parents of this context are StandaloneRhythmStaff and StandaloneRhythmScore. It is possible to apply global tweaks to the output by using a \layout block.

```
\layout {
  \context {
    \StandaloneRhythmVoice
    \xNotesOn
  }
}

\markup \rhythm { 8 16 8 }
```

Used properties:

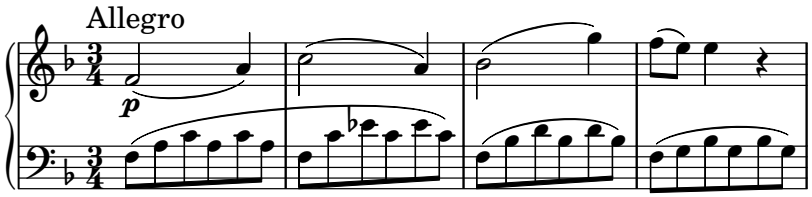
- font-size (-2)

\score *score* (score)

Inline an image of music. The reference point (usually the middle staff line) of the lowest staff in the top system is placed on the baseline.

```
\markup {
  \score {
    \new PianoStaff <<
      \new Staff \relative c' {
        \key f \major
        \time 3/4
        \mark \markup { Allegro }
        f2\p( a4)
        c2( a4)
        bes2( g'4)
        f8( e) e4 r
      }
```

```
      \new Staff \relative c {
        \clef bass
        \key f \major
        \time 3/4
        f8( a c a c a
        f c' es c es c)
        f,( bes d bes d bes)
        f( g bes g bes g)
      }
    >>
    \layout {
      indent = 0.0\cm
      \context {
        \Score
        \override RehearsalMark.break-align-symbols =
          #'(time-signature key-signature)
        \override RehearsalMark.self-alignment-X = #LEFT
      }
      \context {
        \Staff
        \override TimeSignature
                  .break-align-anchor-alignment = #LEFT
      }
    }
  }
}
```



Used properties:

- `baseline-skip`

\segno Draw a segno symbol.

```
\markup {
  \segno
}
```


\semiflat

Draw a semiflat symbol.

```
\markup {
  \semiflat
}
```


\semisharp

Draw a semisharp symbol.

```
\markup {
```

```
  \semisharp
}
```

`\sesquiflat`
: Draw a 3/2 flat symbol.

```
\markup {
  \sesquiflat
}
```

`\sesquisharp`
: Draw a 3/2 sharp symbol.

```
\markup {
  \sesquisharp
}
```

`\sharp` Draw a sharp symbol.

```
\markup {
  \sharp
}
```

`\tied-lyric` *str* (string)
: Replace '~' tilde symbols with tie characters in the argument.

```
\markup \column {
  \tied-lyric
    #"Siam navi~all'onde~algenti Lasciate~in abbandono"
  \tied-lyric
    #"Impetuosi venti I nostri~affetti sono"
  \tied-lyric
    #"Ogni diletto~e scoglio Tutta la vita~e~un mar."
}
```

Siam navi all'onde algenti Lasciate in abbandono
Impetuosi venti I nostri affetti sono
Ogni diletto e scoglio Tutta la vita e un mar.

Used properties:

- `word-space`

`\varcoda` Draw a varcoda sign.

```
\markup {
  \varcoda
}
```

A.12.5 Conditional markup

`\if` *condition?* (procedure) *argument* (markup)

Test *condition*, and only insert *argument* if it is true. The condition is provided as a procedure taking an output definition and a property alist chain. The procedure is applied, and its result determines whether to print the markup. This command is most useful inside `oddHeaderMarkup` or similar. Here is an example printing page numbers in bold:

```
\paper {
  oddHeaderMarkup =
    \markup \fill-line {
      ""
      \if #print-page-number
           \bold \fromproperty #'page:page-number-string
    }
  evenHeaderMarkup =
    \markup \fill-line {
      \if #print-page-number
           \bold \fromproperty #'page:page-number-string
      ""
    }
}
```

`\unless` *condition?* (procedure) *argument* (markup)

Similar to `\if`, printing the argument if the condition is false.

The following example shows how to print the copyright notice on all pages but the last instead of just the first page.

```
\paper {
  oddFooterMarkup = \markup {
    \unless #on-last-page-of-part \fill-line {
      \fromproperty #'header:copyright
    }
  }
}

\header {
  copyright = "© LilyPond Authors. License: GFDL."
  tagline = "© LilyPond Authors.  Documentation placed
under the GNU Free Documentation License
version 1.3."
}
```

A.12.6 Instrument-specific markup

`\fret-diagram` *definition-string* (string)

Make a (guitar) fret diagram. For example, say

```
\markup \fret-diagram #"s:0.75;6-x;5-x;4-o;3-2;2-3;1-2;"
```

for fret spacing 3/4 of staff space, D chord diagram

Syntax rules for *definition-string*:

- Diagram items are separated by semicolons.
- Possible items:
  - `s` : *number* – Set the fret spacing of the diagram (in staff spaces). Default: 1.

- `t:`*number* – Set the line thickness (relative to normal line thickness). Default: 0.5.
- `h:`*number* – Set the height of the diagram in frets. Default: 4.
- `w:`*number* – Set the width of the diagram in strings. Default: 6.
- `f:`*number* – Set fingering label type (0 = none, 1 = in circle on string, 2 = below string). Default: 0.
- `d:`*number* – Set radius of dot, in terms of fret spacing. Default: 0.25.
- `p:`*number* – Set the position of the dot in the fret space. 0.5 is centered; 1 is on lower fret bar, 0 is on upper fret bar. Default: 0.6.
- `c:`*string1*`-`*string2*`-`*fret* – Include a barre mark from *string1* to *string2* on *fret*.
- *string*`-`*fret* – Place a dot on *string* at *fret*. If *fret* is '`o`', *string* is identified as open. If *fret* is '`x`', *string* is identified as muted.
- *string*`-`*fret*`-`*fingering* – Place a dot on *string* at *fret*, and label with *fingering* as defined by the `f:` code.

– Note: There is no limit to the number of fret indications per string.

Used properties:

- `thickness` (`0.5`)
- `fret-diagram-details`
- `size` (`1.0`)
- `align-dir` (`-0.4`)

`\fret-diagram-terse` *definition-string* (string)

Make a fret diagram markup using terse string-based syntax.

Here is an example

```
\markup \fret-diagram-terse #"x;x;o;2;3;2;"
```

for a D chord diagram.

Syntax rules for *definition-string*:

- Strings are terminated by semicolons; the number of semicolons is the number of strings in the diagram.
- Mute strings are indicated by '`x`'.
- Open strings are indicated by '`o`'.
- A number indicates a fret indication at that fret.
- If there are multiple fret indicators desired on a string, they should be separated by spaces.
- Fingerings are given by following the fret number with a `-`, followed by the finger indicator, e.g. '`3-2`' for playing the third fret with the second finger.
- Where a barre indicator is desired, follow the fret (or fingering) symbol with `-(` to start a barre and `-)` to end the barre.

Used properties:

- `thickness` (`0.5`)
- `fret-diagram-details`
- `size` (`1.0`)
- `align-dir` (`-0.4`)

`\fret-diagram-verbose` *marking-list* (pair)

Make a fret diagram containing the symbols indicated in *marking-list*.

For example,

```
\markup \fret-diagram-verbose
  #'((mute 6) (mute 5) (open 4)
     (place-fret 3 2) (place-fret 2 3) (place-fret 1 2))
```

produces a standard D chord diagram without fingering indications.

Possible elements in *marking-list*:

`(mute` *`string-number`*`)`

Place a small 'x' at the top of string *string-number*.

`(open` *`string-number`*`)`

Place a small 'o' at the top of string *string-number*.

`(barre` *`start-string end-string fret-number`*`)`

Place a barre indicator (much like a tie) from string *start-string* to string *end-string* at fret *fret-number*.

`(capo` *`fret-number`*`)`

Place a capo indicator (a large solid bar) across the entire fretboard at fret location *fret-number*. Also, set fret *fret-number* to be the lowest fret on the fret diagram.

`(place-fret` *`string-number fret-number`* `[`*`finger-value`*`] [`*`color-modifier`*`] [`*`color`*`] ['parenthesized ['default-paren-color]])`

Place a fret playing indication on string *string-number* at fret *fret-number* with an optional fingering label *finger-value*, an optional color modifier *color-modifier*, an optional color *color*, an optional parenthesis `'parenthesized` and an optional paranthesis color `'default-paren-color`. By default, the fret playing indicator is a solid dot. This can be globally changed by setting the value of the variable *dot-color* or for a single dot by setting the value of *color*. The dot can be parenthesized by adding `'parenthesized`. By default the color for the parenthesis is taken from the dot. Adding `'default-paren-color` will take the parenthesis-color from the global *dot-color*, as a fall-back black will be used. Setting *color-modifier* to `inverted` inverts the dot color for a specific fingering. The values for *string-number*, *fret-number*, and the optional *finger* should be entered first in that order. The order of the other optional arguments does not matter. If the *finger* part of the `place-fret` element is present, *finger-value* will be displayed according to the setting of the variable *finger-code*. There is no limit to the number of fret indications per string.

Used properties:

- `thickness` (`0.5`)
- `fret-diagram-details`
- `size` (`1.0`)
- `align-dir` (`-0.4`)

`\harp-pedal` *definition-string* (string)

Make a harp pedal diagram.

Possible elements in *definition-string*:

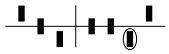
^ pedal is up

-	pedal is neutral
v	pedal is down
|	vertical divider line
o	the following pedal should be circled (indicating a change)

The function also checks if the string has the typical form of three pedals, then the divider and then the remaining four pedals. If not it prints out a warning. However, in any case, it will also print each symbol in the order as given. This means you can place the divider (even multiple dividers) anywhere you want, but you'll have to live with the warnings.

The appearance of the diagram can be tweaked inter alia using the size property of the TextScript grob (`\override Voice.TextScript.size = #0.3`) for the overall, the thickness property (`\override Voice.TextScript.thickness = #3`) for the line thickness of the horizontal line and the divider. The remaining configuration (box sizes, offsets and spaces) is done by the harp-pedal-details list of properties (`\override Voice.TextScript.harp-pedal-details.box-width = #1`). It contains the following settings: `box-offset` (vertical shift of the box center for up/down pedals), `box-width`, `box-height`, `space-before-divider` (the spacing between two boxes before the divider) and `space-after-divider` (box spacing after the divider).

```
\markup \harp-pedal #"^-v|--ov^"
```



Used properties:

- `thickness` (`0.5`)
- `harp-pedal-details` (`()`)
- `size` (`1.2`)

`\woodwind-diagram` *instrument* (symbol) *user-draw-commands* (list)
Make a woodwind-instrument diagram. For example, say

```
\markup \woodwind-diagram
  #'oboe #'((lh . (d ees)) (cc . (five3qT1q)) (rh . (gis)))
```

for an oboe with the left-hand d key, left-hand ees key, and right-hand gis key depressed while the five-hole of the central column effectuates a trill between 1/4 and 3/4 closed.

The following instruments are supported:

- piccolo
- flute
- oboe
- clarinet
- bass-clarinet
- saxophone
- bassoon
- contrabassoon

To see all of the callable keys for a given instrument, include the function `(print-keys 'instrument)` in your .ly file, where instrument is the instrument whose keys you want to print.

Certain keys allow for special configurations. The entire gamut of configurations possible is as follows:

- 1q (1/4 covered)
- 1h (1/2 covered)
- 3q (3/4 covered)
- R (ring depressed)
- F (fully covered; the default if no state put)

Additionally, these configurations can be used in trills. So, for example, `three3qTR` effectuates a trill between 3/4 full and ring depressed on the three hole. As another example, `threeRT` effectuates a trill between R and open, whereas `threeTR` effectuates a trill between open and shut. To see all of the possibilities for all of the keys of a given instrument, invoke `(print-keys-verbose 'instrument)`.

Lastly, substituting an empty list for the pressed-key alist will result in a diagram with all of the keys drawn but none filled, for example:

```
\markup \woodwind-diagram #'oboe #'()
```

Used properties:

- `woodwind-diagram-details` (`()`)
- `font-size` (`0`)
- `graphical` (`#t`)
- `thickness` (`0.1`)
- `size` (`1`)

A.12.7 Accordion registers

`\discant` *name* (string)

`\discant` *name* generates a discant accordion register symbol.

To make it available,

```
#(use-modules (lily accreg))
```

is required near the top of your input file.

The register names in the default `\discant` register set have modeled after numeric Swiss notation like depicted in `http://de.wikipedia.org/wiki/Register_%28Akkordeon%29`, omitting the slashes and dropping leading zeros.

The string *name* is basically a three-digit number with the lowest digit specifying the number of 16' reeds, the tens the number of 8' reeds, and the hundreds specifying the number of 4' reeds. Without modification, the specified number of reeds in 8' is centered in the symbol. Newer instruments may have registrations where 8' can be used either within or without a tone chamber, 'cassotto'. Notationally, the central dot then indicates use of cassotto. One can suffix the tens' digits '1' and '2' with '+' or '−' to indicate clustering the dots at the right or left respectively rather than centered.

Some examples are

\discant "1" \discant "1+0"

\discant "120" \discant "131"

Used properties:

- `font-size` (0)

`\freeBass` *name* (string)

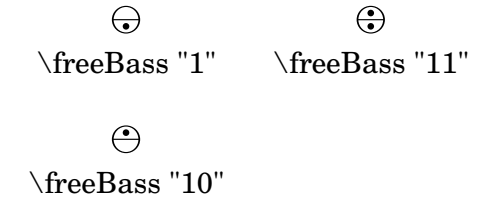
`\freeBass` *name* generates a free bass/converter accordion register symbol for the usual two-reed layout.

To make it available,

```
#(use-modules (lily accreg))
```

is required near the top of your input file.

Available registrations are



Used properties:

- `font-size` (0)

`\stdBass` *name* (string)

`\stdBass` *name* generates a standard bass accordion register symbol.

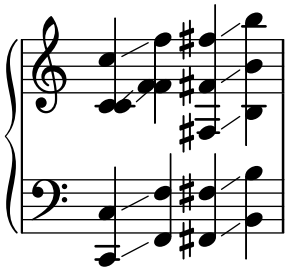
To make it available,

```
#(use-modules (lily accreg))
```

is required near the top of your input file.

The default bass register definitions have been modeled after the article `http://www.accordions.com/index/art/stradella.shtml` originally appearing in Accord Magazine.

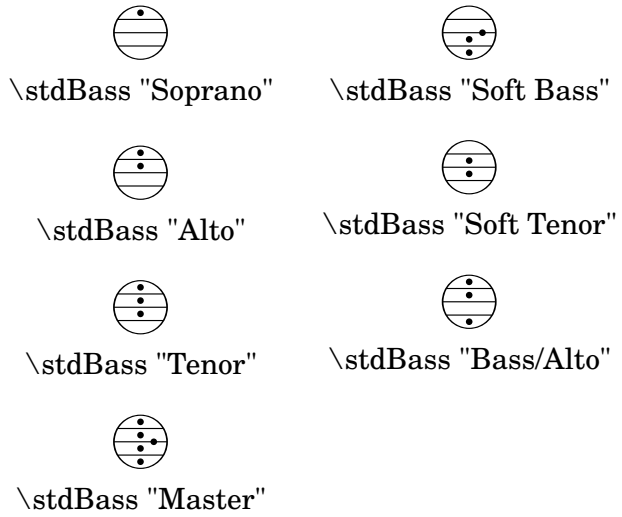
The underlying register model is



This kind of overlapping arrangement is common for Italian instruments though the exact location of the octave breaks differ.

When not composing for a particular target instrument, using the five reed definitions makes more sense than using a four reed layout: in that manner, the '`Master`' register is unambiguous. This is rather the rule in literature bothering about bass registrations at all.

Available registrations are



Used properties:

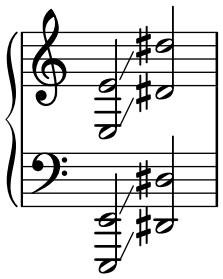
- `font-size` (`0`)

`\stdBassIV` *name* (string)
: `\stdBassIV` *name* generates a standard bass accordion register symbol.

To make it available,

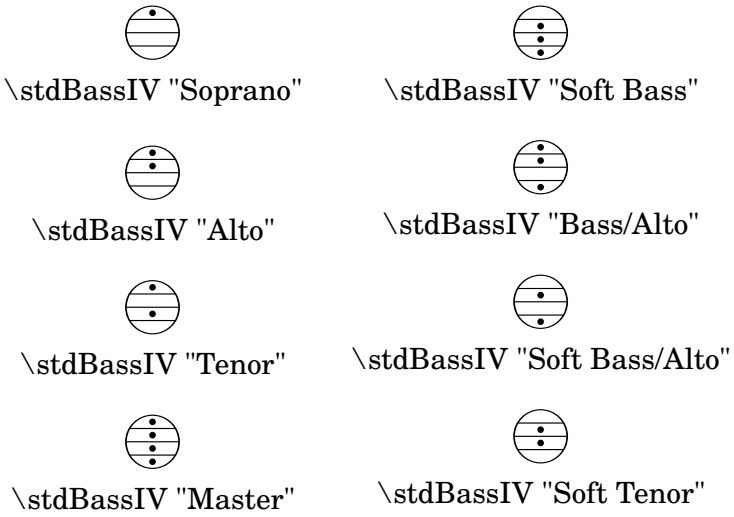
```
#(use-modules (lily accreg))
```

is required near the top of your input file.

The main use is for four-reed standard bass instruments with reedbank layout

Notable instruments are Morino models with MIII (the others are five-reed instead) and the Atlantic IV. Most of those models have three register switches. Some newer Morinos with MIII might have five or even seven.

The prevalent three-register layout uses the middle three switches '`Tenor`', '`Master`', '`Soft Bass`'. Note that the sound is quite darker than the same registrations of '`c,`'-based instruments.

Available registrations are



Used properties:

- `font-size` (0)

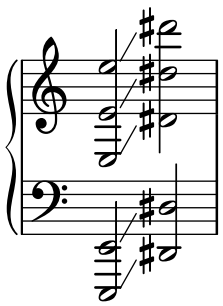
`\stdBassV` *name* (string)

`\stdBassV` *name* generates a standard bass accordion register symbol.

To make it available,

```
#(use-modules (lily accreg))
```

is required near the top of your input file.

The main use is for five-reed standard bass instruments with reedbank layout

This tends to be the bass layout for Hohner's Morino series without convertor or MIII manual.

With the exception of the rather new 7-register layout, the highest two chord reeds are usually sounded together. The Older instruments offer 5 or 3 bass registers. The Tango VM offers an additional '`Solo Bass`' setting that mutes the chord reeds. The symbol on the register buttons of the Tango VM would actually match the physical five-octave layout reflected here, but it is not used in literature.

Composers should likely prefer the five-reed versions of these symbols. The mismatch of a four-reed instrument with five-reed symbols is easier to resolve for the player than the other way round.

Available registrations are

\stdBassV "Bass/Alto"

\stdBassV "Soft Bass"

\stdBassV "Soft Bass/Alto"

\stdBassV "Soft Tenor"

\stdBassV "Alto"

\stdBassV "Soprano"

\stdBassV "Tenor"

\stdBassV "Sopranos"

\stdBassV "Master"

\stdBassV "Solo Bass"

Used properties:

- `font-size` (`0`)

`\stdBassVI` *name* (string)

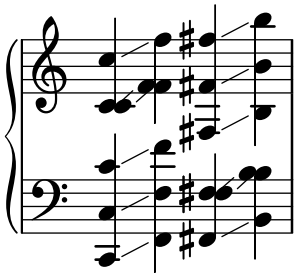
`\stdBassVI` *name* generates a standard bass accordion register symbol for six reed basses.

To make it available,

```
#(use-modules (lily accreg))
```

is required near the top of your input file.

This is primarily the register layout for the Hohner “Gola” model. The layout is



The registers are effectively quite similar to that of `\stdBass`. An additional bass reed at alto pitch is omitted for esthetical reasons from the ‘`Master`’ setting, so the symbols are almost the same except for the ‘`Alto/Soprano`’ register with bass notes at Alto pitch and chords at Soprano pitch.

Available registrations are

\stdBassVI "Soprano"

\stdBassVI "Alto/Soprano"

\stdBassVI "Alto"

\stdBassVI "Bass/Alto"

\stdBassVI "Soft Tenor"

\stdBassVI "Soft Bass"

\stdBassVI "Master"

Used properties:

- `font-size` (0)

A.12.8 Other markup commands

`\auto-footnote` *mkup* (markup) *note* (markup)

Have footnote *note* act as an annotation to the markup *mkup*.

```
\markup {
  \auto-footnote a b
  \override #'(padding . 0.2)
  \auto-footnote c d
}
```

The footnote will be annotated automatically.

Used properties:

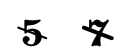
- `padding` (0.0)
- `raise` (0.5)

`\backslashed-digit` *num* (integer)

A feta number, with backslash. This is for use in the context of figured bass notation.

```
\markup {
  \backslashed-digit #5
```

```
  \hspace #2
  \override #'(thickness . 3)
  \backslashed-digit #7
}
```

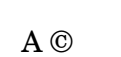


Used properties:

- `thickness` (`1.6`)
- `font-size` (`0`)

`\char` *num* (integer)
: Produce a single character. Characters encoded in hexadecimal format require the prefix `#x`.

```
\markup {
  \char #65 \char ##x00a9
}
```

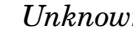


`\eyeglasses`
: Prints out eyeglasses, indicating strongly to look at the conductor.

```
\markup { \eyeglasses }
```

`\first-visible` *args* (markup list)
: Use the first markup in *args* that yields a non-empty stencil and ignore the rest.

```
\markup {
  \first-visible {
    \fromproperty #'header:composer
    \italic Unknown
  }
}
```



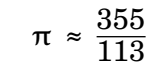
`\footnote` *mkup* (markup) *note* (markup)
: Have footnote *note* act as an annotation to the markup *mkup*.

```
\markup {
  \footnote a b
  \override #'(padding . 0.2)
  \footnote c d
}
```

The footnote will not be annotated automatically.

`\fraction` *arg1* (markup) *arg2* (markup)
Make a fraction of two markups.

```
\markup {
  π ≈
  \fraction 355 113
}
```



Used properties:

- `font-size` (0)

`\fromproperty` *symbol* (symbol)
Read the *symbol* from property settings, and produce a stencil from the markup contained within. If *symbol* is not defined, it returns an empty markup.

```
\header {
  myTitle = "myTitle"
  title = \markup {
    from
    \italic
    \fromproperty #'header:myTitle
  }
}
\markup {
  \null
}
```

`\left-brace` *size* (number)
A feta brace in point size *size*.

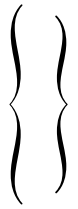
```
\markup {
  \left-brace #35
  \hspace #2
```

```
  \left-brace #45
}
```

\lookup *glyph-name* (string)

Lookup a glyph by name.

```
\markup {
  \override #'(font-encoding . fetaBraces) {
    \lookup #"brace200"
    \hspace #2
    \rotate #180
    \lookup #"brace180"
  }
}
```



\markalphabet *num* (integer)

Make a markup letter for *num*. The letters start with A to Z and continue with double letters.

```
\markup {
  \markalphabet #8
  \hspace #2
  \markalphabet #26
}
```

H Z

\markletter *num* (integer)

Make a markup letter for *num*. The letters start with A to Z (skipping letter I), and continue with double letters.

```
\markup {
  \markletter #8
  \hspace #2
  \markletter #26
}
```

H AA

\null

An empty markup with extents of a single point.

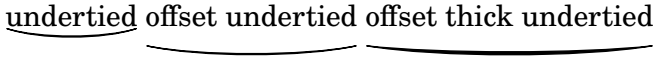
```
\markup {
  \null
}
```

\on-the-fly *procedure* (procedure) *arg* (markup)
: Apply the *procedure* markup command to *arg*. *procedure* takes the same arguments as `interpret-markup` and returns a stencil.

\override *new-prop* (pair) *arg* (markup)
: Add the argument *new-prop* to the property list. Properties may be any property supported by Section "font-interface" in *Internals Reference*, Section "text-interface" in *Internals Reference* and Section "instrument-specific-markup-interface" in *Internals Reference*.

  new-prop may be either a single alist pair, or non-empty alist of its own.

```
\markup {
  \undertie "undertied"
  \override #'(offset . 15)
  \undertie "offset undertied"
  \override #'((offset . 15)(thickness . 3))
  \undertie "offset thick undertied"
}
```



\page-link *page-number* (number) *arg* (markup)
: Add a link to the page *page-number* around *arg*. This only works in the PDF backend.

```
\markup {
  \page-link #2  { \italic { This links to page 2... } }
}
```

This links to page 2...

\page-ref *label* (symbol) *gauge* (markup) *default* (markup)
: Reference to a page number. *label* is the label set on the referenced page (using `\label` or `\tocItem`), *gauge* a markup used to estimate the maximum width of the page number, and *default* the value to display when *label* is not found.

  (If the current book or bookpart is set to use roman numerals for page numbers, the reference will be formatted accordingly – in which case the *gauge*'s width may require additional tweaking.)

\pattern *count* (non-negative, exact integer) *axis* (non-negative, exact integer) *space* (number) *pattern* (markup)
: Prints *count* times a *pattern* markup. Patterns are spaced apart by *space* (defined as for `\hspace` or `\vspace`, respectively). Patterns are distributed on *axis*.

```
\markup \column {
  "Horizontally repeated :"
  \pattern #7 #X #2 \flat
  \null
  "Vertically repeated :"
  \pattern #3 #Y #0.5 \flat
}
```

Horizontally repeated :
♭ ♭ ♭ ♭ ♭ ♭ ♭

Vertically repeated :
♭
♭
♭

\property-recursive *symbol* (symbol)
Print out a warning when a header field markup contains some recursive markup definition.

\qr-code *width* (non-negative number) *str* (string)
Insert a QR code for the given string, usually a URL.

```
\markup \vcenter {
  \center-column { Engraved with LilyPond }
  \hspace #1.5
  \qr-code #10.0 "https://lilypond.org"
}
```

Engraved with LilyPond

The *error-correction-level* property can be set to one of the symbols `low`, `medium`, `quarter` and `high`. The higher the level of error correction is, the more the QR code contains redundancy, potentially helping detectors, e.g., in poor lighting conditions; however, a higher correction level also makes the code denser.

```
\markup \vcenter {
  \center-column { Engraved with LilyPond }
  \hspace #1.5
  \override #'(error-correction-level . high)
    \qr-code #10.0 "https://lilypond.org"
}
```

Engraved with LilyPond

The *quiet-zone-size* property specifies the width of the "quiet zone", namely the white area around the QR code. It is expressed as a multiple of the width of one little square inside the QR code. Use at least 4 for best results.

Used properties:

- `quiet-zone-size` (4)
- `error-correction-level` (low)

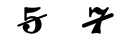
\right-brace *size* (number)
A feta brace in point size *size*, rotated 180 degrees.

```
\markup {
```

```
  \right-brace #45
  \hspace #2
  \right-brace #35
}
```

\slashed-digit *num* (integer)
: A feta number, with slash. This is for use in the context of figured bass notation.

```
\markup {
  \slashed-digit #5
  \hspace #2
  \override #'(thickness . 3)
  \slashed-digit #7
}
```



Used properties:

- `thickness` (`1.6`)
- `font-size` (`0`)

\stencil *stil* (stencil)
: Use a stencil as markup.

```
\markup {
  \stencil #(make-circle-stencil 2 0 #t)
}
```

\strut
: Create a box of the same height as the space in the current font.

\transparent *arg* (markup)
: Make *arg* transparent.

```
\markup {
  \transparent {
    invisible text
  }
}
```

\verbatim-file *name* (string)
: Read the contents of file *name*, and include it verbatim.

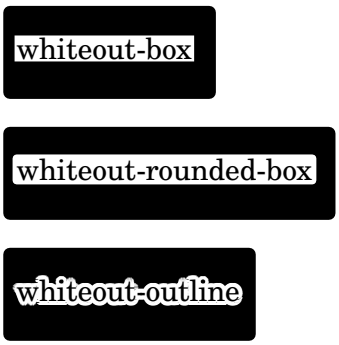
```
\markup {
  \verbatim-file #"en/included/simple.ly"
}
```

```
%% A simple piece in LilyPond, a scale.
\relative {
  c' d e f g a b c
}
%% Optional helper for automatic updating
%% by convert-ly.  May be omitted.
\version "2.19.21"
```

`\whiteout` *arg* (markup)

Provide a white background for *arg*. The shape of the white background is determined by `style`. The default is `box` which produces a rectangle. `rounded-box` produces a rounded rectangle. `outline` approximates the outline of the markup.

```
\markup {
  \combine
    \filled-box #'(-1 . 15) #'(-3 . 4) #1
    \override #'(thickness . 1.5)
    \whiteout whiteout-box
}
\markup {
  \combine
    \filled-box #'(-1 . 24) #'(-3 . 4) #1
    \override #'((style . rounded-box) (thickness . 3))
    \whiteout whiteout-rounded-box
}
\markup {
  \combine
    \filled-box #'(-1 . 18) #'(-3 . 4) #1
    \override #'((style . outline) (thickness . 3))
    \whiteout whiteout-outline
}
```



Used properties:

- `thickness` (())
- `style` (box)

`\with-color` *color* (color) *arg* (markup)

Draw *arg* in color specified by *color*.

```
\markup {
  \with-color #red
  red
  \hspace #2
```

```
  \with-color #green
  green
  \hspace #2
  \with-color "#0000ff"
  blue
}
```

red green blue

\with-dimension *axis* (integer) *val* (pair of numbers) *arg* (markup)
: Set the horizontal dimension of *arg* to *val* if *axis* is equal to X. If *axis* is equal to Y, set the vertical dimension of *arg* to *val* instead.

\with-dimension-from *axis* (integer) *arg1* (markup) *arg2* (markup)
: Print *arg2* but replace the horizontal dimension with the one from *arg1* if *axis* is set to X. If *axis* is set to Y, replace the vertical dimension with the one from *arg1* instead.

\with-dimensions *x* (pair of numbers) *y* (pair of numbers) *arg* (markup)
: Set the horizontal and vertical dimensions of *arg* to *x* and *y*.

\with-dimensions-from *arg1* (markup) *arg2* (markup)
: Print *arg2* with the horizontal and vertical dimensions of *arg1*.

\with-link *label* (symbol) *arg* (markup)
: Add a link to the page holding label *label* around *arg*. This only works in the PDF backend.

```
\markup {
  \with-link #'label {
    \italic { This links to the page
              containing the label... }
  }
}
```

\with-outline *outline* (markup) *arg* (markup)
: Print *arg* with the outline and dimensions of *outline*. The outline is used by skylines to resolve collisions (not for whiteout).

\with-true-dimension *axis* (integer) *arg* (markup)
: Give *arg* its actual dimension (extent) on *axis*. Sometimes, the extents of a markup's printed ink differs from the default extents. The main case is if glyphs are involved. By default, the extents of a glyph are based on the glyph's *metrics* (i.e., a default vertical and horizontal size for the glyph), which, for various reasons, are often not identical to its *bounding box* (i.e., the smallest rectangle that completely encompasses the glyph's outline) – in most cases, the outline protrudes the box spanned up by the metrics.

```
\markup
  \fontsize #10
  \override #'((box-padding . 0) (thickness . 0.2))
  \box
  \musicglyph "scripts.trill"
```

For purposes other than setting text, this behavior may not be wanted. You can use \with-true-dimension in order to give the markup its actual printed extent.

```
\markup
  \fontsize #10
  \override #'((box-padding . 0) (thickness . 0.2))
  \box
  \with-true-dimension #X
  \musicglyph "scripts.trill"
```

\with-true-dimensions *arg* (markup)
: \markup \with-true-dimensions *arg* is short for \markup \with-true-dimension #X \with-true-dimension #Y *arg*, i.e., \with-true-dimensions has the effect of \with-true-dimension on both axes.

A.13 Text markup list commands

The following commands can all be used with \markuplist:

\column-lines *args* (markup list)
: Like \column, but return a list of lines instead of a single markup. baseline-skip determines the space between each markup in *args*.

