LilyPond

The music typesetter

Notation Reference

The LilyPond development team

For LilyPond version 2.12.3

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1 Musical notation

This chapter explains how to create musical notation.

1.1 Pitches

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

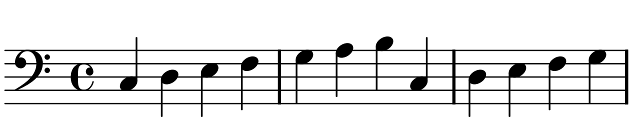
1.1.1 Writing pitches

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.

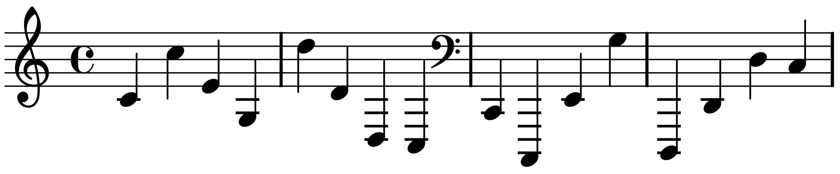
```
\clef bass
c d e f
g a b c
d e f g
```



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' c'' e' g
d'' d' d c
\clef bass
c, c,, e, g
```

```
  d,, d, d c
```



See also

Music Glossary: Section "Pitch names" in *Music Glossary*.

Snippets: Section "Pitches" in *Snippets*.

Relative octave entry

When octaves are specified in absolute mode it is easy to accidentally put a pitch in the wrong octave. Relative octave mode reduces these errors since most of the time it is not necessary to indicate any octaves at all. Furthermore, in absolute mode a single mistake may be difficult to spot, while in relative mode a single error puts the rest of the piece off by one octave.

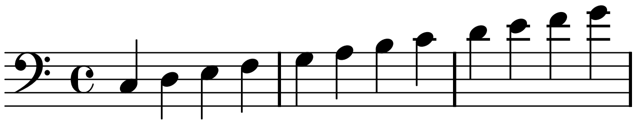
`\relative` ***`startpitch musicexpr`***

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, and it is recommended that it be a octave of `c`.

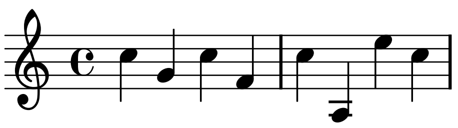
Here is the relative mode shown in action:

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



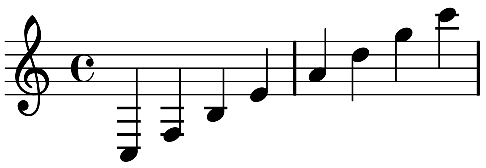
Octave changing marks are used for intervals greater than a fourth:

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



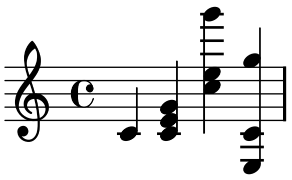
A note sequence without a single octave mark can nevertheless span large intervals:

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



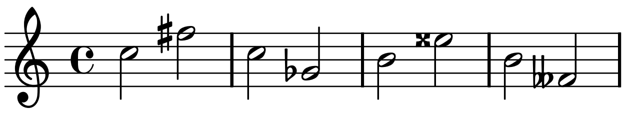
If the preceding item is a chord, the first note of the chord is used as the reference point for the octave placement of a following note or chord. Inside chords, the next note is always relative to the preceding one. Examine the next example carefully, paying attention to the `c` notes.

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



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 7.

Snippets: Section “Pitches” in *Snippets*.

Internals Reference: Section “RelativeOctaveMusic” 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`.

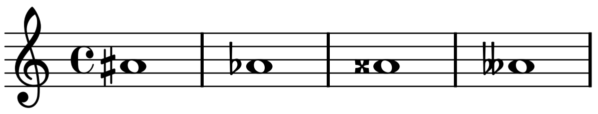
If no *startpitch* is specified for `\relative`, then `c'` is assumed. However, this is a deprecated option and may disappear in future versions, so its use is discouraged.

Accidentals

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 "Accidentals and key signatures" in *Learning Manual*.

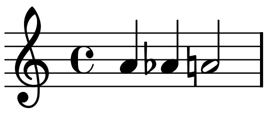
A *sharp* pitch is made by adding `is` to the note name, and a *flat* pitch by adding `es`. As you might expect, a *double sharp* or *double flat* is made by adding `isis` or `eses`. This syntax is derived from Dutch note naming conventions. To use other names for accidentals, see [Note names in other languages], page 6.

```
ais1 aes aisis aeses
```



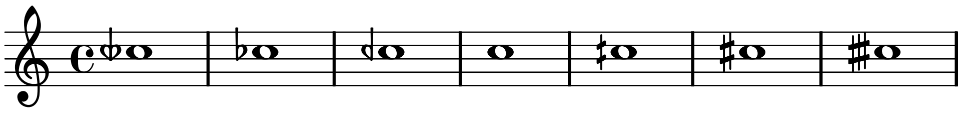
A natural will cancel the effect of an accidental or key signature. However, naturals are not encoded into the note name syntax with a suffix; a natural pitch is shown as a simple note name:

```
a4 aes a2
```



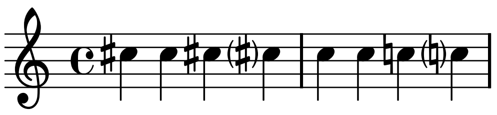
Quarter tones may be added; the following is a series of Cs with increasing pitches:

```
ceseh1 ces ceh c cih cis cisih
```



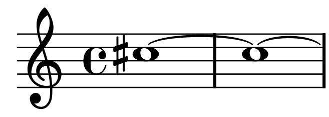
Normally accidentals are printed automatically, but you may also print them manually. A reminder accidental can be forced by adding an exclamation mark `!` after the pitch. A cautionary accidental (i.e., an accidental within parentheses) can be obtained by adding the question mark `?` after the pitch.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

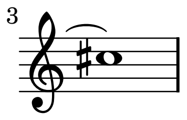
```
cis cis cis! cis? c c c! c?
```



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

```
cis1 ~ cis ~
\break
cis
```



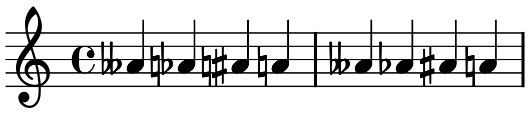


Selected Snippets

Preventing extra naturals from being automatically added

In accordance with standard typesetting rules, a natural sign is printed before a sharp or flat if a previous accidental on the same note needs to be canceled. To change this behavior, set the `extraNatural` property to "false" in the `Staff` context.

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

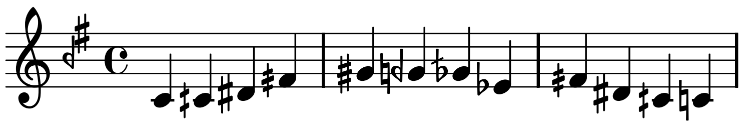


Makam example

Makam is a type of melody from Turkey using 1/9th-tone microtonal alterations. Consult the initialization file ‘`ly/makam.ly`’ for details of pitch names and alterations.

```
% Initialize makam settings
\include "makam.ly"

\relative c' {
  \set Staff.keySignature = #`((3 . ,BAKIYE) (6 . ,(- KOMA)))
  c4 cc db fk
  gbm4 gfc gfb efk
  fk4 db cc c
}
```



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 "Accidentals and key signatures" in *Learning Manual*.

Notation Reference: [Automatic accidentals], page 18, [Annotational accidentals (musica ficta)], page 282, [Note names in other languages], page 6.

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 symbol does not conform to any standard.

Note names in other languages

There are predefined sets of note and accidental names for various other languages. To use them, include the language-specific init file listed below. For example, to use English note names, add `\include "english.ly"` to the input file.

> **Note:** Because some other include files (such as `predefined-fretboards.ly`) use default (Nederlands) note names, the `\include` command for the language file should be placed after all other LilyPond distribution files.

The available language files and the note names they define are:

Language File	**Note Names**
'`nederlands.ly`'	c d e f g a bes b
'`arabic.ly`'	do re mi fa sol la sib si
'`catalan.ly`'	do re mi fa sol la sib si
'`deutsch.ly`'	c d e f g a b h
'`english.ly`'	c d e f g a bf b
'`espanol.ly`'	do re mi fa sol la sib si
'`italiano.ly`'	do re mi fa sol la sib si
'`norsk.ly`'	c d e f g a b h
'`portugues.ly`'	do re mi fa sol la sib si
'`suomi.ly`'	c d e f g a b h
'`svenska.ly`'	c d e f g a b h
'`vlaams.ly`'	do re mi fa sol la sib si

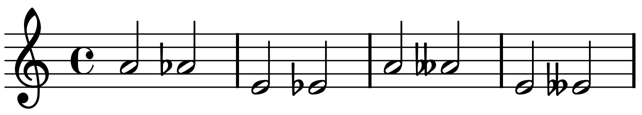
and the accidental suffixes they define are:

Language File	**sharp**	**flat**	**double sharp**	**double flat**
'`nederlands.ly`'	-is	-es	-isis	-eses
'`arabic.ly`'	-d	-b	-dd	-bb
'`catalan.ly`'	-d/-s	-b	-dd/-ss	-bb
'`deutsch.ly`'	-is	-es	-isis	-eses
'`english.ly`'	-s/-sharp	-f/-flat	-ss/-x/-sharpsharp	-ff/-flatflat

‘espanol.ly’	-s	-b	-ss	-bb
‘italiano.ly’	-d	-b	-dd	-bb
‘norsk.ly’	-iss/-is	-ess/-es	-ississ/-isis	-essess/-eses
‘portugues.ly’	-s	-b	-ss	-bb
‘suomi.ly’	-is	-es	-isis	-eses
‘svenska.ly’	-iss	-ess	-ississ	-essess
‘vlaams.ly’	-k	-b	-kk	-bb

In Dutch, `aes` is contracted to `as`, but both forms are accepted in LilyPond. Similarly, both `es` and `ees` are accepted. This also applies to `aeses` / `ases` and `eeses` / `eses`. Sometimes only these contracted names are defined in the corresponding language files.

```
a2 as e es a ases e eses
```



Some music uses microtones whose alterations are fractions of a ‘normal’ sharp or flat. The note names for quarter-tones defined in the various language files are listed in the following table. Here the prefixes *semi-* and *sesqui-* mean ‘half’ and ‘one and a half’, respectively. For the other languages, no special names have been defined yet.

Language File	**semi-sharp**	**semi-flat**	**sesqui-sharp**	**sesqui-flat**
‘nederlands.ly’	-ih	-eh	-isih	-eseh
‘arabic.ly’	-sd	-sb	-dsd	-bsb
‘deutsch.ly’	-ih	-eh	-isih	-eseh
‘english.ly’	-qs	-qf	-tqs	-tqf
‘italiano.ly’	-sd	-sb	-dsd	-bsb
‘portugues.ly’	-sqt	-bqt	-stqt	-btqt

See also

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

Snippets: Section “Pitches” in *Snippets*.

1.1.2 Changing multiple pitches

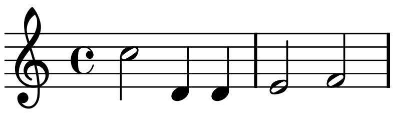
This section discusses how to modify pitches.

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.

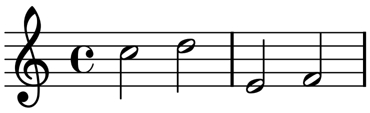
To check the octave of a note, specify the absolute octave after the `=` symbol. This example will generate a warning (and change the pitch) because the second note is the absolute octave `d''` instead of `d'` as indicated by the octave correction.

```
\relative c'' {
  c2 d='4 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, but the previous note is not changed. Future notes are relative to the *controlpitch*.

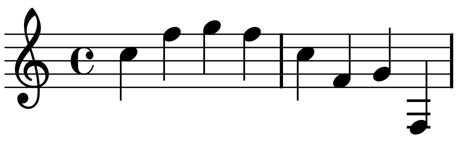
```
\relative c'' {
  c2 d
  \octaveCheck c'
  e2 f
}
```



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

```
\relative c'' {
  c4 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

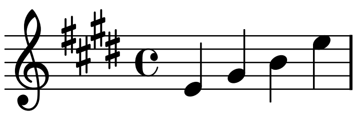
A music expression can be transposed with `\transpose`. The syntax is

```
\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.

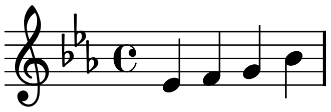
Consider a piece written in the key of D-major. It can be transposed up to E-major; note that the key signature is automatically transposed as well.

```
\transpose d e {
  \relative c' {
    \key d \major
    d4 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:

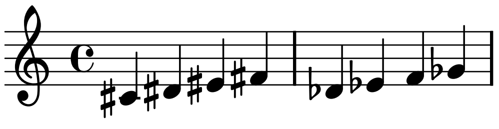
```
\transpose a c' {
  \relative c' {
    \key c \major
    c4 d e g
  }
}
```



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' { 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 17.

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.

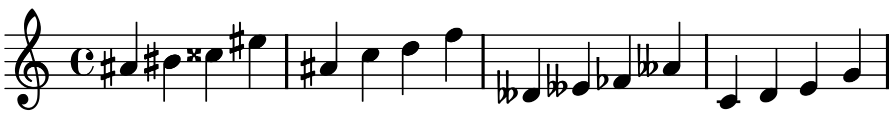
```
#(define (naturalize-pitch p)
  (let ((o (ly:pitch-octave p))
        (a (* 4 (ly:pitch-alteration p)))
        ;; alteration, a, in quarter tone steps,
        ;; for historical reasons
        (n (ly:pitch-notename p)))
    (cond
     ((and (> a 1) (or (eq? n 6) (eq? n 2)))
      (set! a (- a 2))
      (set! n (+ n 1)))
     ((and (< a -1) (or (eq? n 0) (eq? 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 (lambda (x) (naturalize x)) 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 (parser location 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 17.

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`.

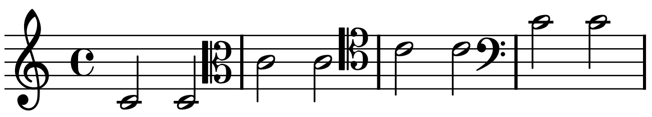
1.1.3 Displaying pitches

This section discusses how to alter the output of pitches.

Clef

The clef may be altered. Middle C is shown in every example.

```
\clef treble
c2 c
\clef alto
c2 c
\clef tenor
c2 c
\clef bass
c2 c
```

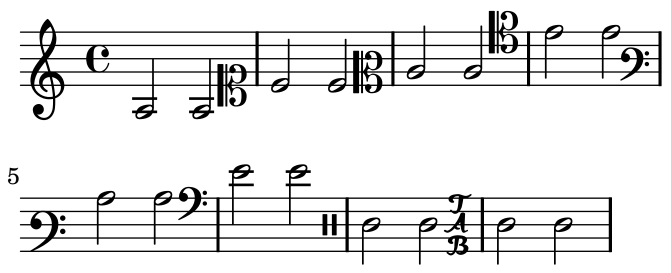


Other clefs include:

```
\clef french
c2 c
\clef soprano
c2 c
\clef mezzosoprano
c2 c
\clef baritone
c2 c

\break

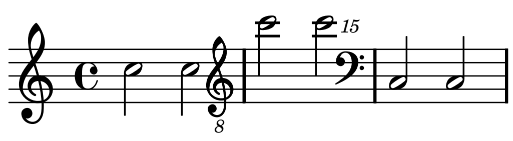
\clef varbaritone
c2 c
\clef subbass
c2 c
\clef percussion
c2 c
\clef tab
c2 c
```



Further supported clefs are described under [Mensural clefs], page 278 and [Gregorian clefs], page 285.

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. The clef name must be enclosed in quotes when it contains underscores or digits.

```
\clef treble
c2 c
\clef "treble_8"
c2 c
\clef "bass^15"
c2 c
```



Selected Snippets

Tweaking clef properties

The command \clef "treble_8" is equivalent to setting clefGlyph, clefPosition (which controls the vertical position of the clef), middleCPosition and clefOctavation. A clef is printed when any of the properties except middleCPosition are changed.

Note that changing the glyph, the position of the clef, or the octavation does not in itself change the position of subsequent notes on the staff: the position of middle C must also be specified to do this. The positional parameters are relative to the staff center line, positive numbers displacing upwards, counting one for each line and space. The `clefOctavation` value would normally be set to 7, -7, 15 or -15, but other values are valid.

When a clef change takes place at a line break the new clef symbol is printed at both the end of the previous line and the beginning of the new line by default. If the warning clef at the end of the previous line is not required it can be suppressed by setting the `Staff` property `explicitClefVisibility` to the value `end-of-line-invisible`. The default behavior can be recovered with `\unset Staff.explicitClefVisibility`.

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.

```
\layout { ragged-right = ##t }

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

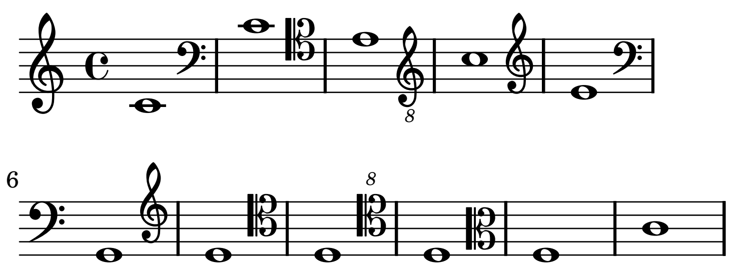
  % The following clef changes do not preserve
  % the normal relationship between notes and clefs:

  \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.clefOctavation = #7
```

```
    c'1
    \set Staff.clefOctavation = #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 278, [Gregorian clefs], page 285.

Snippets: Section "Pitches" in *Snippets*.

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

Key signature

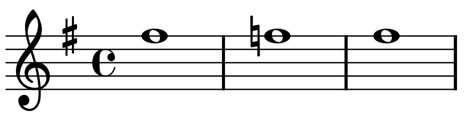
Note: New users are sometimes confused about accidentals and key signatures. In LilyPond, note names are the raw input; key signatures and clefs determine how this raw input is displayed. An unaltered note like `c` means 'C natural', regardless of the key signature or clef. For more information, see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

```
\key g \major
fis1
f
fis
```

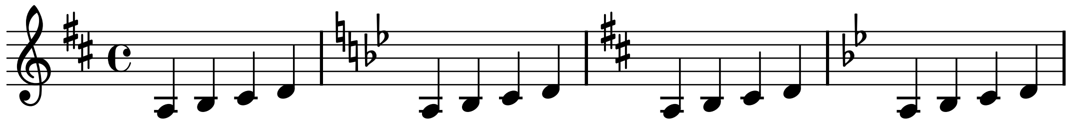


Selected Snippets

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 "false" 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 `keySignature` property, in the `Staff` context.

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

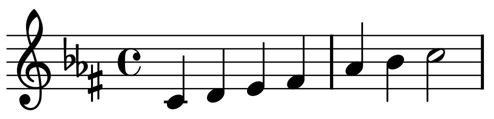
`\set Staff.keySignature = #`(((octave . step) . alter) ((octave . step) . alter) ...)` where, for each element in the list, `octave` specifies the octave (0 being the octave from middle C to the B above), `step` specifies the note within the octave (0 means C and 6 means B), and `alter` is `,SHARP ,FLAT ,DOUBLE-SHARP` etc. (Note the leading comma.) The accidentals in the key signature will appear in the reverse order to that in which they are specified.

Alternatively, for each item in the list, using the more concise format `(step . alter)` specifies that the same alteration should hold 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.

Here is an example of a possible key signature for generating a whole-tone scale:

```
\relative c' {
  \set Staff.keySignature = #`(((0 . 3) . ,SHARP)
                               ((0 . 5) . ,FLAT)
                               ((0 . 6) . ,FLAT))
  c4 d e fis
  aes4 bes c2
}
```



See also

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

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

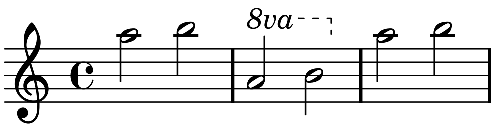
Snippets: Section “Pitches” in *Snippets*.

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-cancellation-interface” in *Internals Reference*, Section “key-signature-interface” in *Internals Reference*.

Ottava brackets

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

```
a'2 b
\ottava #1
a b
\ottava #0
a b
```



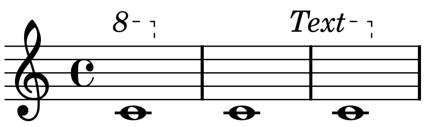
The `ottava` function also takes -1 (for 8va bassa), 2 (for 15ma), and -2 (for 15ma bassa) as arguments.

Selected Snippets

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`.

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



See also

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

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 143.