  Used properties:

  - baseline-skip

\justified-lines *args* (markup list)
: Like \justify, but return a list of lines instead of a single markup. Use \override-lines #'(line-width . *X*) to set the line width; *X* is the number of staff spaces.

  Used properties:

  - text-direction (1)
  - word-space
  - line-width (#f)
  - baseline-skip

\map-commands *compose* (procedure) *args* (markup list)
: This applies the function *compose* to every markup in *args* (including elements of markup list command calls) in order to produce a new markup list. Since the return value from a markup list command call is not a markup list but rather a list of stencils, this requires passing those stencils off as the results of individual markup calls. That way, the results should work out as long as no markups rely on side effects.

\override-lines *new-prop* (pair) *args* (markup list)
: Like \override, for markup lists.

\score-lines *score* (score)
: This is the same as the \score markup but delivers its systems as a list of lines. Its *score* argument is entered in braces like it would be for \score.

\string-lines *strg* (string)
: Takes the string *strg* and splits it at the character provided by the property split-char, defaulting to #\newline. Surrounding whitespace is removed from

every resulting string. The returned list of markups is ready to be formatted by other markup or markup list commands like `\column`, `\line`, etc.

```
\markup {
  \column
    \string-lines
     "foo, foo,
     bar, bar,
     buzz, buzz!"
}
```

foo, foo,
bar, bar,
buzz, buzz!

Used properties:

- `split-char` (`#\newline`)

`\table` *column-align* (number list) *lst* (markup list)

Returns a table.

column-align specifies how each column is aligned, possible values are -1, 0, 1. The number of elements in *column-align* determines how many columns will be printed. The entries to print are given by *lst*, a markup-list. If needed, the last row is filled up with `point-stencils`. Overriding `padding` may be used to increase columns horizontal distance. Overriding `baseline-skip` to increase rows vertical distance.

```
% A markup command to print a fixed-width number.
\markup fwnum =
  \markup \override #'(font-features . ("ss01" "-kern"))
    \number \etc

\markuplist {
  \override #'(padding . 2)
  \table
    #'(0 1 0 -1)
    {
      \underline { center-aligned right-aligned
                   center-aligned left-aligned }
      one      \fwnum    1 thousandth \fwnum 0.001
      eleven   \fwnum   11 hundredth  \fwnum 0.01
      twenty   \fwnum   20 tenth      \fwnum 0.1
      thousand \fwnum 1000 one        \fwnum 1.0
    }
}
```

center-aligned	right-aligned	center-aligned	left-aligned
one	1	thousandth	0.001
eleven	11	hundredth	0.01
twenty	20	tenth	0.1
thousand	1000	one	1.0

Used properties:

- baseline-skip
- padding (0)

\table-of-contents

Used properties:

- baseline-skip

\wordwrap-internal *justify* (boolean) *args* (markup list)

Internal markup list command used to define \justify and \wordwrap.

Used properties:

- text-direction (1)
- word-space
- line-width (#f)

\wordwrap-lines *args* (markup list)

Like \wordwrap, but return a list of lines instead of a single markup. Use \override-lines #'(line-width . *X*) to set the line width, where *X* is the number of staff spaces.

Used properties:

- text-direction (1)
- word-space
- line-width (#f)
- baseline-skip

\wordwrap-string-internal *justify* (boolean) *arg* (string)

Internal markup list command that is used to define \justify-string and \wordwrap-string.

Used properties:

- text-direction (1)
- word-space
- line-width

A.14 List of special characters

The following special characters references can be used; for more details, see [ASCII aliases], page 582.

The HTML syntax is used and most of these references are the same as HTML. The rest of them are inspired by LaTeX.

The characters are boxed so that you can see their size. A small padding has been added between the character and the box for more readability.

¡	¡	¿	¿	&solidus;	⁄	&flq;	‹		
&frq;	›	&flqq;	«	&frqq;	»	&glq;	‚		
&grq;	‘	&glqq;	„	&grqq;	“	&elq;	‘		
&erq;	’	&elqq;	“	&erqq;	”				
						&nnbsp;			

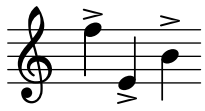
‍		‌		·	·	•	•		
&copyright;	©	&registered;	®	&trademark;	™	†	†		
‡	‡	№	№	ª	ª	º	º		
¶	¶	§	§	°	°	№	№		
‰	‰	¦	¦	´	´	&acutedbl;	˝		
`	`	˘	˘	ˇ	ˇ	&cedilla;	¸		
&circumflex;	^	&diaeresis;	¨	&macron;	¯	&aa;	å		
&AA;	Å	&ae;	æ	&AE;	Æ	ä	ä		
Ä	Ä	&dh;	ð	&DH;	Ð	&dj;	đ		
&DJ;	Đ	&l;	ł	&L;	Ł	&ng;	ŋ		
&NG;	Ŋ	&o;	ø	&O;	Ø	&oe;	œ		
&OE;	Œ	ö	ö	Ö	Ö	&s;	ſ		
&ss;	ß	&th;	þ	&TH;	Þ	ü	ü		
Ü	Ü	+	+	−	−	×	×		
÷	÷	¹	¹	²	²	³	³		
&sqrt;	√	&increment;	Δ	&infty;	∞	∑	∑		
±	±	&bulletop;	∙	&partial;	∂	&neg;	¬		
&currency;	¤	$	$	€	€	&pounds;	£		
¥	¥	¢	¢						

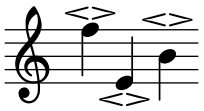
A.15 List of articulations

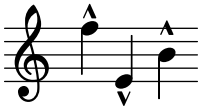
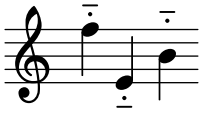
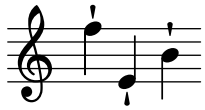
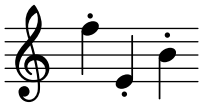
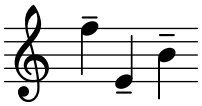
In LilyPond's internal logic, an 'articulation' is any object (other than dynamics) that may be attached directly after a rhythmic event: notes, chords; even silences and skips, or the empty chord construct <> (see Section "Structure of a note entry" in *Learning Manual*). Even slurs, fingerings and text scripts are technically articulations, although these are not shown here.

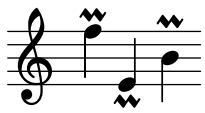
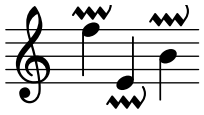
Therefore, the following lists include not only articulation marks, but also all other scripts in the Emmentaler font that may be attached to notes (the way an accent is entered as '`c'\accent`' or '`c'->`'). Each example shows the script in its two possible vertical positions: respectively *up* and *down*, as well as its default (*neutral*) position. See also [Script glyphs], page 746, for a more extensive list of glyphs, for use with the `\musicglyph` markup command as explained in [Music notation inside markup], page 302.

Articulation scripts

`\accent` or `->`

`\espressivo`



`\marcato` or `-^`

`\portato` or `-_`

`\staccatissimo` or `-!`

`\staccato` or `-.`

`\tenuto` or `--`

Ornament scripts

`\prall`

`\prallup`

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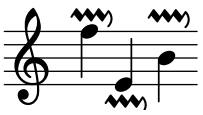

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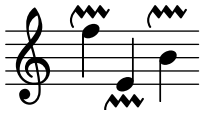
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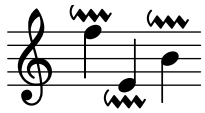
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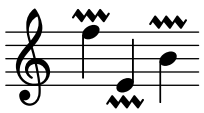
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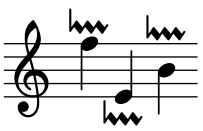
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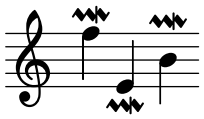
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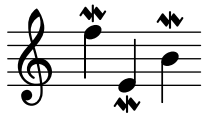

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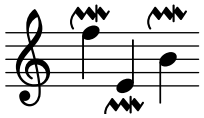
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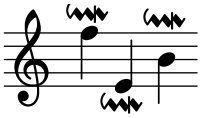
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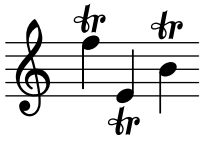
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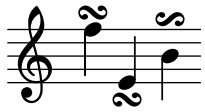
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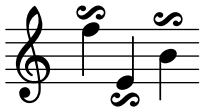
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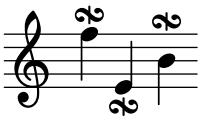
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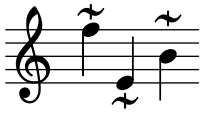

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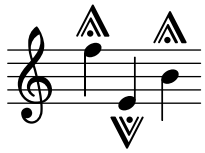
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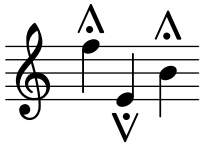
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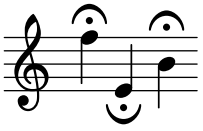
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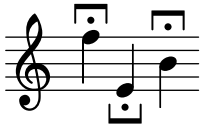

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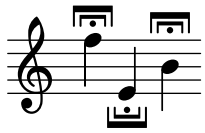

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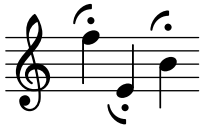
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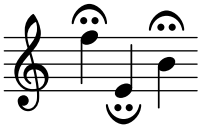
Instrument-specific scripts

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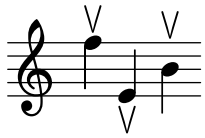
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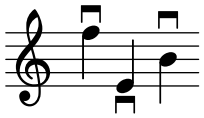
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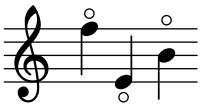

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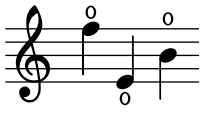
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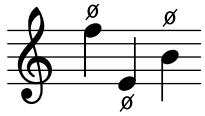
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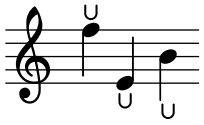

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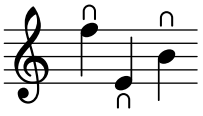

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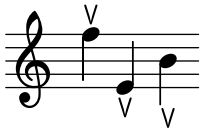

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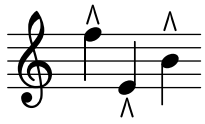

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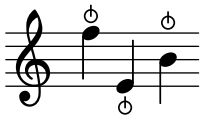

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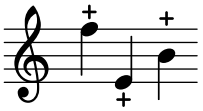

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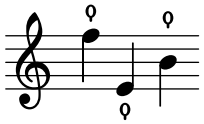

Repeat sign scripts

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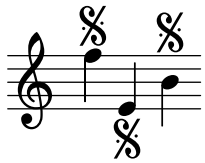
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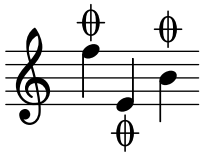
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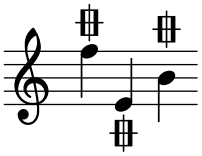

Ancient scripts

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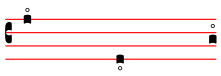
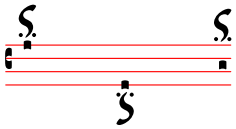
\circulus



\ictus

\semicirculus

\signumcongruentiae



A.16 List of breath marks

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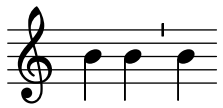
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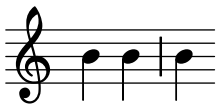
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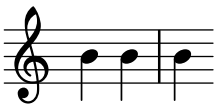
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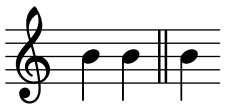
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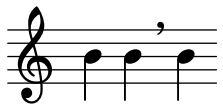
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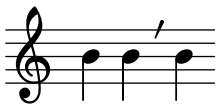
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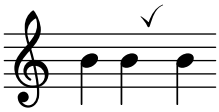
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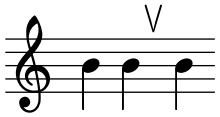

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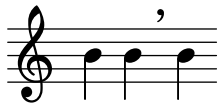
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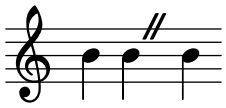
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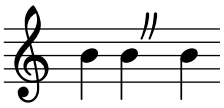
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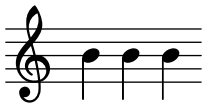
A.17 Percussion notes

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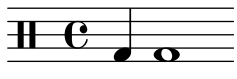
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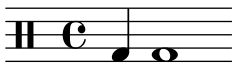
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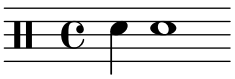
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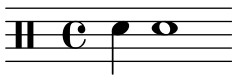
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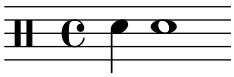
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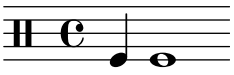
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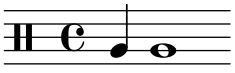
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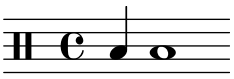
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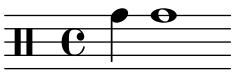
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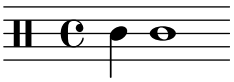
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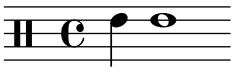
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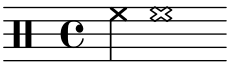

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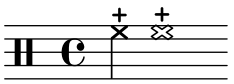
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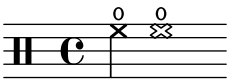
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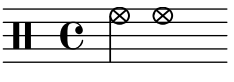
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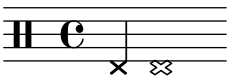
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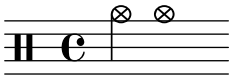
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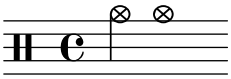
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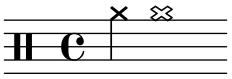
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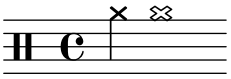
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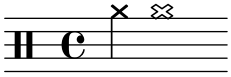
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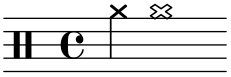
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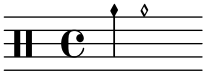
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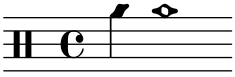
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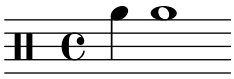
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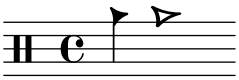
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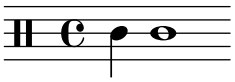
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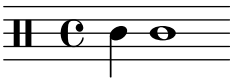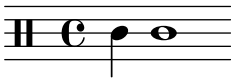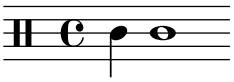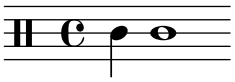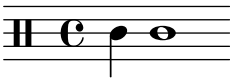
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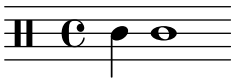
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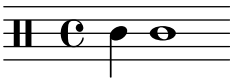
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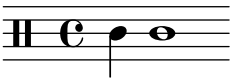
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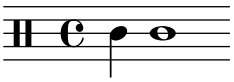
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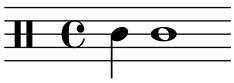
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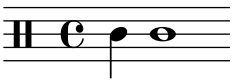
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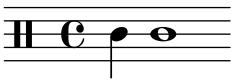
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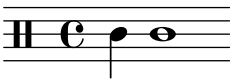
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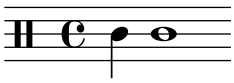
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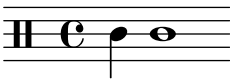
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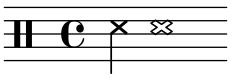
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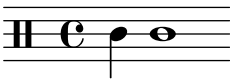
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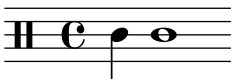
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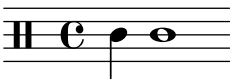
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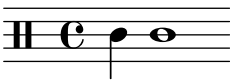
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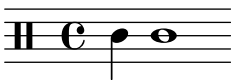
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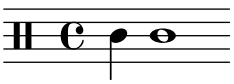
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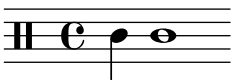
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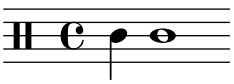
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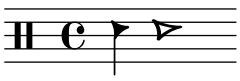
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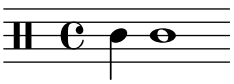
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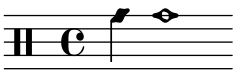
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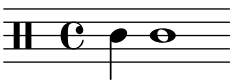
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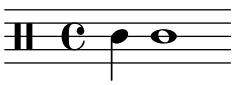
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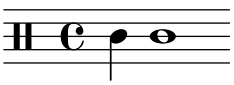
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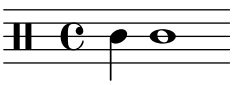
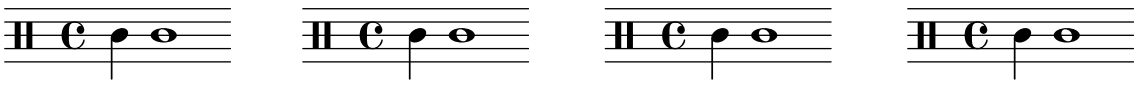

`mutecuica` `triangle` `opentriangle` `mutetriangle`
`cuim` `tri` `trio` `trim`



A.18 List of bar lines

Each system following shows the appearance of a particular bar type at the beginning, middle, and end of a line.

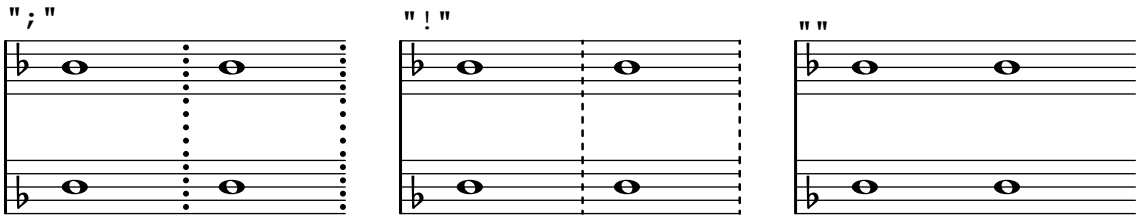
For more information, see [Bar lines], page 106, and [Automatic bar lines], page 115.

Simple bar lines

`";"`

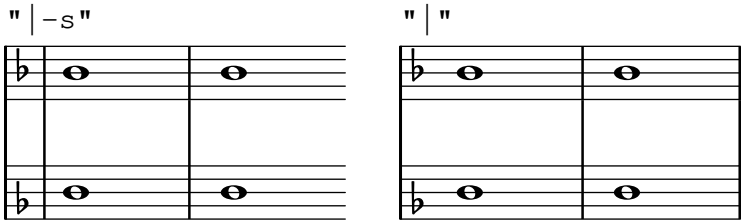
`"!"`

`""`



`"|-s"`

`"|"`

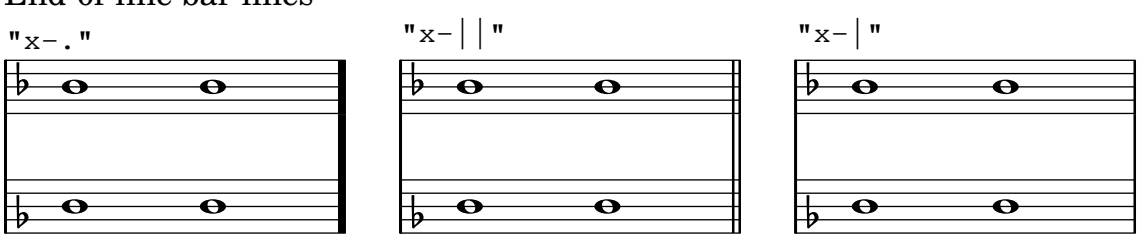


End-of-line bar lines

`"x-."`

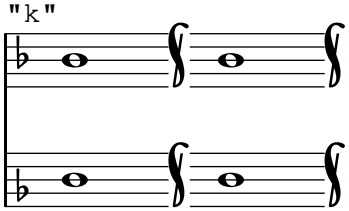
`"x-||"`

`"x-|"`

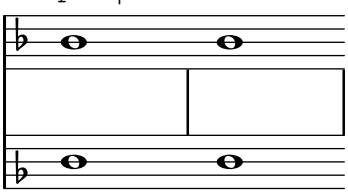


Chant bar lines

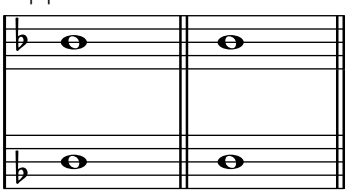
"k"



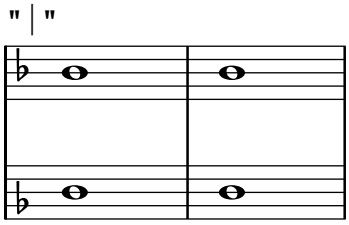
"-span|"



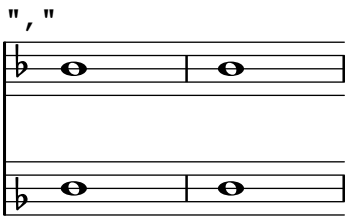
"||"



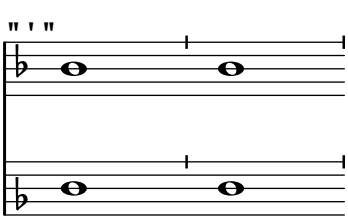
"|"



","

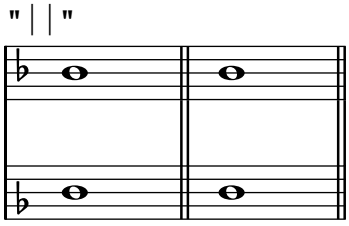


"'"

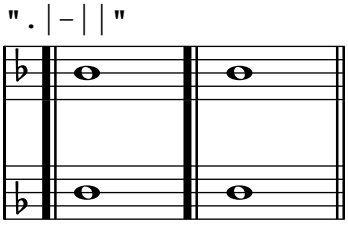


Section bar lines

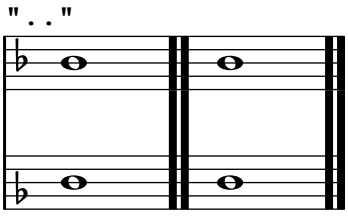
"||"



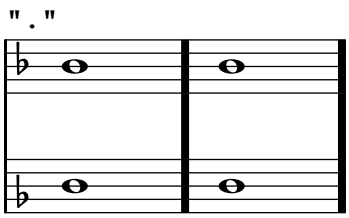
".|-||"



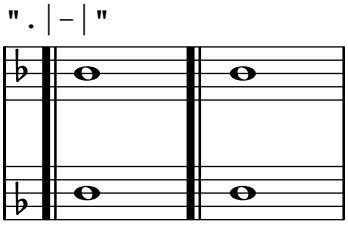
".."



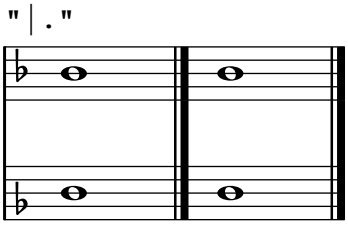
"."



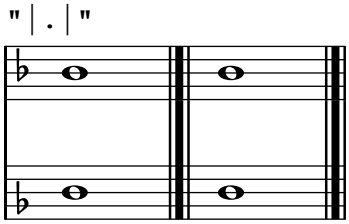
".|-|"



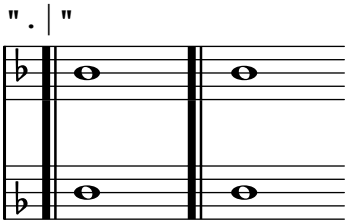
"|."



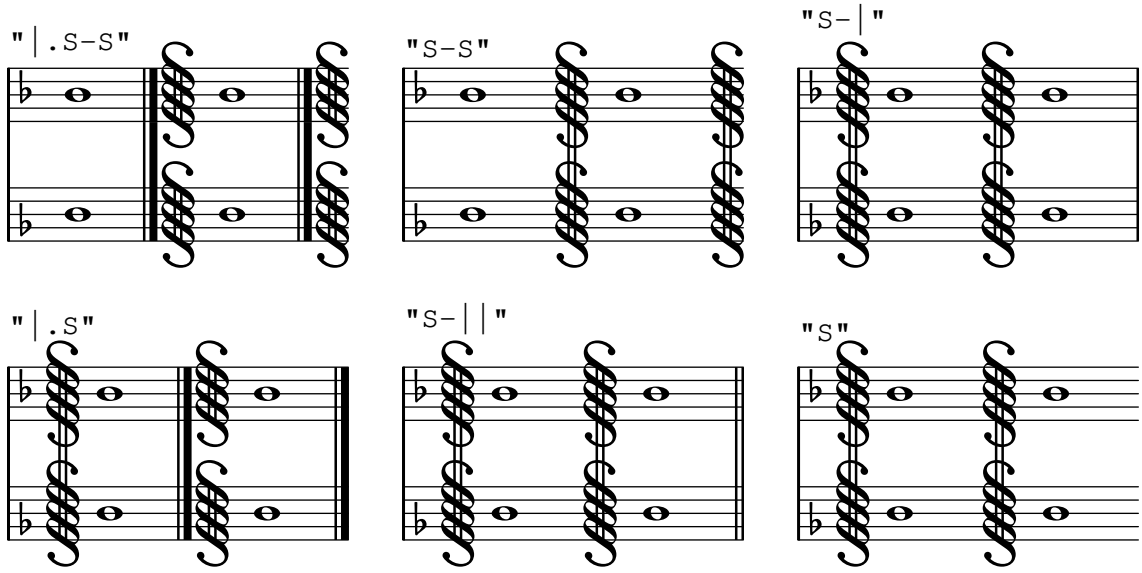
"|.|"



".|"

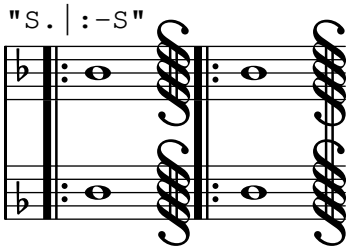


Segno bar lines

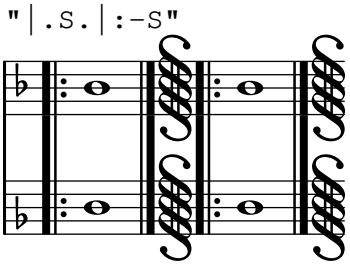


Start-repeat bar lines

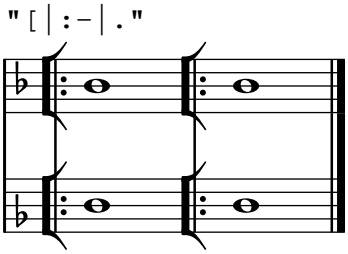
"s.|:-s"



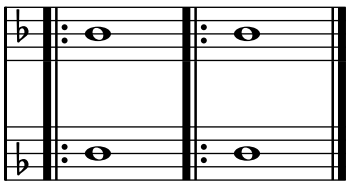
"|.s.|:-s"



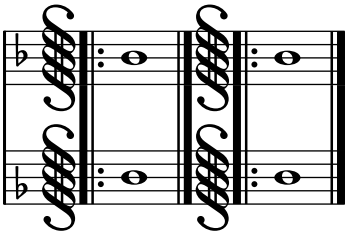
"[|:-|."



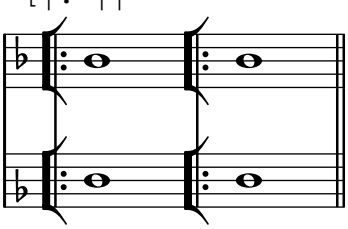
".|:-|."



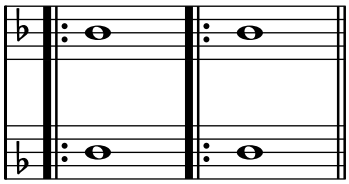
"|.s.|:"



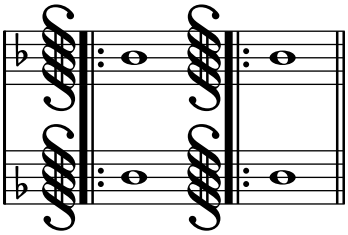
"[|:-||"



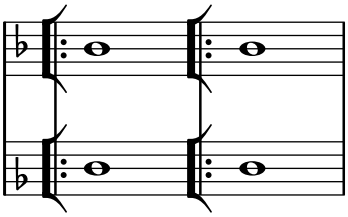
".|:-||"



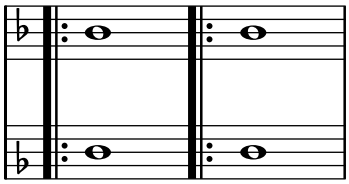
"s.|:-||"



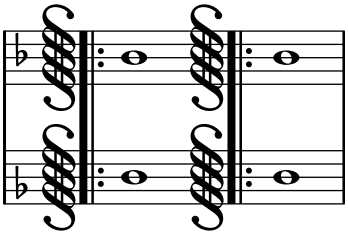
"[|:-|"



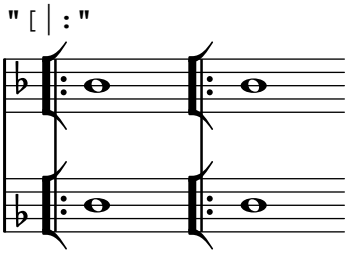
".|:-|"



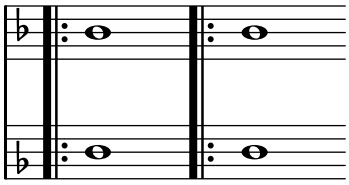
"s.|:-|"



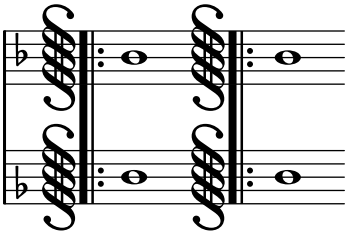
"[|:"



".|:"

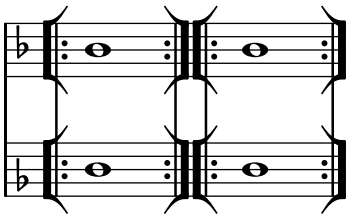


"s.|:"

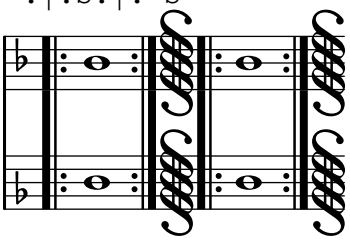


Double-repeat bar lines

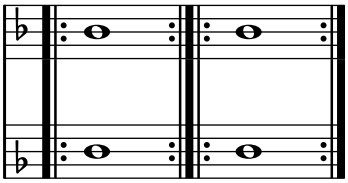
":|][|:"



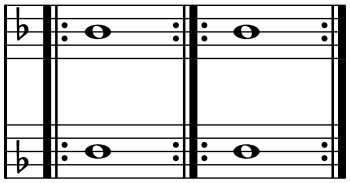
":|.S.|:-S"



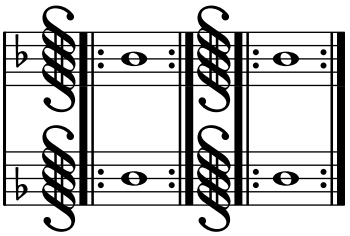
":|.|:"



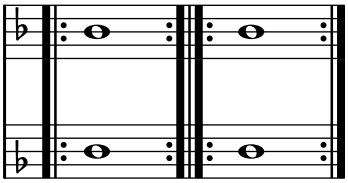
":|.:"



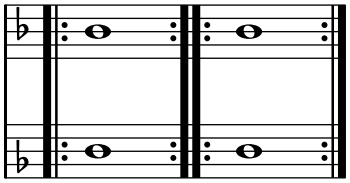
":|.S.|:"



":.|.:"

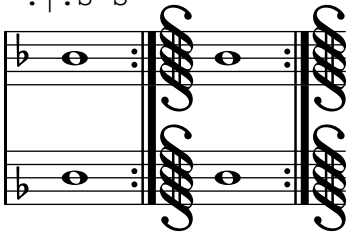


":..:"

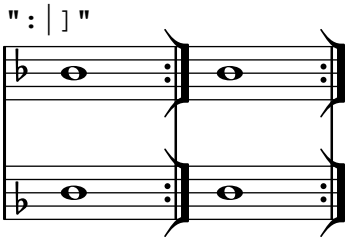


End-repeat bar lines

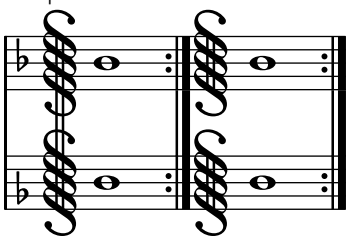
":|.S-S"



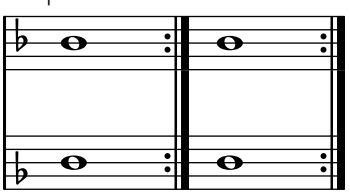
":|]"



":|.S"



":|."