```
\transposition pitch
```

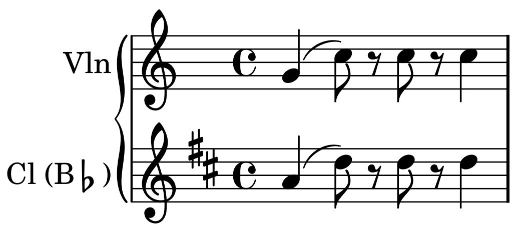
The pitch to use for `\transposition` should correspond to the real sound heard when a `c'` written on the staff is played by the transposing instrument. This pitch is entered in absolute mode, so an instrument that produces a real sound which is one tone higher than the printed music should use `\transposition 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" {
    \relative c'' {
      \set Staff.instrumentName = #"Vln"
      \set Staff.midiInstrument = #"violin"
      % not strictly necessary, but a good reminder
      \transposition c'

      \key c \major
      g4( c8) r c r c4
    }
  }
  \new Staff = "clarinet" {
    \relative c'' {
      \set Staff.instrumentName = \markup { Cl (B\flat) }
      \set Staff.midiInstrument = #"clarinet"
      \transposition bes

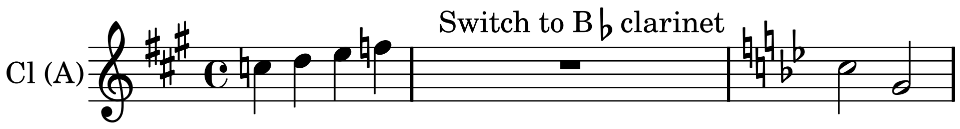
      \key d \major
      a4( d8) r d r d4
    }
  }
>>
```



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

```
\set Staff.instrumentName = #"Cl (A)"
\key a \major
\transposition a
c d e f
\textLengthOn
s1*0^\markup { Switch to B\flat clarinet }
R1

\key bes \major
\transposition bes
c2 g
```



See also

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

Notation Reference: [Quoting other voices], page 143, [Transpose], page 8.

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 <<
  #(set-accidental-style 'voice)
  { ... }
>>
```

The accidental style applies to the current `Staff` by default (with the exception of the styles `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:

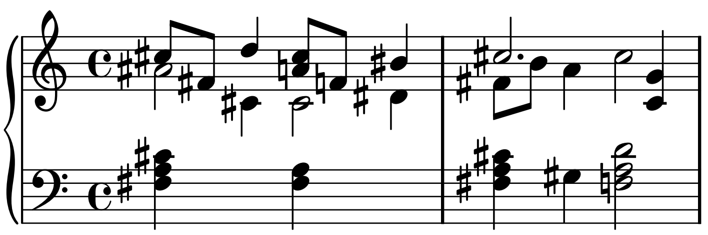
```
#(set-accidental-style 'voice 'StaffGroup)
```

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

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

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

\new PianoStaff {
  <<
    \context Staff = "up" {
      #(set-accidental-style 'default)
      \musicA
    }
    \context Staff = "down" {
      #(set-accidental-style 'default)
      \musicB
    }
  >>
}
```

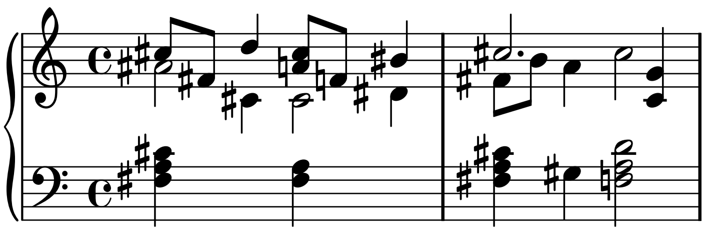


Note that the last lines of this example can be replaced by the following, as long as the same accidental style should be used in both staves.

```
\new PianoStaff {
  <<
    \context Staff = "up" {
      %%% change the next line as desired:
      #(set-accidental-style 'default 'Score)
      \musicA
    }
    \context Staff = "down" {
      \musicB
    }
  >>
}
```

`default`

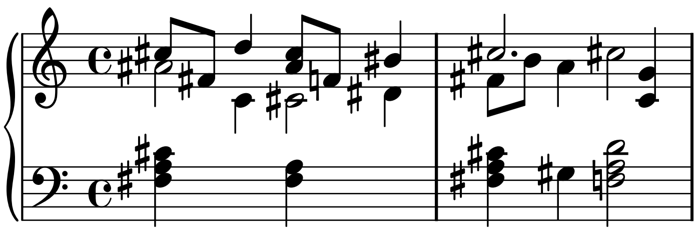
This is the default typesetting behavior. It corresponds to eighteenth-century common practice: accidentals are remembered to the end of the measure in which they occur and only in their own octave. Thus, in the example below, no natural signs are printed before the `b` in the second measure or the last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



`voice`

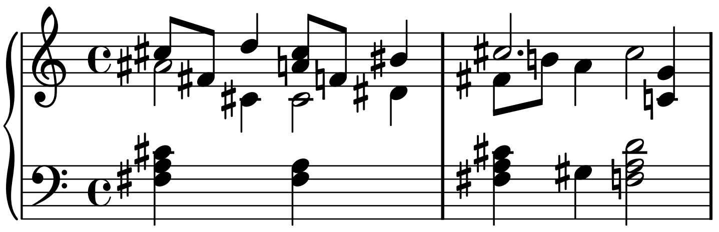
The normal behavior is to remember the accidentals at `Staff`-level. In this style, however, accidentals are typeset individually for each voice. Apart from that, the rule is similar to `default`.

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.

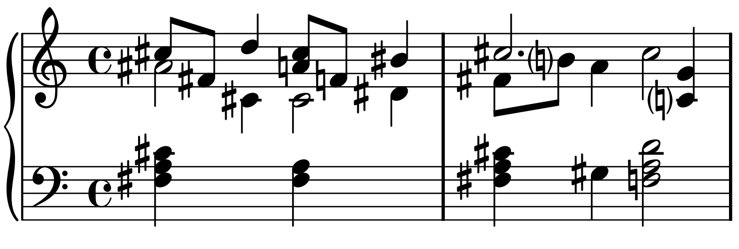


`modern`

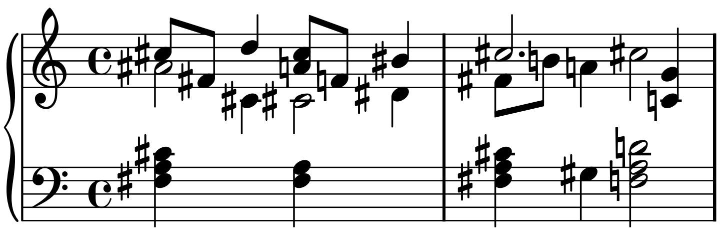
This rule corresponds to the common practice in the twentieth century. It prints the same accidentals as `default`, with two exceptions that serve to avoid ambiguity: after temporary accidentals, cancellation marks are printed also in the following measure (for notes in the same octave) and, in the same measure, for notes in other octaves. Hence the naturals before the `b` and the `c` in the second measure of the upper staff:



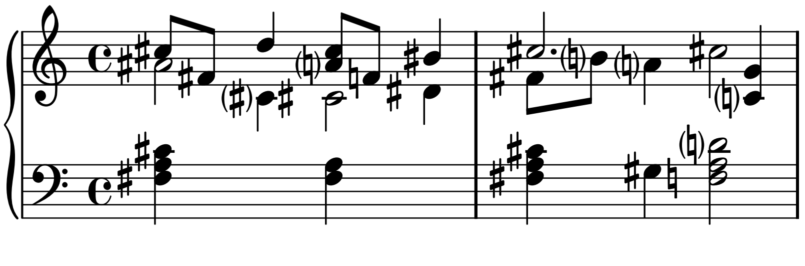
`modern-cautionary`
: This rule is similar to `modern`, but the 'extra' accidentals (the ones not typeset by `default`) are typeset as cautionary accidentals. They are by default printed with parentheses, but they can also be printed in reduced size by defining the `cautionary-style` property of `AccidentalSuggestion`.



`modern-voice`
: This rule is used for multivoice 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:

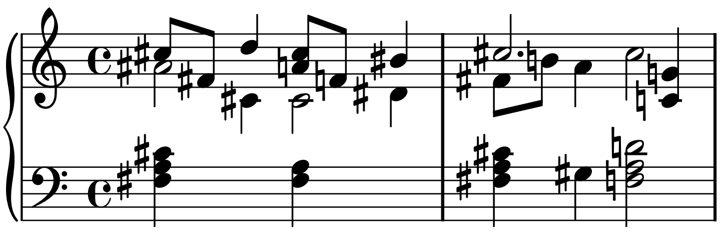


`modern-voice-cautionary`
: This rule is the same as `modern-voice`, but with the extra accidentals (the ones not typeset by `voice`) typeset as cautionaries. Even though all accidentals typeset by `default` *are* typeset with this rule, some of them are typeset as cautionaries.



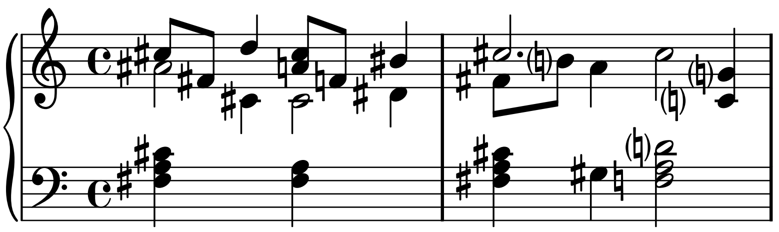
`piano`
: This rule reflects twentieth-century practice for piano notation. Its behavior is very similar to `modern` style, but here accidentals also get canceled across the staves in the same `GrandStaff` or `PianoStaff`, hence all the cancellations of the final notes.

This accidental style applies to the current `GrandStaff` or `PianoStaff` by default.



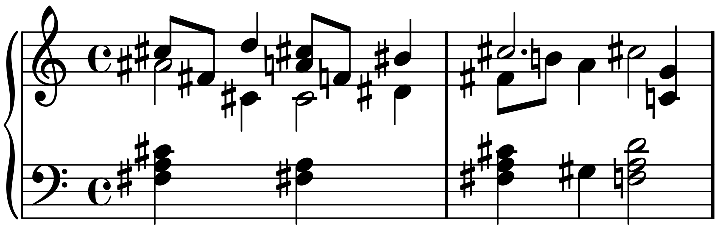
`piano-cautionary`

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



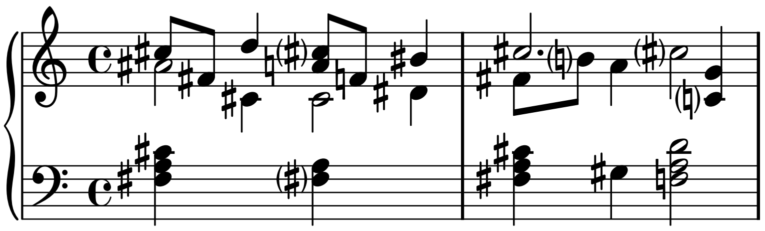
`neo-modern`

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.



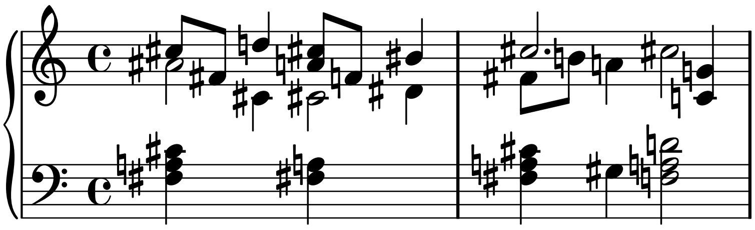
`neo-modern-cautionary`

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



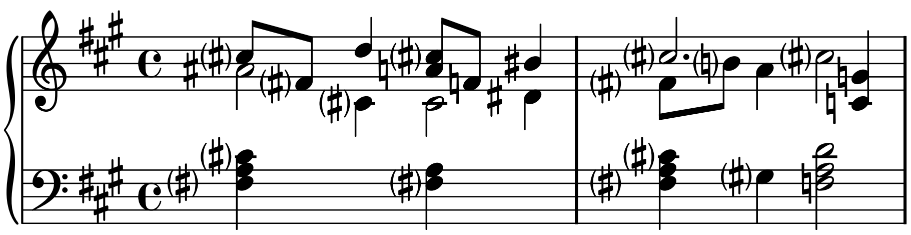
`dodecaphonic`

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.



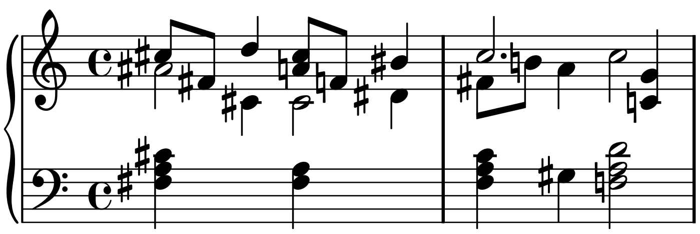
`teaching`

This rule is intended for students, and makes it easy to create scale sheets with automagically 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.



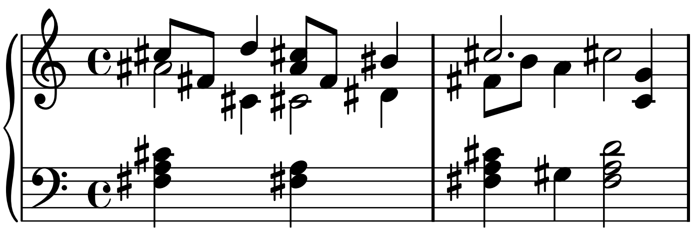
`no-reset`

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. Unlike `dodecaphonic`, this rule never prints any naturals.



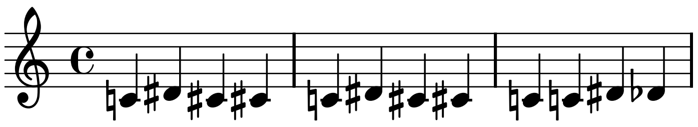
Selected Snippets

Dodecaphonic-style accidentals for each note including naturals

In early 20th century works, starting with Schoenberg, Berg and Webern (the "Second" Viennese school), every pitch in the twelve-tone scale has to be regarded as equal, without any hierarchy such as the classical (tonal) degrees. Therefore, these composers print one accidental for each note, even at natural pitches, to emphasize their new approach to music theory and language.

This snippet shows how to achieve such notation rules.

```
\score {
  \new Staff {
    #(set-accidental-style 'dodecaphonic)
    c'4 dis' cis' cis'
    c'4 dis' cis' cis'
    c'4 c' dis' des'
  }
  \layout {
    \context {
      \Staff
      \remove "Key_engraver"
    }
  }
}
```



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* and 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 considered to be entered in sequential mode. This means that in a chord the accidentals are typeset as if the notes in the chord happen one at a time, in the order in which they appear in the input file. This is a problem when accidentals in a chord depend on each other, which does not happen for the default accidental style. The problem can be solved by manually inserting `!` and `?` for the problematic notes.

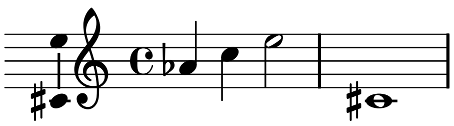
Ambitus

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

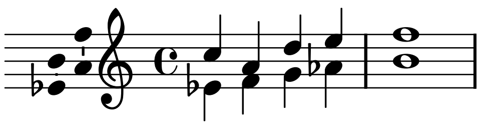


Selected Snippets

Adding ambitus per voice

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

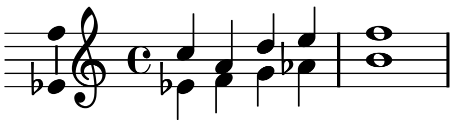
```
\new Staff <<
  \new Voice \with {
    \consists "Ambitus_engraver"
  } \relative c'' {
    \override Ambitus #'X-offset = #2.0
    \voiceOne
    c4 a d e
    f1
  }
  \new Voice \with {
    \consists "Ambitus_engraver"
  } \relative c' {
    \voiceTwo
    es4 f g as
    b1
  }
>>
```



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
  }
>>
```



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.

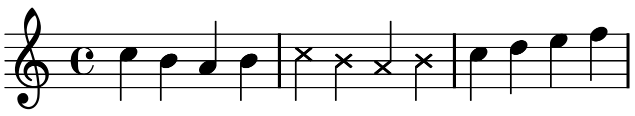
1.1.4 Note heads

This section suggests ways of altering note heads.

Special note heads

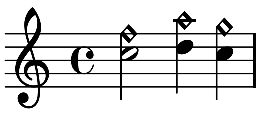
Note heads may be altered:

```
c4 b a b
\override NoteHead #'style = #'cross
c4 b a b
\revert NoteHead #'style
c4 d e f
```



There is a shorthand for diamond shapes which can only be used inside chords:

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



To see all note head styles, see Section B.7 [Note head styles], page 462.

See also

Snippets: Section "Pitches" in *Snippets*.

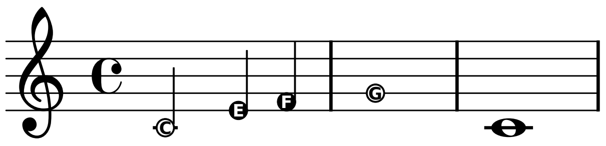
Notation Reference: Section B.7 [Note head styles], page 462, [Chorded notes], page 108.

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 4.2.1 [Setting the staff size], page 338.

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



Predefined commands

`\easyHeadsOn`, `\easyHeadsOff`.

See also

Notation Reference: Section 4.2.1 [Setting the staff size], page 338.

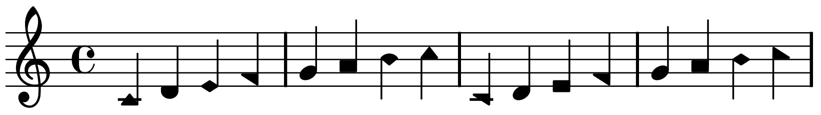
Snippets: Section "Pitches" in *Snippets*.

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:

```
\aikenHeads
c, d e f g a b c
\sacredHarpHeads
c, d e f g a b c
```



Shapes are typeset according to the step in the scale, where the base of the scale is determined by the `\key` command.

Predefined commands

`\aikenHeads`, `\sacredHarpHeads`.

Selected Snippets

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`.

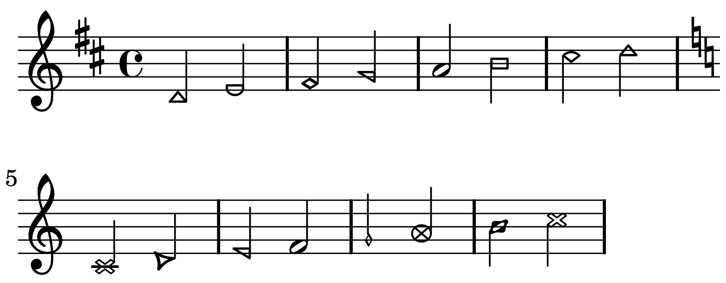
This example shows different ways to obtain shape note heads, and demonstrates the ability to transpose a melody without losing the correspondence between harmonic functions and note head styles.

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

\score {
  \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
    }
  }
  \layout { ragged-right = ##t }
}
```



To see all note head styles, see Section B.7 [Note head styles], page 462.

See also

Snippets: Section "Pitches" in *Snippets*.

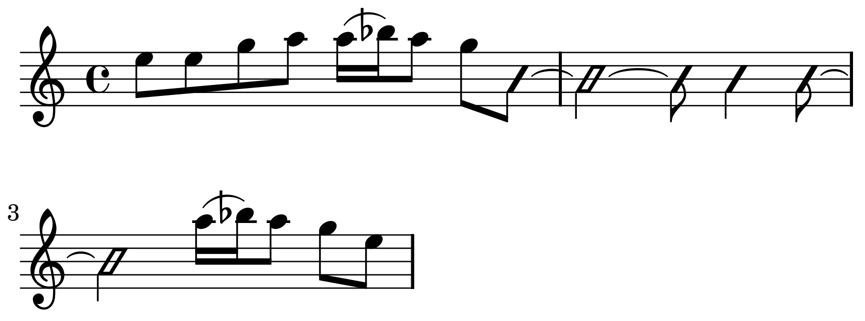
Notation Reference: Section B.7 [Note head styles], page 462.

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"
} {
  e8 e g a a16( bes) a8 g
  \improvisationOn
  e8 ~
  e2 ~ e8 f4 f8 ~
  f2
  \improvisationOff
  a16( bes) a8 g e
}
```



Predefined commands

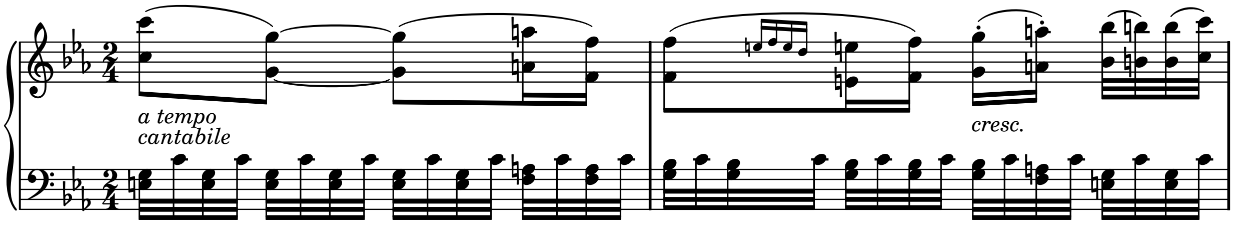
`\improvisationOn`, `\improvisationOff`.

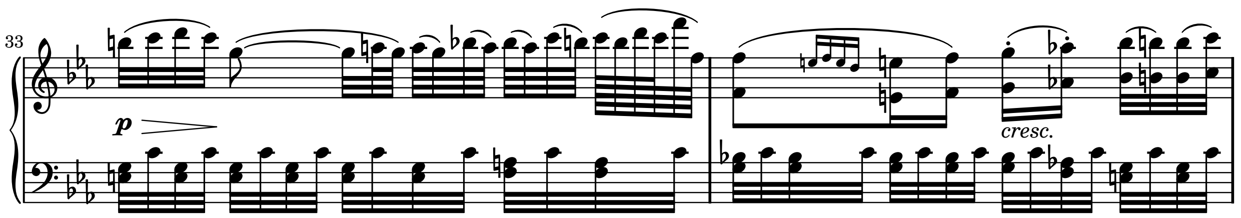
See also

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





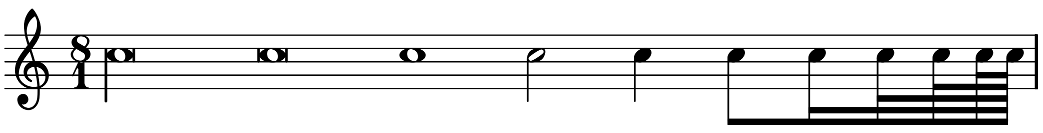
This section discusses rhythms, rests, durations, beaming and bars.

1.2.1 Writing rhythms

Durations

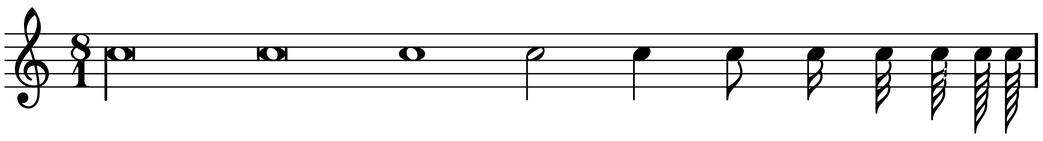
Durations are designated by numbers and dots. Durations are entered as their reciprocal values. For example, a quarter note is entered using a `4` (since it is a 1/4 note), and a half note is entered using a `2` (since it is a 1/2 note). For notes longer than a whole you must use the `\longa` (a double breve) and `\breve` commands. Durations as short as 128th notes may be specified. Shorter values are possible, but only as beamed notes.

```
\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.

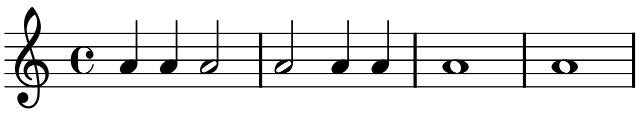
```
\time 8/1
\autoBeamOff
c\longa c\breve c1 c2
c4 c8 c16 c32 c64 c128 c128
```



A note with the duration of a quadruple breve may be entered with `\maxima`, but this is supported only within ancient music notation. For details, see Section 2.8 [Ancient notation], page 274.

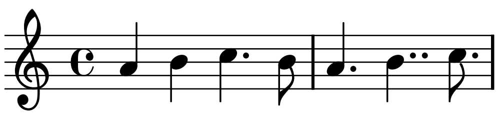
If the duration is omitted, it is set to the previously entered duration. The default for the first note is a quarter note.

```
a a a2 a a4 a a1 a
```



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

```
a4 b c4. b8 a4. b4.. c8.
```



Some durations cannot be represented with just binary durations and dots; they can be represented only by tying two or more notes together. For details, see [Ties], page 35.

For ways of specifying durations for the syllables of lyrics and ways of aligning lyrics to notes, see Section 2.1 [Vocal music], page 183.

Optionally, notes can be spaced strictly proportionately to their duration. For details of this and other settings which control proportional notation, see Section 4.5.5 [Proportional notation], page 365.

Dots are normally moved up to avoid staff lines, except in polyphonic situations. Predefined commands are available to force a particular direction manually, for details see Section 5.4.2 [Direction and placement], page 394.

Predefined commands

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

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: [Automatic beams], page 54, [Ties], page 35, [Stems], page 155, Section 1.2.1 [Writing rhythms], page 30, Section 1.2.2 [Writing rests], page 37, Section 2.1 [Vocal music], page 183, Section 2.8 [Ancient notation], page 274, Section 4.5.5 [Proportional notation], page 365.

Snippets: Section "Rhythms" in *Snippets*.

Internals Reference: Section "Dots" in *Internals Reference*, Section "DotColumn" 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: rests from 128th to maxima (8 x whole) may be printed.

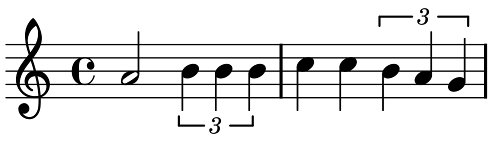
Tuplets

Tuplets are made from a music expression by multiplying all the durations with a fraction:

```
\times fraction { music }
```

The duration of *music* will be multiplied by the fraction. The fraction's denominator will be printed over or under the notes, optionally with a bracket. The most common tuplet is the triplet in which 3 notes have the duration of 2, so the notes are 2/3 of their written length.

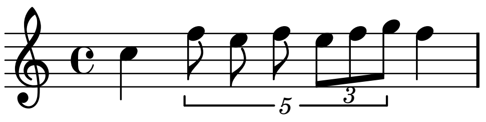
```
a2 \times 2/3 { b4 b b }
c4 c \times 2/3 { b4 a g }
```



The automatic placement of the tuplet bracket above or below the notes may be overridden manually with predefined commands, for details see Section 5.4.2 [Direction and placement], page 394.

Tuplets may be nested:

```
\autoBeamOff
c4 \times 4/5 { f8 e f \times 2/3 { e[ f g] } } f4 |
```



Modifying nested tuplets which begin at the same musical moment must be done with `\tweak`.

To modify the duration of notes without printing a tuplet bracket, see [Scaling durations], page 34.

Predefined commands

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

Selected Snippets

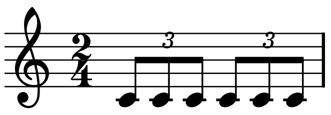
Entering several tuplets using only one \times command

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

In the example, two triplets are shown, while `\times` was entered only once.

For more information about `make-moment`, see "Time administration".

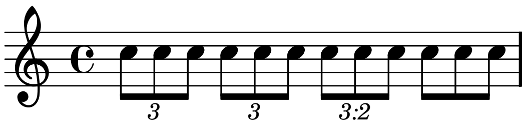
```
\relative c' {
  \time 2/4
  \set tupletSpannerDuration = #(ly:make-moment 1 4)
  \times 2/3 { c8 c c c c c }
}
```



Changing the tuplet number

By default, only the numerator of the tuplet number is printed over the tuplet bracket, i.e., the denominator of the argument to the `\times` command. Alternatively, num:den of the tuplet number may be printed, or the tuplet number may be suppressed altogether.

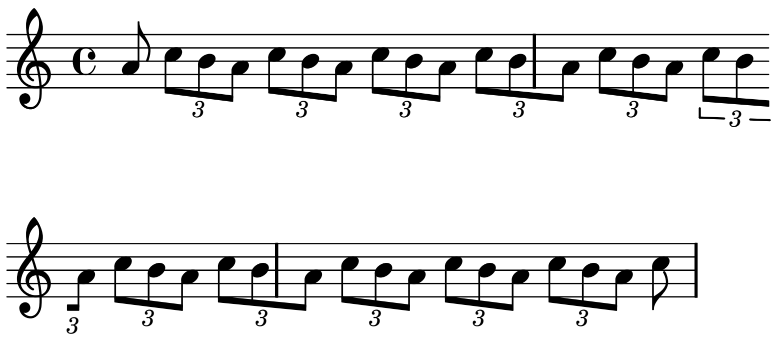
```
\relative c'' {
  \times 2/3 { c8 c c }
  \times 2/3 { c8 c c }
  \override TupletNumber #'text = #tuplet-number::calc-fraction-text
  \times 2/3 { c8 c c }
  \override TupletNumber #'stencil = ##f
  \times 2/3 { c8 c c }
}
```



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 { \times 2/3 { c[ b a] } }
  % Insert a manual line break within a tuplet
  \times 2/3 { c[ b \bar "" \break a] }
  \repeat unfold 5 { \times 2/3 { 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: [Time administration], page 80, [Scaling durations], page 34, Section 5.3.4 [The tweak command], page 390, [Polymetric notation], page 48.

Snippets: Section “Rhythms” in *Snippets*.

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

Known issues and warnings

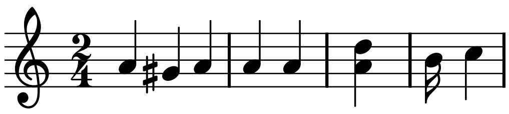
When the first note on a staff is a grace note followed by a tuplet the grace note must be placed before the `\times` command to avoid errors. Anywhere else, grace notes may be placed within tuplet brackets.

Scaling durations

You can alter the duration of single notes, rests or chords by a fraction `N/M` by appending `*N/M` (or `*N` if `M` is 1) to the duration. This 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 such as `*L*M/N`.

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

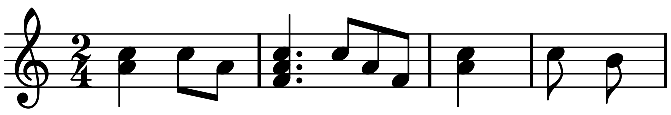
```
\time 2/4
% Alter durations to triplets
a4*2/3 gis4*2/3 a4*2/3
% Normal durations
a4 a4
% Double the duration of chord
<a d>4*2
% Duration of quarter, appears like sixteenth
b16*4 c4
```



The duration of skip or spacing notes 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 fraction *num*/*den*. The spaces around the dot are required. Here is an example showing how music can be compressed and expanded:

```
\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 . 1) {
  <c' a>4 c8 b
}
```



One application of this command is in polymetric notation, see [Polymetric notation], page 48.

See also

Notation Reference: [Tuplets], page 31, [Invisible rests], page 39, [Polymetric notation], page 48.

Snippets: Section “Rhythms” in *Snippets*.

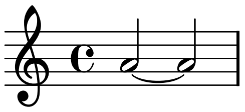
Ties

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

> **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.

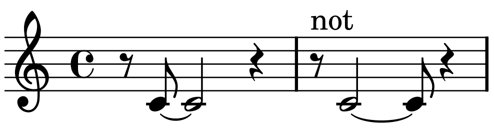
A tie is entered using the tilde symbol ~

```
a2 ~ a
```



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:

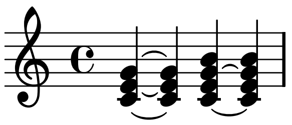
```
\relative c' {
  r8 c8 ~ c2 r4 |
  r8^"not" c2 ~ c8 r4
}
```



If you need to tie many notes across bar lines, it may be easier to use automatic note splitting, see [Automatic note splitting], page 51. This mechanism automatically splits long notes, and ties them across bar lines.

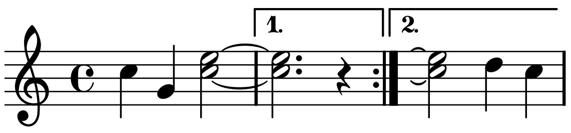
When a tie is applied to a chord, all note heads whose pitches match are connected. When no note heads match, no ties will be created. Chords may be partially tied by placing the tie inside the chord.

```
<c e g> ~ <c e g>
<c~ e g~ b> <c e g b>
```



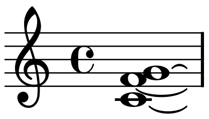
When a second alternative of a repeat starts with a tied note, you have to specify the repeated tie as follows:

```
\repeat volta 2 { c g <c e>2 ~ }
\alternative {
  % First alternative: following note is tied normally
  { <c e>2. r4 }
  % Second alternative: following note has a repeated tie
  { <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
```



The vertical placement of ties may be controlled, see Predefined commands, or for details, see Section 5.4.2 [Direction and placement], page 394.

Solid, dotted or dashed ties may be specified, see Predefined commands.

Predefined commands

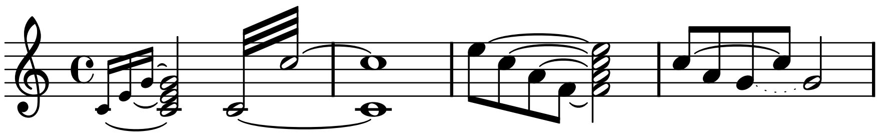
`\tieUp`, `\tieDown`, `\tieNeutral`, `\tieDotted`, `\tieDashed`, `\tieSolid`.

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.

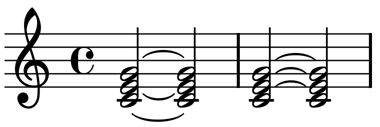
```
\relative c' {
  \set tieWaitForNote = ##t
  \grace { c16[ ~ e ~ g] ~ } <c, e g>2
  \repeat tremolo 8 { c32 ~ c' ~ } <c c,>1
  e8 ~ c ~ a ~ f ~ <e' c a f>2
  \tieUp
  c8 ~ a
  \tieDown
  \tieDotted
  g8 ~ c g2
}
```



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 staff-spaces, and the second number indicates the direction (1 = up, -1 = down).

```
\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> ~ <c e g>
}
```



See also

Music Glossary: Section "tie" in *Music Glossary*, Section "laissez vibrer" in *Music Glossary*.

Notation Reference: [Automatic note splitting], page 51.

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 octavations during a tie is not really well-defined. In these cases, a slur may be preferable.

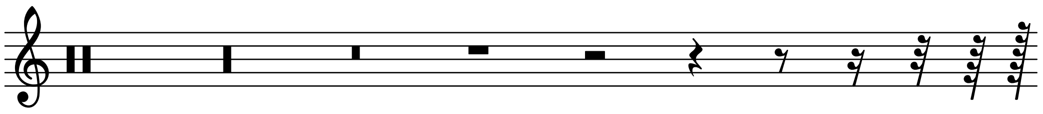
1.2.2 Writing rests

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 predefined commands shown:

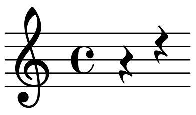
```
\new Staff {
  % These two lines are just to prettify this example
  \time 16/1
  \override Staff.TimeSignature #'stencil = ##f
  % Print a maxima rest, equal to four breves
  r\maxima
  % Print a longa rest, equal to two breves
  r\longa
  % Print a breve rest
  r\breve
  r1 r2 r4 r8 r16 r32 r64 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 40.

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.