A.19 Default values for `outside-staff-priority`

The following table shows the default `outside-staff-priority` of all outside-staff grobs. Objects with smaller values are placed closer to the staff.

Grob	Priority
`AccidentalSuggestion`	0
`BassFigureAlignmentPositioning`	25

MultiMeasureRestScript	40
TrillSpanner	50
BarNumber	100
DynamicLineSpanner	250
TextSpanner	350
OttavaBracket	400
CombineTextScript	450
MultiMeasureRestText	450
TextScript	450
InstrumentSwitch	500
VoltaBracketSpanner	600
MeasureCounter	750
MeasureSpanner	750
SostenutoPedalLineSpanner	1000
SustainPedalLineSpanner	1000
UnaCordaPedalLineSpanner	1000
CenteredBarNumberLineSpanner	1200
TextMark	1250
MetronomeMark	1300
JumpScript	1350
CodaMark	1400
SegnoMark	1400
SectionLabel	1450
RehearsalMark	1500

A.20 Technical glossary

A glossary of the technical terms and concepts used internally in LilyPond. These terms may appear in the manuals, on mailing lists or in the source code.

alist

An association list or **alist** for short is a Scheme pair which associates a value with a key: `(key . value)`. For example, in `scm/lily.scm`, the alist "type-p-name-alist" associates certain type predicates (e.g., `ly:music?`) with names (e.g., "music") so that type check failures can be reported with a console message that includes the name of the expected type predicate.

callback

A **callback** is a routine, function or method whose reference is passed as an argument in a call to another routine, so allowing the called routine to invoke it. The technique enables a lower-level software layer to call a function defined in a higher layer. Callbacks are used extensively in LilyPond to permit user-level Scheme code to define how many low-level actions are performed.

closure

In Scheme, a **closure** is created when a function, usually a lambda expression, is passed as a variable. The closure contains the function's code plus references to the lexical bindings of the function's free variables (i.e., those variables used in the expression but defined outside it). When this function is applied to different arguments later, the free variable bindings that were captured in the closure are used to obtain the values of the free variables to be used in the calculation. One useful property of closures is the retention of internal variable values between invocations, so permitting state to be maintained.

glyph

A **glyph** is a particular graphical representation of a typographic character, or a combination of two characters forming a ligature. A set of glyphs with a single style and shape comprise a font, and a set of fonts covering several styles and sizes comprise a typeface.

See also

Notation Reference: Section 1.8.3 [Fonts], page 305, Section 3.4.4 [Special characters], page 580.

grob

LilyPond objects which represent items of notation in the printed output such as note heads, stems, slurs, ties, fingering, clefs, etc are called 'Layout objects', often known as 'GRaphical OBjects', or **grobs** for short. They are represented by instances of the `Grob` class.

See also

Learning Manual: Section "Objects and interfaces" in *Learning Manual*, Section "Properties of layout objects" in *Learning Manual*.

Notation Reference: Section A.23 [Naming conventions], page 851.

Internals Reference: Section "grob-interface" in *Internals Reference*, Section "All layout objects" in *Internals Reference*.

immutable

An **immutable** object is one whose state cannot be modified after creation, in contrast to a mutable object, which can be modified after creation.

In LilyPond, immutable or shared properties define the default style and behavior of grobs. They are shared between many objects. In apparent contradiction to the name, they can be changed using `\override` and `\revert`.

See also

Notation Reference: [mutable], page 836.

interface

Actions and properties which are common to a number of grobs are grouped together in an object called a `grob-interface`, or just 'interface' for short.

See also

Learning Manual: Section "Objects and interfaces" in *Learning Manual*, Section "Properties found in interfaces" in *Learning Manual*.

Notation Reference: Section A.23 [Naming conventions], page 851, Section 5.2.2 [Layout interfaces], page 679.

Internals Reference: Section "Graphical Object Interfaces" in *Internals Reference*.

lexer

A **lexer** is a program that converts a sequence of characters into a sequence of tokens, a process called *lexical analysis*. The LilyPond lexer converts the stream obtained from an input `.ly` file into a tokenized stream more suited to the next stage of processing – parsing (see [parser], page 836). The LilyPond lexer is built with Flex from the lexer file `lily/lexer.ll`, which contains the lexical rules. This file is part of the source code and is not included in the LilyPond binary installation.

mutable

A **mutable** object is one whose state can be modified after creation, in contrast to an immutable object, whose state is fixed at the time of creation.

In LilyPond, mutable properties contain values that are specific to one grob. Typically, lists of other objects or results from computations are stored in mutable properties.

See also

Notation Reference: [immutable], page 835.

output-def

An instance of the `Output-def` class contains the methods and data structures associated with an output block. Instances are created for midi, layout and paper blocks.

parser

A **parser** analyzes the sequence of tokens produced by a lexer to determine its grammatical structure, grouping the tokens progressively into larger groupings according to the rules of the grammar. If the sequence of tokens is valid the end product is a tree of tokens whose root is the grammar's start symbol. If this cannot be achieved the file is invalid and an appropriate error message is produced. The syntactic groupings and the rules for constructing the groupings from their parts for the LilyPond syntax are defined in `lily/parser.yy` and shown in Backus Normal Form (BNF) in Section "LilyPond grammar" in *Contributor's Guide*. This file is used to build the parser during the program build by the parser generator, Bison. It is part of the source code and is not included in the LilyPond binary installation.

parser variable

These are variables defined directly in Scheme. Their direct use by users is strongly discouraged, because their scoping semantics can be confusing.

When the value of such a variable is changed in a `.ly` file, the change is global, and unless explicitly reverted, the new value will persist to the end of the file, affecting subsequent `\score` blocks as well as external files added with the `\include` command. This can lead to unintended consequences and in complex typesetting projects the consequent errors can be difficult to track down.

LilyPond uses the following parser variables:

- afterGraceFraction
- musicQuotes
- mode
- output-count
- output-suffix
- partCombineListener
- pitchnames
- toplevel-bookparts
- toplevel-scores
- showLastLength
- showFirstLength

prob

PRoperty OBjects, or **probs** for short, are instances of the `Prob` class, a simple base class for objects which have mutable and immutable property alists and the methods to manipulate

them. The `Music` and `Stream_event` classes derive from `Prob`. Instances of the `Prob` class are also created to hold the formatted content of system grobs and titling blocks during page layout.

smob

Smobs, or ScheMe OBjects, are part of the mechanism used by Guile to export C and C++ objects to Scheme code. In LilyPond, smobs are created from C++ objects through macros. There are two types of smob objects: simple smobs, intended for simple immutable objects like numbers, and complex smobs, used for objects with identities. If you have access to the LilyPond sources, more information can be found in `lily/includes/smob.hh`.

spanner

Spanners are a class of grobs that are not horizontally fixed on one point of the score but extend from one point to another. Examples include beams, ties, and slurs, as well as hairpins and staff lines. Whereas non-spanners can only be broken into at most two visible pieces (for example, a clef duplicated at the end of the line and the beginning of the next line), spanners are broken into as many pieces as required by their start and end points (such as a long crescendo extending on three systems, or staff lines, which always span the whole score).

Technically, spanners are defined as grobs having the `spanner-interface`; on the C++ side of LilyPond, they are instances of the `Spanner` subclass of `Grob`. The left and right bounds of a spanner can be retrieved and set using `ly:spanner-bound` and `ly:spanner-set-bound!`, respectively. The bounds are always items. The X parent of a spanner has little musical sense, but is usually set to the left bound.

See also

Notation Reference: Section 5.4.4 [Spanners], page 696.

Internals Reference: Section “all-layout-objects” in *Internals Reference*, Section “spanner-interface” in *Internals Reference*.

stencil

An instance of the **stencil** class holds the information required to print a typographical object. It is a simple smob containing a confining box, which defines the vertical and horizontal extents of the object, and a Scheme expression which will print the object when evaluated. Stencils may be combined to form more complex stencils defined by a tree of Scheme expressions formed from the Scheme expressions of the component stencils.

The `stencil` property, which connects a grob to its stencil, is defined in the `grob-interface` interface.

See also

Internals Reference: Section “grob-interface” in *Internals Reference*.

A.21 Available music functions

`\absolute` [music] - *music* (music)
: Make *music* absolute. This does not actually change the music itself but rather hides it from surrounding `\relative` and `\fixed` commands.

`\acciaccatura` [music] - *music* (music)
: Create an acciaccatura from the following music expression

`\accidentalStyle` [music] - *style* (symbol list)
: Set accidental style to symbol list *style* in the form ‘`piano-cautionary`’. If *style* has a form like ‘`Staff.piano-cautionary`’, the settings are applied to that con-

text. Otherwise, the context defaults to 'Staff', except for piano styles, which use 'GrandStaff' as a context.

\addChordShape [void] - *key-symbol* (symbol) *tuning* (pair) *shape-definition* (string or pair)
Add chord shape *shape-definition* to the *chord-shape-table* hash with the key `(cons key-symbol tuning)`.

\addInstrumentDefinition [void] - *name* (string) *lst* (list)
Create instrument *name* with properties *list*.

This function is deprecated.

\addQuote [void] - *name* (string) *music* (music)
Define *music* as a quotable music expression named *name*

\after [music] - *delta* (duration) *ev* (music) *mus* (music)
Add music *ev* (usually a post-event) with a delay of *delta* after the onset of *mus*.

\afterGrace [music] - *fraction* [non-negative rational, fraction, or moment] *main* (music) *grace* (music)
Create *grace* note(s) after a *main* music expression.

The musical position of the grace expression is after a given fraction of the main note's duration has passed. If *fraction* is not specified as first argument, it is taken from `afterGraceFraction` which has a default value of `3/4`.

\allowPageTurn [music]
Allow a page turn. May be used at toplevel (ie between scores or markups), or inside a score.

\allowVoltaHook [void] - *bar* (string)
Allow the volta bracket hook being drawn over bar line *bar*.

\alterBroken [music] - *property* (key list or symbol) *arg* (list) *target* (key list or music)
Override *property* for pieces of broken spanner *target* with values *arg*. *target* may either be music in the form of a starting spanner event, or a symbol list in the form 'Context.Grob' or just 'Grob'. Iff *target* is in the form of a spanner event, *property* may also have the form 'Grob.property' for specifying a directed tweak.

\ambitusAfter [music] - *target* (symbol)
Move the ambitus after the break-align symbol *target*.

\appendToTag [music] - *tag* (symbol) *more* (music) *music* (music)
Append *more* to the back of music tagged with *tag*. A `post-event` can be added to the articulations of rhythmic events or chords; other expressions may be added to chords, sequential or simultaneous music.

\applyContext [music] - *proc* (procedure)
Modify context properties with Scheme procedure *proc*.

\applyMusic [music] - *func* (procedure) *music* (music)
Apply procedure *func* to *music*.

\applyOutput [music] - *target* (symbol list or symbol) *proc* (procedure)
Apply function `proc` to every layout object matched by *target* which takes the form `Context` or `Context.Grob`.

\appoggiatura [music] - *music* (music)
Create an appoggiatura from *music*

\assertBeamQuant [music] - *l* (pair) *r* (pair)
Testing function: check whether the beam quants *l* and *r* are correct

\assertBeamSlope [music] - *comp* (procedure)
: Testing function: check whether the slope of the beam is the same as comp

\autoChange [music] - *pitch* [pitch] *clef-1* [context modification] *clef-2* [context modification] *music* (music)
: Make voices that switch between staves automatically. As an option the pitch where to switch staves may be specified. The clefs for the staves are optional as well. Setting clefs works only for implicitly instantiated staves.

\balloonGrobText [music] - *grob-name* (symbol) *offset* (pair of numbers) *text* (markup)
: Attach *text* to *grob-name* at offset *offset* (use like \once)

\balloonText [post event] - *offset* (pair of numbers) *text* (markup)
: Attach *text* at *offset* (use like \tweak)

\bar [music] - *type* (string)
: Insert a bar line of type *type*, overriding any automatic bar lines.

\barNumberCheck [music] - *n* (integer)
: Print a warning if the current bar number is not *n*.

\beamExceptions (any type) - *music* (music)
: Extract a value suitable for setting Timing.beamExceptions from the given pattern with explicit beams in *music*. A bar check | has to be used between bars of patterns in order to reset the timing.

\bendAfter [post event] - *delta* (real number)
: Create a fall or doit of pitch interval *delta*.

\bendHold [post event] - *mus* (music)
: Sets the 'style of a BendSpanner to 'hold.

\bendStartLevel [post event] - *idx* (non-negative, exact integer) *mus* (music)
: Sets the details.successive-level of a BendSpanner to *idx*.

\bookOutputName [void] - *newfilename* (string)
: Direct output for the current book block to *newfilename*.

\bookOutputSuffix [void] - *newsuffix* (string)
: Set the output filename suffix for the current book block to *newsuffix*.

\breathe [music]
: Insert a breath mark.

\caesura [music]
: Insert a caesura.

\chordRepeats [music] - *event-types* [list] *music* (music)
: Walk through *music* putting the notes of the previous chord into repeat chords, as well as an optional list of *event-types* such as #'(string-number-event).

\clef [music] - *type* (string)
: Set the current clef to *type*.

\codaMark [music] - *num* [non-negative, exact integer]
: Create a coda mark. *num* may be 1 for the first mark, 2 for the second, etc., or it may be \default to use the next number in sequence automatically.

\compoundMeter [music] - *args* (pair)
: Create compound time signatures. The argument is a Scheme list of lists. Each list describes one fraction, with the last entry being the denominator, while the first

entries describe the summands in the enumerator. If the time signature consists of just one fraction, the list can be given directly, i.e. not as a list containing a single list. For example, a time signature of (3+1)/8 + 2/4 would be created as `\compoundMeter #'((3 1 8) (2 4))`, and a time signature of (3+2)/8 as `\compoundMeter #'((3 2 8))` or shorter `\compoundMeter #'(3 2 8)`.

`\compressMMRests` [music] - *music* (music)
Remove the empty bars created by multi-measure rests, leaving just the first bar containing the MM rest itself.

`\crossStaff` [music] - *notes* (music)
Create cross-staff stems

`\cueClef` [music] - *type* (string)
Set the current cue clef to *type*.

`\cueClefUnset` [music]
Unset the current cue clef.

`\cueDuring` [music] - *what* (string) *dir* (direction) *main-music* (music)
Insert contents of quote *what* corresponding to *main-music*, in a CueVoice oriented by *dir*.

`\cueDuringWithClef` [music] - *what* (string) *dir* (direction) *clef* (string) *main-music* (music)
Insert contents of quote *what* corresponding to *main-music*, in a CueVoice oriented by *dir*.

`\deadNote` [music] - *note* (music)
Print *note* with a cross-shaped note head.

`\defineBarLine` [void] - *bar* (string) *glyph-list* (list)
Define bar line settings for bar line *bar*. The list *glyph-list* must have three entries which define substitute glyphs for the end of a line, the beginning of a line, and a span bar, respectively. The substitute glyphs may be either strings or booleans: `#t` calls for the same value as *bar* and `#f` calls for no glyph.

`\displayLilyMusic` [music] - *port* [output port] *music* (music)
Display the LilyPond input representation of *music* to *port*, defaulting to the console.

`\displayMusic` [music] - *port* [output port] *music* (music)
Display the internal representation of *music* to *port*, default to the console.

`\displayScheme` (any type) - *port* [output port] *expr* (any type)
Display the internal representation of *expr* to *port*, default to the console.

`\dropNote` [music] - *num* (integer) *music* (music)
Drop a note of any chords in *music*, in *num* position from above.

`\enablePolymeter` [void]
For use within an output definition. Enables polymetry, moving timing management from `Score` to `Staff`-like contexts. This is done by removing the `Timing_translator` from `Score`, and adding it to all contexts having the `Staff` alias.

`\endSpanners` [music] - *music* (music)
Terminate the next spanner prematurely after exactly one note without the need of a specific end spanner.

`\eventChords` [music] - *music* (music)
Compatibility function wrapping `EventChord` around isolated rhythmic events occuring since version 2.15.28, after expanding repeat chords 'q'.

\featherDurations [music] - *scale* (non-negative rational, fraction, or moment) *argument* (music)

Adjust durations of music in *argument* by *scale*.

\finger [post event] - *finger* (index or markup)

Apply *finger* as a fingering indication.

\fixed [music] - *pitch* (pitch) *music* (music)

Use the octave of *pitch* as the default octave for *music*.

\footnote [music] - *mark* [markup] *offset* (pair of numbers) *footnote* (markup) *item* (symbol list or music)

Make the markup *footnote* a footnote on *item*. The footnote is marked with a markup *mark* moved by *offset* with respect to the marked music.

If *mark* is not given or specified as *default*, it is replaced by an automatically generated sequence number. If *item* is a symbol list of form 'Grob' or 'Context.Grob', then grobs of that type will be marked at the current time step in the given context (default Bottom).

If *item* is music, the music will get a footnote attached to a grob immediately attached to the event, like *tweak* does. For attaching a footnote to an *indirectly* caused grob, write \single\footnote, use *item* to specify the grob, and follow it with the music to annotate.

Like with \tweak, if you use a footnote on a following post-event, the \footnote command itself needs to be attached to the preceding note or rest as a post-event with -.

\grace [music] - *music* (music)

Insert *music* as grace notes.

\grobdescriptions (any type) - *descriptions* (list)

Create a context modification from *descriptions*, a list in the format of all-grob-descriptions.

\harmonicByFret [music] - *fret* (number) *music* (music)

Convert *music* into mixed harmonics; the resulting notes resemble harmonics played on a fretted instrument by touching the strings at *fret*.

\harmonicByRatio [music] - *ratio* (number) *music* (music)

Convert *music* into mixed harmonics; the resulting notes resemble harmonics played on a fretted instrument by touching the strings at the point given through *ratio*.

\harmonicNote [music] - *note* (music)

Print *note* with a diamond-shaped note head.

\harmonicsOn [music]

Set the default note head style to a diamond-shaped style.

\hide [music] - *item* (symbol list or music)

Set *item*'s 'transparent' property to #t, making it invisible while still retaining its dimensions.

If *item* is a symbol list of form GrobName or Context.GrobName, the result is an override for the grob name specified by it. If *item* is a music expression, the result is the same music expression with an appropriate tweak applied to it.

\incipit [music] - *incipit-music* (music)

Output *incipit-music* before the main staff as an indication of its appearance in the original music.

`\inherit-acceptability` [void] - *to* (symbol) *from* (symbol)
When used in an output definition, will modify all context definitions such that context *to* is accepted as a child by all contexts that also accept *from*.

`\inStaffSegno` [music]
Put the segno variant 'varsegno' at this position into the staff, compatible with the repeat command.

`\instrumentSwitch` [music] - *name* (string)
Switch instrument to *name*, which must have been predefined with function `\addInstrumentDefinition`.

This function is deprecated.

`\inversion` [music] - *around* (pitch) *to* (pitch) *music* (music)
Invert *music* about *around* and transpose from *around* to *to*.

`\invertChords` [music] - *num* (integer) *music* (music)
Invert any chords in *music* into their *num*-th position. (Chord inversions may be directed downwards using negative integers.)

`\jump` [music] - *text* (markup)
Mark a point of departure, e.g. 'Gavotte I D.C.'.

`\keepWithTag` [music] - *tags* (symbol list or symbol) *music* (music)
Include only elements of *music* that are tagged with one of the tags in *tags*. *tags* may be either a single symbol or a list of symbols.

Each tag may be declared as a member of at most one tag group (defined with `\tagGroup`). If none of a *music* element's tags share a tag group with one of the specified *tags*, the element is retained.

`\key` [music] - *tonic* [pitch] *pitch-alist* [list of number pairs]
Set key to *tonic* and scale *pitch-alist*. If both are null, just generate `KeyChangeEvent`.

`\killCues` [music] - *music* (music)
Remove cue notes from *music*.

`\label` [music] - *label* (symbol)
Create *label* as a referrable label.

`\language` [void] - *language* (string)
Set note names for language *language*.

`\languageRestore` [void]
Restore a previously-saved pitchnames alist.

`\languageSaveAndChange` [void] - *language* (string)
Store the previous pitchnames alist, and set a new one.

`\magnifyMusic` [music] - *mag* (positive number) *music* (music)
Magnify the notation of *music* without changing the staff-size, using *mag* as a size factor. Stems, beams, slurs, ties, and horizontal spacing are adjusted automatically.

`\magnifyStaff` [music] - *mag* (positive number)
Change the size of the staff, adjusting notation size and horizontal spacing automatically, using *mag* as a size factor.

`\makeClusters` [music] - *arg* (music)
Display chords in *arg* as clusters.

`\makeDefaultStringTuning` [void] - *symbol* (symbol) *pitches* (list)
This defines a string tuning *symbol* via a list of *pitches*. The *symbol* also gets registered in `defaultStringTunings` for documentation purposes.

`\mark` [music] - *label* [index or markup]
: Create a rehearsal mark. If *label* is an integer, create the rehearsal mark for the given sequence number. If *label* is `\default`, create the next sequential rehearsal mark. If *label* is markup, use it for the mark.

`\markupMap` [music] - *path* (symbol list or symbol) *markupfun* (markup-function) *music* (music)
: This applies the given markup function *markupfun* to all markup music properties matching *path* in *music*.

  For example,

```
\new Voice { g'2 c'' }
\addlyrics {
  \markupMap LyricEvent.text
             \markup \with-color #red \etc
             { Oh yes! }
}
```

`\modalInversion` [music] - *around* (pitch) *to* (pitch) *scale* (music) *music* (music)
: Invert *music* about *around* using *scale* and transpose from *around* to *to*.

`\modalTranspose` [music] - *from* (pitch) *to* (pitch) *scale* (music) *music* (music)
: Transpose *music* from pitch *from* to pitch *to* using *scale*.

`\musicLength` (any type) - *music* (music)
: Return the length of *music* as a moment.

`\musicMap` [music] - *proc* (procedure) *mus* (music)
: Apply *proc* to *mus* and all of the music it contains.

`\noPageBreak` [music]
: Forbid a page break. May be used at toplevel (i.e., between scores or markups), or inside a score.

`\noPageTurn` [music]
: Forbid a page turn. May be used at toplevel (i.e., between scores or markups), or inside a score.

`\octaveCheck` [music] - *pitch* (pitch)
: Octave check.

`\offset` [music] - *property* (symbol list or symbol) *offsets* (any type) *item* (key list or music)
: Offset the default value of *property* of *item* by *offsets*. If *item* is a string, the result is `\override` for the specified grob type. If *item* is a music expression, the result is the same music expression with an appropriate tweak applied.

`\omit` [music] - *item* (symbol list or music)
: Set *item*'s '`stencil`' property to `#f`, effectively omitting it without taking up space.

  If *item* is a symbol list of form `GrobName` or `Context.GrobName`, the result is an override for the grob name specified by it. If *item* is a music expression, the result is the same music expression with an appropriate tweak applied to it.

`\once` [music] - *music* (music)
: Set `once` to `#t` on all layout instruction events in *music*.

`\ottava` [music] - *octave* (integer)
: Set the octavation.

`\overrideProperty` [music] - *grob-property-path* (list of indexes or symbols) *value* (any type)
Set the grob property specified by *grob-property-path* to *value*. *grob-property-path* is a symbol list of the form `Context.GrobName.property` or `GrobName.property`, possibly with subproperties given as well.

As opposed to `\override` which overrides the context-dependent defaults with which a grob is created, this command uses `Output_property_engraver` at the grob acknowledge stage. This may be necessary for overriding values set after the initial grob creation.

`\overrideTimeSignatureSettings` [music] - *time-signature* (fraction, as pair) *base-moment* (fraction, as pair) *beat-structure* (list) *beam-exceptions* (list)
Override `timeSignatureSettings` for time signatures of *time-signature* to have settings of *base-moment*, *beat-structure*, and *beam-exceptions*.

`\pageBreak` [music]
Force a page break. May be used at toplevel (i.e., between scores or markups), or inside a score.

`\pageTurn` [music]
Force a page turn between two scores or top-level markups.

`\palmMute` [music] - *note* (music)
Print *note* with a triangle-shaped note head.

`\palmMuteOn` [music]
Set the default note head style to a triangle-shaped style.

`\parallelMusic` [void] - *voice-ids* (list) *music* (music)
Define parallel music sequences, separated by '|' (bar check signs), and assign them to the identifiers provided in *voice-ids*.

voice-ids: a list of music identifiers (symbols containing only letters)

music: a music sequence, containing BarChecks as limiting expressions.

Example:

```
  \parallelMusic A,B,C {
    c c | d d | e e |
    d d | e e | f f |
  }
<==>
  A = { c c | d d }
  B = { d d | e e }
  C = { e e | f f }
```

The last bar checks in a sequence are not copied to the result in order to facilitate ending the last entry at non-bar boundaries.

`\parenthesize` [music] - *arg* (symbol list or music)
Tag *arg* to be parenthesized. *arg* may be either a music event or a grob path.

`\partCombine` [music] - *chord-range* [pair of numbers] *part1* (music) *part2* (music)
Take the music in *part1* and *part2* and return a music expression containing simultaneous voices, where *part1* and *part2* are combined into one voice where appropriate. Optional *chord-range* sets the distance in steps between notes that may be combined into a chord or unison.

`\partCombineDown` [music] - *chord-range* [pair of numbers] *part1* (music) *part2* (music)
Take the music in *part1* and *part2* and typeset so that they share a staff with stems directed downward.

\partCombineForce [music] - *type* [symbol]
: Override the part-combiner.

\partCombineUp [music] - *chord-range* [pair of numbers] *part1* (music) *part2* (music)
: Take the music in *part1* and *part2* and typeset so that they share a staff with stems directed upward.

\partial [music] - *dur* (duration)
: Make a partial measure.

\phrasingSlurDashPattern [music] - *dash-fraction* (number) *dash-period* (number)
: Set up a custom style of dash pattern for *dash-fraction* ratio of line to space repeated at *dash-period* interval for phrasing slurs.

\pitchedTrill [music] - *main-note* (music) *secondary-note* (music)
: Print a trill with *main-note* as the main note of the trill and print *secondary-note* as a stemless note head in parentheses.

\pointAndClickOff [void]
: Suppress generating extra code in final-format (e.g. pdf) files to point back to the lilypond source statement.

\pointAndClickOn [void]
: Enable generation of code in final-format (e.g. pdf) files to reference the originating lilypond source statement; this is helpful when developing a score but generates bigger final-format files.

\pointAndClickTypes [void] - *types* (symbol list or symbol)
: Set a type or list of types (such as `#'note-event`) for which point-and-click info is generated.

\preBend [post event] - *mus* (music)
: Sets the `'style` of a `BendSpanner` to `'pre-bend`.

\preBendHold [post event] - *mus* (music)
: Sets the `'style` of a `BendSpanner` to `'pre-bend-hold`.

\propertyOverride [music] - *grob-property-path* (list of indexes or symbols) *value* (any type)
: Set the grob property specified by *grob-property-path* to *value*. *grob-property-path* is a symbol list of the form `Context.GrobName.property` or `GrobName.property`, possibly with subproperties given as well. This music function is mostly intended for use from Scheme as a substitute for the built-in `\override` command.

\propertyRevert [music] - *grob-property-path* (list of indexes or symbols)
: Revert the grob property specified by *grob-property-path* to its previous value. *grob-property-path* is a symbol list of the form `Context.GrobName.property` or `GrobName.property`, possibly with subproperties given as well. This music function is mostly intended for use from Scheme as a substitute for the built-in `\revert` command.

\propertySet [music] - *property-path* (symbol list or symbol) *value* (any type)
: Set the context property specified by *property-path* to *value*. This music function is mostly intended for use from Scheme as a substitute for the built-in `\set` command.

\propertyTweak [music] - *prop* (key list or symbol) *value* (any type) *item* (key list or music)
: Add a tweak to the following *item*, usually music. This generally behaves like `\tweak` but will turn into an `\override` when *item* is a symbol list.

  In that case, *item* specifies the grob path to override. This is mainly useful when using `\propertyTweak` as as a component for building other functions like `\omit`.

It is not the default behavior for \tweak since many input strings in \lyricmode can serve equally as music or as symbols which causes surprising behavior when tweaking lyrics using the less specific semantics of \propertyTweak.

prop can contain additional elements in which case a nested property (inside of an alist) is tweaked.

\propertyUnset [music] - *property-path* (symbol list or symbol)
Unset the context property specified by *property-path*. This music function is mostly intended for use from Scheme as a substitute for the built-in \unset command.

\pushToTag [music] - *tag* (symbol) *more* (music) *music* (music)
Add *more* to the front of music tagged with *tag*. A post-event can be added to the articulations of rhythmic events or chords; other expressions may be added to chords, sequential or simultaneous music.

\quoteDuring [music] - *what* (string) *main-music* (music)
Indicate a section of music to be quoted. *what* indicates the name of the quoted voice, as specified in an \addQuote command. *main-music* is used to indicate the length of music to be quoted; usually contains spacers or multi-measure rests.

\raiseNote [music] - *num* (integer) *music* (music)
Raise a note of any chords in *music*, in *num* position from below.

\reduceChords [music] - *music* (music)
Reduce chords contained in *music* to single notes, intended mainly for reusing music in RhythmicStaff. Does not reduce parallel music.

\relative [music] - *pitch* [pitch] *music* (music)
Make *music* relative to *pitch*. If *pitch* is omitted, the first note in *music* is given in absolute pitch.

\removeWithTag [music] - *tags* (symbol list or symbol) *music* (music)
Remove elements of *music* that are tagged with one of the tags in *tags*. *tags* may be either a single symbol or a list of symbols.

\resetRelativeOctave [music] - *pitch* (pitch)
Set the octave inside a \relative section.

\retrograde [music] - *music* (music)
Return *music* in reverse order.

\revertTimeSignatureSettings [music] - *time-signature* (pair)
Revert timeSignatureSettings for time signatures of *time-signature*.

\rightHandFinger [post event] - *finger* (index or markup)
Apply *finger* as a fingering indication.

\scaleDurations [music] - *fraction* (non-negative rational, fraction, or moment) *music* (music)
Multiply the duration of events in *music* by *fraction*.

\sectionLabel [music] - *text* (markup)
Mark the beginning of a named passage, e.g. “Coda”. This is well suited for use at a section division created with \section, but it does not imply \section and may be used alone.

\segnoMark [music] - *num* [non-negative, exact integer]
Create a segno mark (or bar line, if the segnoStyle context property is 'bar-line). *num* may be 1 for the first segno, 2 for the second, etc., or it may be \default to use the next number in sequence automatically.

`\settingsFrom` (any type) - *ctx* [symbol] *music* (music)
: Take the layout instruction events from *music*, optionally restricted to those applying to context type *ctx*, and return a context modification duplicating their effect.

`\shape` [music] - *offsets* (list) *item* (key list or music)
: Offset control-points of *item* by *offsets*. The argument is a list of number pairs or list of such lists. Each element of a pair represents an offset to one of the coordinates of a control-point. The y-coordinate of each number pair is scaled by staff space. If *item* is a string, the result is `\once\override` for the specified grob type. If *item* is a music expression, the result is the same music expression with an appropriate tweak applied.

`\shiftDurations` [music] - *dur* (integer) *dots* (integer) *arg* (music)
: Change the duration of *arg* by adding *dur* to the `durlog` of *arg* and *dots* to the `dots` of *arg*.