```
a4\rest d4\rest
```



Selected Snippets

Rest styles

Rests may be used in various styles.

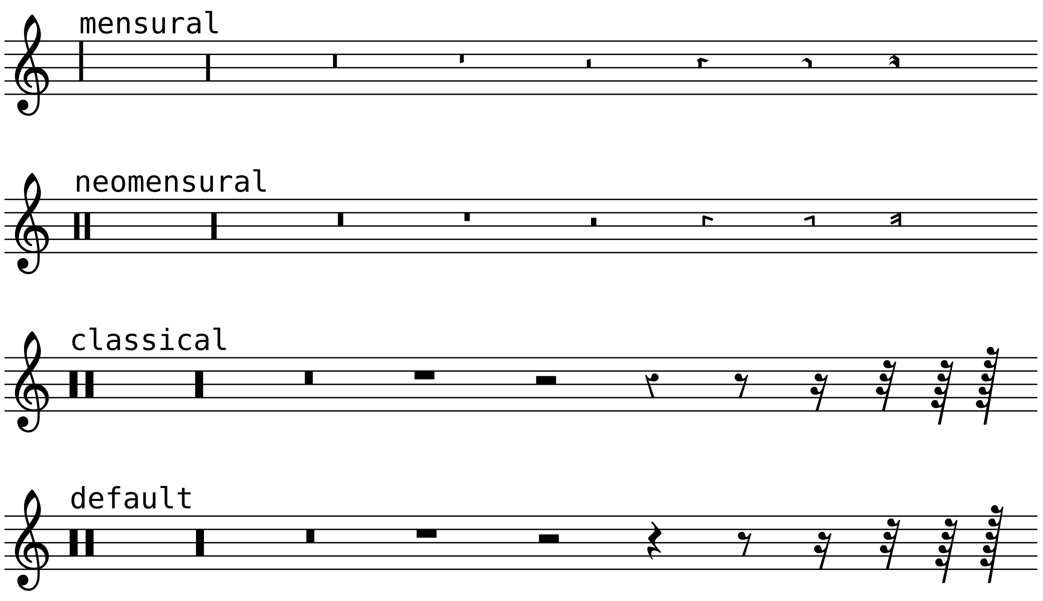
```
\layout {
  indent = 0.0
  \context {
    \Staff
    \remove "Time_signature_engraver"
  }
}

\new Staff \relative c {
  \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 ""

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

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

  \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 40.

Snippets: Section "Rhythms" in *Snippets*.

Internals Reference: Section "Rest" in *Internals Reference*.

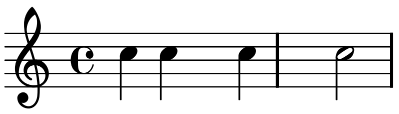
Known issues and warnings

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 128th to maxima (8 x whole).

Invisible rests

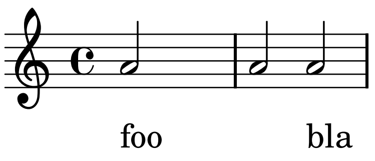
An invisible rest (also called a 'spacer rest') can be entered like a note with the note name `s`:

```
c4 c s c
s2 c
```



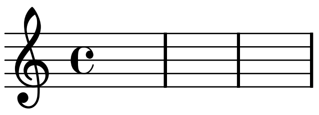
Spacer rests are available only in note mode and chord mode. In other situations, for example, when entering lyrics, `\skip` is used to skip a musical moment. `\skip` requires an explicit duration.

```
<<
  {
    a2 \skip2 a2 a2
  }
  \new Lyrics {
    \lyricmode {
      foo2 \skip 1 bla2
    }
  }
>>
```



A spacer rest implicitly causes `Staff` and `Voice` contexts to be created if none exist, just like notes and rests do:

```
s1 s s
```



`\skip` 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

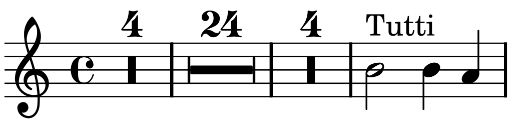
Snippets: Section "Rhythms" in *Snippets*.

Internals Reference: Section "SkipMusic" in *Internals Reference*

Full measure rests

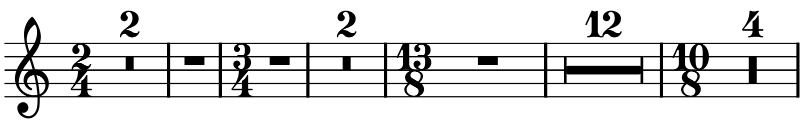
Rests for one or more full measures are entered like notes with the note name uppercase `R`:

```
% Rest measures contracted to single measure
\compressFullBarRests
R1*4
R1*24
R1*4
b2^"Tutti" b4 a4
```



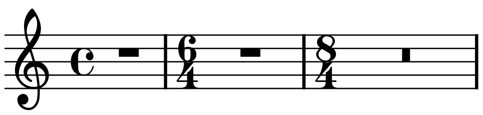
The duration of full-measure rests is identical to the duration notation used for notes. The duration in a multi-measure rest must always be an integral number of measure-lengths, so augmentation dots or fractions must often be used:

```
\compressFullBarRests
\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 |
```



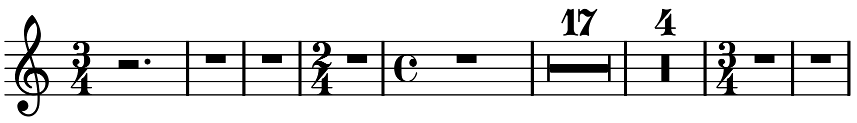
A full-measure rest is printed as either a whole or breve rest, centered in the measure, depending on the time signature.

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



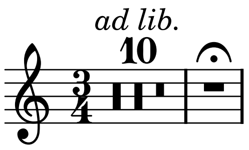
By default a multi-measure rest is expanded in the printed score to show all the rest measures explicitly. Alternatively, a multi-measure rest can be shown as a single measure containing a multi-measure rest symbol, with the number of measures of rest printed above the measure:

```
% Default behavior
\time 3/4 r2. | R2.*2 |
\time 2/4 R2 |
\time 4/4
% Rest measures contracted to single measure
\compressFullBarRests
r1 | R1*17 | R1*4 |
% Rest measures expanded
\expandFullBarRests
\time 3/4
R2.*2 |
```



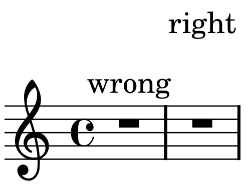
Markups can be added to multi-measure rests. The predefined command `\fermataMarkup` is provided for adding fermatas.

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



> **Note:** Markups attached to a multi-measure rest are objects of type `MultiMeasureRestText`, not `TextScript`. 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
R1^"wrong"
% This is correct and works
\override MultiMeasureRestText #'padding = #5
R1^"right"
```



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

Predefined commands

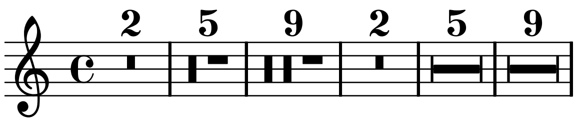
`\textLengthOn`, `\textLengthOff`, `\fermataMarkup`, `\compressFullBarRests`, `\expandFullBarRests`.

Selected Snippets

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.

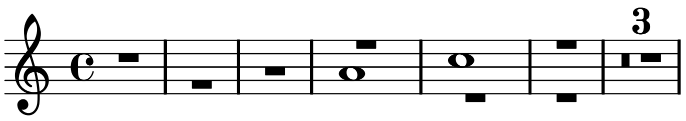
```
\relative c'' {
  \compressFullBarRests
  R1*2 | R1*5 | R1*9
  \override MultiMeasureRest #'expand-limit = #3
  R1*2 | R1*5 | R1*9
}
```



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 with an override
  \override MultiMeasureRest #'staff-position = #-2
  R1
  % A value of 0 is the default position;
  % the following trick moves the rest to the center line
  \override MultiMeasureRest #'staff-position = #-0.01
  R1
  % Multi-measure rests in odd-numbered voices are under the top line
  << { R1 } \\ { a1 } >>
  % Multi-measure rests in even-numbered voices are under the bottom line
  << { c1 } \\ { R1 } >>
  % They remain separated even in empty measures
  << { R1 } \\ { R1 } >>
  % This brings them together even though there are two voices
  \compressFullBarRests
  <<
    \revert MultiMeasureRest #'staff-position
    { R1*3 }
    \\
    \revert MultiMeasureRest #'staff-position
    { R1*3 }
  >>
}
```

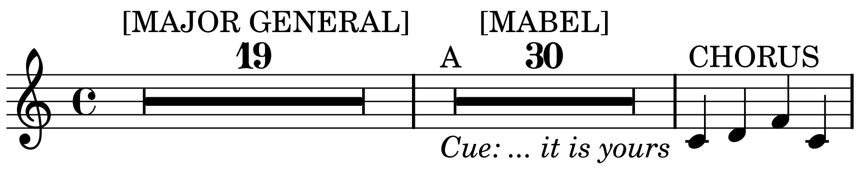


Multi-measure rest markup

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 a spacer rest with an attached markup before the multi-measure rest.

Note that the spacer rest causes a bar line to be inserted. 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' {
  \compressFullBarRests
  \textLengthOn
  s1*0^\markup { [MAJOR GENERAL] }
  R1*19
  s1*0_\markup { \italic { Cue: ... it is yours } }
  s1*0^\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 30, Section 1.8 [Text], page 159, Section 1.8.2 [Formatting text], page 167, [Text scripts], page 160.

Snippets: Section "Rhythms" in *Snippets*.

Internals Reference: Section "MultiMeasureRest" in *Internals Reference*, Section "MultiMeasureRestNumber" in *Internals Reference*, Section "MultiMeasureRestText" in *Internals Reference*.

Known issues and warnings

If an attempt is made to use fingerings (e.g., `R1*10-4`) to put numbers over multi-measure rests, the fingering numeral (4) may collide with the bar counter numeral (10).

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

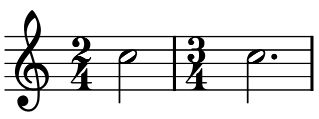
Multi-measure rests do not take part in rest collisions.

1.2.3 Displaying rhythms

Time signature

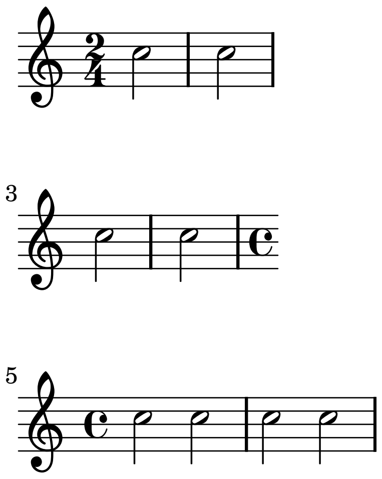
The time signature is set as follows:

```
\time 2/4 c2
\time 3/4 c2.
```



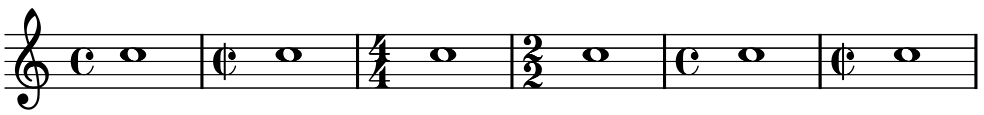
Time signatures are printed at the beginning of a piece and whenever the time signature changes. If a change takes place at the end of a line a warning time signature sign is printed there. This default behavior may be changed, see Section 5.4.6 [Visibility of objects], page 400.

```
\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:

```
% 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 279.

Predefined commands

`\numericTimeSignature`, `\defaultTimeSignature`.

Selected Snippets

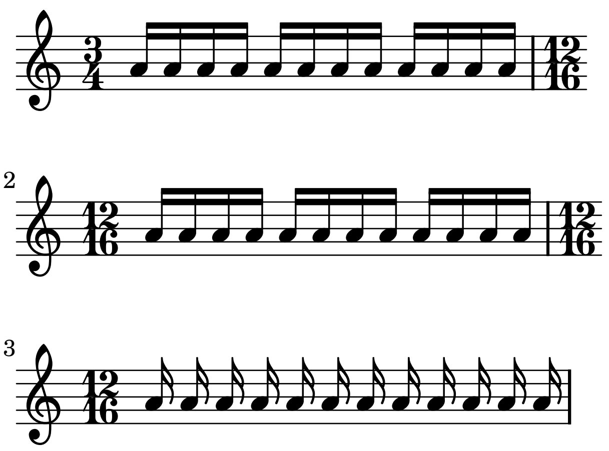
Changing the time signature without affecting the beaming

The `\time` command sets the properties `timeSignatureFraction`, `beatLength`, `beatGrouping` and `measureLength` in the `Timing` context, which is normally aliased to `Score`. Changing the value of `timeSignatureFraction` causes the new time signature symbol to be printed without changing any of the other properties:

```
\relative c'' {
  \time 3/4
  a16 a a a a a a a a a a a

  % Change time signature symbol but keep 3/4 beaming
  % due to unchanged underlying time signature
  \set Score.timeSignatureFraction = #'(12 . 16)
  a16 a a a a a a a a a a a

  \time 12/16
  % Lose 3/4 beaming now \time has been changed
  a16 a a a a a a a a a a a
}
```

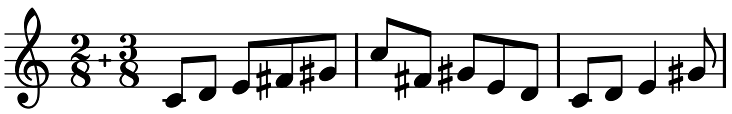


Compound time signatures

Odd 20th century time signatures (such as "5/8") can often be played as compound time signatures (e.g. "3/8 + 2/8"), which combine two or more inequal metrics. LilyPond can make such music quite easy to read and play, by explicitly printing the compound time signatures and adapting the automatic beaming behavior. (Graphic measure grouping indications can also be added; see the appropriate snippet in this database.)

```
#(define ((compound-time one two num) grob)
  (grob-interpret-markup grob
    (markup #:override '(baseline-skip . 0) #:number
      (#:line (
          (#:column (one num))
          #:vcenter "+"
          (#:column (two num))))))

\relative c' {
  \override Staff.TimeSignature #'stencil = #(compound-time "2" "3" "8")
  \time 5/8
  #(override-auto-beam-setting '(end 1 8 5 8) 1 4)
  c8 d e fis gis
  c8 fis, gis e d
  c8 d e4 gis8
}
```



See also

Music Glossary: Section "time signature" in *Music Glossary*

Notation Reference: [Mensural time signatures], page 279, [Time administration], page 80.

Snippets: Section "Rhythms" in *Snippets*.

Internals Reference: Section "TimeSignature" in *Internals Reference*, Section "Timing_translator" in *Internals Reference*.

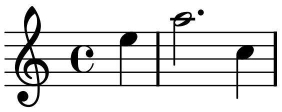
Upbeats

Partial or pick-up measures, such as an anacrusis or upbeat, are entered using the `\partial` command, with the syntax

```
\partial duration
```

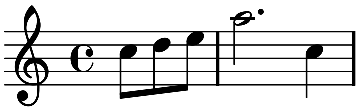
where `duration` is the rhythmic length of the interval before the start of the first complete measure:

```
\partial 4 e4 |
a2. c,4 |
```



The partial measure can be any duration less than a full measure:

```
\partial 8*3 c8 d e |
a2. c,4 |
```



Internally, this is translated into

```
\set Timing.measurePosition = -duration
```

The property `measurePosition` contains a rational number indicating how much of the measure has passed at this point. Note that this is set to a negative number by the `\partial` command: i.e., `\partial 4` is internally translated to `-4`, meaning "there is a quarter note left in the measure."

See also

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

Notation Reference: [Grace notes], page 75.

Snippets: Section “Rhythms” in *Snippets*.

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

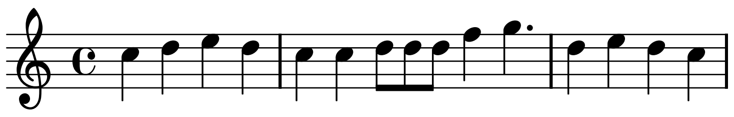
Known issues and warnings

The `\partial` command is intended to be used only at the beginning of a piece. If you use it after the beginning, some odd warnings may occur.

Unmetered music

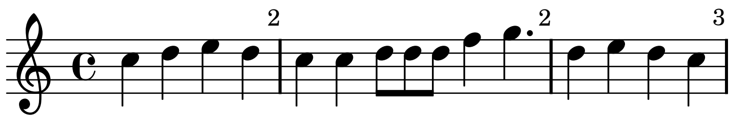
Bar lines and bar numbers are calculated automatically. For unmetered music (some cadenzas, for example), this is not desirable. To turn off automatic calculation of bar lines and bar numbers, use the command `\cadenzaOn`, and use `\cadenzaOff` to turn them on again.

```
c4 d e d
\cadenzaOn
c4 c d8 d d f4 g4.
\cadenzaOff
\bar "|"
d4 e d c
```



Bar numbering is resumed at the end of the cadenza as if the cadenza were not there:

```
% Show all bar numbers
\override Score.BarNumber #'break-visibility = #all-visible
c4 d e d
\cadenzaOn
c4 c d8 d d f4 g4.
\cadenzaOff
\bar "|"
d4 e d c
```



Predefined commands

`\cadenzaOn`, `\cadenzaOff`.

See also

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

Notation Reference: Section 5.4.6 [Visibility of objects], page 400.

Snippets: Section “Rhythms” in *Snippets*.

Known issues and warnings

LilyPond will insert line breaks and page breaks only at a bar line. Unless the unmetered music ends before the end of the staff line, you will need to insert invisible bar lines with

```
\bar ""
```

to indicate where breaks can occur.

Polymetric notation

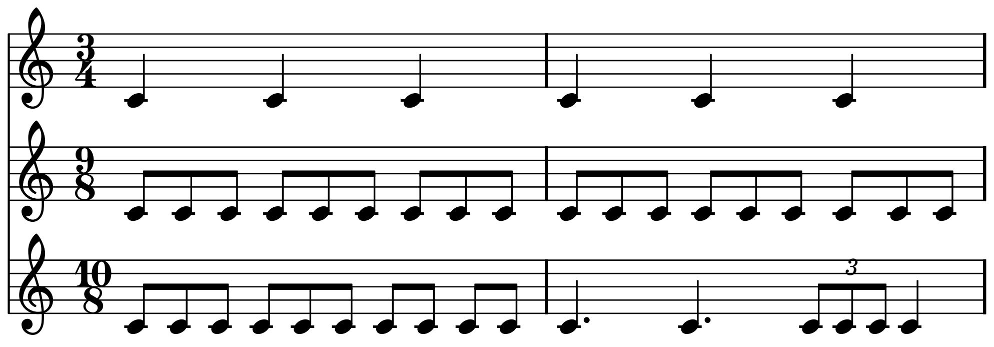
Polymetric notation is supported, either explicitly or by modifying the visible time signature symbol and scaling the note durations.

Staves with different time signatures, equal measure lengths

This notation can be created by setting a common time signature for each staff but replacing the symbol manually by setting `timeSignatureFraction` to the desired fraction and scaling the printed durations in each staff to the common time signature; see [Time signature], page 43. The scaling is done with `\scaleDurations`, which is used in a similar way to `\times`, but does not create a tuplet bracket; see [Scaling durations], page 34.

In this 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, as 2/3 * 9/8 = 3/4, and in the third staff, shown durations are multiplied by 3/5, as 3/5 * 10/8 = 3/4. It will often be necessary to insert beams manually, as the duration scaling affects the autobeaming rules.

```
\relative c' <<
  \new Staff {
    \time 3/4
    c4 c c |
    c c c |
  }
  \new Staff {
    \time 3/4
    \set Staff.timeSignatureFraction = #'(9 . 8)
    \scaleDurations #'(2 . 3)
    \repeat unfold 6 { c8[ c c] }
  }
  \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. c4. \times 2/3 { c8[ c c] } c4
    }
  }
>>
```



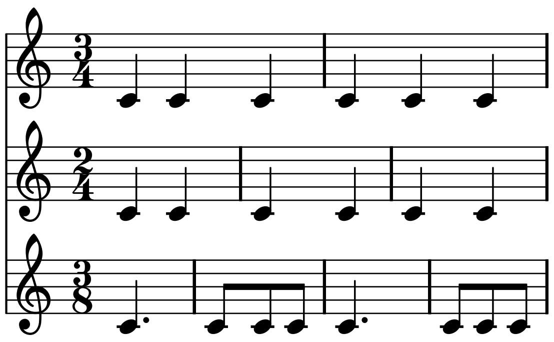
Staves with different time signatures, unequal bar lengths

Each staff can be given its own independent time signature by moving the `Timing_translator` and the `Default_bar_line_engraver` to the `Staff` context.

```
\layout {
  \context {
    \Score
    \remove "Timing_translator"
    \remove "Default_bar_line_engraver"
  }
  \context {
    \Staff
    \consists "Timing_translator"
    \consists "Default_bar_line_engraver"
  }
}

% Now each staff has its own time signature.

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



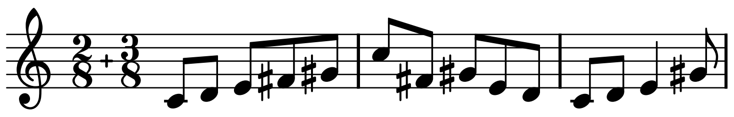
Selected Snippets

Compound time signatures

Odd 20th century time signatures (such as "5/8") can often be played as compound time signatures (e.g. "3/8 + 2/8"), which combine two or more inequal metrics. LilyPond can make such music quite easy to read and play, by explicitly printing the compound time signatures and adapting the automatic beaming behavior. (Graphic measure grouping indications can also be added; see the appropriate snippet in this database.)

```
#(define ((compound-time one two num) grob)
  (grob-interpret-markup grob
    (markup #:override '(baseline-skip . 0) #:number
      (#:line (
          (#:column (one num))
          #:vcenter "+"
          (#:column (two num))))))

\relative c' {
  \override Staff.TimeSignature #'stencil = #(compound-time "2" "3" "8")
  \time 5/8
  #(override-auto-beam-setting '(end 1 8 5 8) 1 4)
  c8 d e fis gis
  c8 fis, gis e d
  c8 d e4 gis8
}
```



See also

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

Notation Reference: [Time signature], page 43, [Scaling durations], page 34.

Snippets: Section "Rhythms" in *Snippets*.

Internals Reference: Section "TimeSignature" in *Internals Reference*, Section "Timing_translator" in *Internals Reference*, Section "Default_bar_line_engraver" in *Internals Reference*, Section "Staff" in *Internals Reference*.

Known issues and warnings

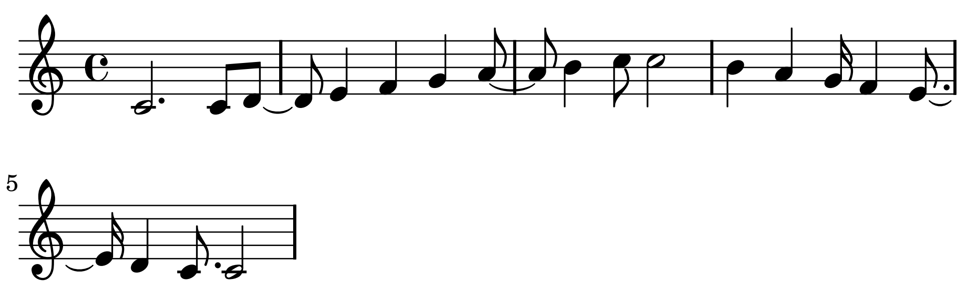
When using different time signatures in parallel, notes at the same moment will be be placed at the same horizontal location. However, the bar lines in the different staves will cause the note spacing to be less regular in each of the individual staves than would be normal without the different time 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`. In the following example, notes crossing the bar lines are split and tied.

```
\new Voice \with {
  \remove "Note_heads_engraver"
  \consists "Completion_heads_engraver"
}

{ c2. c8 d4 e f g a b c8 c2 b4 a g16 f4 e d c8. c2 }
```



This engraver splits all running notes at the bar line, and inserts ties. 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.

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 "Forbid_line_break_engraver" in *Internals Reference*.

Known issues and warnings

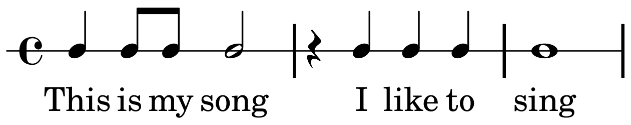
Not all durations (especially those containing tuplets) can be represented exactly with normal notes and dots, but the `Completion_heads_engraver` will not insert tuplets.

The `Completion_heads_engraver` only affects notes; it does not split rests.

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

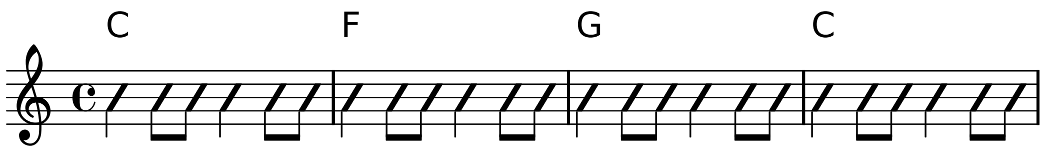
```
<<
  \new RhythmicStaff {
    \new Voice = "myRhythm" {
      \time 4/4
      c4 e8 f g2
      r4 g g f
      g1
    }
  }
  \new Lyrics {
    \lyricsto "myRhythm" {
      This is my song
      I like to sing
    }
  }
>>
```



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
  }
>>
```



Predefined commands

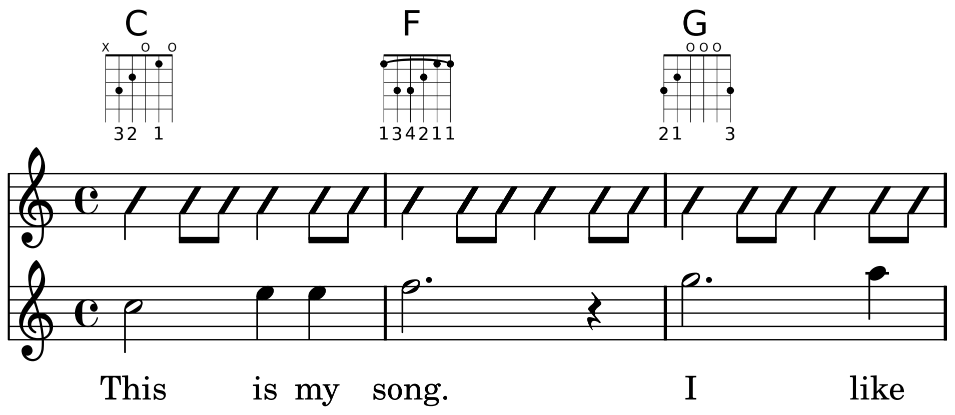
`\improvisationOn`, `\improvisationOff`.

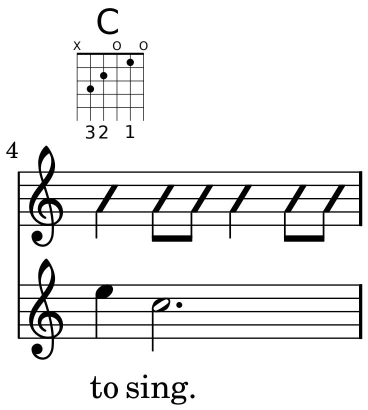
Selected Snippets

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*.

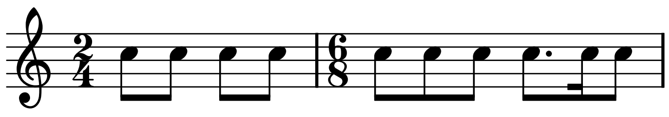
Internals Reference: Section “RhythmicStaff” in *Internals Reference*, Section “Pitch_squash_engraver” in *Internals Reference*.

1.2.4 Beams

Automatic beams

By default, beams are inserted automatically:

```
\time 2/4 c8 c c c
\time 6/8 c c c c8. c16 c8
```



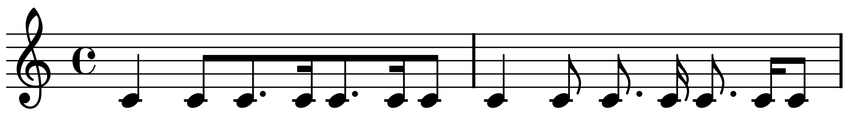
If these automatic decisions are not satisfactory, beaming can be entered explicitly; see [Manual beams], page 65. Beams must also be entered manually in the same way if beams are to be extended over rests.

It is possible to define beaming patterns that differ from the defaults. The default beaming rules for most common time signatures are defined in ‘`scm/auto-beam.scm`’. If there are no beaming rules defined for a particular beam’s duration in the time signature being used, its beaming is controlled by the values of three context properties, `measureLength`, `beatLength` and `beatGrouping`. Both the beaming rules and the context properties can be overridden, see [Setting automatic beam behavior], page 56.

Note: If beams are used to indicate melismata in songs, then automatic beaming should be switched off with `\autoBeamOff` and the beams indicated manually.

Automatic beaming may be turned off and on with `\autoBeamOff` and `\autoBeamOn` commands:

```
c4 c8 c8. c16 c8. c16 c8
\autoBeamOff
c4 c8 c8. c16 c8.
\autoBeamOn
c16 c8
```



Predefined commands

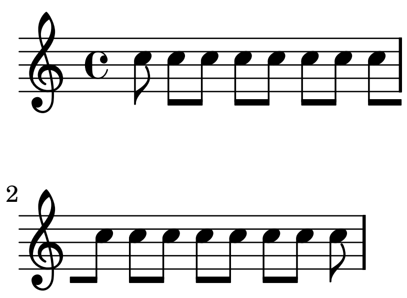
`\autoBeamOff`, `\autoBeamOn`.

Selected Snippets

Beams across line breaks

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

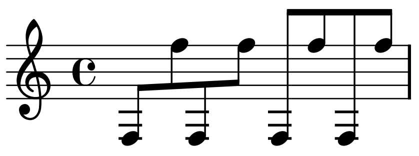
```
\relative c'' {
  \override Beam #'breakable = ##t
  c8 c[ c] c[ c] c[ c] c[ \break
  c8] c[ c] c[ c] c[ c] c
}
```



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
}
```



See also

Notation Reference: [Manual beams], page 65, [Setting automatic beam behavior], page 56.

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

Snippets: Section “Rhythms” in *Snippets*.

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

Known issues and warnings

Automatically kneed cross-staff beams cannot be used together with hidden staves. See [Hiding staves], page 134.

Beams can collide with note heads and accidentals in other voices

Setting automatic beam behavior

The placement of automatic beams is determined by the rules described in [Automatic beams], page 54. There are two mutually exclusive ways in which these rules may be modified. The first, modifying the grouping of beats, applies to uncommon time signatures, i.e. those for which there are no predefined rules defining the beam end points. The second method, modifying the specification of the beam end points, can be used for any time signature. This second method **must** be used for those time signatures and beam durations combinations for which beam ending rules are pre-defined, unless these have all been reverted. There are predefined rules for time signatures of 3/2, 3/4, 4/4, 2/4, 4/8, 4/16, 6/8, 9/8 and 12/8.

Modifying the grouping of beats

If there are no beam-ending rules defined for the beam duration of a particular beam in the time signature in use, its beaming is controlled by three context properties: `measureLength`, `beatLength` and `beatGrouping`. These properties may be set in the `Score`, `Staff` or `Voice` contexts to delimit their scope. The default values are set while processing `\time` commands, so the `\set` commands must be placed after all `\time` commands.

These determine the beaming as follows:

Beams may begin anywhere (unless a beam is already active). Beams end at a time determined by the values of `beatGrouping` and `beatLength`, as follows:

- If `beatGrouping` and `beatLength` are consistent with `measureLength`, `beatGrouping` is used to determine the end points of beams.
- If `beatGrouping` and `beatLength` are inconsistent with `measureLength`, `beatLength` is used to determine the end points of beams.

Note: These three properties become effective for a particular beam **only** if there are no beam-ending rules predefined for that beam's duration in the time signature in use, or if these beam-ending rules have all been reverted.

By default the `measureLength` and `beatLength` are derived from the time signature set by the `\time` command. The `measureLength` is set to be exactly the same length as the measure length given by the time signature, and the `beatLength` is set to be the same as one over the denominator of the time signature.

The default value of `beatGrouping` is taken from a table in '`scm/music-functions.scm`'. To find this, see Section "Other sources of information" in *Learning Manual*. It defines the beat grouping for 5/8, 6/8, 8/8, 9/8 and 12/8 time signatures.

Both `measureLength` and `beatLength` are *moments*, units of musical duration. A quantity of type *moment* is created by the scheme function `ly:make-moment`. For more information about this function, see [Time administration], page 80.

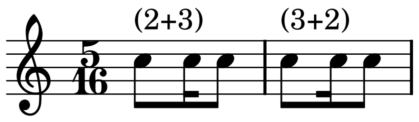
`beatGrouping` is a list of integers giving the number of beats in each group.

Selected Snippets

Grouping beats

Beaming patterns may be altered with the `beatGrouping` property:

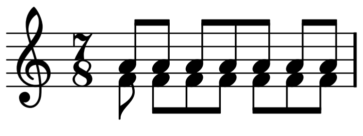
```
\relative c'' {
  \time 5/16
  #(override-auto-beam-setting '(end * * 5 16) 5 16)
  \set beatGrouping = #'(2 3)
  c8^"(2+3)" c16 c8
  \set beatGrouping = #'(3 2)
  c8^"(3+2)" c16 c8
}
```



Specifying context with beatGrouping

By specifying the context, the effect of `beatGrouping` can be limited to the context specified, and the values which may have been set in higher-level contexts can be overridden. The `\set` commands must be placed after all `\time` commands:

```
\score {
  \new Staff <<
    \time 7/8
    \new Voice {
      \relative c'' {
        \set Staff.beatGrouping = #'(2 3 2)
        a8 a a a a a a
      }
    }
    \new Voice {
      \relative c' {
        \voiceTwo
        \set beatGrouping = #'(1 3 3)
        f8 f f f f f f
      }
    }
  >>
}
```



Using beatLength and beatGrouping

The property `measureLength` determines where bar lines should be inserted and, with `beatLength` and `beatGrouping`, how automatic beams should be generated for beam durations and time signatures for which no beam-ending rules are defined. This example shows several ways of controlling beaming by setting these properties. The explanations are shown as comments in the code.