`\single` [music] - *overrides* (music) *music* (music)
: Convert *overrides* to tweaks and apply them to *music*. This does not convert `\revert`, `\set` or `\unset`.

`\skip` [music] - *arg* (duration-or-music)
: Skip over *arg*, which may be music or a duration.

`\slashedGrace` [music] - *music* (music)
: Create slashed graces (slashes through stems, but no slur) from the following music expression

`\slurDashPattern` [music] - *dash-fraction* (number) *dash-period* (number)
: Set up a custom style of dash pattern for *dash-fraction* ratio of line to space repeated at *dash-period* interval for slurs.

`\staffHighlight` [music] - *color* (color)
: Start a highlight with the specified color.

`\storePredefinedDiagram` [void] - *fretboard-table* (hash table) *chord* (music) *tuning* (pair) *diagram-definition* (string or pair)
: Add predefined fret diagram defined by *diagram-definition* for the chord pitches *chord* and the stringTuning *tuning*.

`\stringTuning` (any type) - *chord* (music)
: Convert *chord* to a string tuning. *chord* must be in absolute pitches and should have the highest string number (generally the lowest pitch) first.

`\styledNoteHeads` [music] - *style* (symbol) *heads* (symbol list or symbol) *music* (music)
: Set *heads* in *music* to *style*.

`\tabChordRepeats` [music] - *event-types* [list] *music* (music)
: Walk through *music* putting the notes, fingerings and string numbers of the previous chord into repeat chords, as well as an optional list of *event-types* such as `#'(articulation-event)`.

`\tabChordRepetition` [void]
: Include the string and fingering information in a chord repetition. This function is deprecated; try using `\tabChordRepeats` instead.

`\tag` [music] - *tags* (symbol list or symbol) *music* (music)
: Tag the following *music* with *tags* and return the result, by adding the single symbol or symbol list *tags* to the `tags` property of *music*.

\tagGroup [void] - *tags* (symbol list)
: Define a tag group comprising the symbols in the symbol list *tags*. Tag groups must not overlap.

\temporary [music] - *music* (music)
: Make any \override in *music* replace an existing grob property value only temporarily, restoring the old value when a corresponding \revert is executed. This is achieved by clearing the 'pop-first' property normally set on \overrides.

  An \override/\revert sequence created by using \temporary and \undo on the same music containing overrides will cancel out perfectly or cause a warning.

  Non-property-related music is ignored, warnings are generated for any property-changing music that isn't an \override.

\textEndMark [music] - *text* (markup)
: (undocumented; fixme)

\textMark [music] - *text* (markup)
: (undocumented; fixme)

\tieDashPattern [music] - *dash-fraction* (number) *dash-period* (number)
: Set up a custom style of dash pattern for *dash-fraction* ratio of line to space repeated at *dash-period* interval for ties.

\time [music] - *beat-structure* [number list] *fraction* (fraction, as pair)
: Set *fraction* as time signature, with optional number list *beat-structure* before it.

\times [music] - *fraction* (fraction, as pair) *music* (music)
: Scale *music* in time by *fraction*.

\tocItem [music] - *label* [symbol list or symbol] *text* (markup)
: Add a line to the table of contents, using the tocItemMarkup paper variable markup and assigning it to *label* if one is provided. If a hierarchy of labels is given, make the current item a child of the corresponding objects.

\transpose [music] - *from* (pitch) *to* (pitch) *music* (music)
: Transpose *music* from pitch *from* to pitch *to*.

\transposedCueDuring [music] - *what* (string) *dir* (direction) *pitch* (pitch) *main-music* (music)
: Insert notes from the part *what* into a voice called cue, using the transposition defined by *pitch*. This happens simultaneously with *main-music*, which is usually a rest. The argument *dir* determines whether the cue notes should be notated as a first or second voice.

\transposition [music] - *pitch* (pitch)
: Set instrument transposition

\tuplet [music] - *ratio* (fraction, as pair) *tuplet-span* [duration] *music* (music)
: Scale the given *music* to tuplets. *ratio* is a fraction that specifies how many notes are played in place of the nominal value: it will be '3/2' for triplets, namely three notes being played in place of two. If the optional duration *tuplet-span* is specified, it is used instead of tupletSpannerDuration for grouping the tuplets. For example,

  ```
  \tuplet 3/2 4 { c8 c c c c c }
  ```

  will result in two groups of three tuplets, each group lasting for a quarter note.

\tupletSpan [music] - *tuplet-span* [duration]
: Set tupletSpannerDuration, the length into which \tuplet without an explicit 'tuplet-span' argument of its own will group its tuplets, to the duration *tuplet-*

span. To revert to the default of not subdividing the contents of a `\tuplet` command without explicit '`tuplet-span`', use

```
\tupletSpan \default
```

`\tweak` [music] - *prop* (key list or symbol) *value* (any type) *music* (music)
Add a tweak to the following *music*. Layout objects created by *music* get their property *prop* set to *value*. If *prop* has the form '`Grob.property`', like with

```
\tweak Accidental.color #red cis'
```

an indirectly created grob ('`Accidental`' is caused by '`NoteHead`') can be tweaked; otherwise only directly created grobs are affected.

prop can contain additional elements in which case a nested property (inside of an alist) is tweaked.

If *music* is an '`event-chord`', every contained '`rhythmic-event`' is tweaked instead.

`\undo` [music] - *music* (music)
Convert `\override` and `\set` in *music* to `\revert` and `\unset`, respectively. Any reverts and unsets already in *music* cause a warning. Non-property-related music is ignored.

`\unfolded` [music] - *music* (music)
Mask *music* until the innermost enclosing repeat is unfolded.

`\unfoldRepeats` [music] - *types* [symbol list or symbol] *music* (music)
Force `\repeat volta`, `\repeat tremolo` or `\repeat percent` commands in *music* to be interpreted as `\repeat unfold`, if specified in the optional symbol-list *types*. The default for *types* is an empty list, which will force any of those commands in *music* to be interpreted as `\repeat unfold`. Possible entries are `volta`, `tremolo` or `percent`. Multiple entries are possible.

`\voices` [music] - *ids* (list of indexes or symbols) *music* (music)
Take the given key list of numbers (indicating the use of '`\voiceOne`'...) or symbols (indicating voice names, typically converted from strings by argument list processing) and assign the following \\-separated music to contexts according to that list. Named rather than numbered contexts can be used for continuing one voice (for the sake of spanners and lyrics), usually requiring a `\voiceOne`-style override at the beginning of the passage and a `\oneVoice` override at its end.

The default

```
<< ... \\ ... \\ ... >>
```

construct would correspond to

```
\voices 1,2,3 << ... \\ ... \\ ... >>
```

`\void` [void] - *arg* (any type)
Accept a scheme argument, return a void expression. Use this if you want to have a scheme expression evaluated because of its side-effects, but its value ignored.

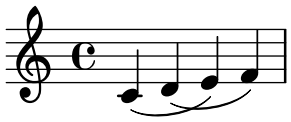
`\volta` [music] - *volta-numbers* (number list) *music* (music)
Mark *music* as being limited to the volte given in *volta-numbers* when the innermost enclosing repeat is unfolded. Volta number begins at 1 and increases by 1 with each repetition.

`\vshape` [music] - *offsets* (list) *item* (key list or music)
Like `\shape`, but additionally show control points for ease of tweaking.

`\withMusicProperty` [music] - *sym* (symbol) *val* (any type) *music* (music)
Set *sym* to *val* in *music*.

\xNote [music] - *note* (music)
: Print *note* with a cross-shaped note head.

\= [post event] - *id* (index or symbol) *event* (post event)
: This sets the spanner-id property of the following *event* to the given *id* (non-negative integer or symbol). This can be used to tell LilyPond how to connect overlapping or parallel slurs or phrasing slurs within a single Voice.

```
\fixed c' { c\=1( d\=2( e\=1) f\=2) }
```

A.22 Context modification identifiers

The following commands are defined for use as context modifications within a \layout or \with block.

\EnableGregorianDivisiones
: Configure division commands such as \section to create Divisio grobs rather than BarLine grobs. This does not affect measure bar lines or the properties of the grobs themselves.

- Sets translator property caesuraTypeTransform to caesura-to-divisio.
- Sets translator property doubleRepeatBarType to '().
- Sets translator property endRepeatBarType to '().
- Sets translator property fineBarType to "".
- Sets translator property sectionBarType to "".
- Sets translator property startRepeatBarType to '().
- Sets translator property underlyingRepeatBarType to "".
- Sets translator property doubleRepeatSegnoBarType to "S-||".
- Sets translator property endRepeatSegnoBarType to "S-||".
- Sets translator property fineSegnoBarType to "S-||".
- Sets translator property fineStartRepeatSegnoBarType to "S-||".
- Sets translator property segnoBarType to "S-||".
- Sets translator property startRepeatSegnoBarType to "S-||".

\RemoveAllEmptyStaves
: Remove staves which are considered to be empty according to the list of interfaces set by keepAliveInterfaces, including those in the first system.

- Sets grob property remove-empty in Section "VerticalAxisGroup" in *Internals Reference* to #t.
- Sets grob property remove-first in Section "VerticalAxisGroup" in *Internals Reference* to #t.

\RemoveEmptyStaves
: Remove staves which are considered to be empty according to the list of interfaces set by keepAliveInterfaces.

- Sets grob property remove-empty in Section "VerticalAxisGroup" in *Internals Reference* to #t.

A.23 Naming conventions

Naming conventions are used so that it is easier to keep the nature of an object in mind.

Object/property type	Naming convention	Examples
Keywords	aaaa	\score, \addlyrics
Music functions and shortcuts	aaaa or aaaaAaaaAaaa	\time, \stemUp
Markup functions	aaaa or aaaa-aaaa-aaaa	\bold, \with-dimensions
Paper variables	aaaa or aaaa-aaaa-aaaa	indent, page-breaking
Music expressions	Aaaa or AaaaAaaaAaaa	NoteEvent, SequentialMusic
Music classes	aaaa or aaaa-aaaa-aaaa	note-event, rhythmic-event
Music properties	aaaa or aaaa-aaaa-aaaa	force-accidental, iterator-ctor
Contexts	Aaaa or AaaaAaaaAaaa	Staff, GrandStaff
Context properties	aaaa or aaaaAaaaAaaa	stanza, instrumentName
Engravers	Aaaa_engraver or Aaaa_aaaa_aaaa_engraver	Clef_engraver, Note_heads_engraver
Layout Objects	Aaaa or AaaaAaaaAaaa	Slur, NoteHead
Layout Object Properties	aaa or aaa-aaa-aaa	direction, beam-thickness
Interfaces	aaa-aaa-interface	grob-interface, break-aligned-interface
Scheme functions defined in Guile	aaaa or aaaa-aaaa-aaaa	map, for-each
Scheme functions defined in LilyPond	ly:aaaa or ly:aaaa-aaaa-aaaa or aaaa or aaaa-aaaa-aaaa[2]	ly:round-filled-box, music-map

A.24 Predefined type predicates

Predicates return #t when their argument is of the named type and #f if it isn't.

R5RS primary predicates

Primary predicates can be applied to any expression. They can be used on their own as predicates for LilyPond functions. The predicates here are part of the Scheme standard R5RS.

Type predicate	Description
boolean?	boolean
char?	character
complex?	complex number
eof-object?	end-of-file object
input-port?	input port
integer?	integer
list?	list *(use* cheap-list? *for faster processing)*
null?	null
number?	number
output-port?	output port
pair?	pair
port?	port
procedure?	procedure

[2] For historical reasons, some but not all of the functions defined by LilyPond start with the ly: prefix.

`rational?`	rational number
`real?`	real number
`string?`	string
`symbol?`	symbol
`vector?`	vector

R5RS secondary predicates

Secondary predicates are only applicable to specific expressions (for example, to numbers). They will throw a type error when applied to expressions they are not intended for. The predicates here are part of the Scheme standard R5RS.

Type predicate	**Description**
`char-alphabetic?`	alphabetic character
`char-lower-case?`	lower-case character
`char-numeric?`	numeric character
`char-upper-case?`	upper-case character
`char-whitespace?`	whitespace character
`even?`	even number
`exact?`	exact number
`inexact?`	inexact number
`negative?`	negative number
`odd?`	odd number
`positive?`	positive number
`zero?`	zero

Guile predicates

These predicates are defined by Guile but are not part of a Scheme standard.

Type predicate	**Description**
`hash-table?`	hash table

LilyPond scheme predicates

These predicates are only available within LilyPond and defined in Scheme.

Type predicate	**Description**
`alist?`	association list (list of pairs)
`boolean-or-symbol?`	boolean or symbol
`cheap-list?`	list *(use this instead of* `list?` *for faster processing)*
`color?`	color
`exact-rational?`	an exact rational number
`fraction?`	fraction, as pair
`grob-list?`	list of grobs
`index?`	non-negative, exact integer
`index-or-markup?`	index or markup
`key?`	index or symbol
`key-list?`	list of indexes or symbols
`key-list-or-music?`	key list or music
`key-list-or-symbol?`	key list or symbol
`ly:skyline-pair?`	pair of skylines
`markup?`	markup
`markup-command-list?`	markup command list
`markup-list?`	markup list
`moment-pair?`	pair of moment objects
`non-negative-number?`	non-negative number

number-list?	number list
number-or-grob?	number or grob
number-or-pair?	number or pair
number-or-string?	number or string
number-pair?	pair of numbers
number-pair-list?	list of number pairs
positive-number?	positive number
rational-or-procedure?	an exact rational or procedure
rhythmic-location?	rhythmic location
scale?	non-negative rational, fraction, or moment
scheme?	any type
string-or-music?	string or music
string-or-pair?	string or pair
string-or-symbol?	string or symbol
symbol-key-alist?	alist, with symbols as keys
symbol-list?	symbol list
symbol-list-or-music?	symbol list or music
symbol-list-or-symbol?	symbol list or symbol
void?	void

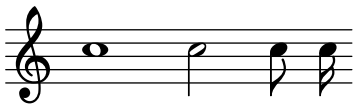
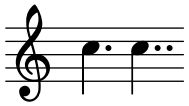
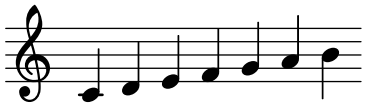
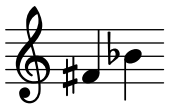
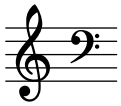
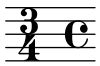
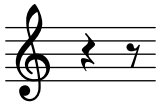
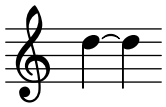
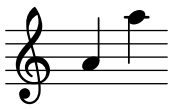
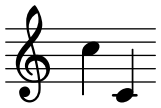
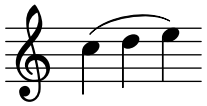
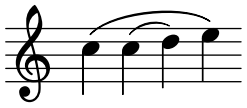
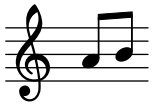
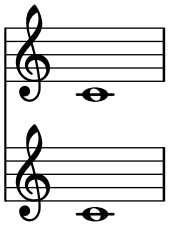
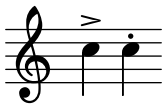
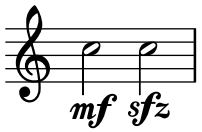
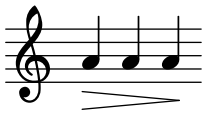
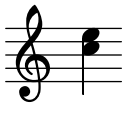
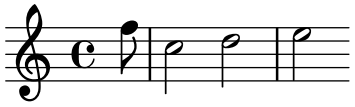
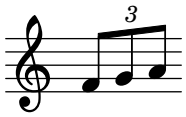
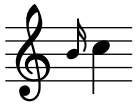
LilyPond exported predicates

These predicates are only available within LilyPond and usually defined in C++.

Type predicate	**Description**
ly:book?	book
ly:context?	context
ly:context-def?	context definition
ly:context-mod?	context modification
ly:dimension?	dimension, in staff space
ly:dir?	direction
ly:dispatcher?	dispatcher
ly:duration?	duration
ly:event?	post event
ly:font-metric?	font metric
ly:grob?	graphical (layout) object
ly:grob-array?	array of grobs
ly:grob-properties?	grob properties
ly:input-location?	input location
ly:item?	item
ly:iterator?	iterator
ly:lily-lexer?	lily-lexer
ly:lily-parser?	lily-parser
ly:listener?	listener
ly:moment?	moment
ly:music?	music
ly:music-function?	music function
ly:music-list?	list of music objects
ly:music-output?	music output
ly:note-scale?	note scale
ly:otf-font?	OpenType font
ly:output-def?	output definition
ly:page-marker?	page marker

`ly:pango-font?`	Pango font
`ly:paper-book?`	paper book
`ly:paper-system?`	paper-system Prob
`ly:pitch?`	pitch
`ly:prob?`	property object
`ly:score?`	score
`ly:skyline?`	skyline
`ly:source-file?`	source file
`ly:spanner?`	spanner
`ly:spring?`	spring
`ly:stencil?`	stencil
`ly:stream-event?`	stream event
`ly:transform?`	coordinate transform
`ly:translator?`	translator
`ly:translator-group?`	translator group
`ly:unpure-pure-container?`	unpure/pure container

Appendix B Cheat sheet

Syntax	Description	Example
`1 2 8 16`	durations	
`c4. c4..`	augmentation dots	
`c d e f g a b`	scale	
`fis bes`	alteration	
`\clef treble \clef bass`	clefs	
`\time 3/4 \time 4/4`	time signature	
`r4 r8`	rest	
`d ~ d`	tie	
`\key es \major`	key signature	
note`'`	raise octave	
note`,`	lower octave	

`c( d e)`	slur	
`c\( c( d) e\)`	phrasing slur	
`a8[ b]`	beam	
`<< \new Staff ... >>`	more staves	
`c-> c-.`	articulations	
`c2\mf c\sfz`	dynamics	
`a\< a a\!`	crescendo	
`a\> a a\!`	decrescendo	
`< >`	chord	
`\partial 8`	pickup / upbeat	
`\tuplet 3/2 {f g a}`	triplets	
`\grace`	grace notes	

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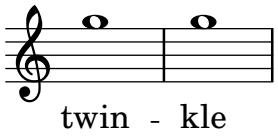
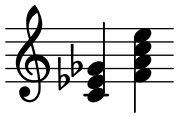
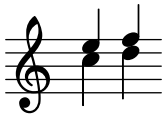
`\new Lyrics`	printing lyrics	**twinkle**
`twin -- kle`	lyric hyphen	
`\chordmode { c:dim f:maj7 }`	chords	
`\new ChordNames`	printing chord names	C° F△
`<<{e f} \\ {c d}>>`	polyphony	
`s4 s8 s16`	spacer rests	

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Appendix D LilyPond command index

This index lists all the LilyPond commands and keywords with links to those sections of the manual that describe or discuss their use.

!

! 6
\! 141

"

"|" 124

%

% 536, 541
%{ ... %} 536, 541

’

' 1

(

(..... 151
\(..... 155

)

) 151
\) 155

,

, ... 1

—

- 138, 491, 694
-! 824
-+ 825
-- 824
-. 824
-> 824
-^ 824
-_ 824

.

. 49

/

/ 471
/+ 471

:

: 190

<

< 192
\< 141
<...> 192
<> 193, 379

=

= 10
\= 151, 850

>

> 192
\> 141

?

? 6

[

[..... 102
\[..... 495

]

] 102
\] 495

^

^ 471, 694

_

_ 321, 694

|

| 124

~

~ 58

A

\abs-fontsize 293, 759
\absolute 837
\accent 138, 824
\accentus 506, 826
\accepts 673, 674, 676
\acciaccatura 130, 837
\accidental 794
\accidentalStyle 28, 837
AccidentalSuggestion 140
add-grace-property 133
add-stem-support 256
add-toc-item! 566
\addChordShape 430, 838
\addInstrumentDefinition 838
additionalPitchPrefix 476
\addlyrics 315, 317, 318
\addQuote 239, 838
\aeolian 22
\after 142, 187, 838
\afterGrace 131, 838
afterGraceFraction 836
\aikenHeads 43
\aikenHeadsMinor 44
\aikenThinHeads 43
\aikenThinHeadsMinor 44
\alias 673, 674
\align-on-other 770
alignAboveContext 230, 677
alignBelowContext 230, 337, 677
\allowPageTurn 624, 838
\allowVoltaHook 838
\alterBroken 697, 838
\alternative 170, 172
ambitusAfter 39, 838
AmbitusLine 38
annotate-spacing 655
\appendToTag 573, 838
\applyContext 664, 838
\applyMusic 838
\applyOutput 838
\applySwing 598
\applySwingWithOffset 598
\appoggiatura 130, 838
\arabicStringNumbers 394
\arpeggio 162
arpeggio-direction 162
\arpeggioArrowDown 162
\arpeggioArrowUp 162
\arpeggioBracket 163
\arpeggioNormal 162
\arpeggioParenthesis 163
\arpeggioParenthesisDashed 163
\arrow-head 301, 785
\articulate 598
articulation-event 242
\ascendens 507, 512
\assertBeamQuant 838
\assertBeamSlope 839
associatedVoice 315, 317, 349
\auctum 507, 512
aug 469
\augmentum 513
auto-first-page-number 610
\auto-footnote 811
autoBeaming 94, 659
\autoBeamOff 91, 384
\autoBeamOn 91
\autoBreaksOff 617
\autoBreaksOn 617
\autoChange 381, 839
\autoLineBreaksOff 617
\autoLineBreaksOn 617
\autoPageBreaksOff 621
\autoPageBreaksOn 621

B

\backslashed-digit 811
Balloon_engraver 270
\balloonGrobText 270, 839
\balloonLengthOff 270
\balloonLengthOn 270
\balloonText 270, 839
banjo-c-tuning 445
banjo-double-c-tuning 445
banjo-double-d-tuning 445
banjo-modal-tuning 445
banjo-open-d-tuning 445
banjo-open-dm-tuning 445
banjo-open-g-tuning 445
\bar 106, 115, 839
barCheckSynchronize 124
BarNumber 117
\barNumberCheck 124, 839
barNumberVisibility 117
bartype 115
base-shortest-duration 641
baseMoment 94, 98
\bassFigureExtendersOff 486
\bassFigureExtendersOn 486
\bassFigureStaffAlignmentDown 488
\bassFigureStaffAlignmentNeutral 488
\bassFigureStaffAlignmentUp 488
\beam 785
\beamExceptions 94, 839
beatStructure 94, 98
\bendAfter 157, 839
\bendHold 401, 839
\bendStartLevel 401, 839
binding-offset 608
\blackTriangleMarkup 476
blank-after-score-page-penalty 610
blank-last-page-penalty 610
blank-page-penalty 610
\bold 293, 759
\book 536, 539
\bookOutputName 539, 839
\bookOutputSuffix 539, 839
\bookpart 537, 539, 621
bookpart-level-page-numbering 610
bookTitleMarkup 550
bottom-margin 604
\box 300, 759
\bp 695
bracket 386
\bracket 149, 300, 786
\break 617

break-align-symbols 714
break-visibility 706
breakable 92
breakbefore 547
\breakDynamicSpan 147
\breathe 156, 839
\breve 48, 61

C

\cadenzaOff 81
\cadenzaOn 81
\caesura 70, 71, 115, 374, 506, 515, 839
\caps 759
\cavum 507, 512
\center-align 295, 770
\center-column 298, 770
\change 379
\char 812
check-consistency 607
choral 32
choral-cautionary 32
chordChanges 434, 474
ChordGrid 480
\chordmode 6, 14, 428, 534
chordNameExceptions 477, 478
chordNameLowercaseMinor 476
ChordNames 428
chordNameSeparator 476, 479
chordNoteNamer 476
chordPrefixSpacer 477
\chordRepeats 397, 839
chordRootNamer 476
\chords 473, 534
\circle 300, 786
\circulus 506, 826
\clef 17, 839
clip-regions 583
\cm 695
\coda 138, 794, 825
\codaMark 115, 178, 185, 839
color 260
\column 298, 771
\column-lines 820
\combine 301, 771
common-shortest-duration 641
Completion_heads_engraver 87
Completion_rest_engraver 87
\compound-meter 794
\compoundMeter 86, 839
\compressEmptyMeasures 248
\compressMMRests 66, 67, 248, 840
\concat 771
\consists 667, 673, 674
\context 661, 668
context-spec-music 205
controlpitch 10
countPercentRepeats 188
\cr 141
\cresc 143
crescendo-event 242
crescendoSpanner 148
crescendoText 148
\crescHairpin 143
\crescTextCresc 143
cross 40
\crossStaff 384, 840
\cueClef 243, 840
\cueClefUnset 243, 840
\cueDuring 243, 840
\cueDuringWithClef 243, 840
CueVoice 243
currentBarNumber 117, 137
\customTabClef 795

D

\dashBang 139
\dashDash 139
\dashDot 139
\dashHat 139
\dashLarger 139
\dashPlus 139
\dashUnderscore 139
\deadNote 41, 840
\deadNotesOff 41
\deadNotesOn 41
debug-beam-scoring 612
debug-slur-scoring 612
debug-tie-scoring 612
\decr 141
\decresc 143
decrescendoSpanner 148
decrescendoText 148
default 28, 30
\default 125, 556
default-staff-staff-spacing 625
\defaultchild 677
\defaultTimeSignature 72
\defineBarLine 111, 840
\deminutum 507, 512
\denies 673, 675, 676
\descendens 507, 512
dim 469
\dim 143
\dimHairpin 143
\dimTextDecr 143
\dimTextDecresc 143
\dimTextDim 143
\dir-column 772
\discant 806
\displayLilyMusic 599, 840
\displayMusic 840
\displayScheme 840
\divisioMaior 506
\divisioMaxima 506
\divisioMinima 506
dodecaphonic 33
dodecaphonic-first 34
dodecaphonic-no-repeat 34
\dorian 22
\dotsDown 49
\dotsNeutral 49
\dotsUp 49
\doubleflat 795
\doublesharp 795
\downbow 138, 390, 825
\downmordent 138, 824
\downprall 138, 824

\draw-circle 301, 786
\draw-dashed-line 786
\draw-dotted-line 787
\draw-hline 787
\draw-line 301, 787
\draw-squiggle-line 788
\dropNote 472, 840
\drummode 216, 446, 534
drumPitchNames 451
drumPitchTable 452
\drums 446, 534
DrumStaff 216
drumStyleTable 451
\dwn 525
\dynamic 149, 760
dynamic-event 242
\dynamicDown 144
DynamicLineSpanner 144, 147
\dynamicNeutral 144
\dynamicUp 144

E

\easyHeadsOff 42
\easyHeadsOn 42
\ellipse 788
\EnableGregorianDivisiones 850
\enablePolymeter 840
\endcr 141
\enddecr 141
\endSpanners 704, 840
Engraver_group 674
\episemFinis 506
\episemInitium 506
\epsfile 302, 789
\espressivo 138, 143, 824
\etc 292, 577
\eventChords 840
\expandEmptyMeasures 248
explicitClefVisibility 708
explicitKeySignatureVisibility 708
extra-offset 625
extra-spacing-height 646
extra-spacing-width 646
\eyeglasses 812
Ez_numbers_engraver 42

F

\f 141
\featherDurations 105, 841
\fermata 71, 138, 795, 825
\ff 141
\fff 141
\ffff 141
\fffff 141
\figured-bass 760
figuredBassAlterationDirection 487
figuredBassPlusDirection 487
figuredBassPlusStrokedAlist 487
\figuremode 484, 534
\figures 484, 534
\fill-line 298, 772
\fill-with-pattern 566, 773
\filled-box 301, 789
\finalis 506
\fine 116, 129, 174, 175, 515
\finger 254, 760, 841
fingeringOrientations 255
first-page-number 610
\first-visible 812
\fixed 2, 841
\flageolet 138, 825
\flat 795
\flexa 513
followVoice 383
font-encoding 311
font-interface 254, 311
font-size 250, 254
\fontCaps 760
fontSize 250
\fontsize 293, 760
\footnote 555, 812, 841
footnote-separator-markup 612
Forbid_line_break_engraver 55
forget 35
four-string-banjo 445
\fp 141
\fraction 813
\freeBass 807
\frenchChords 475
\fret-diagram 417, 802
fret-diagram-interface 424
\fret-diagram-terse 420, 803
\fret-diagram-verbose 421, 804
FretBoards 426
\fromproperty 813
\funkHeads 43
\funkHeadsMinor 44

G

\general-align 297, 773
\germanChords 475
glide 256
\glissando 158
\glissandoMap 158
\grace 130, 841
GregorianTranscriptionStaff 216
Grid_line_span_engraver 271
Grid_point_engraver 271
gridInterval 271
grob-interface 835
\grobdescriptions 841
grow-direction 105

H

\halfopen 138, 451, 825
\halign 296, 774
\harmonic 41, 391, 399
\harmonicByFret 399, 841
\harmonicByRatio 399, 841
\harmonicNote 841
\harmonicsOff 391
\harmonicsOn 391, 841
\harp-pedal 804
\haydnturn 138, 824
\hbracket 300, 789
\hcenter-in 775
\header 539
\henzelongfermata 138, 825
\henzeshortfermata 138, 825
\hide 705, 841
\hideKeySignature 456
\hideNotes 259
\hideSplitTiedTabNotes 398
\hideStaffSwitch 383
horizontal-shift 608
Horizontal_bracket_engraver 273
HorizontalBracketText 274
\hspace 296, 776
\huge 250, 295, 761

I

\ictus 506, 826
\if 553, 802
\iij 508
\IIJ 508
\ij 508
\IJ 508
\image 789
\improvisationOff 47, 89
\improvisationOn 47, 89
\in 695
\incipit 517, 841
\inclinatum 507, 512
\include 541, 567
indent 237, 608, 649
\inherit-acceptability 674, 842
inner-margin 608
\inStaffSegno 115, 116, 185, 842
\instrumentSwitch 842
\inversion 14, 842
\invertChords 472, 842
\ionian 22
\italianChords 475
\italic 293, 761

J

\jump 186, 842
\justified-lines 291, 820
\justify 299, 776
\justify-field 776
\justify-line 777
\justify-string 777

K

keepAliveInterfaces 232
\keepWithTag 570, 842
\key 21, 44, 842
\kievanOff 514
\kievanOn 514
KievanStaff 513
KievanVoice 513
\killCues 247, 842

L

\label 564, 842
\laissezVibrer 59
\language 842
\languageRestore 842
\languageSaveAndChange 842
\large 250, 295, 761
\larger 293, 295, 761
last-bottom-spacing 606
\layout 539, 612, 659, 668
layout-set-staff-size 614
\left-align 295, 778
\left-brace 813
\left-column 778
left-margin 607
\lheel 138, 825
\line 779
line-width 299, 606, 649
\linea 507, 512
\lineprall 138, 824
\locrian 22
\longa 48, 61
\longfermata 138, 825
\lookup 814
\lower 296, 779
\ltoe 138, 825
ly:minimal-breaking 622
ly:one-line-auto-height-breaking 623
ly:one-line-breaking 623
ly:one-page-breaking 623
ly:optimal-breaking 622
ly:page-turn-breaking 623
\lydian 22
\lyricmode 314, 315, 535
\lyrics 535
\lyricsto 315, 317

M

m 469
magnification->font-size 250, 614
\magnify 293, 762
\magnifyMusic 250, 842
\magnifyStaff 614, 842
magstep 250, 614, 696
maj 469
\major 22
majorSevenSymbol 476, 478
make-dynamic-script 149
make-pango-font-tree 309
make-relative 579
\makeClusters 197, 842
\makeDefaultStringTuning 842