```
\relative c'' {
  \time 3/4
  % The default in 3/4 time is to beam in three groups
  % each of a quarter note length
  a16 a a a a a a a a a a a

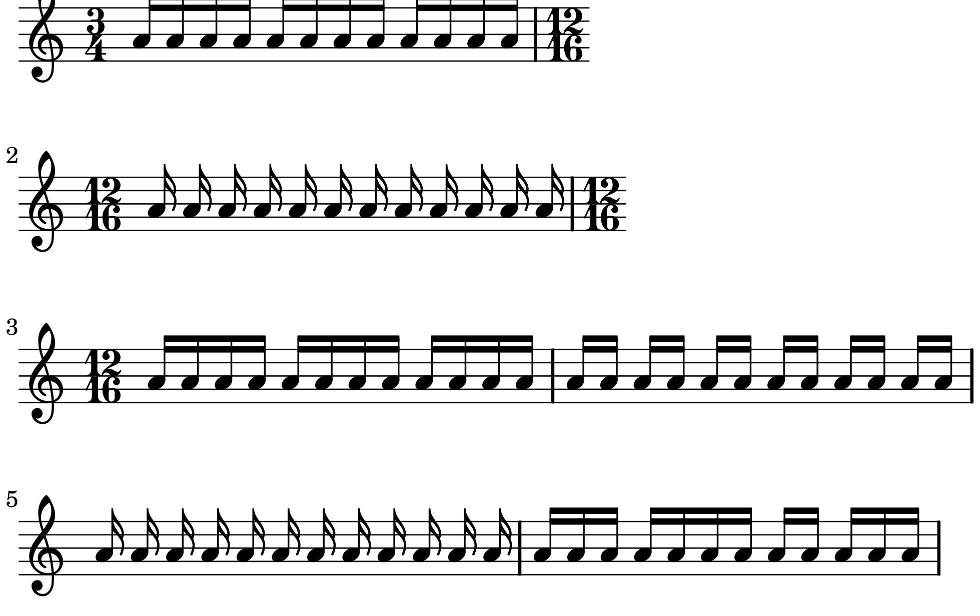
  \time 12/16
  % No auto-beaming is defined for 12/16
  a16 a a a a a a a a a a a

  \time 3/4
  % Change time signature symbol, but retain underlying 3/4 beaming
  \set Score.timeSignatureFraction = #'(12 . 16)
  a16 a a a a a a a a a a a

  % The 3/4 time default grouping of (1 1 1) and beatLength of 1/8
  % are not consistent with a measureLength of 3/4, so the beams
  % are grouped at beatLength intervals
  \set Score.beatLength = #(ly:make-moment 1 8)
  a16 a a a a a a a a a a a

  % Specify beams in groups of (3 3 2 3) 1/16th notes
  % 3+3+2+3=11, and 11*1/16<>3/4, so beatGrouping does not apply,
  % and beams are grouped at beatLength (1/16) intervals
  \set Score.beatLength = #(ly:make-moment 1 16)
  \set Score.beatGrouping = #'(3 3 2 3)
  a16 a a a a a a a a a a a

  % Specify beams in groups of (3 4 2 3) 1/16th notes
  % 3+4+2+3=12, and 12*1/16=3/4, so beatGrouping applies
  \set Score.beatLength = #(ly:make-moment 1 16)
  \set Score.beatGrouping = #'(3 4 2 3)
  a16 a a a a a a a a a a a
}
```



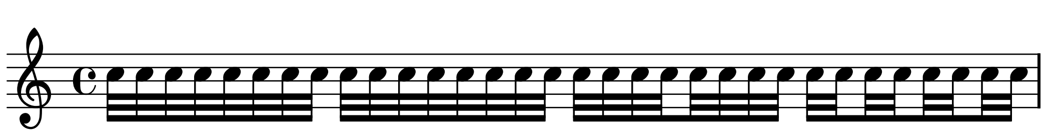
Sub-dividing beams

The beams of consecutive 16th (or shorter) notes are, by default, not sub-divided. That is, the three (or more) beams stretch unbroken over entire groups of notes. This behavior can be modified to sub-divide the beams into sub-groups by setting the property `subdivideBeams`. When set, multiple beams will be sub-divided at intervals defined by the current value of `beatLength` by reducing the multiple beams to just one beam between the sub-groups. Note that `beatLength` 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 `make-moment` function, as shown here:

```
\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 beatLength = #(ly:make-moment 1 8)
  c32[ c c c c c c c]

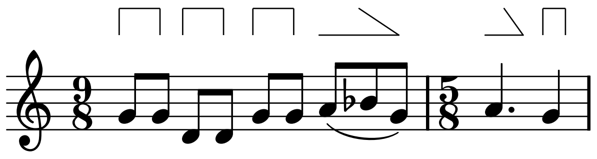
  % Set beam sub-group length to a sixteenth note
  \set beatLength = #(ly:make-moment 1 16)
  c32[ c c c c c c c]
}
```



Conducting signs, measure grouping signs

Options to group beats within a bar are available through the Scheme function `set-time-signature`, which takes three arguments: the number of beats, the beat length, and the internal grouping of beats in the measure. If the `Measure_grouping_engraver` is included, the function will also create `MeasureGrouping` signs. Such signs ease reading rhythmically complex modern music. In the example, the 9/8 measure is subdivided in 2, 2, 2 and 3. This is passed to `set-time-signature` as the third argument: `'(2 2 2 3)`:

```
\score {
  \relative c'' {
    #(set-time-signature 9 8 '(2 2 2 3))
    #(revert-auto-beam-setting '(end * * 9 8) 3 8)
    #(override-auto-beam-setting '(end 1 8 9 8) 1 4)
    #(override-auto-beam-setting '(end 1 8 9 8) 2 4)
    #(override-auto-beam-setting '(end 1 8 9 8) 3 4)
    g8 g d d g g a( bes g) |
    #(set-time-signature 5 8 '(3 2))
    a4. g4
  }
  \layout {
    \context {
      \Staff
      \consists "Measure_grouping_engraver"
    }
  }
}
```



Modifying the beam end points

In common time signatures, automatic beams can start on any note but can end at only a few positions within the measure, namely at durations specified by the properties in `autoBeamSettings`. These properties consist of a list of rules defining where beams can end. The default `autoBeamSettings` rules are defined in '`scm/auto-beam.scm`'. To find this, see Section "Other sources of information" in *Learning Manual*.

This method **must** be used for the time signatures for which beam-ending rules are defined by default, unless these have all been reverted. It is also particularly suitable for many other time signatures if the time signature of the measures changes frequently, or if the beaming should be different for different beam durations.

In order to add a rule to the list, use

```
#(override-auto-beam-setting
  '(beam-limit
    beam-numerator  beam-denominator
    time-signature-numerator time-signature-denominator)
  moment-numerator moment-denominator [context])
```

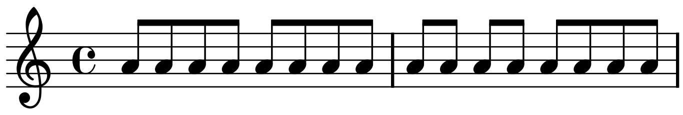
where

- `beam-limit` is the type of automatic beam limit defined. This can be either `begin` or `end` but only `end` is effective.
- `beam-numerator/beam-denominator` is the beam duration to which the rule is to apply. A beam is considered to have the duration of its shortest note. Set `beam-numerator` and `beam-denominator` to `'*'` to have this rule apply to beams of any duration.
- `time-signature-numerator/time-signature-denominator` specifies the time signature to which this rule should apply. If `time-signature-numerator` and `time-signature-denominator` are set to `'*'` this rule will apply in any time signature.
- `monent-numerator/moment-denominator` is the position in the bar at which the beam should end.
- `context` is optional, and it specifies the context at which the change should be made. The default is `'Voice`.

  `#(score-override-auto-beam-setting '(A B C D) E F)` is equivalent to `#(override-auto-beam-setting '(A B C D) E F 'Score)`.

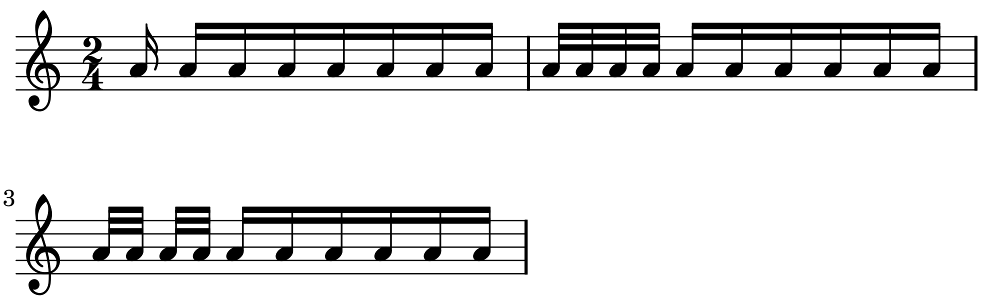
For example, if automatic beams should always end on the first quarter note, whatever the time signature or beam duration, use

```
a8 a a a a a a a
#(override-auto-beam-setting '(end * * * *) 1 4)
a8 a a a a a a a
```



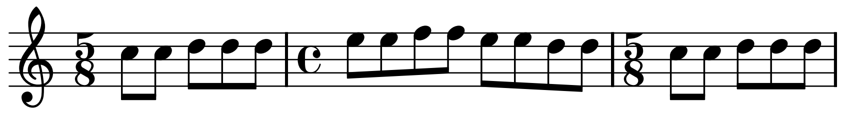
You can force the beam settings to take effect only on beams whose shortest note is a certain duration

```
\time 2/4
% end 1/16 beams for all time signatures at the 1/16 moment
#(override-auto-beam-setting '(end 1 16 * *) 1 16)
a16 a a a a a a a |
a32 a a a a16 a a a a a |
% end 1/32 beams for all time signatures at the 1/16 moment
#(override-auto-beam-setting '(end 1 32 * *) 1 16)
a32 a a a a16 a a a a a |
```



You can force the beam settings to take effect only in certain time signatures

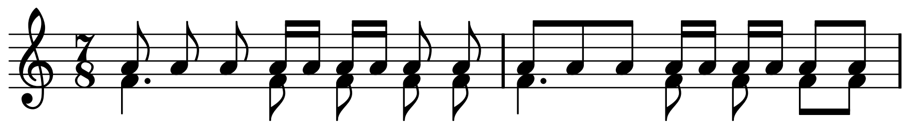
```
\time 5/8
% end beams of all durations in 5/8 time signature at the 2/8 moment
#(override-auto-beam-setting '(end * * 5 8) 2 8)
c8 c d d d
\time 4/4
e8 e f f e e d d
\time 5/8
c8 c d d d
```



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
% Context not specified - does not work correctly
#(override-auto-beam-setting '(end * * 7 8) 3 8)
#(override-auto-beam-setting '(end * * 7 8) 4 8)
#(override-auto-beam-setting '(end * * 7 8) 5 8)
<< {a8 a a a16 a a a a8 a} \\ {f4. f8 f f f} >>

% Works correctly with context specified
#(override-auto-beam-setting '(end * * 7 8) 3 8 'Staff)
#(override-auto-beam-setting '(end * * 7 8) 4 8 'Staff)
#(override-auto-beam-setting '(end * * 7 8) 5 8 'Staff)
<< {a8 a a a16 a a a a8 a} \\ {f4. f8 f f f} >>
```



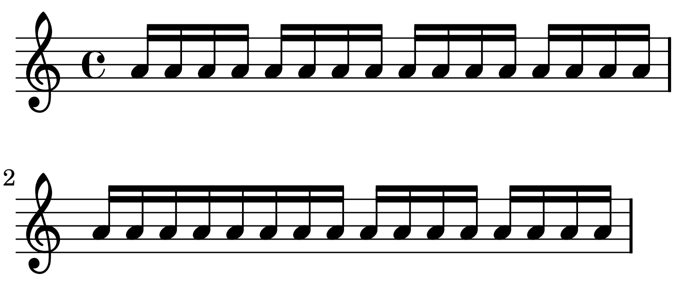
Note: If any unexpected beam behavior occurs, check the default automatic beam settings in '`scm/auto-beam.scm`' for possible interference, because the beam endings defined there will still apply in addition to your own.

Any unwanted or conflicting default endings must be reverted for your time signature(s). Existing auto-beam rules are removed by using

```
#(revert-auto-beam-setting
  '(beam-limit
    beam-numerator  beam-denominator
    time-signature-numerator time-signature-denominator)
  moment-numerator moment-denominator [context])
```

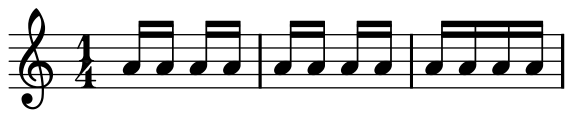
`beam-limit`, `beam-numerator`, `beam-denominator`, `time-signature-numerator`, `time-signature-denominator`, `moment-numerator`, `moment-denominator` and `context` are the same as above.

```
\time 4/4
a16 a a a a a a a a a a a a a a a
% undo a rule ending 1/16 beams in 4/4 time at 1/4 moment
#(revert-auto-beam-setting '(end 1 16 4 4) 1 4)
a16 a a a a a a a a a a a a a a a
```



The rule in a `revert-auto-beam-setting` statement must exactly match the original rule. That is, no wildcard expansion is taken into account.

```
\time 1/4
#(override-auto-beam-setting '(end 1 16 1 4) 1 8)
a16 a a a
#(revert-auto-beam-setting '(end 1 16 * *) 1 8) % this won't revert it!
a a a a
#(revert-auto-beam-setting '(end 1 16 1 4) 1 8) % this will
a a a a
```

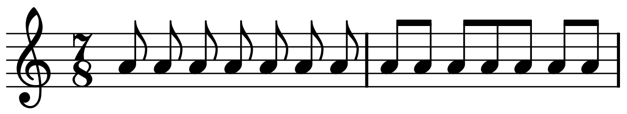


Selected Snippets

Beam grouping in 7/8 time

There are no default automatic beam groupings specified for 7/8 time, so if automatic beams are required the grouping must be specified. For example, to group all beams 2-3-2 in 7/8 time, specify beam endings at 2/8 and 5/8:

```
\relative c'' {
  \time 7/8
  % rhythm 2-3-2
  a8 a a a a a a
  #(override-auto-beam-setting '(end * * 7 8) 2 8)
  #(override-auto-beam-setting '(end * * 7 8) 5 8)
  a8 a a a a a a
}
```



Reverting default beam endings

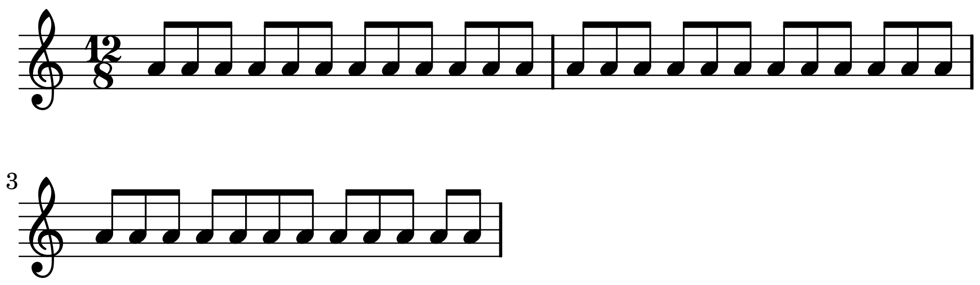
To typeset beams grouped `3-4-3-2` in 12/8 it is necessary first to override the default beam endings in 12/8, and then to set up the new beaming endings:

```
\relative c'' {
  \time 12/8

  % Default beaming
  a8 a a a a a a a a a a a

  % Revert default values in scm/auto-beam.scm for 12/8 time
  #(revert-auto-beam-setting '(end * * 12 8) 3 8)
  #(revert-auto-beam-setting '(end * * 12 8) 3 4)
  #(revert-auto-beam-setting '(end * * 12 8) 9 8)
  a8 a a a a a a a a a a a

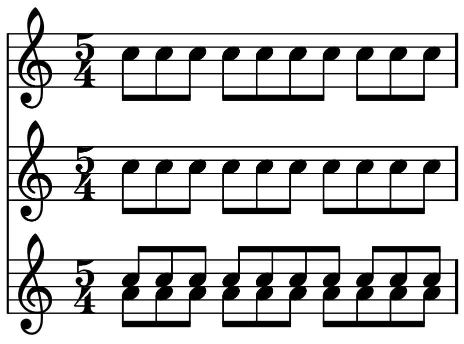
  % Set new values for beam endings
  #(override-auto-beam-setting '(end * * 12 8) 3 8)
  #(override-auto-beam-setting '(end * * 12 8) 7 8)
  #(override-auto-beam-setting '(end * * 12 8) 10 8)
  a8 a a a a a a a a a a a
}
```



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
  #(score-override-auto-beam-setting '(end * * 5 4) 3 8)
  #(score-override-auto-beam-setting '(end * * 5 4) 7 8)
  <<
    \new Staff {
      c8 c c c c c c c c c
    }
    \new Staff {
      % Modify beaming for just this staff
      #(override-auto-beam-setting '(end * * 5 4) 6 8 'Staff)
      #(revert-auto-beam-setting '(end * * 5 4) 7 8 'Staff)
      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
          #(override-auto-beam-setting '(end * * 5 4) 6 8)
          #(revert-auto-beam-setting '(end * * 5 4) 7 8)
          a8 a a a a a a a a a
        }
      >>
    }
  >>
}
```



Predefined commands

`\autoBeamOff`, `\autoBeamOn`.

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.

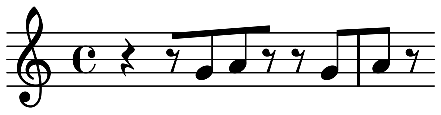
See also

Snippets: Section "Rhythms" in *Snippets*.

Manual beams

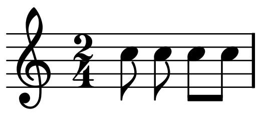
In some cases it may be necessary to override the automatic beaming algorithm. For example, the autobeamer will not put beams over rests or bar lines, and in choral scores the beaming is often set to follow the meter of the lyrics rather than the notes. Such beams can be specified manually by marking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

```
{
  r4 r8[ g' a r8] r8 g[ | a] r8
}
```



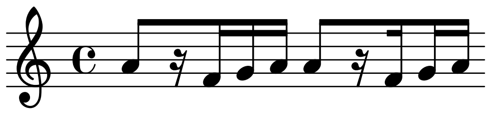
Individual notes may be marked with `\noBeam` to prevent them from being beamed:

```
\time 2/4 c8 c\noBeam c c
```



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.

```
a8[ r16 f g a]
a8[ r16
\set stemLeftBeamCount = #2
\set stemRightBeamCount = #1
f
\set stemLeftBeamCount = #1
g a]
```



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).

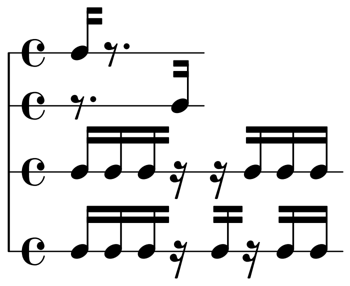
(Note that `\set stemLeftBeamCount` is always equivalent to `\once \set`. In other words, the beam count settings are not "sticky", so the pair of flat flags attached to the lone `c'16[]` in the last example have nothing to do with the `\set` two notes prior.)

```
\score {
  <<
    % Example 1
    \new RhythmicStaff {
      \set stemLeftBeamCount = #0
      c16[]
      r8.
    }

    % Example 2
    \new RhythmicStaff {
      r8.
      \set stemRightBeamCount = #0
      c16[]
    }

    % Example 3
    \new RhythmicStaff {
      c16 c
      \set stemRightBeamCount = #2
      c16 r r
      \set stemLeftBeamCount = #2
      c16 c c
    }

    % Example 4
    \new RhythmicStaff {
      c16 c
      \set stemRightBeamCount = #2
      c16 r
      c16[]
      r16
      \set stemLeftBeamCount = #2
      c16 c
    }
  >>
}
```



Feathered beams

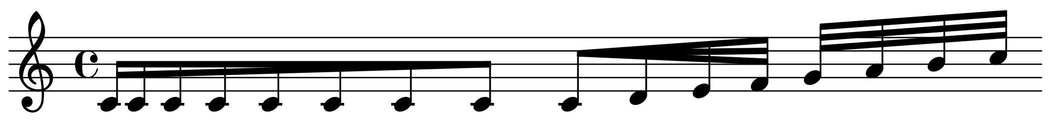
Feathered beams are used to indicate that a small group of notes should be played at an increasing (or decreasing) tempo, without changing the overall tempo of the piece. The extent of the feathered beam must be indicated manually using `[` and `]`, and the beam feathering is turned on by specifying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

```
\override Beam #'grow-direction = #LEFT
\featherDurations #(ly:make-moment 2 1)
{ c16[ c c c c c c c] }
\override Beam #'grow-direction = #RIGHT
\featherDurations #(ly:make-moment 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.

Known issues and warnings

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

See also

Snippets: Section “Rhythms” in *Snippets*.

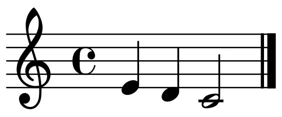
1.2.5 Bars

Bar lines

Bar lines delimit measures, and are also used to indicate repeats. Normally, simple bar lines are automatically inserted into the printed output at places based on the current time signature.