\map-commands 820
\marcato 138, 824
\mark 125, 283, 843
Mark_engraver 126
\markalphabet 814
\markLengthOff 78, 285
\markLengthOn 78, 285
\markletter 814
\markup 277, 283, 287, 288, 289, 535
markup-markup-spacing 606
markup-system-spacing 605
\markuplist 288, 291
\markupMap 843
max-systems-per-page 609
\maxima 48, 61
Measure_grouping_engraver 99
measureBarType 115
measureLength 94, 137
measurePosition 80, 137
\medium 762
\melisma 321
\melismaEnd 321
MensuralStaff 216, 497
MensuralVoice 497
\mergeDifferentlyDottedOff 202
\mergeDifferentlyDottedOn 202
\mergeDifferentlyHeadedOff 202
\mergeDifferentlyHeadedOn 202
\mf 141
\midi 539, 659
midiBalance 596
midiChannelMapping 594
midiChorusLevel 596
midiDrumPitches 452
midiExpression 596
midiPanPosition 596
midiReverbLevel 596
min-systems-per-page 609
minimum-Y-extent 625
minimumFret 396, 439
minimumPageTurnLength 623
minimumRepeatLengthForPageTurn 624
\minor 22
minorChordModifier 477
mixed 386
\mixolydian 22
\mm 695
\modalInversion 16, 843
\modalTranspose 15, 843
mode 836
modern 31
modern-cautionary 31
modern-voice 31
modern-voice-cautionary 31
\mordent 138, 824
\mp 141
\multi-measure-rest-by-number 795
MultiMeasureRestScript 67
MultiMeasureRestText 67
\musicglyph 796
\musicLength 843
\musicMap 843
musicQuotes 836

N

\n 141
\name 673
\natural 796
neo-modern 33
neo-modern-cautionary 33
neo-modern-voice 33
neo-modern-voice-cautionary 33
\new 661
\newSpacingSection 642
no-reset 34
\noBeam 103
\noBreak 617
noChordSymbol 474
nonstaff-nonstaff-spacing 625
nonstaff-relatedstaff-spacing 625
nonstaff-unrelatedstaff-spacing 625
\noPageBreak 621, 843
\noPageTurn 624, 843
\normal-size-sub 762
\normal-size-super 294, 762
\normal-text 763
\normalsize 250, 295, 763
\note 796
\note-by-number 797
note-event 242
Note_heads_engraver 87
Note_name_engraver 268
\notemode 535
noteNameFunction 268
NoteNames 268
noteNameSeparator 268
\null 296, 814
NullVoice 343
\number 763
\numericTimeSignature 72

O

\octaveCheck 10, 843
\offset 687, 843
\omit 705, 843
\on-the-fly 815
\once 682, 684, 689, 697, 843
OneStaff 219
\oneVoice 197
\open 138, 390, 454, 825
\oriscus 507, 512
\ottava 24, 843
ottavation 25
ottavation-numbers 24
ottavation-ordinals 24
ottavation-simple-ordinals 24
ottavationMarkups 24
outer-margin 608
output-count 836
output-def 836
output-suffix 836
outside-staff-horizontal-padding 639
outside-staff-padding 639
outside-staff-priority 639
\oval 790
\overlay 779
\override 683, 686, 815

\override-lines ... 820
\overrideProperty ... 687, 844
\overrideTimeSignatureSettings ... 73, 844
\overtie ... 764

P

\p ... 141
\pad ... 779
\pad-around ... 301, 780
\pad-markup ... 301
\pad-to-box ... 301, 780
\pad-x ... 301, 780
page-breaking ... 609
page-breaking-system-system-spacing ... 609
page-count ... 609
\page-link ... 815
page-number-type ... 610
\page-ref ... 564, 815
page-spacing-weight ... 609
\pageBreak ... 621, 844
\pageTurn ... 624, 844
\palmMute ... 844
\palmMuteOn ... 844
\paper ... 539, 602
paper-height ... 604
paper-width ... 606
\parallelMusic ... 213, 844
\parenthesize ... 265, 790, 844
\partCombine ... 208, 343, 844
\partCombineApart ... 210
\partCombineAutomatic ... 210
\partCombineChords ... 210
\partCombineDown ... 844
\partCombineForce ... 845
partCombineListener ... 836
\partCombineSoloI ... 210
\partCombineSoloII ... 210
\partCombineUnisono ... 210
\partCombineUp ... 845
\partial ... 80, 170, 845
\path ... 790
\pattern ... 815
pedalSustainStyle ... 386
percent ... 186
Performer_group ... 675
\pes ... 513
\phrasingSlurDashed ... 155
\phrasingSlurDashPattern ... 156, 845
\phrasingSlurDotted ... 155
\phrasingSlurDown ... 155
\phrasingSlurHalfDashed ... 155
\phrasingSlurHalfSolid ... 155
\phrasingSlurNeutral ... 155
\phrasingSlurSolid ... 155
\phrasingSlurUp ... 155
\phrygian ... 22
piano ... 32
piano-cautionary ... 32
PianoStaff ... 378, 381
Pitch_squash_engraver ... 89
\pitchedTrill ... 167, 845
pitchnames ... 836
\pointAndClickOff ... 845
\pointAndClickOn ... 845
\pointAndClickTypes ... 845
\polygon ... 791
\portato ... 138, 824
\postscript ... 302, 792
\pp ... 141
\ppp ... 141
\pppp ... 141
\ppppp ... 141
\prall ... 138, 824
\pralldown ... 138, 824
\prallmordent ... 138, 824
\prallprall ... 138, 824
\prallup ... 138, 824
\preBend ... 401, 845
\preBendHold ... 401, 845
predefinedDiagramTable ... 435
\predefinedFretboardsOff ... 437
\predefinedFretboardsOn ... 437
print-all-headers ... 611
print-first-page-number ... 610
print-page-number ... 610
printAccidentalNames ... 268
printNotesLanguage ... 268
printOctaveNames ... 268
\property-recursive ... 816
\propertyOverride ... 845
\propertyRevert ... 845
\propertySet ... 845
\propertyTweak ... 845
\propertyUnset ... 846
\pt ... 695
\pushToTag ... 573, 846
\put-adjacent ... 781

Q

\qr-code ... 816
\quilisma ... 507, 512
quotedCueEventTypes ... 242
quotedEventTypes ... 242
\quoteDuring ... 239, 243, 846

R

r ... 61
R ... 66
ragged-bottom ... 604
ragged-last ... 607, 649
ragged-last-bottom ... 604
ragged-right ... 607, 649
\raise ... 296, 781
\raiseNote ... 472, 846
\reduceChords ... 89, 846
\relative ... 2, 6, 14, 382, 579, 846
\remove ... 667
remove-empty ... 232
remove-first ... 232
remove-grace-property ... 133
remove-layer ... 233
\RemoveAllEmptyStaves ... 231, 850
\RemoveEmptyStaves ... 231, 850
\removeWithTag ... 570, 846
\repeat ... 169, 170
\repeat percent ... 186

\repeat segno ... 115, 116, 175
\repeat tremolo ... 189
\repeat unfold ... 169
\repeat volta ... 115, 116, 169, 170
repeatCommands ... 183
repeatCountVisibility ... 188
\repeatTie ... 59, 339
\replace ... 765
reset-footnotes-on-new-page ... 611
\resetRelativeOctave ... 5, 846
\responsum ... 508
\rest ... 61, 797
\rest-by-number ... 798
rest-event ... 242
restNumberThreshold ... 249
restrainOpenStrings ... 396
\retrograde ... 14, 846
\reverseturn ... 138, 824
\revert ... 684
\revertTimeSignatureSettings ... 74, 846
\rfz ... 141
rgb-color ... 261
\rheel ... 138, 825
\rhythm ... 798
RhythmicStaff ... 216
\right-align ... 295, 781
\right-brace ... 816
\right-column ... 781
right-margin ... 607
\rightHandFinger ... 440, 846
\roman ... 765
\romanStringNumbers ... 390, 394
\rotate ... 782
\rounded-box ... 300, 793
\rtoe ... 138, 825

S

s ... 63
\sacredHarpHeads ... 43
\sacredHarpHeadsMinor ... 44
\sans ... 765
\scale ... 793
\scaleDurations ... 57, 83, 846
\score ... 535, 539, 799
\score-lines ... 820
score-markup-spacing ... 605
score-system-spacing ... 606
Score_engraver ... 676
Score_performer ... 676
scoreTitleMarkup ... 550
\section ... 115, 129, 515
\sectionLabel ... 176, 283, 846
\segno ... 138, 800, 825
\segnoMark ... 115, 116, 178, 185, 846
self-alignment-X ... 625
\semicirculus ... 506, 826
\semiflat ... 800
\semiGermanChords ... 475
\semisharp ... 800
\sesquiflat ... 801
\sesquisharp ... 801
\set ... 94, 681, 686
set-global-fonts ... 310
set-global-staff-size ... 614
\settingsFrom ... 847
\sf ... 141
\sff ... 141
\sfz ... 141
\shape ... 718, 847
\sharp ... 801
\shiftDurations ... 847
\shiftOff ... 202
\shiftOn ... 202
\shiftOnn ... 202
\shiftOnnn ... 202
short-indent ... 237, 608
\shortfermata ... 138, 825
show-available-fonts ... 309
showFirstLength ... 583, 836
\showKeySignature ... 456
showLastLength ... 583, 836
\showStaffSwitch ... 383
\signumcongruentiae ... 138, 826
\simple ... 766
\single ... 558, 689, 847
\skip ... 63, 338, 847
skipBars ... 249
skipTypesetting ... 583
slashChordSeparator ... 477
\slashed-digit ... 817
\slashedGrace ... 130, 847
\slashSeparator ... 611
\slashturn ... 138, 824
slur-event ... 242
\slurDashed ... 152
\slurDashPattern ... 152, 847
\slurDotted ... 152
\slurDown ... 151
\slurHalfDashed ... 152
\slurHalfSolid ... 152
\slurNeutral ... 151
\slurSolid ... 152
\slurUp ... 152
\small ... 250, 295, 766
\smallCaps ... 766
\smaller ... 293, 295, 766
\snappizzicato ... 138, 825
\sostenutoOff ... 386
\sostenutoOn ... 386
\sourcefileline ... 541
\sourcefilename ... 541
\southernHarmonyHeads ... 43
\southernHarmonyHeadsMinor ... 44
\sp ... 141
space-alist ... 645
spacing ... 641
Span_stem_engraver ... 384
\spp ... 141
\staccatissimo ... 138, 824
\staccato ... 138, 824
staff-affinity ... 625
staff-padding ... 256
\staff-space ... 695
staff-staff-spacing ... 625
Staff.midiInstrument ... 598
Staff_collecting_engraver ... 126, 286
Staff_symbol_engraver ... 231
staffgroup-staff-spacing ... 625

\staffHighlight 262, 847
start-repeat 183
startAcciaccaturaMusic 133
startAppoggiaturaMusic 133
startGraceMusic 133
\startGroup 273
\startStaff 224, 227
\startTrillSpan 166
\stdBass 807
\stdBassIV 808
\stdBassV 809
\stdBassVI 810
stem-spacing-correction 641
\stemDown 267
stemLeftBeamCount 103
\stemNeutral 267
stemRightBeamCount 103
\stemUp 267
\stencil 817
stopAcciaccaturaMusic 133
stopAppoggiaturaMusic 133
stopGraceMusic 133
\stopGroup 273
\stopped 138, 451, 454, 825
\stopStaff 224, 227, 231
\stopStaffHighlight 262
\stopTrillSpan 166
\storePredefinedDiagram 430, 435, 847
strictBeatBeaming 99
\string-lines 820
stringNumberOrientations 255
\stringTuning 413, 847
stringTunings 413, 426
strokeFingerOrientations 255, 440
\stropha 507, 512
\strut 817
\styledNoteHeads 847
\sub 294, 766
subdivideBeams 98
suggestAccidentals 140, 502
\super 294, 767
sus 471
\sustainOff 386
\sustainOn 386
system-count 609
system-separator-markup 611
system-system-spacing 606
systems-per-page 609

T

\tabChordRepeats 397, 847
\tabChordRepetition 847
\tabFullNotation 396
\table 821
\table-of-contents 567, 822
TabStaff 216, 395
TabVoice 395
\tag 570, 847
\tagGroup 573, 848
\taor 456
teaching 34
\teeny 250, 295, 767
\tempo 76
\temporary 689, 697, 848
\tenuto 138, 824
text 386, 767
Text_mark_engraver 286
\textEndMark 283, 848
\textLengthOff 67, 69, 280
\textLengthOn 67, 69, 147, 280
\textMark 283, 848
\textSpannerDown 281
\textSpannerNeutral 281
\textSpannerUp 281
\thumb 138, 255
\tie 767
TieColumn 61
\tied-lyric 801
\tieDashed 59
\tieDashPattern 59, 848
\tieDotted 59
\tieDown 59
\tieHalfDashed 59
\tieHalfSolid 59
\tieNeutral 59
\tieSolid 59
\tieUp 59
tieWaitForNote 60
\time 72, 94, 848
\times 848
timeSignatureFraction 83
Timing 137
\tiny 250, 295, 768
tocFormatMarkup 567
tocIndentMarkup 567
\tocItem 567, 848
tocItemMarkup 567
\tocItemWithDotsMarkup 565
tocTitleMarkup 567
top-margin 604
top-markup-spacing 606
top-system-spacing 606
toplevel-bookparts 836
toplevel-scores 836
\translate 297, 782
\translate-scaled 297, 782
\transparent 817
\transpose 6, 11, 14, 848
\transposedCueDuring 246, 848
\transposition 27, 239, 848
\treCorde 386
tremolo 189
\triangle 301, 793
\trill 138, 166, 824
\tripletFeel 598
\tuplet 51, 83, 848
tuplet-slur 52
\tupletDown 51
\tupletNeutral 51
TupletNumber 53
\tupletSpan 52, 848
tupletSpannerDuration 52
\tupletUp 51
\turn 138, 824
\tweak 685, 687, 849
two-sided 608
\type 673, 674

\typewriter 768

U

\unaCorda 386
\underline 293, 768
\undertie 769
\undo 689, 849
unfold 169
\unfolded 172, 849
\unfoldRepeats 172, 594, 849
\unHideNotes 259
universal-color 261, 739
\unless 553, 802
\unset 682
\upbow 138, 390, 825
\upmordent 138, 824
\upprall 138, 824
\upright 769

V

\varcoda 138, 801, 825
VaticanaStaff 216, 504
VaticanaVoice 504
\vcenter 783
\verbatim-file 817
\version 541
\versus 508
VerticalAxisGroup 625
\verylongfermata 138, 825
\veryshortfermata 138, 825
\virga 507, 512
\virgula 506
voice 28, 30
Voice 197
\voiceFour 197
\voiceFourStyle 202
\voiceNeutralStyle 202
\voiceOne 197
\voiceOneStyle 202
\voices 201, 849
\voiceThree 197
\voiceThreeStyle 202
\voiceTwo 197
\voiceTwoStyle 202
\void 600, 849
volta 169, 170, 172, 849
Volta_engraver 181
\vshape 849
\vspace 297, 783

W

\walkerHeads 43
\walkerHeadsMinor 44
\whiteout 818
\whiteTriangleMarkup 476
\with 667, 671
\with-color 260, 818
\with-dimension 819
\with-dimension-from 819
\with-dimensions 819
\with-dimensions-from 819
\with-link 819
\with-outline 819
\with-string-transformer 769
\with-true-dimension 819
\with-true-dimensions 820
\with-url 794
\withMusicProperty 849
\woodwind-diagram 805
\wordwrap 299, 783
\wordwrap-field 784
\wordwrap-internal 822
\wordwrap-lines 291, 822
\wordwrap-string 784
\wordwrap-string-internal 822

X

x11-color 260, 262, 736
X-offset 625
\xNote 40, 850
\xNotesOff 40
\xNotesOn 40

Appendix E LilyPond index

In addition to all the LilyPond commands and keywords, this index lists musical terms and words that relate to each of them, with links to those sections of the manual that describe or discuss that topic.

Slanted index entries point to locations (mostly 'See also' sections) that contain external links to other LilyPond documentation files like the Internal Reference or the Glossary.

!

! 6
\! 141

"

"|" 124

%

% 536, 541
%{ ... %} 536, 541

,

' 1

(

(..... 151
\(..... 155

)

) 151
\) 155

,

, ... 1

—

- 138, 491, 694
-! 824
-+ 825
-- 824
-. 824
-> 824
-^ 824
-_ 824

.

. 49

/

/ 471
/+ 471

:

: 190

<

< 192
\< 141
<...> 192
<> 193, 379

=

= 10
\= 151, 850

>

> 192
\> 141

?

? 6

[

[..... 102
\[..... 495

]

] 102
\] 495

^

^ 471, 694

_

_ 321, 694

|

| 124

~

~ 58

1

15ma ... 24
15mb ... 24

8

8va ... 24
8vb ... 24

A

a due ... 213
a due part ... 208
A score is a (single) compound musical expression ... 536
\abs-fontsize ... 293, 759
absolute ... 1
\absolute ... 837
absolute dynamics ... 141
absolute octave entry ... 1
absolute octave specification ... 1
accent ... 140
accent ... 138
\accent ... 138, 824
'accent' articulation ... 138, 824
\accentus ... 506, 826
'accentus' Gregorian articulation ... 506, 826
\accepts ... 673, 674, 676
acciaccatura ... 134
acciaccatura ... 130
\acciaccatura ... 130, 837
acciaccatura, multi-note ... 134
Accidental ... 8, 35
accidental ... 501, 505, 515
accidental ... 6, 28
\accidental ... 794
accidental glyph set ... 754
accidental style ... 28
accidental style, choral ... 32
accidental style, choral-cautionary ... 32
accidental style, default ... 28, 30
accidental style, dodecaphonic ... 33
accidental style, dodecaphonic-first ... 34
accidental style, dodecaphonic-no-repeat ... 34
accidental style, forget ... 35
accidental style, modern ... 30, 31
accidental style, modern-cautionary ... 30, 31
accidental style, modern-voice-cautionary ... 31
accidental style, neo-modern ... 33
accidental style, neo-modern-cautionary ... 33
accidental style, neo-modern-voice ... 33
accidental style, neo-modern-voice-cautionary ... 33
accidental style, no-reset ... 34
accidental style, piano ... 32
accidental style, piano-cautionary ... 32
accidental style, teaching ... 34
accidental style, voice ... 30
accidental, alternate glyphs ... 36
accidental, and simultaneous notes ... 35
accidental, automatic ... 28
accidental, cautionary ... 6
accidental, Gregorian ... 505
accidental, hiding, on tied notes at start of system ... 7
accidental, in cadenzas ... 81
accidental, in chords ... 35
accidental, in unmetered music ... 81
accidental, Kievan ... 515
accidental, mensural ... 501
accidental, modern style ... 31
accidental, multi-voice ... 31
accidental, musica ficta ... 502
accidental, on tied note ... 6
accidental, parenthesized ... 6
accidental, quarter tone ... 8
accidental, reminder ... 6
accidental-interface ... 8
accidental-suggestion-interface ... 35
accidental-switch-interface ... 37
Accidental_engraver ... 8, 35, 502
AccidentalCautionary ... 8
AccidentalPlacement ... 35
\accidentalStyle ... 28, 837
AccidentalSuggestion ... 35, 502
AccidentalSuggestion ... 140
accordion ... 387
accordion discant symbol ... 387
accordion register symbol ... 387
accordion shift symbol ... 387
acoustic bass ... 826
acoustic snare ... 826
add-grace-property ... 133
add-stem-support ... 256
add-toc-item! ... 566
\addChordShape ... 430, 838
Adding and removing engravers ... 88
adding custom fret diagram ... 429
adding white background, to text ... 818
\addInstrumentDefinition ... 838
addition, in chords ... 470
additional voices in polyphonic music ... 205
additionalPitchPrefix ... 476
\addlyrics ... 315, 317, 318
\addQuote ... 239, 838
AdHocMarkEvent ... 127
adjusting start and end, slur ... 152
Advanced command-line options for LilyPond ... 586, 789
Aeolian ... 22
\aeolian ... 22
\after ... 142, 187, 838
\afterGrace ... 131, 838
afterGraceFraction ... 836
agogo ... 826
Aiken shape note head ... 43
Aiken shape note head, thin variant ... 45
\aikenHeads ... 43
\aikenHeadsMinor ... 44
\aikenThinHeads ... 43
\aikenThinHeadsMinor ... 44
al coda ... 176
al fine ... 175
al niente ... 149
al niente, hairpin ... 146
\alias ... 673, 674
align to object ... 714
\align-on-other ... 770
alignAboveContext ... 230, 677
alignBelowContext ... 230, 337, 677

Aligning lyrics to a melody ... 317, 324
aligning markup ... 295
aligning markup text ... 295
aligning text ... 295
aligning to cadenza ... 135
alignment breaking vertical, text scripts ... 147
alignment, bar numbers ... 121
alignment, breaking vertical, dynamics ... 147
alignment, horizontal, lyrics ... 333
alignment, text, commands ... 300
alignment, vertical, dynamics ... 147
alignment, vertical, text ... 296
alignment, vertical, text scripts ... 147
alist ... 834
All context properties ... 584
All layout objects ... 252, 681, 687, 688, 694, 835
all-layout-objects ... 837
alla coda ... 176
`\allowPageTurn` ... 624, 838
`\allowVoltaHook` ... 838
alpha transparency ... 260
alteration, figured bass, glyphs ... 487
alteration, figured bass, position ... 487
Alteration_glyph_engraver ... 37
`\alterBroken` ... 697, 838
altered chord ... 469
alternate accidental glyph ... 36
alternate fretboard table ... 435
`\alternative` ... 170, 172
alternative chord name ... 475
alternative ending ... 170
alternative ending, and lyrics ... 338
alternative ending, with ties ... 59
alternative melody, switching to ... 349
alternative style of breve notes ... 50
alto clef ... 17, 755
alto varC clef ... 755
Amazing Grace bagpipe example ... 457
Ambitus ... 40
ambitus ... 40, 314
ambitus ... 37
ambitus, line gap ... 38
ambitus, multiple voices ... 38
ambitus, per voice ... 38
ambitus, placement ... 39
ambitus-interface ... 40
Ambitus_engraver ... 40
AmbitusAccidental ... 40
`ambitusAfter` ... 39, 838
AmbitusLine ... 40
`AmbitusLine` ... 38
AmbitusNoteHead ... 40
An extra staff appears ... 169, 172, 678
anacrusis ... 81
anacrusis ... 80
anacrusis, in a repeat ... 170
analysis bracket, musicological ... 273
analysis bracket, with label ... 274
ancient clef ... 17
ancient music clef ... 497, 755
Ancient notation ... 497, 501, 506, 507
angled hairpin ... 711
`annotate-spacing` ... 655
AnnotateOutputEvent ... 271
anthem ... 354
`\appendToTag` ... 573, 838
`\applyContext` ... 664, 838
`\applyMusic` ... 838
`\applyOutput` ... 838
`\applySwing` ... 598
`\applySwingWithOffset` ... 598
appoggiatura ... 134
appoggiatura ... 130
`\appoggiatura` ... 130, 838
Arabic improvisation ... 527
Arabic key signatures ... 525
Arabic maqam ... 523
Arabic music ... 523
Arabic music example ... 528
Arabic music template ... 528
Arabic note name ... 524
Arabic semi-flat symbol ... 525
Arabic time signatures ... 527
`\arabicStringNumbers` ... 394
Arpeggio ... 165, 688
arpeggio ... 165
arpeggio ... 162
`\arpeggio` ... 162
arpeggio and ties ... 60
arpeggio bracket, cross-staff ... 385
arpeggio bracket, marking divided voices ... 356
arpeggio symbol, special ... 163
arpeggio, cross-staff ... 163
arpeggio, cross-staff parenthesis-style ... 165
arpeggio, cross-voice ... 165
`arpeggio-direction` ... 162
`\arpeggioArrowDown` ... 162
`\arpeggioArrowUp` ... 162
`\arpeggioBracket` ... 163
`\arpeggioNormal` ... 162
`\arpeggioParenthesis` ... 163
`\arpeggioParenthesisDashed` ... 163
`\arrow-head` ... 301, 785
`\articulate` ... 598
articulate script ... 598
articulate.ly ... 598
articulation, accent ... 138, 824
articulation, default values, modifying ... 139
articulation, espressivo ... 138, 824
articulation, Gregorian ... 506
articulation, Gregorian, accentus ... 506, 826
articulation, Gregorian, circulus ... 506, 826
articulation, Gregorian, episem finis ... 506
articulation, Gregorian, episem initium ... 506
articulation, Gregorian, ictus ... 506, 826
articulation, Gregorian, semicirculus ... 506, 826
articulation, half open ... 138, 825
articulation, marcato ... 138, 824
articulation, open ... 138, 454, 825
articulation, portato ... 138, 824
articulation, staccatissimo ... 138, 824
articulation, staccato ... 138, 824
articulation, stopped ... 138, 454, 825
articulation, tenuto ... 138, 824
`articulation-event` ... 242
articulations ... 824
Articulations and dynamics ... 149
artificial harmonics ... 391
`\ascendens` ... 507, 512
`\assertBeamQuant` ... 838

\assertBeamSlope ... 839
associatedVoice ... 315, 317, 349
association list ... 834
Association lists (alists) ... 646
\auctum ... 507, 512
aug ... 469
augmentation dot, change number of ... 50
\augmentum ... 513
auto-beaming, properties for time signatures ... 73
auto-first-page-number ... 610
\auto-footnote ... 811
Auto_beam_engraver ... 93, 101
autoBeaming ... 94, 659
\autoBeamOff ... 91, 384
\autoBeamOn ... 91
\autoBreaksOff ... 617
\autoBreaksOn ... 617
\autoChange ... 381, 839
\autoChange, and relative music ... 382
AutoChangeMusic ... 383
\autoLineBreaksOff ... 617
\autoLineBreaksOn ... 617
automatic accidental ... 28
automatic bar line ... 115
automatic chord diagram ... 437
automatic fret diagram ... 437
automatic part combining ... 208
automatic replacement, of strings ... 582
automatic staff change ... 381
\autoPageBreaksOff ... 621
\autoPageBreaksOn ... 621
available fonts, listing ... 309
Axis_group_engraver ... 235, 630

B

Bézier curve, control points ... 717
Backend ... 679, 681, 685
backslashed digit ... 811
\backslashed-digit ... 811
bagpipe ... 456
bagpipe example ... 457
balance in MIDI ... 596
balloon ... 270
balloon help ... 270
balloon-interface ... 271
Balloon_engraver ... 271
Balloon_engraver ... 270
\balloonGrobText ... 270, 839
\balloonLengthOff ... 270
\balloonLengthOn ... 270
BalloonText ... 271
\balloonText ... 270, 839
banjo tablature ... 393, 444
banjo tuning ... 445
banjo-c-tuning ... 445
banjo-double-c-tuning ... 445
banjo-double-d-tuning ... 445
banjo-modal-tuning ... 445
banjo-open-d-tuning ... 445
banjo-open-dm-tuning ... 445
banjo-open-g-tuning ... 445
\bar ... 106, 115, 839
bar check ... 124
bar check, with repeats ... 170
bar line ... 106
bar line, automatic ... 115
bar line, avoided by lyrics ... 333
bar line, between staves ... 111, 221
bar line, cadenzas ... 81
bar line, caesura ... 115
bar line, default ... 115
bar line, default, changing ... 115
bar line, defining ... 111
bar line, double ... 106, 115, 129
bar line, final ... 106, 116, 129
bar line, for repeat at start of piece ... 170
bar line, hairpin, stopping at ... 144
bar line, in ChordNames ... 478
bar line, in Gregorian chant ... 505
bar line, in hymns ... 374
bar line, in Kievan chant ... 515
bar line, invisible ... 106
bar line, list of ... 829
bar line, manual ... 106
bar line, measure ... 115
bar line, phrase ... 115
bar line, repeat ... 116
bar line, section ... 115, 129
bar line, segno ... 108, 116, 178
bar line, short ... 107
bar line, single ... 115
bar line, symbols on ... 283
bar line, text over ... 283
bar line, tick ... 107
bar line, underlying repeat ... 115
bar line, unmetered music ... 81
bar number ... 117, 137
bar number check ... 124
bar number, alignment ... 121
bar number, alternative, in repeat ... 181
bar number, broken measure ... 119
bar number, cadenzas ... 81
bar number, centered ... 122
bar number, collision ... 123
bar number, modulo bar number ... 119
bar number, printed at regular intervals ... 118
bar number, printed in first measure ... 118
bar number, regular spacing ... 117
bar number, removal ... 122
bar number, style ... 120
bar number, unmetered music ... 81
bar number, with letter, in repeat ... 181
Bar_engraver ... 475
Bar_number_engraver ... 123
barCheckSynchronize ... 124
baritone clef ... 17, 755
baritone varC clef ... 755
baritone varF clef ... 755
BarLine ... 115
BarNumber ... 123, 124
BarNumber ... 117
\barNumberCheck ... 124, 839
barNumberVisibility ... 117
barre indication ... 417
Bartók pizzicato ... 392
bartype ... 115
base-shortest-duration ... 641
baseMoment ... 94, 98

Basic command-line options for LilyPond 584
bass 826
bass clef 17, 755
bass note, for chords 471
bass, figured 484
bass, thorough 484
BassFigure 488, 490
BassFigureAlignment 488, 490
BassFigureBracket 488, 490
BassFigureContinuation 488, 490
`\bassFigureExtendersOff` 486
`\bassFigureExtendersOn` 486
BassFigureLine 488, 490
`\bassFigureStaffAlignmentDown` 488
`\bassFigureStaffAlignmentNeutral` 488
`\bassFigureStaffAlignmentUp` 488
basso continuo 484
bayati 527
Beam 93, 101, 105, 381, 412
`\beam` 785
beam, cadenzas 81
beam, cross-staff 379
beam, customizing rules 91
beam, endings, in a score 100
beam, endings, with multiple voices 100
beam, feathered 105
beam, horizontal 405
beam, in tablature 405
beam, line breaks 92
beam, manual 91, 102
beam, nibs 103
beam, `\partCombine` with `\autoBeamOff` 92
beam, subdividing 98
beam, unmetered music 81
beam, with knee gap 92
beam, with knee gap, changing 92
beam, with lyrics 94
beam, with melisma 92
beam, with polymetric meters 83
beam-interface 93, 101, 105
Beam_engraver 93, 105
beamed tuplet, line break within 55
BeamEvent 93, 105
`\beamExceptions` 94, 839
BeamForbidEvent 93, 101
beaming, strict-beat 99
beaming, time signature default properties 73
beamlet, orientation 99
beat repeat 186
beat, grouping 99
beats per minute 76
`beatStructure` 94, 98
beginners' music 42
`\bendAfter` 157, 839
`\bendHold` 401, 839
bending, string, in tablature notation 401
`\bendStartLevel` 401, 839
big point (bp) 695
binding gutter 608
`binding-offset` 608
bisbigliando 388
Bison 836
black mensural clef 497, 755
`\blackTriangleMarkup` 476
`blank-after-score-page-penalty` 610
`blank-last-page-penalty` 610
`blank-page-penalty` 610
block comment 536, 541
BNF 836
`\bold` 293, 759
bongo 826
`\book` 536, 539
`\book`, and `\layout` 538
`\book`, and variables 537
bookmarks 563, 564
`\bookOutputName` 539, 839
`\bookOutputSuffix` 539, 839
`\bookpart` 537, 539, 621
`\bookpart`, and `\layout` 538
`\bookpart`, and variables 537
`bookpart-level-page-numbering` 610
`bookTitleMarkup` 550
`bottom-margin` 604
bounding box 696
bounding box, of glyph 819
bowing indication 390
bowing, down 138, 825
bowing, up 138, 825
`\box` 300, 759
`\bp` 695
brace 221
brace, at start of single staff 220
brace, nesting of 221
brace, various sizes 311
brace, vertical 217
bracket 221
bracket 265, 273
`bracket` 386
`\bracket` 149, 300, 786
bracket, angle 192
bracket, at start of single staff 220
bracket, cross-staff 385
bracket, horizontal 273
bracket, nesting of 221
bracket, phrasing 273
bracket, phrasing, with label 274
bracket, square, at start of staff group 220
bracket, vertical 217
bracket, vertical, marking divided voices 356
bracket, volta 183
`\break` 617
break align symbol 645
break, in unmetered music 82
`break-align-symbols` 714
break-alignable-interface 646, 714
break-aligned-interface 645, 646, 714
break-alignment-interface 645, 646, 714
`break-visibility` 706
Break_align_engraver 646
`breakable` 92
breakable glissando 160
BreakAlignGroup 646
BreakAlignment 646
`breakbefore` 547
`\breakDynamicSpan` 147
breaking lines 617
breaking pages 649
breath mark 157
breath mark 156
breath mark symbol, changing 157

breath mark symbol, list of ... 826
\breathe ... 156, 839
Breathing_sign_engraver ... 157
BreathingEvent ... 157
BreathingSign ... 71, 157
breve ... 50, 63
\breve ... 48, 61
breve note, alternative style ... 50
breve rest ... 61
broken chord ... 162
broken spanner, modifying ... 697
Built-in templates ... 354