The simple bar lines inserted automatically can be changed to other types with the `\bar` command. For example, a closing double bar line is usually placed at the end of a piece:

```
e4 d c2 \bar "|."
```



It is not invalid if the final note in a measure does not end on the automatically entered 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 cause line breaks to be inhibited, leading to a line of highly compressed music or music which 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

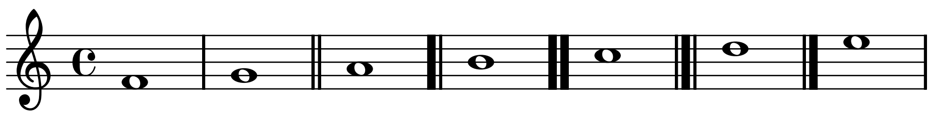
```
\bar ""
```

This will insert an invisible bar line and allow (but not force) a line break to occur at this point. The bar number counter is not increased. To force a line break see Section 4.3.1 [Line breaking], page 340.

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. Such insertions do not affect the calculation and placement of subsequent automatic bar lines.

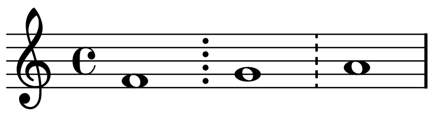
The simple bar line and five types of double bar line are available for manual insertion:

```
f1 \bar "|" g \bar "||" a \bar ".|" b \bar ".|." c \bar "|.|" d \bar "|." e
```



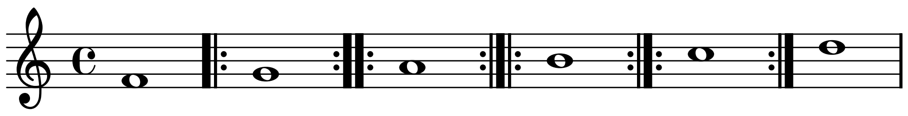
together with dotted and dashed bar lines:

```
f1 \bar ":" g \bar "dashed" a
```



and five types of repeat bar line:

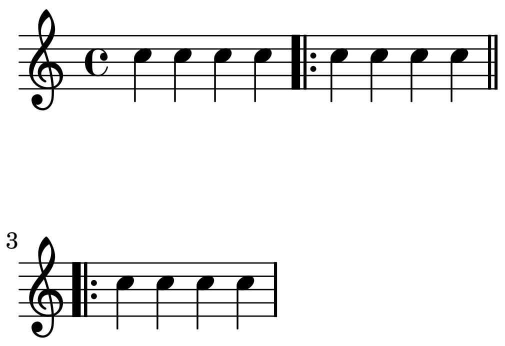
```
f1 \bar "|:" g \bar ":|:" a \bar ":|.|:" b \bar ":|.:" c \bar ":|" d
```



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 98), which automatically print the appropriate bar lines.

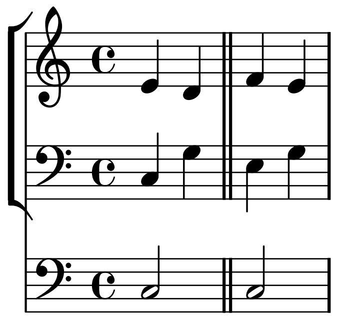
In addition, you can specify "||:", which is equivalent to "|:" except at line breaks, where it gives a double bar line at the end of the line and a start repeat at the beginning of the next line.

```
\override Score.RehearsalMark #'padding = #3
c c c c
\bar "||:"
c c c c \break
\bar "||:"
c c c c
```



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 {
      e'4 d'
      \bar "||"
      f' e'
    }
    \new Staff { \clef bass c4 g e g }
  >>
  \new Staff { \clef bass c2 c2 }
>>
```



Selected Snippets

The command `\bar` *bartype* is a shortcut for `\set Timing.whichBar =` *bartype*. A bar line is created whenever the `whichBar` property is set.

The default bar type used for automatically inserted bar lines is `"|"`. This may be changed at any time with `\set Timing.defaultBarType =` *bartype*.

See also

Notation Reference: Section 4.3.1 [Line breaking], page 340, Section 1.4 [Repeats], page 98, [Grouping staves], page 123.

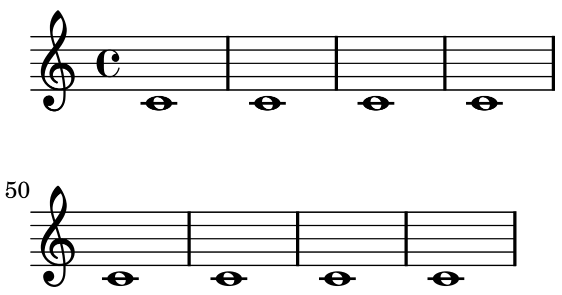
Snippets: Section "Rhythms" in *Snippets*.

Internals Reference: Section "BarLine" in *Internals Reference* (created at Section "Staff" in *Internals Reference* level), Section "SpanBar" in *Internals Reference* (across staves), Section "Timing_translator" in *Internals Reference* (for Timing properties).

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:

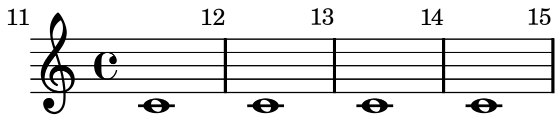
```
c1 c c c
\break
\set Score.currentBarNumber = #50
c1 c c c
```

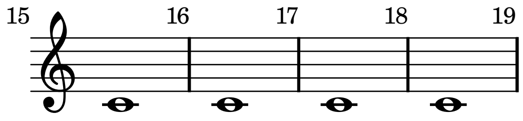


Selected Snippets

Bar numbers can be typeset at regular intervals instead of just at the beginning of every line. To do this the default behavior must be overridden to permit bar numbers to be printed at places other than the start of a line. This is controlled by 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:

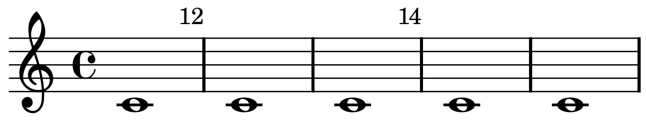
```
\override Score.BarNumber #'break-visibility = #'#(#t #t #t)
\set Score.currentBarNumber = #11
\bar ""  % Permit first bar number to be printed
c1 c c c
\break
c c c c
```

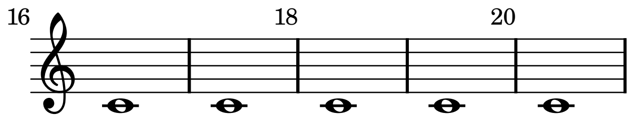




and here the bar numbers are printed every two measures except at the end of the line:

```
\override Score.BarNumber #'break-visibility = #'#(#f #t #t)
\set Score.currentBarNumber = #11
\bar ""  % Permit first bar number to be printed
% Print a bar number every second measure
\set Score.barNumberVisibility = #(every-nth-bar-number-visible 2)
c1 c c c c
\break
c c c c c
```





The size of the bar number may be changed. This is illustrated in the following example, which also shows how to enclose bar numbers in boxes and circles, and shows an alternative way of specifying `#(#f #t #t)` for `break-visibility`.

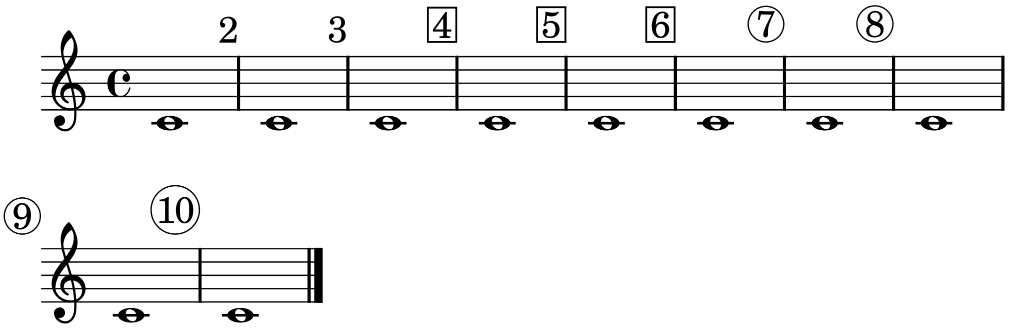
```
% Prevent bar numbers at the end of a line and permit them elsewhere
\override Score.BarNumber #'break-visibility
  = #end-of-line-invisible

% Increase the size of the bar number by 2
\override Score.BarNumber #'font-size = #2
\repeat unfold 3 { c1 } \bar "|"

% 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 3 { c1 } \bar "|"

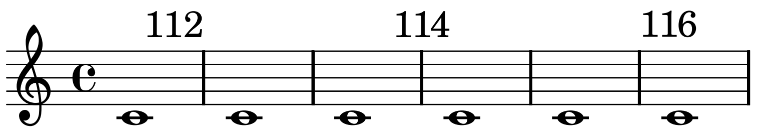
% Draw a circle round the following bar number(s)
```

```
\override Score.BarNumber  #'stencil
  = #(make-stencil-circler 0.1 0.25 ly:text-interface::print)
\repeat unfold 4 { c1 } \bar "|."
```



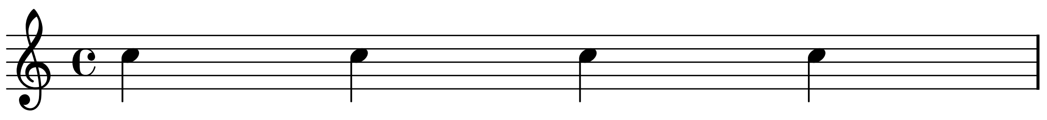
Bar numbers by default are left-aligned to their parent object. This is usually the left edge of a line or, if numbers are printed within a line, the left bar line of the measure. The numbers may also be positioned directly on the bar line or right-aligned to the bar line:

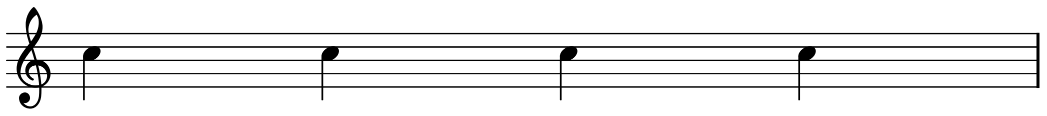
```
\set Score.currentBarNumber = #111
\override Score.BarNumber #'break-visibility = #'#(#t #t #t)
% Increase the size of the bar number by 2
\override Score.BarNumber #'font-size = #2
% Print a bar number every second measure
\set Score.barNumberVisibility = #(every-nth-bar-number-visible 2)
c1 c1
% Center-align bar numbers
\override Score.BarNumber #'self-alignment-X = #0
c1 c1
% Right-align bar numbers
\override Score.BarNumber #'self-alignment-X = #-1
c1 c1
```



Bar numbers can be removed entirely by removing the `Bar_number_engraver` from the `Score` context.

```
\layout {
  \context {
    \Score
    \remove "Bar_number_engraver"
  }
}
\relative c''{
  c4 c c c \break
  c4 c c c
}
```





See also

Snippets: Section "Rhythms" in *Snippets*.

Internals Reference: Section "BarNumber" in *Internals Reference*.

Known issues and warnings

Bar numbers may collide with the top of the Section "StaffGroup" in *Internals Reference* bracket, if there is one. To solve this, the `padding` property of Section "BarNumber" in *Internals Reference* can be used to position the number correctly.

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 |
```

Bar checks can also be used in lyrics, for example

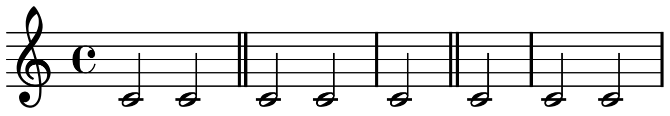
```
\lyricmode {
  \time 2/4
  Twin -- kle | Twin -- kle |
}
```

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.

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 `pipeSymbol`. 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.

```
pipeSymbol = \bar "||"
{
  c'2 c'2 |
  c'2 c'2
  c'2 | c'2
  c'2 c'2
}
```



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.

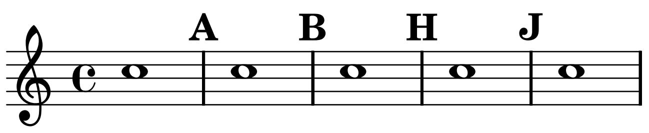
See also

Snippets: Section “Rhythms” in *Snippets*.

Rehearsal marks

To print a rehearsal mark, use the `\mark` command

```
c1 \mark \default
c1 \mark \default
c1 \mark #8
c1 \mark \default
c1 \mark \default
```



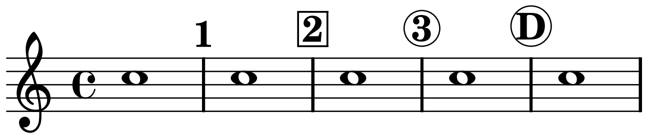
The letter ‘I’ is skipped in accordance with engraving traditions. If you wish to include the letter ‘I’, then use

```
\set Score.markFormatter = #format-mark-alphabet
```

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`.

The style is defined by the property `markFormatter`. 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, `markFormatter` is set to a pre-defined procedure. After a few measures, it is set to a procedure that produces a boxed number.

```
\set Score.markFormatter = #format-mark-numbers
c1 \mark \default
c1 \mark \default
\set Score.markFormatter = #format-mark-box-numbers
c1 \mark \default
\set Score.markFormatter = #format-mark-circle-numbers
c1 \mark \default
\set Score.markFormatter = #format-mark-circle-letters
c1
```



The file ‘`scm/translation-functions.scm`’ contains the definitions of `format-mark-numbers` (the default format), `format-mark-box-numbers`, `format-mark-letters` and `format-mark-box-letters`. 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.

Other styles of rehearsal mark can be specified manually

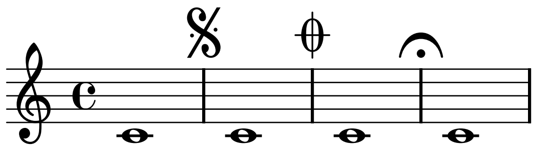
```
\mark "A1"
```

`Score.markFormatter` does not affect marks specified in this manner. However, it is possible to apply a `\markup` to the string.

```
\mark \markup{ \box A1 }
```

Music glyphs (such as the segno sign) may be printed inside a `\mark`

```
c1 \mark \markup { \musicglyph #"scripts.segno" }
c1 \mark \markup { \musicglyph #"scripts.coda" }
c1 \mark \markup { \musicglyph #"scripts.ufermata" }
c1
```



See Section B.6 [The Feta font], page 446, for a list of symbols which may be printed with `\musicglyph`.

For common tweaks to the positioning of rehearsal marks, see Section 1.8.2 [Formatting text], page 167.

See also

Notation Reference: Section B.6 [The Feta font], page 446, Section 1.8.2 [Formatting text], page 167.

Installed Files: '`scm/translation-functions.scm`' contains the definition of `format-mark-numbers` and `format-mark-letters`. They can be used as inspiration for other formatting functions.

Snippets: Section "Rhythms" in *Snippets*.

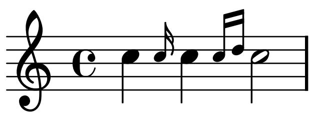
Internals Reference: Section "RehearsalMark" in *Internals Reference*.

1.2.6 Special rhythmic concerns

Grace notes

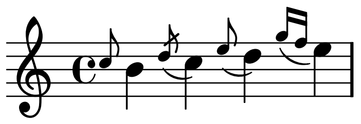
Grace notes are ornaments that are written out. Grace notes are printed in a smaller font and take up no logical time in a measure.

```
c4 \grace c16 c4
\grace { c16[ d16] } c2
```



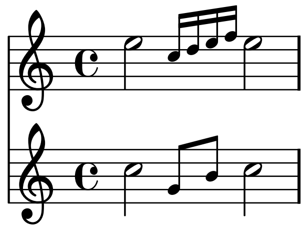
Lilypond also supports two special types of grace notes, the *acciaccatura*–an unmeasured grace note indicated by a slurred small note with a slashed stem–and the *appoggiatura*, which takes a fixed fraction of the main note and appears in small print without a slash.

```
\grace c8 b4
\acciaccatura d8 c4
\appoggiatura e8 d4
\acciaccatura { g16[ f] } e4
```



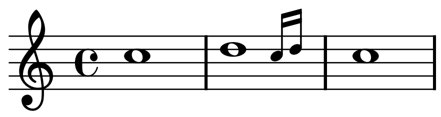
The placement of grace notes is synchronized between different staves. In the following example, there are two sixteenth grace notes for every eighth grace note

```
<< \new Staff { e2 \grace { c16[ d e f] } e2 }
   \new Staff { c2 \grace { g8[ b] } c2 } >>
```



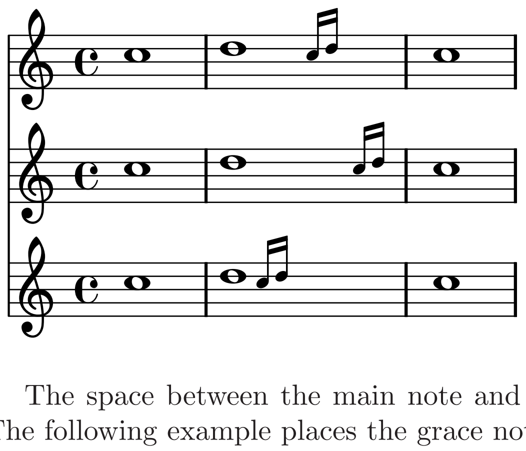
If you want to end a note with a grace, use the `\afterGrace` command. It takes two arguments: the main note, and the grace notes following the main note.

```
c1 \afterGrace d1 { c16[ d] } c1
```



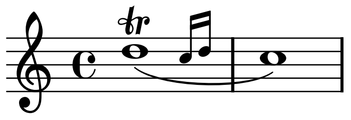
This will put the grace notes after a space lasting 3/4 of the length of the main note. The default fraction 3/4 can be changed by setting `afterGraceFraction`. The following example shows the results from setting the space at the default, at 15/16, and finally at 1/2 of the main note.

```
<<
  \new Staff {
    c1 \afterGrace d1 { c16[ d] } c1
  }
  \new Staff {
    #(define afterGraceFraction (cons 15 16))
    c1 \afterGrace d1 { c16[ d] } c1
  }
  \new Staff {
    #(define afterGraceFraction (cons 1 2))
    c1 \afterGrace d1 { c16[ d] } c1
  }
>>
```



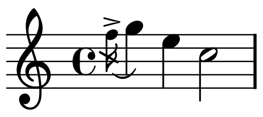
The space between the main note and the grace note may also be specified using spacers. The following example places the grace note after a space lasting 7/8 of the main note.

```
\new Voice {
  << { d1^\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 overriden and then reverted.

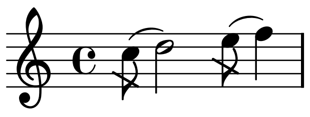
```
\new Voice {
  \acciaccatura {
    \stemDown
    f16->
    \stemNeutral
  }
  g4 e c2
}
```



Selected Snippets

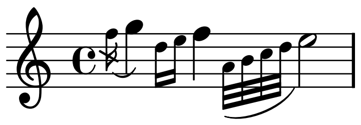
The slash through the stem found in *acciaccatura*s can be applied in other situations:

```
\relative c'' {
  \override Stem #'stroke-style = #"grace"
  c8( d2) e8( f4)
}
```



The layout of grace expressions can be changed throughout the music using the function `add-grace-property`. The following example undefines the `Stem` direction for this grace, so that stems do not always point up.

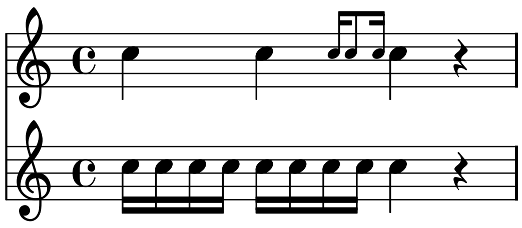
```
\relative c'' {
  \new Staff {
    #(add-grace-property 'Voice 'Stem 'direction ly:stem::calc-direction)
    #(remove-grace-property 'Voice 'Stem 'direction)
    \new Voice {
       \acciaccatura { f16 } g4
       \grace { d16[ e] } f4
       \appoggiatura { a,32[ b c d] } e2
    }
  }
}
```



Another option is to change the variables `startGraceMusic`, `stopGraceMusic`, `startAcciaccaturaMusic`, `stopAcciaccaturaMusic`, `startAppoggiaturaMusic`, `stopAppoggiaturaMusic`. The default values of these can be seen in the file `ly/grace-init.ly`. By redefining them other effects may be obtained.

Grace notes may be forced to align with regular notes in other staves:

```
\relative c'' {
  <<
    \override Score.SpacingSpanner #'strict-grace-spacing = ##t
    \new Staff {
      c4
      \afterGrace c4 { c16[ c8 c16] }
      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*.