C

C clef ... 17, 755
cabasa ... 826
cadenza ... 83, 136
cadenza ... 81, 135
cadenza, accidentals ... 81
cadenza, aligning to ... 135
cadenza, bar lines ... 81
cadenza, bar numbers ... 81
cadenza, beams ... 81
cadenza, line breaks ... 82
cadenza, page breaks ... 82
\cadenzaOff ... 81
\cadenzaOn ... 81
caesura ... 71, 506
caesura ... 70
\caesura ... 70, 71, 115, 374, 506, 515, 839
caesura bar line ... 115
caesura bar line, in hymns ... 374
caesura bar line, in Kievan chant ... 515
Caesura_engraver ... 71
CaesuraEvent ... 71
CaesuraScript ... 72, 141
caesuraType ... 72
caesuraTypeTransform ... 72
callback ... 834
Callback functions ... 712
canticle ... 365, 369
capo ... 421
\caps ... 759
cautionary accidental ... 6
\cavum ... 507, 512
\center-align ... 295, 770
\center-column ... 298, 770
centered dynamics in piano music ... 378
Centered_bar_number_align_engraver ... 123
CenteredBarNumber ... 123
CenteredBarNumberLineSpanner ... 123
centering column of text ... 770
centering text on page ... 298
centimeter (cm) ... 695
\change ... 379
change number of augmentation dots ... 50
change tempo without metronome mark ... 79
change tuplet number ... 53
changing breath mark symbol ... 157
changing chord separator ... 479
changing direction of text column ... 772
changing font ... 293
changing instrument name ... 238
changing property ... 681
changing staff automatically ... 381
changing staff manually ... 379
chant ... 365, 369
\char ... 812
character name ... 358
chart, fingering ... 455
check mark ... 157
check-consistency ... 607
Chinese cymbal ... 826
choir staff ... 217
ChoirStaff ... 221, 223, 355
choral ... 32
choral accidental style ... 32
choral tenor clef ... 17
choral-cautionary ... 32
choral-cautionary accidental style ... 32
chord ... 193, 468, 475
chord ... 192, 467, 472
chord diagram ... 416, 426
chord diagram, automatic ... 437
chord grid ... 483
chord grid ... 480
chord inversion ... 472
chord mode ... 467
chord name ... 467, 472
chord name, with fret diagrams ... 428
chord names, exceptions ... 478
chord quality ... 468
chord separator, changing ... 479
chord shape, for fretted instrument ... 430
chord step, altering ... 470
chord voicing ... 472
chord, accidentals in ... 35
chord, alternative name ... 475
chord, and relative octave entry ... 5
chord, and tie ... 58
chord, broken ... 162
chord, cross-staff ... 384
chord, empty ... 133, 143, 193, 379
chord, fingering ... 255
chord, glissando, in tablatures ... 410
chord, jazz ... 475
chord, major 7, layout ... 478
chord, modifying one note in ... 685
chord, power ... 443
chord, relative pitch ... 193
chord, repetition ... 194, 397
chord, rotating ... 472
chord, splitting across staves with \autoChange ... 383
chord, suppressing repeated ... 434, 474
Chord_name_engraver ... 475
Chord_square_engraver ... 483
chordChanges ... 434, 474
ChordGrid ... 483
ChordGrid ... 480
ChordGridScore ... 483
\chordmode ... 6, 14, 428, 534
ChordName ... 475
chordNameExceptions ... 477, 478
chordNameLowercaseMinor ... 476
ChordNames ... 235, 475
ChordNames ... 428
ChordNames, with bar lines ... 478
chordNameSeparator ... 476, 479

chordNoteNamer ... 476
chordPrefixSpacer ... 477
\chordRepeats ... 397, 839
chordRootNamer ... 476
Chords ... 468, 469, 472, 475, 480, 484, 488, 490, 722
\chords ... 473, 534
chords, volta repeat, below ... 479
ChordSquare ... 483
chorus level in MIDI ... 596
Christian Harmony note head ... 43
church mode ... 24
church mode ... 22
church rest ... 249
\circle ... 300, 786
circling text ... 786
\circulus ... 506, 826
'circulus' Gregorian articulation ... 506, 826
claves ... 826
clef ... 498, 505, 514
Clef ... 21, 498
clef ... 6, 17, 504, 514
\clef ... 17, 839
clef style ... 497, 755
clef, alto ... 17, 755
clef, alto varC ... 755
clef, ancient ... 17
clef, ancient music ... 497, 755
clef, baritone ... 17
clef, baritone varC ... 755
clef, baritone varF ... 755
clef, bass ... 17, 755
clef, black mensural ... 497, 755
clef, C ... 17, 755
clef, F ... 17, 755
clef, french ... 17, 755
clef, G ... 17, 755
clef, G2 ... 755
clef, GG ... 755
clef, Kievan ... 497, 755
clef, mensural ... 497, 755
clef, mezzo-soprano ... 17, 755
clef, moderntab ... 415
clef, percussion ... 447, 755
clef, Petrucci ... 497, 755
clef, soprano ... 17, 755
clef, subbass ... 17, 755
clef, tab ... 415, 755
clef, tenor ... 17, 755
clef, tenor G ... 755
clef, tenor varC ... 755
clef, transposing ... 17
clef, treble ... 17, 755
clef, tweaking properties ... 19
clef, varbaritone ... 17, 755
clef, varC ... 755
clef, violin ... 17, 755
clef, visibility following explicit change ... 708
clef, visibility of transposition ... 710
clef, with cue notes ... 17
clef-interface ... 21, 498
Clef_engraver ... 21, 498
ClefModifier ... 21, 498
clip-regions ... 583
closure ... 834
cluster ... 197
cluster ... 197
Cluster_spanner_engraver ... 197
ClusterSpanner ... 197
ClusterSpannerBeacon ... 197
\cm ... 695
coda ... 176
\coda ... 138, 794, 825
'coda' sign ... 138, 825
'coda' sign, manual ... 185
'coda' sign, variant ... 138, 180, 825
'coda' sign, with repeats ... 175
CodaMark ... 178, 186
\codaMark ... 115, 178, 185, 839
collision ... 202
collision, bar number ... 123
collision, cross-staff voices ... 380
collision, ignoring ... 196, 207
color ... 260
color ... 260
color blind ... 261
color in chord ... 262
color, CSS-like codes ... 260
color, list of ... 734
color, rgb ... 261
color, suitable for dichromatism ... 739
colored note ... 260
colored note in chord ... 262
colored object ... 260
coloring note ... 260
coloring object ... 260, 705
coloring text ... 818
coloring voice ... 202
column ... 645
\column ... 298, 771
column, text ... 288, 298
\column-lines ... 820
\combine ... 301, 771
Combining notes into chords ... 193
combining parts ... 208
combining parts, changing text ... 212
comma interval ... 529
Command-line usage ... 583
comment ... 536, 541
Common Practice Period ... 10, 523
common-shortest-duration ... 641
Completion_heads_engraver ... 88
Completion_heads_engraver ... 87
Completion_rest_engraver ... 88
Completion_rest_engraver ... 87
compound time signature ... 86
\compound-meter ... 794
\compoundMeter ... 86, 839
\compressEmptyMeasures ... 248
compressing music ... 57
\compressMMRests ... 66, 67, 248, 840
\concat ... 771
concatenating text ... 771
concert pitch ... 28
condensing rests ... 69
conducting signs ... 99
conga ... 826
\consists ... 667, 673, 674
constante hairpin ... 146
contemporary glissando ... 159
\context ... 661, 668

context definitions with MIDI ... 592
\context in \layout block ... 668
context property, changing default ... 668
context, adding alias ... 674
context, creating and referencing ... 661
context, defining in MIDI ... 675
context, defining new ... 673
context, implicit ... 677
context, keeping alive ... 664
context, layout order ... 676
context, lifetime ... 664
context, Score-level ... 676
context-spec-music ... 205
ContextChange ... 381
Contexts ... 626, 627, 631, 659, 675
Contexts and engravers ... 200, 659
contexts, overlaying ... 219
continuation, of notes ... 491
control pitch ... 10
control point, Bézier curve ... 717
control point, tweaking ... 686
controlling general text alignment ... 773
controlpitch ... 10
copyright sign ... 581
count visibility of percent repeats ... 188
counter, percent repeat ... 188
countPercentRepeats ... 188
cowbell ... 826
\cr ... 141
crash cymbal ... 826
creating a table ... 821
creating empty text object ... 814
creating horizontal space, in text ... 776
creating text fraction ... 813
creating vertical space, in text ... 783, 817
\cresc ... 143
crescendo ... 149
crescendo ... 141
crescendo-event ... 242
crescendoSpanner ... 148
crescendoText ... 148
\crescHairpin ... 143
\crescTextCresc ... 143
cross ... 40
cross note head ... 40
cross-staff arpeggio ... 163
cross-staff arpeggio bracket ... 385
cross-staff beam ... 379
cross-staff chord ... 384
cross-staff collision ... 380
cross-staff line ... 383
cross-staff note ... 379, 384
cross-staff parenthesis-style arpeggio ... 165
cross-staff stem ... 384
cross-staff tremolo ... 190
cross-voice arpeggio ... 165
\crossStaff ... 384, 840
CSS color codes ... 260
cue clef ... 17
cue note ... 239, 243
cue note, formatting ... 243
cue note, removing ... 247
cue, in vocal score ... 361
cue, musical ... 360
cue-notes ... 363
\cueClef ... 243, 840
\cueClefUnset ... 243, 840
\cueDuring ... 243, 840
\cueDuringWithClef ... 243, 840
CueVoice ... 248, 363
CueVoice ... 243
cuica ... 826
currentBarNumber ... 117, 137
custodes ... 496
custom fret diagram ... 416, 425
custom fret diagram, adding ... 429
custom fretboard fret diagram ... 431
custom metronome mark markup ... 79
custom rehearsal mark ... 125
custom string tuning ... 413
customized fret diagram ... 424
customizing chord name ... 475
\customTabClef ... 795
Custos ... 497
custos ... 494, 497
custos ... 496
cymbal, various ... 826

D

D.C. ... 176
D.C., manual ... 186
D.S. ... 177
D.S., forced at start ... 179
D.S., manual ... 186
da capo ... 178
da capo ... 176
da capo, manual ... 186
dal segno ... 178
dal segno ... 177
dal segno, forced at start ... 179
dal segno, manual ... 186
dampened note, on fretted instrument ... 442
dash patterns, slur ... 152, 154
\dashBang ... 139
\dashDash ... 139
\dashDot ... 139
dashed phrasing slur ... 155
dashed slur ... 152
dashed tie ... 59
\dashHat ... 139
\dashLarger ... 139
\dashPlus ... 139
\dashUnderscore ... 139
dead note, percussion ... 453
\deadNote ... 41, 840
\deadNotesOff ... 41
\deadNotesOn ... 41
debug-beam-scoring ... 612
debug-slur-scoring ... 612
debug-tie-scoring ... 612
Debugging scoring algorithms ... 612
debugging, vertical spacing ... 655
decorating text ... 300
\decr ... 141
\decresc ... 143
decrescendo ... 149
decrescendo ... 141
decrescendoSpanner ... 148

decrescendoText ... 148
default ... 28, 30
\default ... 125, 556
default accidental style ... 28, 30
default bar line ... 115
default bar line, changing ... 115
default context property, changing ... 668
default note duration ... 49
default note name ... 6
default pitch ... 49
default vertical direction (-) ... 694
default, offsetting ... 687
default-staff-staff-spacing ... 625
\defaultchild ... 677
\defaultTimeSignature ... 72
define predefined fretboard ... 432
\defineBarLine ... 111, 840
defining bar line ... 111
delayed turn ornamentation ... 140
\deminutum ... 507, 512
\denies ... 673, 675, 676
\descendens ... 507, 512
desk parts ... 236
diagram, chord for fretted instruments ... 416
diagram, fret ... 416
diagram, fret, customized ... 424
diagram, fret, transposing ... 428
diamond note head ... 40
diamond-shaped note head ... 391
dichromatism, suitable colors ... 739
Difficult tweaks ... 698
dim ... 469
\dim ... 143
dimension ... 696
dimension units ... 695
dimensions, of bounding box ... 819
\dimHairpin ... 143
diminuendo ... 141
\dimTextDecr ... 143
\dimTextDecresc ... 143
\dimTextDim ... 143
\dir-column ... 772
direction, automatic, of stem, on center line ... 267
direction, default (-) ... 694
direction, default, of stem, on center line ... 267
direction, down (_) ... 694
direction, up (^) ... 694
\discant ... 806
discant symbol, accordion ... 387
display vertical layout ... 655
Displaying music expressions ... 600, 686
\displayLilyMusic ... 599, 840
\displayMusic ... 840
\displayScheme ... 840
distance, absolute ... 695
distance, between staves ... 624
distance, scaled ... 695
divided lyrics ... 342
divided voices ... 356
divisi staves ... 233
Divisio ... 507
divisio ... 506
divisio ... 505
\divisioMaior ... 506
\divisioMaxima ... 506
\divisioMinima ... 506
divisiones ... 505
dodecaphonic ... 33
dodecaphonic accidental style ... 33
dodecaphonic-first ... 34
dodecaphonic-first accidental style ... 34
dodecaphonic-no-repeat ... 34
dodecaphonic-no-repeat accidental style ... 34
doit ... 158
doit ... 157
Dorian ... 22
\dorian ... 22
DotColumn ... 51
Dots ... 51
\dotsDown ... 49
\dotsNeutral ... 49
\dotsUp ... 49
dotted note ... 49
dotted note, change number of dots ... 50
dotted note, moving horizontally ... 206
dotted phrasing slur ... 155
dotted slur ... 152
dotted tie ... 59
double bar line ... 106, 115, 129
double flat ... 7
double flat ... 6
double sharp ... 7
double sharp ... 6
double slurs, for legato chords ... 153
double-dotted note ... 49
double-time signature ... 83
Double_percent_repeat_engraver ... 189
\doubleflat ... 795
DoublePercentEvent ... 189
DoublePercentRepeat ... 189
DoublePercentRepeatCounter ... 189
DoubleRepeatSlash ... 189
\doublesharp ... 795
doubleSlurs ... 153
down direction (_) ... 694
'down prall triller' ornament ... 138, 824
'down-bow' bowing indication ... 138, 825
down-bow indication ... 390
\downbow ... 138, 390, 825
\downmordent ... 138, 824
\downprall ... 138, 824
\draw-circle ... 301, 786
\draw-dashed-line ... 786
\draw-dotted-line ... 787
\draw-hline ... 787
\draw-line ... 301, 787
\draw-squiggle-line ... 788
drawing beam, within text ... 785
drawing box, with rounded corners ... 789
drawing box, with rounded corners, around text ... 793
drawing circle, within text ... 786
drawing dashed line, within text ... 786
drawing dotted line, within text ... 787
drawing ellipse, around text ... 788
drawing graphic object ... 300
drawing line, across a page ... 787
drawing line, within text ... 787
drawing oval, around text ... 790
drawing path ... 790

drawing polygon ... 791
drawing solid box, within text ... 789
drawing squiggled line, within text ... 788
drawing triangle, within text ... 793
\dropNote ... 472, 840
drum ... 446, 448
drum staff ... 216
drum, various ... 826
\drummode ... 216, 446, 534
drumPitchNames ... 451
drumPitchTable ... 452
\drums ... 446, 534
DrumStaff ... 217, 453
DrumStaff ... 216
drumStyleTable ... 451
DrumVoice ... 453
duration line ... 491
Duration names notes and rests ... 50
duration, default ... 49
duration, isolated ... 49
duration, of note ... 48
duration, scaling ... 56
\dwn ... 525
\dynamic ... 149, 760
dynamic mark, multiple on one note ... 142
dynamic mark, new ... 149
dynamic-event ... 242
Dynamic_performer ... 589, 591, 593
\dynamicDown ... 144
DynamicLineSpanner ... 144, 149
DynamicLineSpanner ... 144, 147
\dynamicNeutral ... 144
Dynamics ... 149
dynamics ... 141
dynamics in MIDI ... 589
dynamics in MIDI, custom ... 589
dynamics, absolute ... 141
dynamics, breaking vertical alignment ... 147
dynamics, centered in keyboard music ... 378
dynamics, editorial ... 149
dynamics, extender line, hiding ... 148
dynamics, parenthesis ... 149
dynamics, text spanner, customize ... 281
dynamics, text, style ... 148
dynamics, vertical alignment ... 147
dynamics, vertical positioning ... 144
DynamicText ... 149
\dynamicUp ... 144

E

easy notation ... 42
easy notation, using numbers ... 42
easy play note head ... 42
\easyHeadsOff ... 42
\easyHeadsOn ... 42
Editorial annotations ... 254, 256, 260, 262, 266, 268, 271, 273
editorial dynamics ... 149
effects in MIDI ... 596
electric snare ... 826
\ellipse ... 788
embedded graphics ... 302
embedding graphic object ... 300
Emmentaler font ... 739
empty chord ... 133, 143, 379
empty staff ... 231
\EnableGregorianDivisiones ... 850
\enablePolymeter ... 840
encapsulated postscript output ... 584
enclosing text in box, with rounded corners ... 793
enclosing text within a box ... 759
end repeat ... 183
\endcr ... 141
\enddecr ... 141
\endSpanners ... 704, 840
engraver, including in context ... 673
Engraver_group ... 674
Engravers and Performers ... 659, 675
Engravers explained ... 88
ensemble music ... 357
entering lyrics ... 314
entering multiple tuplets ... 52
'episem finis' Gregorian articulation ... 506
'episem initium' Gregorian articulation ... 506
Episema ... 506
Episema_engraver ... 506
EpisemaEvent ... 506
\episemFinis ... 506
\episemInitium ... 506
EPS output ... 584
EPS, image ... 789
\epsfile ... 302, 789
equalization, instrument, replacing MIDI default ... 591
\espressivo ... 138, 143, 824
'espressivo' articulation ... 138, 143, 824
\etc ... 292, 577
\eventChords ... 840
exception, chord names ... 478
\expandEmptyMeasures ... 248
expanding music ... 57
explicitClefVisibility ... 708
explicitKeySignatureVisibility ... 708
Explicitly instantiating voices ... 200, 202
expression in MIDI ... 596
expression, markup ... 289
Expressive marks ... 61, 71, 141, 149, 151, 155, 156, 157, 158, 162, 165, 168, 282, 442
extended chord ... 469
extender ... 325
extender line, dynamics, hiding ... 148
extent, of actual inking ... 819
extent, of bounding box ... 819
extra natural sign, preventing ... 7
extra voice for handling breaks ... 620
extra-offset ... 625
extra-spacing-height ... 646
extra-spacing-width ... 646
\eyeglasses ... 812
Ez_numbers_engraver ... 42

F

\f 141
F clef 17, 755
fall 158
fall 157
false note, percussion 453
\featherDurations 105, 841
feathered beam 105
feature, OpenType font 307, 763
fermata 138, 825
\fermata 71, 138, 795, 825
fermata, Henze 138, 825
fermata, long 138, 825
fermata, on bar line 71
fermata, on multi-measure rest 67
fermata, short 138, 825
Ferneyhough hairpin 146
Feta font 739
\ff 141
\fff 141
\ffff 141
\fffff 141
fifth 5
figured bass 484
figured bass 484
figured bass, alignment 490
figured bass, alteration, glyphs 487
figured bass, alteration, position 487
figured bass, extender lines 487
figured bass, vertical distance of elements 489
\figured-bass 760
FiguredBass 235, 488, 490
figuredBassAlterationDirection 487
figuredBassPlusDirection 487
figuredBassPlusStrokedAlist 487
\figuremode 484, 534
\figures 484, 534
\fill-line 298, 772
\fill-with-pattern 566, 773
\filled-box 301, 789
final bar line 106, 116, 129
final bar line, in Gregorian chant 505
final bar line, in Kievan chant 515
finalis 505
\finalis 506
finding available fonts 309
fine 130, 175, 178
fine 175
\fine 116, 129, 174, 175, 515
FineEvent 130, 175
\finger 254, 760, 841
finger change 254
finger-glide-interface 259
finger-interface 679
Finger_glide_engraver 258
FingerGlideSpanner 259
Fingering 256, 395, 678, 679
fingering 254
fingering chart 455
fingering chord 255
fingering instruction, for chords 255
fingering vs. string number 394
fingering, adding to fret diagram 438
fingering, and multi-measure rest 69
fingering, glide 256
fingering, inside of staff 256
fingering, orientation 255
fingering, right-hand, for fretted instruments 440
fingering, right-hand, placement 440
fingering, stem support 256
fingering, symbols for wind instruments 454
fingering, thumb 138, 255, 825
fingering-event 256, 679
fingering-glide-event 258
Fingering_engraver 256, 678, 679, 681
FingeringEvent 256, 679
FingeringGlideEvent 258
fingeringOrientations 255
first-page-number 610
\first-visible 812
\fixed 2, 841
Fixing overlapping notation 380, 381
flag 494, 500
flag, mensural 500
\flageolet 138, 825
'flageolet' harmonics 138, 825
flags, flat 103
flared hairpin 146
flat 7
flat 6
\flat 795
flat flags 103
flat, double 6
Flex 835
\flexa 513
Flexible architecture 278, 279
floor tom tom 826
follow voice 383
followVoice 383
font 835
font family 294
font family, setting 309
font feature, OpenType 307, 763
font size 293
font size (notation) 250
font size (notation), scaling 250
font size (notation), standard 254
font size, setting 614
font switching 293
font, changing for entire document 309
font, Emmentaler 739
font, external files 305
font, Feta 739
font, finding 305
font, finding available 309
font, music notation 311
font, non-text in markup 311
font, Parmesan 739
font-encoding 311
font-interface 254, 679, 815
font-interface 254, 311
font-size 250, 254
\fontCaps 760
FontConfig 305
\fontsize 293, 760
fontSize 250
foot mark 138, 825
footer 541
footer, page 549

Footnote ... 563
footnote ... 555
\footnote ... 555, 812, 841
footnote, event-based ... 556
footnote, in music expressions ... 555
footnote, in stand-alone text ... 561
footnote, time-based ... 557
footnote-separator-markup ... 612
Footnote_engraver ... 563
FootnoteEvent ... 563
Forbid_line_break_engraver ... 88
Forbid_line_break_engraver ... 55
forced vertical direction of grobs ... 694
forget ... 35
forget accidental style ... 35
format, rehearsal mark ... 125
formatting, cue notes ... 243
formatting, in lyrics ... 314
formatting, text spanner ... 281
four-bar music ... 619
Four-part SATB vocal score ... 354, 355
four-string-banjo ... 445
\fp ... 141
\fraction ... 813
fragment ... 243
fragment, music ... 583
fragment, quoting ... 239
framing text ... 300
\freeBass ... 807
French clef ... 17, 755
\frenchChords ... 475
Frenched score ... 358
Frenched score ... 231
Frenched staff ... 231, 235
Frenched staff ... 227, 231
Frenched staves ... 358
fret ... 396
fret diagram ... 416, 426
fret diagram, adding custom ... 429
fret diagram, adding fingering ... 438
fret diagram, automatic ... 437
fret diagram, changing orientation ... 424
fret diagram, custom ... 416
fret diagram, customized ... 424, 425
fret diagram, left-handed ... 419
fret diagram, mandolin ... 426
fret diagram, markup ... 417
fret diagram, transposing ... 428
fret diagram, ukulele ... 426
fret diagram, with chord names ... 428
\fret-diagram ... 417, 802
fret-diagram-interface ... 424, 426, 431, 437, 439, 440
fret-diagram-interface ... 424
\fret-diagram-terse ... 420, 803
\fret-diagram-terse markup ... 420
\fret-diagram-verbose ... 421, 804
\fret-diagram-verbose markup ... 421
fretboard fret diagram, customized ... 431
fretboard, alternate table ... 435
fretboard, define predefined ... 432
FretBoards ... 426
fretted instrument, chord shape ... 430
fretted instrument, dampened note ... 442
fretted instrument, harmonics ... 442
fretted instrument, indicating position and barring ... 441
fretted instrument, predefined string tunings ... 413
fretted instrument, right-hand fingering ... 440
Fretted strings ... 395, 412, 416, 426, 437, 439, 441, 442, 443, 444, 445
\fromproperty ... 813
full score ... 357
full-measure rest ... 66
funk shape note head ... 43
\funkHeads ... 43
\funkHeadsMinor ... 44

G

G clef ... 17
\general-align ... 297, 773
\germanChords ... 475
ghost note ... 265
ghost note, percussion ... 453
glide ... 256
gliding fingering ... 256
glissando ... 162
Glissando ... 162, 704
glissando ... 158
\glissando ... 158
glissando, across repeats ... 161
glissando, and repeats ... 183
glissando, breakable ... 160
glissando, chords in tablatures ... 410
glissando, contemporary ... 159
glissando, timing marks ... 159
\glissandoMap ... 158
global replacement, automatic, of strings ... 582
global variable ... 836
glyph ... 835
glyph set, accidental ... 754
glyph, alternate accidentals ... 36
glyph, bounding box ... 819
glyph, for figured bass alteration ... 487
\grace ... 130, 841
grace note ... 130, 456
grace note, and lyrics ... 348
grace note, and strict spacing ... 134
grace note, changing layout settings ... 132, 133
grace note, following ... 131
grace note, synchronization ... 134
grace note, tweaking ... 132, 133
grace notes ... 134
Grace_auto_beam_engraver ... 134
Grace_beam_engraver ... 134
Grace_engraver ... 134
Grace_spacing_engraver ... 134
GraceMusic ... 134
grammar, for LilyPond ... 836
grand staff ... 221
grand staff ... 217
GrandStaff ... 35, 221
graphic notation ... 301
graphic object, drawing ... 300
graphic object, embedding ... 300
graphical object ... 835
graphical object interface ... 835
Graphical Object Interfaces ... 835
graphics, embedding ... 300, 302

Gregorian accidental 505
Gregorian articulation 506
Gregorian articulation, accentus 506, 826
Gregorian articulation, circulus 506, 826
Gregorian articulation, episem finis 506
Gregorian articulation, episem initium 506
Gregorian articulation, ictus 506, 826
Gregorian articulation, semicirculus 506, 826
Gregorian key signature 505
Gregorian music, modern transcription 370
Gregorian square neumes ligature 507
Gregorian transcription staff 216
GregorianTranscriptionStaff 217
GregorianTranscriptionStaff 216
grid line 271
grid lines, changing appearance 272
grid-line-interface 273
grid-point-interface 273
Grid_chord_name_engraver 483
Grid_line_span_engraver 273
Grid_line_span_engraver 271
Grid_point_engraver 273
Grid_point_engraver 271
GridChordName 483
gridInterval 271
GridLine 273
GridPoint 273
grob 679, 835
grob, and whiteout 60, 705
grob, overwriting 60, 705
grob, property 683
grob, vertical position 694
grob, visibility of 704
grob-interface 679, 835, 837
grob-interface 835
\grobdescriptions 841
grouping beats 99
grow-direction 105
guiro 826
guitar note head 40
guitar tablature 393
guitar, chord chart 89
guitar, strumming rhythm, showing 89, 90
gutter 608

H

hairpin 149
Hairpin 149, 688
hairpin 141
hairpin, al niente 146
hairpin, aligning ends to NoteColumn directions .. 145
hairpin, angled 711
hairpin, constante 146
hairpin, Ferneyhough 146
hairpin, flared 146
hairpin, minimum length 145
hairpin, moving ends of 145
hairpin, stopping at bar lines 144
'half open' articulation 138, 825
half open high hat 826
half-open high hat 138, 451
\halfopen 138, 451, 825
\halign 296, 774
hammer on 411
hand clap 826
Harmonia Sacra note head 43
\harmonic 41, 391, 399
harmonic indication, in tablature notation 399
harmonic note head 40
harmonic, in tablatures 406
\harmonicByFret 399, 841
\harmonicByRatio 399, 841
\harmonicNote 841
harmonics 392
harmonics, artificial 391
harmonics, flageolet 138, 825
harmonics, natural 391
harmonics, on fretted instrument 442
\harmonicsOff 391
\harmonicsOn 391, 841
harp 388
harp pedal 389
harp pedal diagram 389
\harp-pedal 804
'Haydn turn' ornament 138, 824
\haydnturn 138, 824
\hbracket 300, 789
\hcenter-in 775
header 541
\header 539
header, page 549
'heel' pedal mark 138, 825
Hel-arabic note name 524
help, balloon 270
Henze fermata 138, 825
\henzelongfermata 138, 825
\henzeshortfermata 138, 825
hidden note 259
\hide 705, 841
\hideKeySignature 456
\hideNotes 259
\hideSplitTiedTabNotes 398
\hideStaffSwitch 383
hiding accidentals, on tied notes at start of system 7
hiding ancient staves 231
hiding dynamics extender line 148
hiding rhythmic staves 231
hiding staves 231
hiding Vaticana staves 231
high bongo 826
high conga 826
high hat 826
high hat, half open 138, 451, 826
high hat, open 138, 826
high hat, pedal 138, 451, 826
high timbale 826
high tom tom 826
highlight, staff 262
horizontal alignment, lyrics 333
horizontal beams 405
horizontal bracket 273
horizontal padding in markup 296
horizontal shift of notes 207
horizontal spacing 640
horizontal spacing, between columns 646
horizontal spacing, between non-musical items ... 645
horizontal text alignment 295

horizontal-bracket-interface ... 276
horizontal-bracket-text-interface ... 276
`horizontal-shift` ... 608
Horizontal_bracket_engraver ... 276
`Horizontal_bracket_engraver` ... 273
HorizontalBracket ... 276
HorizontalBracketText ... 276
`HorizontalBracketText` ... 274
horizontally centering text ... 770
How LilyPond input files work ... 541, 549
`\hspace` ... 296, 776
Hufnagel ... 493, 494
`\huge` ... 250, 295, 761
hymn ... 365, 369
hymn, and partial measures ... 375
hyperlink, as QR code ... 816
hyphen ... 325

I

I'm hearing voices ... 202, 448, 451
`\ictus` ... 506, 826
'ictus' Gregorian articulation ... 506, 826
`\if` ... 553, 802
`\iij` ... 508
`\IIJ` ... 508
`\ij` ... 508
`\IJ` ... 508
image ... 789
`\image` ... 789
image, embedding ... 302
immutable object ... 835
immutable property ... 835
implicit context ... 677
importing stencil, into text ... 817
improvisation ... 47
improvisation, Arabic ... 527
`\improvisationOff` ... 47, 89
`\improvisationOn` ... 47, 89
`\in` ... 695
inch (in) ... 695
`\incipit` ... 517, 841
incipit, adding ... 517
`\inclinatum` ... 507, 512
`\include` ... 541, 567
include settings ... 574
including files ... 567
`indent` ... 237, 608, 649
indicating No Chord in `ChordNames` ... 473
indicating position and barring for fretted instrument ... 441
individual parts ... 236
`\inherit-acceptability` ... 674, 842
`inner-margin` ... 608
inserting music, into text ... 799
inserting PostScript directly, into text ... 792
inserting URL link, into text ... 794
`\inStaffSegno` ... 115, 116, 185, 842
instrument equalization in MIDI, replacing default ... 591
instrument name ... 236, 598
instrument name, adding to other contexts ... 238
instrument name, centering ... 237
instrument name, changing ... 238
instrument name, complex ... 236
instrument name, short ... 236
instrument, transposing ... 11
instrument-specific-markup-interface ... 467, 815
InstrumentName ... 239
`\instrumentSwitch` ... 842
interface ... 835
interface, layout ... 679
Interfaces for programmers ... 694
interleaved music ... 213
Intermediate substitution functions ... 689, 697
Internals Reference ... 659
interval ... 5
inversion ... 14
`\inversion` ... 14, 842
inversion, modal ... 16
`\invertChords` ... 472, 842
invisible note ... 259
invisible rest ... 63
invisible stem ... 267
Ionian ... 22
`\ionian` ... 22
iraq ... 527
isolated duration ... 49
isolated percent repeat ... 188
isolated pitch ... 49
`\italianChords` ... 475
`\italic` ... 293, 761
item, musical ... 645
item, non-musical ... 645
item-interface ... 648, 679

J

jazz chord ... 475
`\jump` ... 186, 842
Jump_engraver ... 175, 186
JumpScript ... 175, 178, 186
justified text ... 299
`\justified-lines` ... 291, 820
`\justify` ... 299, 776
`\justify-field` ... 776
`\justify-line` ... 777
`\justify-string` ... 777
justifying lines of text ... 820
justifying text ... 776

K

keep tagged music ... 570
Keep_alive_together_engraver ... 235
`keepAliveInterfaces` ... 232
`\keepWithTag` ... 570, 842
`\key` ... 21, 44, 842
key signature ... 501, 505
key signature ... 6, 21
key signature, Gregorian ... 505
key signature, mensural ... 501
key signature, non-traditional ... 23
key signature, preventing natural signs ... 22
key signature, visibility following explicit change ... 708
key-signature-interface ... 24, 37
Key_engraver ... 24

Key_performer ... 24
keyboard instrument staff ... 378
keyboard music, centering dynamics ... 378
Keyboards ... 379, 381, 383, 384, 386, 387, 388
KeyCancellation ... 24
KeyChangeEvent ... 24
keyed instrument staff ... 378
KeySignature ... 24, 501, 505, 527
Kievan accidental ... 515
Kievan clef ... 497, 755
Kievan ligature ... 515
Kievan notation ... 514, 515
`\kievanOff` ... 514
`\kievanOn` ... 514
`KievanStaff` ... 513
`KievanVoice` ... 513
`\killCues` ... 247, 842
Kirchenpause ... 249
knee gap, with beams ... 92
knee gap, with beams, changing ... 92
koron ... 531
kurd ... 527

L

`\label` ... 564, 842
laissez vibrer ... 61
laissez vibrer ... 59
`\laissezVibrer` ... 59
LaissezVibrerTie ... 61
LaissezVibrerTieColumn ... 61
`\language` ... 842
language, note names in other ... 8
language, pitch names in other ... 8
`\languageRestore` ... 842
`\languageSaveAndChange` ... 842
`\large` ... 250, 295, 761
`\larger` ... 293, 295, 761
`last-bottom-spacing` ... 606
layer ... 705
`\layout` ... 539, 612, 659, 668
layout interface ... 679
layout object ... 835
`\layout`, and `\book` ... 538
`\layout`, and `\bookpart` ... 538
layout, file ... 614
layout, major 7 chord ... 478
layout, vertical, debugging ... 655
`layout-set-staff-size` ... 614
lead sheet ... 474
Learning Manual ... 1
ledger line ... 227
ledger line ... 224
ledger line, internal ... 224
ledger line, modifying ... 224
ledger-line-spanner-interface ... 41
Ledger_line_engraver ... 41
LedgerLineSpanner ... 41
`\left-align` ... 295, 778
left-aligning text ... 778
`\left-brace` ... 813
`\left-column` ... 778
left-handed fret diagram ... 419
`left-margin` ... 607
Length and thickness of objects ... 231, 696
length of multi-measure rest ... 67
length of note ... 48
lexer ... 835
`\lheel` ... 138, 825
ligature ... 494, 495, 503, 504, 513, 516
ligature ... 495
ligature, in text ... 771
ligature, Kievan ... 515
ligature, mensural ... 502
ligature, square neumes ... 507
LilyPond grammar ... 836
LilyPond grammar ... 836
LilyPond Scheme syntax ... 578
line ... 227
`\line` ... 779
line break ... 106
line break, beams ... 92
line break, cadenzas ... 82
line break, managing with extra voice ... 620
line break, unmetered music ... 82
line comment ... 536, 541
line, cross-staff ... 383
line, grid ... 271
line, staff-change ... 383
line, staff-change follower ... 383
line, to indicate duration ... 491
line-interface ... 702
line-spanner-interface ... 704
`line-width` ... 299, 606, 649
`\linea` ... 507, 512
LineBreakEvent ... 621
`\lineprall` ... 138, 824
lines, vertical, between staves ... 271
list of colors ... 734
list of keys in woodwind diagrams ... 466
list of markups ... 290
list of woodwind diagrams ... 462
listing available fonts ... 309
Literature list ... 475, 480
Locrian ... 22
`\locrian` ... 22
long fermata ... 138, 825
longa ... 50, 63
`\longa` ... 48, 61
longa rest ... 61
`\longfermata` ... 138, 825
`\lookup` ... 814
low bongo ... 826
low conga ... 826
low timbale ... 826
low tom tom ... 826
`\lower` ... 296, 779
'lower mordent' ornament ... 138, 824
lowering text ... 779
`\ltoe` ... 138, 825
lute tablature ... 445
lute tuning ... 446
`ly:minimal-breaking` ... 622
`ly:one-line-auto-height-breaking` ... 623
`ly:one-line-breaking` ... 623
`ly:one-page-breaking` ... 623
`ly:optimal-breaking` ... 622
`ly:page-turn-breaking` ... 623
Lydian ... 22
`\lydian` ... 22

LyricCombineMusic 321, 327
LyricExtender 325
LyricHyphen 325
`\lyricmode` 314, 315, 535
Lyrics 235, 317, 321, 327, 355
`\lyrics` 535
lyrics, aligning to a melody 315
lyrics, aligning with sporadic melody 665
lyrics, and markup 315
lyrics, and melodies 317
lyrics, and tied notes 339
lyrics, assigned to one voice 197
lyrics, avoid bar lines 333
lyrics, divided 342
lyrics, entering 314
lyrics, formatting 314
lyrics, horizontal alignment 333
lyrics, increasing space between 332
lyrics, keeping inside margin 280, 333
lyrics, on grace notes 348
lyrics, positioning 230, 327
lyrics, punctuation 314
lyrics, repeating 334
lyrics, repeats with alternative endings 338
lyrics, shared among voices 343
lyrics, skip 64
lyrics, skipping notes 338
lyrics, using variables 326
lyrics, version 2.12 spacing 329
lyrics, with beam 94
`\lyricsto` 315, 317
LyricText 315, 353, 365

M

`m` 469
`magnification->font-size` 250, 614
`\magnify` 293, 762
magnifying text 762
`\magnifyMusic` 250, 842
`\magnifyStaff` 614, 842
`magstep` 250, 614, 696
`maj` 469
major 22
`\major` 22
major 7 chord, layout 478
major seven symbol 478
`majorSevenSymbol` 476, 478
makam 530
makam 523, 529
makam, example 530
makamlar 523, 530
makamlar 523, 529
`make-dynamic-script` 149
`make-pango-font-tree` 309
`make-relative` 579
`\makeClusters` 197, 842
`\makeDefaultStringTuning` 842
manual bar line 106
manual beam 91, 102
manual beam, direction shorthand for 102
manual beam, grace notes 102
manual engraving of ties 61
manual line break 617
manual measure line 106
manual rehearsal mark 125
manual repeat mark 183
manual staff change 379
Manuals 1
`\map-commands` 820
maqam 527
maqam 523
maracas 826
marcato 138
`\marcato` 138, 824
'marcato' articulation 138, 824
margin, text running over 280
`\mark` 125, 283, 843
mark, on every staff 126
mark, phrasing 155
mark, rehearsal 125
mark, rehearsal, below staff 78
mark, rehearsal, format 125
mark, rehearsal, manual 125
mark, rehearsal, style 125
mark, text 283
Mark_engraver 186
`Mark_engraver` 126
`\markalphabet` 814
`\markLengthOff` 78, 285
`\markLengthOn` 78, 285
`\markletter` 814
markup 289
`\markup` 277, 283, 287, 288, 289, 535
Markup construction in Scheme 150, 151, 565
markup expression 289
Markup functions 292
markup list 290
markup mode, quoted text 289
markup mode, special characters 289
markup object 277
markup syntax 289
markup text 289
markup text, aligning 295
markup text, alignment command 300
markup text, decorating 300
markup text, framing 300
markup text, justified 299
markup text, line width 299
markup text, multi-page 291
markup text, padding 301
markup text, word-wrapped 299
markup, aligning 295
markup, centering on page 298
markup, conditional 553
markup, image 789
markup, in lyrics 315
markup, multi-line 298
markup, multi-measure rest 69
markup, multi-page 291
markup, music notation inside 302
markup, on multi-measure rest 67
markup, rhythm 798
markup, score inside 304
markup, text, inside slurs 154
markup, two-column 288
`markup-markup-spacing` 606
`markup-system-spacing` 605
`\markuplist` 288, 291

\markupMap ... 843
max-systems-per-page ... 609
maxima ... 50, 63
\maxima ... 48, 61
maxima rest ... 61
measure check ... 124
measure counter ... 127
measure grouping ... 99
measure line ... 106, 115
measure line, invisible ... 106
measure line, manual ... 106
measure number ... 117, 137
measure number check ... 124
measure number, and repeats ... 183
measure number, style ... 120
measure repeat ... 186
measure subgrouping ... 99
measure, partial ... 80
measure, partial, in hymns ... 375
measure, pickup ... 80
measure-counter-interface ... 129
measure-spanner-interface ... 276
Measure_counter_engraver ... 129
Measure_grouping_engraver ... 99
Measure_spanner_engraver ... 276
measureBarType ... 115
MeasureCounter ... 129
measureLength ... 94, 137
measurePosition ... 80, 137
MeasureSpanner ... 276
measuring units ... 695
Medicaea, Editio ... 493, 494
\medium ... 762
medium interval ... 523
melisma ... 321, 324
melisma ... 321, 325
\melisma ... 321
melisma, with beams ... 92
\melismaEnd ... 321
melismata ... 321
melody rhythm, showing ... 88
mensural ... 493, 494
mensural clef ... 497, 755
mensural flag ... 500
mensural ligature ... 502
mensural music, transcription of ... 221
mensural notation .. 494, 495, 497, 498, 499, 500, 501
mensural notation, signum congruentiae ... 826
MensuralStaff ... 217
MensuralStaff ... 216, 497
MensuralVoice ... 497
mensuration sign ... 498
mensurstrich ... 221
Mensurstriche ... 517
Mensurstriche layout ... 221
\mergeDifferentlyDottedOff ... 202
\mergeDifferentlyDottedOn ... 202
\mergeDifferentlyHeadedOff ... 202
\mergeDifferentlyHeadedOn ... 202
merging notes ... 202
merging rests ... 207
merging text ... 771, 779
meter ... 87
meter ... 72
meter style ... 72
meter, polymetric ... 83
metronome ... 80
metronome mark ... 80
metronome mark ... 76
metronome mark, below staff ... 78
metronome mark, custom markup ... 79
MetronomeMark ... 80
metronomic indication ... 80
mezzo-soprano clef ... 17, 755
\mf ... 141
microtone ... 9
microtone, tab ... 415
mid tom tom ... 826
\midi ... 539, 659
MIDI ... 27, 587
MIDI, balance ... 596
MIDI, block ... 588
MIDI, channels ... 594
MIDI, chorus level ... 596
MIDI, context definitions ... 592
MIDI, custom dynamics ... 589
MIDI, dynamics ... 589
MIDI, effects ... 596
MIDI, equalization ... 589
MIDI, expression ... 596
MIDI, instrument ... 598
MIDI, metadata ... 554
MIDI, one channel per voice ... 595
MIDI, pan position ... 596
MIDI, replacing default instrument equalization ... 591
MIDI, reverb ... 596
MIDI, stereo balance ... 596
MIDI, supported notation ... 587
MIDI, tracks ... 594
MIDI, transposition ... 27
MIDI, unsupported notation ... 587
MIDI, using repeats ... 594
MIDI, volume ... 589
midiBalance ... 596
midiChannelMapping ... 594
midiChorusLevel ... 596
midiDrumPitches ... 452
midiExpression ... 596
midiPanPosition ... 596
midiReverbLevel ... 596
MIDI ... 589, 593
millimeter (mm) ... 695
min-systems-per-page ... 609
minimum length, hairpin ... 145
minimum-Y-extent ... 625
minimumFret ... 396, 439
minimumPageTurnLength ... 623
minimumRepeatLengthForPageTurn ... 624
minor ... 22
\minor ... 22
minorChordModifier ... 477
mirroring markup ... 793
mixed ... 386
Mixolydian ... 22
\mixolydian ... 22
\mm ... 695
modal inversion ... 16
modal transformation ... 15
modal transposition ... 15

\modalInversion 16, 843
\modalTranspose 15, 843
mode 22
mode 836
modern 31
modern accidental 31
modern accidental style 30, 31
modern style accidental 31
modern transcription of Gregorian music 370
modern-cautionary 31
modern-cautionary accidental style 30, 31
modern-voice 31
modern-voice-cautionary 31
modern-voice-cautionary accidental style 31
moderntab clef 415
modifier, in chord 468
Modifying context properties 673
\mordent 138, 824
'mordent' ornament 138, 824
'mordent, lower' ornament 138, 824
'mordent, upper' ornament 138, 824
movements, multiple 536
Moving objects 295, 300
\mp 141
multi-line comment 536, 541
multi-line markup 298
multi-line text 298
multi-measure notes, contracting 248
multi-measure notes, expanding 248
multi-measure rest 69
multi-measure rest 66
multi-measure rest, and fingerings 69
multi-measure rest, attaching fermata 67
multi-measure rest, attaching text 67
multi-measure rest, length 67
multi-measure rest, markup 69
multi-measure rest, numbering 249
multi-measure rest, positioning 68
multi-measure rest, script 67
multi-measure rest, style 249
multi-measure rest, with markup 67
multi-measure rest, within text, by duration 797
multi-measure rest, within text, by duration-scale 795
multi-measure rests, contracting 248
multi-measure rests, expanding 248
\multi-measure-rest-by-number 795
multi-note acciaccatura 134
multi-page markup 291
multi-voice accidental 31
MultiMeasureRest 69, 250
MultiMeasureRestNumber 69, 250
MultiMeasureRestScript 69, 141, 250
MultiMeasureRestScript 67
MultiMeasureRestText 69, 250
MultiMeasureRestText 67
multiple dynamic marks, on one note 142
Multiple notes at once 207
multiple phrasing slurs 155
multiple slurs 151
multiple voices 202
Music classes 242
music expression, copying 578
music expression, sharing 578
Music expressions explained 536
music fragment 583
Music functions 575, 576
music, beginners' 42
music, inside markup 302
music, unmetered 137
musica ficta 502
musical cue 360
musical item 645
musical theater 357
\musicglyph 796
\musicLength 843
\musicMap 843
musicological analysis 273
musicQuotes 836
mutable object 836
mutable property 836
mute bongo 826
mute conga 826
mute timbale 826
muted note, percussion 453

N

\n 141
N.C. symbol 473
N.C. symbol, customizing 474
\name 673
name of singer 347
name, character 358
\natural 796
natural harmonics 391
natural pitch 6
natural sign 6
natural sign, extra, preventing 7
natural sign, preventing in key signatures 22
neo-modern 33
neo-modern accidental style 33
neo-modern-cautionary 33
neo-modern-cautionary accidental style 33
neo-modern-voice 33
neo-modern-voice accidental style 33
neo-modern-voice-cautionary 33
neo-modern-voice-cautionary accidental style 33
neomensural 494
nested repeat 183
nested staff bracket 221
Nesting music expressions 228, 231, 678
nesting of staves 221
\new 661
new context 661
new dynamic mark 149
New markup command definition 770
new spacing section 642
new staff 216
New_fingering_engraver 256, 678
\newSpacingSection 642
niente, al, hairpin 146
no-chord symbol 473
no-chord symbol, customizing 474
no-reset 34
no-reset accidental style 34
\noBeam 103
\noBreak 617
noChordSymbol 474

non-ASCII character 580
non-default tuplet numbers 53
non-empty text 279
non-musical item 645
non-musical symbol 301
non-text font, in markup 311
NonMusicalPaperColumn 641
`nonstaff-nonstaff-spacing` 625
`nonstaff-relatedstaff-spacing` 625
`nonstaff-unrelatedstaff-spacing` 625
`\noPageBreak` 621, 843
`\noPageTurn` 624, 843
`\normal-size-sub` 762
`\normal-size-super` 294, 762
`\normal-text` 763
`\normalsize` 250, 295, 763
notation, explaining 270
notation, font size 250
notation, graphic 301
notation, inside markup 302
`\note` 796
note cluster 197
note collision 202
note continuation 491
note duration 48
note duration, default 49
note grouping bracket 273
note head 500, 514
note head 250
note head style 40, 753
note head, Aiken 43
note head, Aiken, thin variant 45
note head, ancient 499, 514
note head, Christian Harmony 43
note head, cross 40
note head, diamond 40
note head, diamond-shaped 391
note head, easy notation 42
note head, easy play 42
note head, funk 43
note head, guitar 40
note head, Harmonia Sacra 43
note head, harmonic 40
note head, improvisation 47
note head, parlato 40
note head, practice 42
note head, Sacred Harp 43
note head, shape 43
note head, shape, merging 45
note head, slashed 47
note head, Southern Harmony 43
note head, special 40
note head, Walker 43
note length 48
note name, Arabic 524
note name, default 6
note name, Dutch 6
note name, Hel-arabic 524
note name, other languages 8
note name, printing 268
note pitch, default 49
note value 50
note, colored 260
note, colored in chords 262
note, cross-staff 379, 384
note, dotted 49
note, dotted, moving horizontally 206
note, double-dotted 49
note, ghost 265
note, hidden 259
note, horizontal shift 207
note, invisible 259
note, parenthesized 265
note, smaller 243
note, spacing horizontally 642
note, splitting 87
note, transparent 259
note, transposition of 11
note, within text, by duration 796
note, within text, by `log` and `dot-count` 797
`\note-by-number` 797
note-event 41, 43, 47
`note-event` 242
note-head-interface 41, 43, 47
Note_head_line_engraver 384
Note_heads_engraver 41, 43, 47, 88
`Note_heads_engraver` 87
Note_name_engraver 269
`Note_name_engraver` 268
Note_spacing_engraver 260
NoteCollision 207
NoteColumn 207
NoteHead 41, 43, 47
`\notemode` 535
NoteName 269
`noteNameFunction` 268
NoteNames 269
`NoteNames` 268
`noteNameSeparator` 268
NoteSpacing 260, 641
`\null` 296, 814
`NullVoice` 343
`\number` 763
number, bar 117
number, in easy notation 42
number, measure 117
`\numericTimeSignature` 72

O

object, colored 260
object, coloring 705
object, markup 277
object, overwriting 705
object, rotating 711
object, visibility of 704
Objects and interfaces 563, 835
octavation 27
octavation 24
octave changing mark 1
octave check 10
octave correction 10
octave entry, absolute 1
octave entry, relative 2
octave specification, absolute 1
octave specification, relative 2
octave transposition 17
octave transposition, optional 17
`\octaveCheck` 10, 843

\offset ... 687, 843
offsetting ... 687
\omit ... 705, 843
On the un-nestedness of brackets and ties ... 154, 156
\on-the-fly ... 815
\once ... 682, 684, 689, 697, 843
OneStaff ... 221
OneStaff ... 219
\oneVoice ... 197
\open ... 138, 390, 454, 825
'open' articulation ... 138, 454, 825
open bongo ... 826
open conga ... 826
open high hat ... 138, 826
open string indication ... 390
open timbale ... 826
OpenType, font feature ... 307, 763
opera ... 357
operation, inversion ... 14
operation, modal ... 15
operation, modal inversion ... 16
operation, retrograde ... 14
operation, transposition ... 15
Optical spacing ... 641
optional octave transposition ... 17
oratorio ... 354
orchestra, notation for ... 357
orchestral music ... 357
orchestral strings ... 390
ordering, vertical, of scripts ... 140
organ pedal mark ... 138, 825
Organizing pieces with variables ... 215, 360, 568, 574, 575, 664
orientation of fret diagram, changing ... 424
orientation, of fingerings ... 255
orientation, of string numbers ... 255
orientation, of stroke finger ... 255
\oriscus ... 507, 512
ornament ... 130
ornament, down pralltriller ... 138, 824
ornament, Haydn turn ... 138, 824
ornament, lower mordent ... 138, 824
ornament, mordent ... 138, 824
ornament, mordent, lower ... 138, 824
ornament, mordent, upper ... 138, 824
ornament, pralltriller ... 138, 824
ornament, pralltriller, down ... 138, 824
ornament, pralltriller, long ... 138, 824
ornament, pralltriller, up ... 138, 824
ornament, reverse turn ... 138, 824
ornament, signum congruentiae ... 138
ornament, slash turn ... 138, 824
ornament, trill ... 138, 824
ornament, turn ... 138, 824
ornament, up pralltriller ... 138, 824
ornament, upper mordent ... 138, 824
ornamentation, turn, delayed ... 140
ossia ... 231
ossia ... 227, 235
ossia, positioning ... 230
Other sources of information ... 202, 523, 568, 586, 593, 598, 599, 679, 694
Other uses for tweaks ... 379
ottava ... 24
\ottava ... 24, 843
ottava spanner, modify slope ... 26
ottava text ... 25
ottava, for single voice ... 25
ottava-bracket-interface ... 27
Ottava_spanner_engraver ... 27
OttavaBracket ... 27
ottavation ... 25
ottavation-numbers ... 24
ottavation-ordinals ... 24
ottavation-simple-ordinals ... 24
ottavationMarkups ... 24
Ottoman music ... 529
Ottoman, classical music ... 523
outer-margin ... 608
output definition ... 659
output-count ... 836
output-def ... 836
output-suffix ... 836
outside-staff-horizontal-padding ... 639
outside-staff-padding ... 639
outside-staff-priority ... 639
\oval ... 790
\overlay ... 779
overlaying contexts ... 219
\override ... 683, 686, 815
override, reverting ... 684
\override-lines ... 820
OverrideProperty ... 681
\overrideProperty ... 687, 844
\overrideTimeSignatureSettings ... 73, 844
overriding for only one moment ... 684
overriding property within text markup ... 815
\overtie ... 764
overtie-ing text ... 764
overwriting grob ... 60
overwriting object ... 705

P

\p ... 141
\pad ... 779
\pad-around ... 301, 780
\pad-markup ... 301
\pad-to-box ... 301, 780
\pad-x ... 301, 780
padding ... 680
padding around text ... 301
padding in markup, horizontal ... 296
padding in markup, vertical ... 297
padding text ... 779
padding text horizontally ... 780
page break ... 649
page break, cadenzas ... 82
page break, managing with extra voice ... 620
page break, unmetered music ... 82
page breaking, manual ... 621
page breaks, within markup ... 291
page footer ... 549
page header ... 549
page layout ... 649
page number, auto-numbering ... 610
page number, in roman numerals ... 610
page number, specify first ... 610
page number, suppress ... 610

page numbers, independent for introduction 610
page numbers, per book part 610
page numbers, referencing 563
page size 602
page, orientation 603
page-breaking 609
page-breaking-system-system-spacing 609
page-count 609
\page-link 815
page-number-type 610
\page-ref 564, 815
page-spacing-weight 609
\pageBreak 621, 844
\pageTurn 624, 844
\palmMute 844
\palmMuteOn 844
pan position in MIDI 596
Pango 305
\paper 539, 602
paper column 645
paper size 602
paper size, landscape 603
paper size, orientation 603
paper-height 604
paper-width 606
parallel music 213
\parallelMusic 213, 844
Parentheses 266
parentheses-interface 266
parenthesis 265
Parenthesis_engraver 266
\parenthesize 265, 790, 844
parenthesized accidental 6
parlato 363
parlato note head 40
Parmesan font 739
parser 836
parser variable 836
part 213
part combiner 208
part combiner, changing text 212
part song 354
\partCombine 208, 343, 844
\partCombine and lyrics 211, 343
\partCombineApart 210
\partCombineAutomatic 210
\partCombineChords 210
\partCombineDown 844
\partCombineForce 845
partCombineListener 836
PartCombineMusic 213
\partCombineSoloI 210
\partCombineSoloII 210
\partCombineUnisono 210
\partCombineUp 845
\partial 80, 170, 845
partial measure 80
partial measure, in hymns 375
parts, desk 236
parts, individual 236
parts, section 236
\path 790
path, drawing 790
\pattern 815
pause mark 70, 156
PDF metadata 554
pedal diagram, harp 389
pedal high hat 138, 451, 826
pedal indication style 386
pedal indication, bracket 386
pedal indication, mixed 386
pedal indication, text 386
pedal mark, heel 138, 825
pedal mark, organ 138, 825
pedal mark, toe 138, 825
pedal sustain style 386
pedal, harp 389
pedal, piano 386
pedal, sostenuto 386
pedal, sustain 386
pedalSustainStyle 386
percent 186
percent repeat 189
percent repeat 186
percent repeat counter 188
percent repeat, count visibility 188
percent repeat, isolated 188
Percent_repeat_engraver 189
PercentRepeat 189
PercentRepeatCounter 189
PercentRepeatedMusic 189
Percussion 446, 447, 448, 451, 453
percussion 446, 448
percussion clef 447, 755
percussion staff 216
percussion, custom 451
percussion, dead note 453
percussion, false note 453
percussion, ghost note 453
percussion, muted note 453
percussion, silenced note 453
Performer_group 675
Persian accidentals (sori, koron) 531
Persian classical music 531
Persian makam 523
\pes 513
Petrucci 493, 494
Petrucci clef 497, 755
phrase bar line 115
phrase bar line, in Gregorian chant 505
phrase bar line, in hymns 374
phrase bar line, in Kievan chant 515
phrasing bracket 273
phrasing mark 155
phrasing slur 151, 155
phrasing slur, dashed 155
phrasing slur, defining dash patterns 156
phrasing slur, dotted 155
phrasing slur, half solid and half dashed 155
phrasing slur, multiple 155
phrasing slur, simultaneous 155
phrasing, in lyrics 321
PhrasingSlur 156
\phrasingSlurDashed 155
\phrasingSlurDashPattern 156, 845
\phrasingSlurDotted 155
\phrasingSlurDown 155
\phrasingSlurHalfDashed 155
\phrasingSlurHalfSolid 155
\phrasingSlurNeutral 155

\phrasingSlurSolid 155
\phrasingSlurUp 155
Phrygian 22
\phrygian 22
piano 32
piano accidental style 32
piano music, centering dynamics 378
piano pedal 386
piano staff 217, 378
piano-cautionary 32
piano-cautionary accidental style 32
Piano_pedal_engraver 387
PianoPedalBracket 387
PianoStaff 35, 165, 221, 239, 355, 379
PianoStaff 378, 381
pickup measure 80
pickup, in a repeat 170
pitch 1
pitch name 1
pitch name, other languages 8
Pitch names 2, 5, 7, 10, 501
pitch range 37
pitch, default 49
pitch, isolated 49
pitch, transposition of 11
Pitch_squash_engraver 47, 91
Pitch_squash_engraver 89
pitched trill 167
pitched trill, with accidental 167
Pitched_trill_engraver 168
\pitchedTrill 167, 845
Pitches .. 2, 6, 7, 10, 11, 13, 21, 24, 27, 28, 35, 40, 41, 43, 47, 498, 527
Pitches and key signatures 6, 7, 21, 24, 527
pitches, 'smart' transposition 12
pitchnames 836
pizzicato, Bartók 392
pizzicato, snap 392
placeholder event 193
Placement of objects 139, 141, 280
placement, lyrics 327
placement, right-hand fingering 440
placing horizontal brackets, around text 789
placing parentheses, around text 790
placing vertical brackets, around text 786
PNG, image 789
point (pt) 695
point, big (bp) 695
\pointAndClickOff 845
\pointAndClickOn 845
\pointAndClickTypes 845
\polygon 791
polymetric 56, 87
polymetric meter, with beams 83
polymetric signatures 83
polymetric time signature 87
polyphonic music 202
polyphony 207
polyphony, additional voices 205
polyphony, in tablatures 405
polyphony, shared lyrics 343
polyphony, single-staff 197
portato 140
portato 138
\portato 138, 824
'portato' articulation 138, 824
position, figured bass alteration 487
position, lyrics 230
position, multi-measure rest 68
position, ossia 230
position, vertical, of grobs 694
post-events 824
postscript 302
\postscript 302, 792
power chord 444
power chord 443
\pp 141
\ppp 141
\pppp 141
\ppppp 141
practice note head 42
\prall 138, 824
\pralldown 138, 824
\prallmordent 138, 824
\prallprall 138, 824
'pralltriller' ornament 138, 824
'pralltriller, down' ornament 138, 824
'pralltriller, long' ornament 138, 824
'pralltriller, up' ornament 138, 824
\prallup 138, 824
\preBend 401, 845
\preBendHold 401, 845
predefined string tuning, for fretted instruments 413
predefinedDiagramTable 435
\predefinedFretboardsOff 437
\predefinedFretboardsOn 437
prefatory material 645
prima volta 170
print-all-headers 611
print-first-page-number 610
print-page-number 610
printAccidentalNames 268
printing chord name 472
printing order 705
printing reserved character 289
printing special character 289
printNotesLanguage 268
printOctaveNames 268
prob 836
Properties found in interfaces 835
Properties of layout objects 835
property 681
property object 836
property, grob 683
\property-recursive 816
\propertyOverride 845
\propertyRevert 845
PropertySet 681
\propertySet 845
\propertyTweak 845
\propertyUnset 846
psalm 365, 369
Psalms 373
\pt 695
pull off 411
punctuation, in lyrics 314
\pushToTag 573, 846
\put-adjacent 781

putting space around text 779

Q

q, chord repetition 194, 397
\qr-code 816
QR code 816
quarter tone 7
quarter tone 6
quarter tone accidental 8
quarter tone, tab 415
\quilisma 507, 512
quote, in lyrics 314, 321
quote, voices 239
quoted text 279
quoted text, in markup mode 289
quotedCueEventTypes 242
quotedEventTypes 242
\quoteDuring 239, 243, 846
QuoteMusic 242

R

r 61
R 66
ragged-bottom 604
ragged-last 607, 649
ragged-last-bottom 604
ragged-right 607, 649
\raise 296, 781
\raiseNote 472, 846
raising text 781
range of pitches 37
rast 527
Ratisbona, Editio 494
Real music example 205, 207, 379
\reduceChords 89, 846
referencing context 661
referencing page label, in text 819
referencing page number, in text 815
register symbol, accordion 387
regular line break 619
rehearsal mark 125
rehearsal mark, below staff 78
rehearsal mark, format 125
rehearsal mark, manual 125
rehearsal mark, style 125
RehearsalMark 127
RehearsalMarkEvent 127
relative 2
\relative 2, 6, 14, 382, 579, 846
relative music, and \autoChange 382
relative octave entry 2
relative octave entry, and chords 5
relative octave entry, and transposition 6
relative octave specification 2
relative pitch, chords 193
RelativeOctaveCheck 11
RelativeOctaveMusic 6
religious music 365
reminder accidental 6
removal, in chord 471
\remove 667
remove tagged music 570
remove-empty 232
remove-first 232
remove-grace-property 133
remove-layer 233
\RemoveAllEmptyStaves 231, 850
\RemoveEmptyStaves 231, 850
\removeWithTag 570, 846
removing bar numbers 122
removing cue notes 247
renaissance music 221
repeat 182
repeat 108
\repeat 169, 170
repeat bar 106
repeat bar line 116
repeat bar line, underlying 115
repeat number, changing 183
\repeat percent 186
\repeat segno 115, 116, 175
\repeat tremolo 189
\repeat unfold 169
\repeat volta 115, 116, 169, 170
repeat volta, changing 183
repeat, al fine 175
repeat, alla coda 176
repeat, alternative bar numbers 181
repeat, ambiguous 183
repeat, and glissandi 161, 183
repeat, and lyrics 334
repeat, and measure number 183
repeat, and slur 183
repeat, bar line at start of piece 170
repeat, bar numbers with letters 181
repeat, beat 186
repeat, D.C. 176
repeat, D.C., manual 186
repeat, D.S. 177
repeat, D.S., forced at start 179
repeat, D.S., manual 186
repeat, da capo 176
repeat, da capo, manual 186
repeat, dal segno 177
repeat, dal segno, forced at start 179
repeat, dal segno, manual 186
repeat, double, style for volta 116
repeat, e poi la coda 176
repeat, end 183
repeat, manual 183
repeat, measure 186
repeat, nested 183
repeat, percent 186
repeat, percent counter 188
repeat, percent, count visibility 188
repeat, percent, isolated 188
repeat, short 186
repeat, simple 169
repeat, slash 186
repeat, start 183
repeat, timing information 183
repeat, tremolo 189
repeat, unfold 169
repeat, with alternative endings 170
repeat, with anacrusis 170
repeat, with bar checks 170
repeat, with pickup 170

repeat, with segno ... 178
repeat, with ties ... 59
repeat, with upbeat ... 170
repeat, written-out ... 169
Repeat_acknowledge_engraver ... 117
repeatCommands ... 183
repeatCountVisibility ... 188
repeated chords, suppressing ... 434, 474
RepeatedMusic ... 169, 183
repeating lyrics, with alternative endings ... 338
repeating tie ... 59
Repeats ... 169, 175, 178, 183, 186, 189, 191
repeats in MIDI ... 594
RepeatSlash ... 189
RepeatSlashEvent ... 189
\repeatTie ... 59, 339
repetition, using q ... 194, 397
\replace ... 765
replacing strings, automatically ... 582
reserved character, printing ... 289
reset-footnotes-on-new-page ... 611
\resetRelativeOctave ... 5, 846
resizing of staves ... 227
\responsum ... 508
Rest ... 63
rest ... 61
\rest ... 61, 797
rest, ancient ... 501
rest, church ... 249
rest, collisions of ... 70
rest, condensing ordinary ... 69
rest, entering durations ... 61
rest, full-measure ... 66
rest, invisible ... 63
rest, merging ... 207
rest, multi-measure ... 62, 66
rest, specifying vertical position ... 62
rest, splitting ... 87
rest, style ... 62
rest, whole, for a full measure ... 66
rest, whole-measure ... 62
rest, within text, by duration ... 797
rest, within text, by log and dot-count ... 798
\rest-by-number ... 798
rest-event ... 242
Rest_engraver ... 88
RestCollision ... 207
restNumberThreshold ... 249
restoring default properties for time signatures ... 74
restrainOpenStrings ... 396
\retrograde ... 14, 846
retrograde transformation ... 14
reverb in MIDI ... 596
'reverse turn' ornament ... 138, 824
\reverseturn ... 138, 824
\revert ... 684
reverting override ... 684
RevertProperty ... 681
\revertTimeSignatureSettings ... 74, 846
\rfz ... 141
rgb color ... 261
rgb-color ... 261
\rheel ... 138, 825
\rhythm ... 798
rhythm, in text ... 798
rhythm, showing melody ... 88
rhythmic staff ... 216
RhythmicStaff ... 47, 91, 217
RhythmicStaff ... 216
Rhythms ... 51, 56, 57, 61, 63, 65, 69, 76, 81, 83, 87, 88, 91, 93, 101, 105, 106, 115, 117, 123, 124, 127, 134, 136, 137
ride bell ... 826
ride cymbal ... 826
\right-align ... 295, 781
right-aligning text ... 781
\right-brace ... 816
\right-column ... 781
right-hand fingering, for fretted instruments ... 440
right-hand fingering, placement ... 440
right-margin ... 607
\rightHandFinger ... 440, 846
\roman ... 765
\romanStringNumbers ... 390, 394
root of chord ... 468
\rotate ... 782
rotating object ... 711
rotating text ... 782
\rounded-box ... 300, 793
\rtoe ... 138, 825

S

s ... 63
Sacred Harp note head ... 43
\sacredHarpHeads ... 43
\sacredHarpHeadsMinor ... 44
\sans ... 765
SATB ... 354
scalable vector graphics output ... 584
\scale ... 793
\scaleDurations ... 57, 83, 846
scaling duration ... 56
scaling markup ... 793
scaling text ... 782
Scheme functions ... 415, 416
Scheme object ... 837
Scheme tutorial ... 659
Scheme variable ... 836
scordatura ... 24
Score ... 137
\score ... 535, 539, 799
Score context, replacing ... 676
score, inside markup ... 304
score, vocal, adding cues ... 361
\score-lines ... 820
score-markup-spacing ... 605
score-system-spacing ... 606
Score_engraver ... 676
Score_performer ... 676
Scores and parts ... 568
scoreTitleMarkup ... 550
Scottish highland bagpipe ... 456
Script ... 141, 506
script, on multi-measure rest ... 67
script, vertical ordering ... 140
Script_engraver ... 506
ScriptEvent ... 506
scripts ... 824

seconda volta ... 170
\section ... 115, 129, 515
section bar line ... 115, 129
section bar line, in Gregorian chant ... 505
section bar line, in Kievan chant ... 515
section label ... 283
section parts ... 236
SectionEvent ... 130
SectionLabel ... 178, 283
\sectionLabel ... 176, 283, 846
SectionLabelEvent ... 283
segno ... 177
\segno ... 138, 800, 825
segno bar line ... 108, 116, 178
'segno' sign ... 138, 825
'segno' sign, bar line ... 108, 178
'segno' sign, manual ... 185
'segno' sign, with repeats ... 175, 178
segno, forced at start ... 179, 185
SegnoMark ... 178, 186
\segnoMark ... 115, 116, 178, 185, 846
SegnoRepeatedMusic ... 186
selecting font size (notation) ... 250
self-alignment-interface ... 679, 711
self-alignment-X ... 625
semai ... 528
semai form ... 527
semi-flat ... 6, 9
semi-flat symbol, appearance ... 525
semi-flat symbol, Persian (koron) ... 531
semi-sharp ... 6, 9
semi-sharp symbol, Persian (sori) ... 531
semi-transparent colors ... 260
\semicirculus ... 506, 826
'semicirculus' Gregorian articulation ... 506, 826
\semiflat ... 800
\semiGermanChords ... 475
\semisharp ... 800
separate text ... 287
separation-item-interface ... 648
sesqui-flat ... 9
sesqui-sharp ... 9
\sesquiflat ... 801
\sesquisharp ... 801
\set ... 94, 681, 686
set-global-fonts ... 310
set-global-staff-size ... 614
setting extent of text object ... 819
setting horizontal text alignment ... 774
Setting simple songs ... 313, 314
setting subscript, in standard font size ... 762
setting superscript, in standard font size ... 762
\settingsFrom ... 847
seventh chord ... 468
\sf ... 141
\sff ... 141
\sfz ... 141
\shape ... 718, 847
shape note ... 43
shape note, merging ... 45
shaping slurs and ties ... 718
shared property ... 835
sharp ... 7
sharp ... 6
\sharp ... 801
sharp, double ... 6
shift note ... 202
shift rest, automatic ... 202
shift symbol, accordion ... 387
\shiftDurations ... 847
shifting voice ... 202
\shiftOff ... 202
\shiftOn ... 202
\shiftOnn ... 202
\shiftOnnn ... 202
short bar line ... 107
short bar line, in Gregorian chant ... 505
short fermata ... 138, 825
short-indent ... 237, 608
shortened volta brackets ... 181
\shortfermata ... 138, 825
show vertical layout ... 655
show-available-fonts ... 309
showFirstLength ... 583, 836
\showKeySignature ... 456
showLastLength ... 583, 836
\showStaffSwitch ... 383
side-position-interface ... 679, 711
sidestick ... 826
sign, coda ... 138, 825
sign, coda, manual ... 185
sign, coda, variant ... 138, 180, 825
sign, coda, with repeats ... 175
sign, conducting ... 99
sign, segno ... 138, 825
sign, segno, bar line ... 108, 178
sign, segno, manual ... 185
sign, segno, with repeats ... 175, 178
sign, snappizzicato ... 138, 825
sign, variant coda ... 138, 180, 825
signature, polymetric ... 83
'signum congruentiae' mensural notation ... 826
'signum congruentiae' ornament ... 138
\signumcongruentiae ... 138, 826
sikah ... 527
silenced note, percussion ... 453
simile ... 189
\simple ... 766
simple repeat ... 169
simple text string, with tie characters ... 801
Simultaneous notes ... 193, 197, 202, 207, 213, 215
simultaneous notes and accidentals ... 35
simultaneous phrasing slurs ... 155
simultaneous slurs ... 151
singer name ... 347
\single ... 558, 689, 847
single bar line ... 115
single staff with bracket or brace ... 220
single-line comment ... 536, 541
single-staff polyphony ... 197
Size of objects ... 231
skip ... 63
\skip ... 63, 338, 847
skip typesetting ... 583
skipBars ... 249
SkipMusic ... 65
skipping notes in lyrics ... 338
skipTypesetting ... 583
slash repeat ... 186
'slash turn' ornament ... 138, 824

Slash_repeat_engraver ... 189
slashChordSeparator ... 477
slashed digit ... 817
slashed note head ... 47
slashed stem ... 132
\slashed-digit ... 817
\slashedGrace ... 130, 847
\slashSeparator ... 611
\slashturn ... 138, 824
slide, in tablature notation ... 410
slope, ottava spanner, modification ... 26
slur ... 154
Slur ... 155, 165
slur ... 151
slur style ... 152
slur, above notes ... 151
slur, adjusting start and end ... 152
slur, and repeats ... 183
slur, below notes ... 151
slur, dashed ... 152
slur, dashed phrasing ... 155
slur, defining dash patterns ... 152, 154
slur, defining dash patterns for phrasing ... 156
slur, dotted ... 152
slur, dotted phrasing ... 155
slur, for tuplets ... 52
slur, half dashed and half solid ... 152
slur, half solid and half dashed phrasing ... 155
slur, manual placement ... 151
slur, modifying ... 717
slur, multiple ... 151
slur, multiple phrasing ... 155
slur, phrasing ... 151, 155
slur, phrasing, defining dash patterns ... 156
slur, simultaneous ... 151
slur, simultaneous phrasing ... 155
slur, solid ... 152
slur, text markup inside ... 154
slur-event ... 242
\slurDashed ... 152
\slurDashPattern ... 152, 847
\slurDotted ... 152
\slurDown ... 151
\slurHalfDashed ... 152
\slurHalfSolid ... 152
\slurNeutral ... 151
slurs, double, for legato chords ... 153
\slurSolid ... 152
\slurUp ... 152
\small ... 250, 295, 766
\smallCaps ... 766
\smaller ... 293, 295, 766
smaller note ... 243
smob ... 837
snap pizzicato ... 392
\snappizzicato ... 138, 825
'snappizzicato' sign ... 138, 825
snare ... 826
Solesmes ... 494
solid slur ... 152
solo part ... 208
Songs ... 315, 353
soprano clef ... 17, 755
sori ... 531
sos ... 386
sostenuto pedal ... 386
SostenutoEvent ... 387
\sostenutoOff ... 386
\sostenutoOn ... 386
SostenutoPedal ... 387
SostenutoPedalLineSpanner ... 387
sound ... 587
\sourcefileline ... 541
\sourcefilename ... 541
Southern Harmony note head ... 43
\southernHarmonyHeads ... 43
\southernHarmonyHeadsMinor ... 44
\sp ... 141
space, between staves ... 624
space, in lyrics ... 314, 321
space, inside systems ... 624
space-alist ... 645
spacer note ... 63
spacer rest ... 63
Spacing .. 604, 606, 608, 612, 614, 615, 621, 622, 624, 629, 630, 631, 639, 640, 641, 642, 644, 649, 655, 656, 658
spacing ... 641
spacing lyrics ... 332
spacing section, new ... 642
spacing, display of layout ... 655
spacing, horizontal ... 640
spacing, vertical ... 624
SpacingSpanner ... 640, 641, 642
span bar ... 111
Span_stem_engraver ... 384
SpanBar ... 115
spanner ... 696, 837
spanner, modifying ... 697
spanner-interface ... 837
special arpeggio symbol ... 163
special character ... 580
special character, in markup mode ... 289
special note head ... 40
splash cymbal ... 826
splice into tagged music ... 573
splitting notes ... 87
splitting rests ... 87
\spp ... 141
Sprechgesang ... 363
square bracket, at start of staff group ... 220
square neumes ligature ... 507
staccatissimo ... 138
\staccatissimo ... 138, 824
'staccatissimo' articulation ... 138, 824
staccato ... 140
staccato ... 138
\staccato ... 138, 824
'staccato' articulation ... 138, 824
stacking text in a column ... 771
Staff ... 35, 40, 87, 217, 221, 235, 239, 276, 641
staff ... 217, 227, 231
staff change, automatic ... 381
staff change, manual ... 379
staff distance ... 624
staff group ... 217
staff group, with square bracket at start ... 220
staff initiation ... 216
staff instantiation ... 216
staff line, modifying ... 224
staff line, stopping and starting ... 224

Staff notation .. 80, 217, 221, 223, 224, 227, 231, 235, 239, 242, 247
staff size, setting 614
staff switching 383
staff symbol 224
staff, choir 217
staff, drum 216
staff, empty 231
staff, Frenched 227
staff, grand 217
staff, hiding 231
staff, highlight 262
staff, keyboard instruments 378
staff, keyed instruments 378
staff, metronome mark below 78
staff, multiple 217
staff, nested 221
staff, new 216
staff, percussion 216
staff, piano 217, 378
staff, resizing of 227
staff, single 216
staff, single, with bracket or brace 220
`staff-affinity` 625
staff-change line 383
staff-highlight-event 265
staff-highlight-interface 265
`staff-padding` 256
`\staff-space` 695
`staff-staff-spacing` 625
staff-symbol-interface 227
`Staff.midiInstrument` 598
`Staff_collecting_engraver` 126, 286
Staff_highlight_engraver 265
Staff_symbol_engraver 235
`Staff_symbol_engraver` 231
StaffGroup 124, 221, 223
`staffgroup-staff-spacing` 625
StaffGrouper 356, 626, 627, 630, 692
StaffHighlight 265
`\staffHighlight` 262, 847
StaffHighlightEvent 265
StaffSpacing 641
StaffSymbol 217, 227, 231
stand-alone text 287
standard font size (notation) 254
stanza number 345
StanzaNumber 353
start of system 217
start repeat 183
`start-repeat` 183
`startAcciaccaturaMusic` 133
`startAppoggiaturaMusic` 133
`startGraceMusic` 133
`\startGroup` 273
`\startStaff` 224, 227
`\startTrillSpan` 166
staves 217
staves, divisi 233
`\stdBass` 807
`\stdBassIV` 808
`\stdBassV` 809
`\stdBassVI` 810
Stem 268, 386, 688
stem 267
stem, automatic direction on center line 267
stem, cross-staff 384
stem, default direction on center line 267
stem, direction 267
stem, down 267
stem, in tablature 405
stem, invisible 267
stem, neutral 267
stem, up 267
stem, with slash 132
stem-interface 268
`stem-spacing-correction` 641
Stem_engraver 105, 268
`\stemDown` 267
`stemLeftBeamCount` 103
`\stemNeutral` 267
`stemRightBeamCount` 103
`\stemUp` 267
stencil 837
`\stencil` 817
stencil, removing 705
stereo balance in MIDI 596
`stopAcciaccaturaMusic` 133
`stopAppoggiaturaMusic` 133
`stopGraceMusic` 133
`\stopGroup` 273
`\stopped` 138, 451, 454, 825
'stopped' articulation 138, 454, 825
`\stopStaff` 224, 227, 231
`\stopStaffHighlight` 262
`\stopTrillSpan` 166
`\storePredefinedDiagram` 430, 435, 847
strict spacing and grace notes 134
strict-beat beaming 99
`strictBeatBeaming` 99
string bending, in tablature notation 401
string number 390, 394
string numbers, orientation 255
String quartet templates 390
string vs. fingering number 394
string, automatic replacement 582
string, indicating open 390
`\string-lines` 820
StringNumber 395
`stringNumberOrientations` 255
strings, orchestral 390
strings, writing for 390
`\stringTuning` 413, 847
`stringTunings` 413, 426
stroke finger, orientation 255
StrokeFinger 441
`strokeFingerOrientations` 255, 440
`\stropha` 507, 512
Structure of a note entry 824
strumming rhythm, showing 89, 90
`\strut` 817
Style sheets 574, 575
style, bar number 120
style, double repeat for volta 116
style, measure number 120
style, multi-measure rests 249
style, note heads 40
style, rehearsal mark 125
style, rests 62
style, slur 152

style, text dynamics 148
style, voice 202
\styledNoteHeads 847
\sub 294, 766
subbass clef 17, 755
subdivideBeams 98
subdividing beams 98
subscript 294
subscript text 766
substitution function, and relative octave entry .. 579
suggestAccidentals 140, 502
\super 294, 767
superscript 294
superscript text 767
suppressing repeated chords 434, 474
sus 471
sustain pedal 386
sustain pedal style 386
SustainEvent 387
\sustainOff 386
\sustainOn 386
SustainPedal 387
SustainPedalLineSpanner 387
SVG output 584
swing 798
swing script 598
swing.ly 598
switching font 293
syllable duration, automatic 317
symbol, breath mark, changing 157
symbol, major seven 478
symbol, non-musical 301
syntax, markup 289
system 217
system separator mark 223
system start delimiter 217
system start delimiter, nested 221
system-count 609
system-separator-markup 611
system-system-spacing 606
systems-per-page 609
SystemStartBar 221, 223
SystemStartBrace 221, 223
SystemStartBracket 221, 223
SystemStartSquare 221, 223

T

tab clef 415, 755
tab microtones 415
tab quarter tones 415
Tab_note_heads_engraver 416
\tabChordRepeats 397, 847
\tabChordRepetition 847
\tabFullNotation 396
tablature 216, 393
tablature, and beams 405
tablature, and harmonic indications 399
tablature, and harmonics 406
tablature, and polyphony 405
tablature, and slides 410
tablature, and stems 405
tablature, and string bending 401
tablature, banjo 393, 413, 444
tablature, basic 395
tablature, bass 413
tablature, bass guitar 413
tablature, cello 413
tablature, chord glissando 410
tablature, custom 413
tablature, custom string tunings 413
tablature, default 395
tablature, double bass 413
tablature, guitar 393, 413
tablature, hammer on 411
tablature, lute 445
tablature, mandolin 413
tablature, predefined string tunings 413
tablature, pull off 411
tablature, ukulele 413
tablature, viola 413
tablature, violin 413
\table 821
table of contents 564
table of contents, customized functions 566
\table-of-contents 567, 822
TabNoteHead 412
TabStaff 217, 412
TabStaff 216, 395
TabVoice 412
TabVoice 395
tag 570
\tag 570, 847
tag groups 573
\tagGroup 573, 848
tam tam 826
tambourine 826
\taor 456
taqasim 528
taqasim 527
teaching 34
teaching accidental style 34
\teeny 250, 295, 767
template, Arabic music 528
tempo 76
\tempo 76
tempo indication 80
tempo, change, without metronome mark 79
tempo, with rhythm 798
\temporary 689, 697, 848
tenor clef 17, 755
tenor clef, choral 17
tenor G clef 755
tenor varC clef 755
tenuto 140
tenuto 138
\tenuto 138, 824
'tenuto' articulation 138, 824
Text 279, 280, 282, 283, 287, 289, 292, 295, 300, 302, 305, 309, 315
text 386, 767
text alignment command 300
text column, left-aligned 778
text column, right-aligned 781
text dynamics, style 148
text item, non-empty 279
text mark 283
text mark, alignment 286
text mark, below staff 285

text mark, on every staff 286
text mark, vertical stacking 285
text markup 289
text markup, inside slurs 154
text object 277
text script 279
text script, breaking vertical alignment 147
text script, vertical alignment 147
text size 293
text spanner 280
text spanner, dynamics, customize 281
text spanner, formatting 281
text, aligning 295
text, at beginning of line 283
text, at end of score 283
text, between notes 283
text, centering on page 298
text, decorating 300
text, framing 300
text, horizontal alignment 295
text, in columns 288, 298
text, in volta bracket 184
text, justified 299
text, keeping inside margin 280
text, line width 299
text, multi-line 298
text, on bar line 283
text, on multi-measure rest 67
text, other languages 277
text, ottavation 25
text, outside margin 280
text, padding 301
text, separate 287
text, spread over multiple pages 291
text, stand-alone 287
text, top-level 287
text, vertical alignment 296
text, word-wrapped 299
text-interface 679, 815
text-script-interface 679
Text_mark_engraver 287
`Text_mark_engraver` 286
`\textEndMark` 283, 848
`\textLengthOff` 67, 69, 280
`\textLengthOn` 67, 69, 147, 280
TextMark 287
`\textMark` 283, 848
TextMarkEvent 287
TextScript .. 141, 280, 289, 292, 295, 300, 302, 305, 467
TextSpanner 282, 704
`\textSpannerDown` 281
`\textSpannerNeutral` 281
`\textSpannerUp` 281
The Emmentaler font 796
the Internals Reference 659
thorough bass 484
`\thumb` 138, 255
'thumb' fingering 138, 255, 825
tick bar line 107
tick bar line, in Gregorian chant 505
tick mark 157
Tie 61
tie 61, 88
tie 58
`\tie` 767
tie, alternative endings 59
tie, and volta bracket 59
tie, appearance 59
tie, dashed 59
tie, dotted 59
tie, from nothing 59
tie, in chord 58
tie, in lyrics 321
tie, in repeats 59
tie, laissez vibrer 59
tie, manual engraving 61
tie, modifying 717
tie, placement 59
tie, repeating 59
tie, to nothing 59
tie, with arpeggios 60
tie-ing text 767
TieColumn 61, 721
`TieColumn` 61
tied note, accidental 6
`\tied-lyric` 801
`\tieDashed` 59
`\tieDashPattern` 59, 848
`\tieDotted` 59
`\tieDown` 59
`\tieHalfDashed` 59
`\tieHalfSolid` 59
`\tieNeutral` 59
`\tieSolid` 59
`\tieUp` 59
`tieWaitForNote` 60
timbale 826
`\time` 72, 94, 848
time administration 137
time signature 76
time signature 72
time signature style 72, 498
time signature, compound 86
time signature, default settings 73
time signature, double 83
time signature, mensural 498
time signature, mid-measure 80
time signature, polymetric 83
time signature, printing only numerator 75
time signature, properties, restoring default values 74
time signature, visibility 72
`\times` 848
TimeScaledMusic 56
TimeSignature 76, 87
`timeSignatureFraction` 83
`Timing` 137
timing information and repeats 183
timing mark, for glissando 159
timing, within score 137
Timing_translator 76, 81, 87, 115, 137
`\tiny` 250, 295, 768
title 541
toc 564
`tocFormatMarkup` 567
`tocIndentMarkup` 567
`\tocItem` 567, 848
`tocItemMarkup` 567
`\tocItemWithDotsMarkup` 565
`tocTitleMarkup` 567

'toe' pedal mark ... 138, 825
tom tom ... 826
top-level text ... 287
top-margin ... 604
top-markup-spacing ... 606
top-system-spacing ... 606
toplevel-bookparts ... 836
toplevel-scores ... 836
transcription of mensural music ... 221
transcription, mensural to modern ... 521
transcription, modern of Gregorian music ... 370
transformation, modal ... 15
transformation, retrograde ... 14
\translate ... 297, 782
\translate-scaled ... 297, 782
translating text ... 782
Translation ... 679
transparency, semi ... 260
\transparent ... 817
transparent note ... 259
transparent, making objects ... 705
transpose ... 11
\transpose ... 6, 11, 14, 848
transposed clef, visibility of ... 710
\transposedCueDuring ... 246, 848
TransposedMusic ... 14
transposing ... 11
transposing clef ... 17
transposing fret diagram ... 428
transposing instrument ... 28, 358
transposing instrument ... 11, 27
transposition ... 11
\transposition ... 27, 239, 848
transposition, and relative octave entry ... 6
transposition, instrument ... 27
transposition, MIDI ... 27
transposition, modal ... 15
transposition, of notes ... 11
transposition, of pitches ... 11
transposition, pitches, 'smart' ... 12
tre corde ... 386
treble clef ... 17, 755
\treCorde ... 386
tremolo ... 189
tremolo ... 189
tremolo beam ... 189
tremolo mark ... 190
tremolo, cross-staff ... 190
triad ... 468
triangle ... 826
\triangle ... 301, 793
trill ... 168
trill ... 166
\trill ... 138, 166, 824
'trill' ornament ... 138, 824
trill, pitched ... 167
trill, with accidental ... 167
TrillPitchAccidental ... 168
TrillPitchGroup ... 168
TrillPitchHead ... 168
TrillPitchParentheses ... 168
TrillSpanner ... 168, 704
triplet ... 56
triplet ... 51
triplet, formatting ... 52
\tripletFeel ... 598
Tunable context properties ... 324, 683
tuning, banjo ... 445
tuning, lute ... 446
tuning, non-Western ... 523
tuplet ... 56
tuplet ... 51
\tuplet ... 51, 83, 848
tuplet bracket, note head side ... 55
tuplet bracket, placement ... 51
tuplet bracket, visibility ... 52, 54
tuplet number , visibility ... 52
tuplet number, change ... 53
tuplet number, non-default ... 53
tuplet slur ... 52
tuplet, beamed, line break within ... 55
tuplet, entering multiple ... 52
tuplet, formatting ... 52
tuplet, grouping ... 51
tuplet-slur ... 52
TupletBracket ... 56
\tupletDown ... 51
\tupletNeutral ... 51
TupletNumber ... 56
TupletNumber ... 53
\tupletSpan ... 52, 848
tupletSpannerDuration ... 52
\tupletUp ... 51
Turkish makam ... 523
Turkish makam, example ... 530
Turkish music ... 529
Turkish note name ... 529
Turkish, classical music ... 523
\turn ... 138, 824
'turn' ornament ... 138, 824
turn ornamentation, delayed ... 140
\tweak ... 685, 687, 849
tweak, relation to \override ... 687
tweaking ... 685
tweaking control point ... 686
tweaking grace note ... 132, 133
Tweaking methods ... 56, 685, 686
Tweaking output ... 659, 694
Tweaks and overrides ... 694
two-column text ... 288
two-sided ... 608
\type ... 673, 674
typeface ... 835
typeset text ... 289
typesetting, skip ... 583
\typewriter ... 768

U

U.C. ... 386
ukulele ... 417
ultima volta ... 170
una corda ... 386
\unaCorda ... 386
UnaCordaEvent ... 387
UnaCordaPedal ... 387
UnaCordaPedalLineSpanner ... 387
unbreakable-spanner-interface ... 93
\underline ... 293, 768

underlining text ... 768
underlying repeat bar line ... 115
\undertie ... 769
undertie-ing text ... 769
\undo ... 689, 849
unfold ... 169
unfold repeat ... 169
\unfolded ... 172, 849
UnfoldedRepeatedMusic ... 169, 183
\unfoldRepeats ... 172, 594, 849
Unfretted strings ... 390
\unHideNotes ... 259
Unicode ... 581
units, of measuring ... 695
universal-color ... 261, 739
\unless ... 553, 802
unmetered music ... 81, 137
unmetered music, accidentals ... 81
unmetered music, bar lines ... 81
unmetered music, bar numbers ... 81
unmetered music, beams ... 81
unmetered music, line breaks ... 82
unmetered music, page breaks ... 82
\unset ... 682
up direction (^) ... 694
'up pralltriller' ornament ... 138, 824
'up-bow' bowing indication ... 138, 825
up-bow indication ... 390
upbeat ... 80
upbeat, in a repeat ... 170
\upbow ... 138, 390, 825
\upmordent ... 138, 824
'upper mordent' ornament ... 138, 824
\upprall ... 138, 824
\upright ... 769
URL link, as QR code ... 816
UTF-8 ... 580

V

varbaritone clef ... 17
varC clef ... 755
\varcoda ... 138, 801, 825
variable, and \book ... 537
variable, and \bookpart ... 537
variables ... 540
variables, use of ... 568
variant 'coda' sign ... 138, 180, 825
Vaticana, Editio ... 493, 494
VaticanaStaff ... 217
VaticanaStaff ... 216, 504
VaticanaVoice ... 504
\vcenter ... 783
\verbatim-file ... 817
\version ... 541
\versus ... 508
vertical alignment, dynamics ... 147
vertical alignment, dynamics, breaking ... 147
vertical alignment, text ... 296
vertical alignment, text scripts ... 147
vertical direction, default, of grobs ... 694
vertical direction, forced, of grobs ... 694
vertical distance, figured bass elements ... 489
vertical lines between staves ... 271
vertical ordering, of scripts ... 140
vertical padding in markup ... 297
vertical positioning of dynamics ... 144
vertical spacing ... 624, 649
vertical spacing, debugging ... 655
VerticalAxisGroup ... 235, 356, 626, 627, 629, 630, 631, 850
VerticalAxisGroup ... 625
vertically centering text ... 783
\verylongfermata ... 138, 825
\veryshortfermata ... 138, 825
vibraslap ... 826
violin clef ... 17, 755
\virga ... 507, 512
\virgula ... 506
Visibility and color of objects ... 65, 235, 260, 370, 668, 704, 707, 710
visibility of object ... 704
visibility of transposed clef ... 710
visibility of tuplet brackets ... 54
visibility of tuplets ... 52
Vocal ensembles templates ... 329, 332, 354, 355, 370, 373, 662
Vocal music ... 314, 353, 355, 358, 363, 365
vocal score ... 357
vocal score, adding cues ... 361
Voice ... 40, 47, 213, 242, 248, 321, 641, 681
voice ... 197
voice ... 28, 30
Voice ... 197
voice accidental style ... 30
voice style ... 202
voice, additional, in polyphonic music ... 205
voice, ambitus ... 38
voice, divided ... 356
voice, extra, for handling breaks ... 620
voice, following ... 383
voice, multiple ... 202
voice, \partCombine with \autoBeamOff ... 92
voice, quoting ... 239, 243
voice, shifting ... 202
voice, with ottavation ... 25
VoiceFollower ... 384, 704
\voiceFour ... 197
\voiceFourStyle ... 202
\voiceNeutralStyle ... 202
\voiceOne ... 197
\voiceOneStyle ... 202
\voices ... 201, 849
Voices contain music ... 202, 207
\voiceThree ... 197
\voiceThreeStyle ... 202
\voiceTwo ... 197
\voiceTwoStyle ... 202
\void ... 600, 849
volta ... 182
volta ... 169, 170
volta ... 169, 170, 172, 849
volta bracket ... 183
volta bracket, and tie ... 59
volta bracket, in additional staves ... 181
volta bracket, shortened ... 181
volta bracket, with text ... 184
volta repeat, bar line at start of piece ... 170
volta repeat, below chords ... 479
volta, double repeat style ... 116

volta, prima 170
volta, seconda 170
volta, ultima 170
Volta_engraver 475
`Volta_engraver` 181
VoltaBracket 183, 186
VoltaRepeatedMusic 183, 186
vowel transition 326
vowel transition 325
VowelTransition 326
`\vshape` 849
`\vspace` 297, 783

W

Walker shape note head 43
`\walkerHeads` 43
`\walkerHeadsMinor` 44
whistle 826
white mensural ligature 502
whiteout 60, 705
`\whiteout` 818
whitespace 541
`\whiteTriangleMarkup` 476
whole rest, for a full measure 66
wind instrument 454
wind instruments, fingering symbols 454
Winds 454, 456, 457, 458, 467
`\with` 667, 671
`\with-color` 260, 818
`\with-dimension` 819
`\with-dimension-from` 819
`\with-dimensions` 819
`\with-dimensions-from` 819
`\with-link` 819
`\with-outline` 819
`\with-string-transformer` 769
`\with-true-dimension` 819
`\with-true-dimensions` 820
`\with-url` 794
Within-staff objects 695
`\withMusicProperty` 849
woodblock 826
woodwind diagram, key lists 466
woodwind diagram, list 462
woodwind diagrams, modifying 465
`\woodwind-diagram` 805
word-wrapped text 299
`\wordwrap` 299, 783
`\wordwrap-field` 784
`\wordwrap-internal` 822
`\wordwrap-lines` 291, 822
`\wordwrap-string` 784
`\wordwrap-string-internal` 822
Working on input files 536
World music 524, 525, 527, 528, 529
writing music in parallel 213
written-out repeat 169

X

x11 color 260, 262
`x11-color` 260, 262, 736
`X-offset` 625
`\xNote` 40, 850
`\xNotesOff` 40
`\xNotesOn` 40