Installed Files: '`ly/grace-init.ly`'.

Snippets: Section "Rhythms" in *Snippets*.

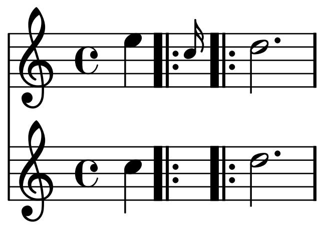
Internals Reference: Section "GraceMusic" in *Internals Reference*.

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*.

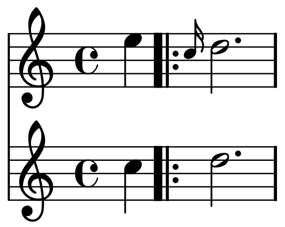
Grace note synchronization can also lead to surprises. Staff notation, such as key signatures, bar lines, etc., are also synchronized. Take care when you mix staves with grace notes and staves without, for example,

```
<< \new Staff { e4 \bar "|:" \grace c16 d2. }
   \new Staff { c4 \bar "|:" d2. } >>
```



This can be remedied by inserting grace skips of the corresponding durations in the other staves. For the above example

```
<< \new Staff { e4 \bar "|:" \grace c16 d2. }
   \new Staff { c4 \bar "|:" \grace s16 d2. } >>
```



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.

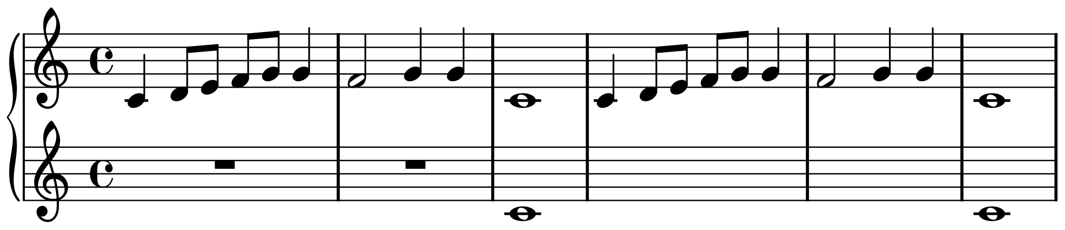
Aligning to cadenzas

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' {
  c4 d8 e f g g4
  f2 g4 g
}

\new GrandStaff <<
  \new Staff {
    \MyCadenza c'1
    \MyCadenza c'1
  }
  \new Staff {
    #(ly:export (mmrest-of-length MyCadenza))
    c'1
    #(ly:export (skip-of-length MyCadenza))
    c'1
  }
>>
```



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.

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 70.

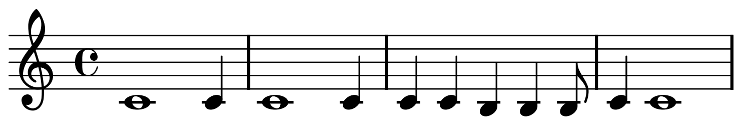
`measureLength`
: The length of the measures in the current time signature. For a 4/4 time this is 1, and for 6/8 it is 3/4. Its value determines when bar lines are inserted and how automatic beams should be generated.

`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.

```
\set Score.measureLength = #(ly:make-moment 5 4)
c1 c4
c1 c4
c4 c4
\set Score.measurePosition = #(ly:make-moment 5 8)
b4 b4 b8
c4 c1
```



As the example illustrates, `ly:make-moment n m` constructs a duration of n/m of a whole note. For example, `ly:make-moment 1 8` is an eighth note duration and `ly:make-moment 7 16` is the duration of seven sixteenths notes.

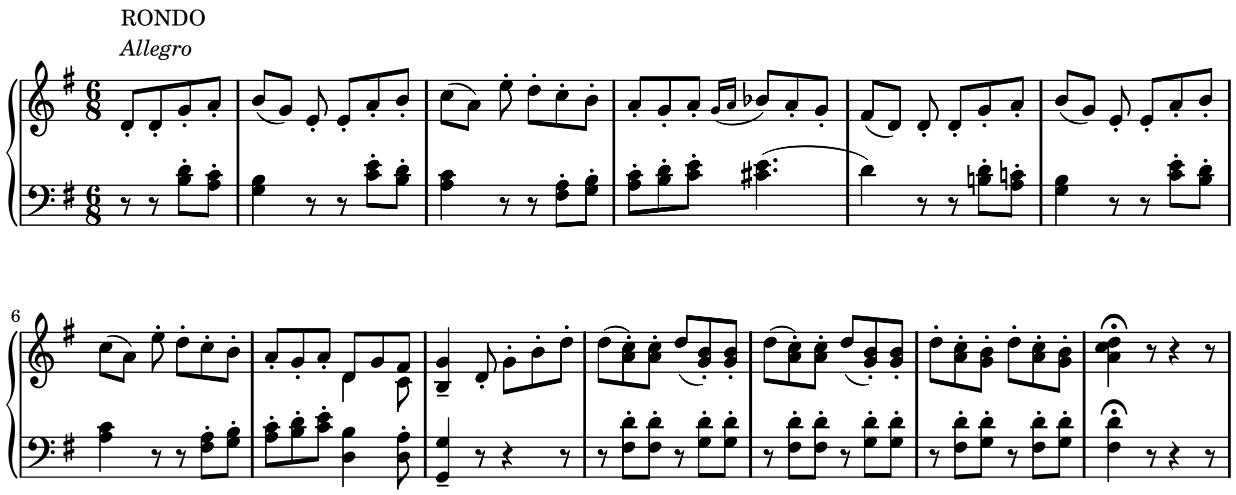
See also

This manual: [Bar numbers], page 70, [Unmetered music], page 47

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 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.

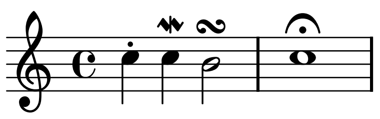
Articulations and ornamentations

A variety of symbols that denote articulations, ornamentations, and other performance indications can be attached to a note using this syntax:

*note**name*

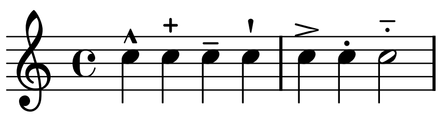
The possible values for *name* are listed in Section B.10 [List of articulations], page 500. For example:

```
c4\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:

```
c4-^  c-+  c--  c-|
c4->  c-.  c2-_
```



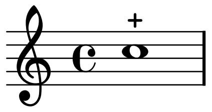
The rules for the default placement of articulations are defined in 'scm/script.scm'. Articulations and ornamentations may be manually placed above or below the staff, see Section 5.4.2 [Direction and placement], page 394.

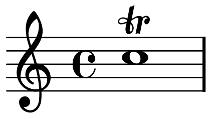
Selected Snippets

Modifying default values for articulation shorthand notation

The shorthands are defined in 'ly/script-init.ly', where the variables dashHat, dashPlus, dashDash, dashBar, 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:

```
\relative c'' { c1-+ }
dashPlus = "trill"
\relative c'' { c1-+ }
```



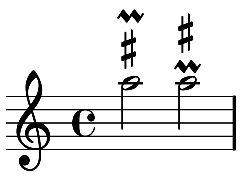


Controlling the vertical ordering of scripts

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 }

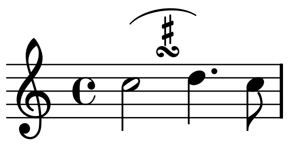
  \once \override Script #'script-priority = #-100
  a2^\prall^\markup { \sharp }
}
```



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. The value of halign is used to position the turn horizontally.

```
\relative c'' {
  \once \override TextScript #'avoid-slur = #'inside
  \once \override TextScript #'outside-staff-priority = ##f
  c2(^\markup \tiny \override #'(baseline-skip . 1) {
    \halign #-4
    \center-column {
      \sharp
      \musicglyph #"scripts.turn"
    }
  }
  d4.) c8
}
```



See also

Music Glossary: Section “tenuto” in *Music Glossary*, Section “accent” in *Music Glossary*, Section “staccato” in *Music Glossary*, Section “portato” in *Music Glossary*.

Notation Reference: Section 5.4.2 [Direction and placement], page 394, Section B.10 [List of articulations], page 500, [Trills], page 97.

Installed Files: ‘`scm/script.scm`’.

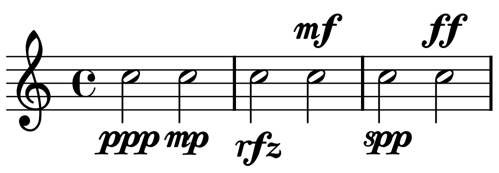
Snippets: Section “Expressive marks” in *Snippets*.

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`, `\fp`, `\sf`, `\sff`, `\sp`, `\spp`, `\sfz`, and `\rfz`. The dynamic marks may be manually placed above or below the staff, see Section 5.4.2 [Direction and placement], page 394.

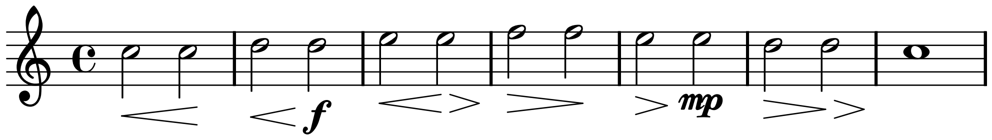
```
c2\ppp c\mp
c2\rfz c^\mf
c2_\spp c^\ff
```



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 `\>`. *Hairpins* are engraved by default using this notation.

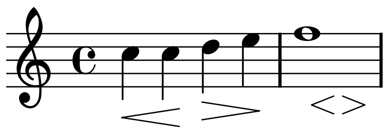
```
c2\< c\!
d2\< d\f
e2\< e\>
```

```
f2\> f\!
e2\> e\mp
d2\> d\>
c1\!
```



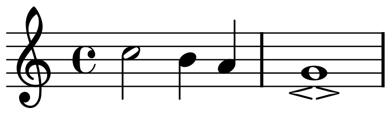
Spacer rests are needed to engrave multiple marks on one note.

```
c4\< c\! d\> e\!
<< f1 { s4 s4\< s4\> s4\! } >>
```



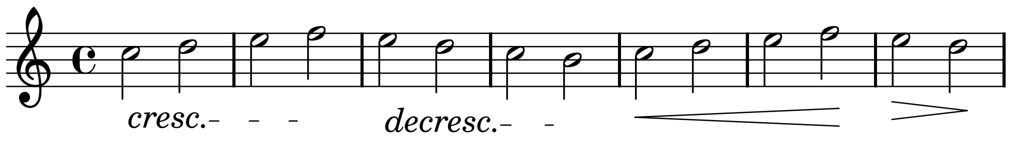
In some situations the `\espressivo` articulation mark may be the appropriate choice to indicate a crescendo and decrescendo on one note:

```
c2 b4 a
g1\espressivo
```



Crescendos and decrescendos can be engraved as textual markings instead of hairpins. Dashed lines are printed to indicate their extent. The built-in commands that enable these text modes are `\crescTextCresc`, `\dimTextDecresc`, `\dimTextDecr`, and `\dimTextDim`. The corresponding `\crescHairpin` and `\dimHairpin` commands will revert to hairpins again:

```
\crescTextCresc
c2\< d | e f\!
\dimTextDecresc
e2\> d | c b\!
\crescHairpin
c2\< d | e f\!
\dimHairpin
e2\> d\!
```



To create new absolute dynamic marks or text that should be aligned with dynamics, see [New dynamic marks], page 87.

Vertical positioning of dynamics is handled by Section "DynamicLineSpanner" in *Internals Reference*.

Predefined commands

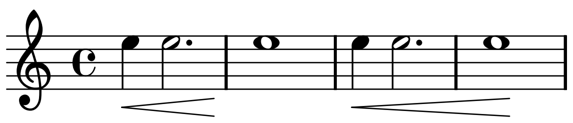
`\dynamicUp`, `\dynamicDown`, `\dynamicNeutral`, `\crescTextCresc`, `\dimTextDim`, `\dimTextDecr`, `\dimTextDecresc`, `\crescHairpin`, `\dimHairpin`.

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.

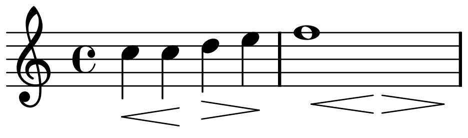
```
\relative c'' {
  e4\< e2.
  e1\!
  \override Hairpin #'to-barline = ##f
  e4\< e2.
  e1\!
}
```



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.

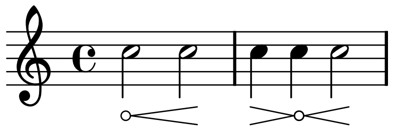
```
\relative c'' {
  c4\< c\! d\> e\!
  \override Hairpin #'minimum-length = #5
  << f1 { s4 s\< s\> s\! } >>
}
```



Printing hairpins using al niente notation

Hairpins 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\!
}
```



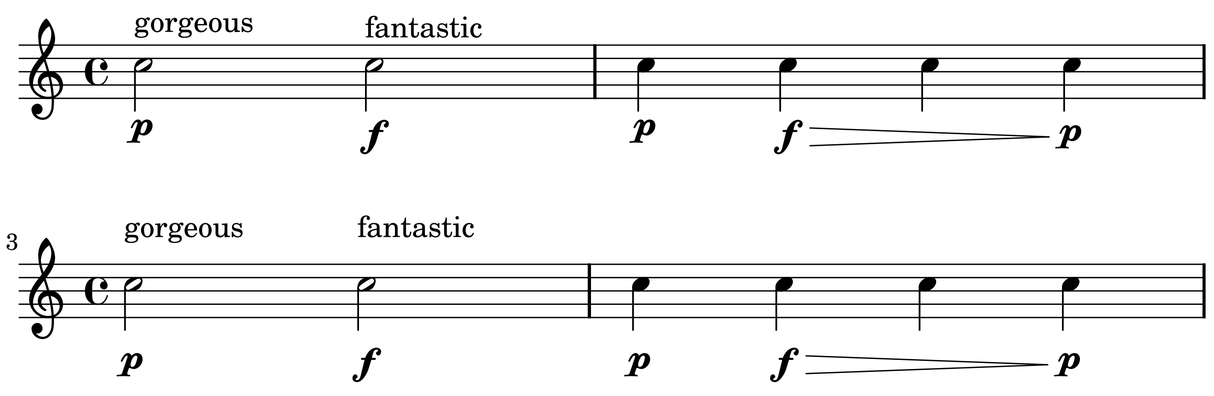
Vertically aligned dynamics and textscripts

By setting the `'Y-extent` property to a suitable value, all `DynamicLineSpanner` objects (hairpins and dynamic texts) can be aligned to a common reference point, regardless of their actual extent. This way, every element will be vertically aligned, thus producing a more pleasing output.

The same idea is used to align the text scripts along their baseline.

```
music = \relative c'' {
  c2\p^\markup { gorgeous } c\f^\markup { fantastic }
  c4\p c\f\> c c\!\p
}

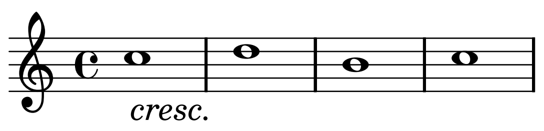
{
  \music \break
  \override DynamicLineSpanner #'staff-padding = #2.0
  \override DynamicLineSpanner #'Y-extent = #'(-1.5 . 1.5)
  \override TextScript #'Y-extent = #'(-1.5 . 1.5)
  \music
}
```



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:

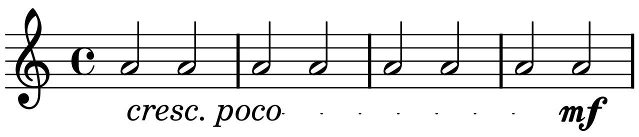
```
\relative c'' {
  \override DynamicTextSpanner #'dash-period = #-1.0
  \crescTextCresc
  c1\< | d | b | c\!
}
```



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 `'hairpin`, and other possible values include `'line`, `'dashed-line` and `'dotted-line`.

```
\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 "Articulation and dynamics" in *Learning Manual*.

Notation Reference: Section 5.4.2 [Direction and placement], page 394, [New dynamic marks], page 87, Section 3.5.3 [What goes into the MIDI output?], page 326, Section 3.5.5 [Controlling MIDI dynamics], page 328.

Snippets: Section "Expressive marks" in *Snippets*.

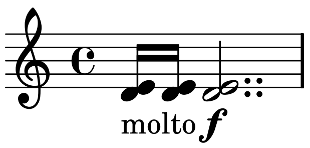
Internals Reference: Section "DynamicText" in *Internals Reference*, Section "Hairpin" in *Internals Reference*, Section "DynamicLineSpanner" in *Internals Reference*.

New dynamic marks

The easiest way to create dynamic indications is to use `\markup` objects.

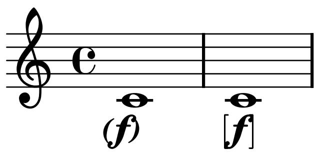
```
moltoF = \markup { molto \dynamic f }

\relative c' {
  <d e>16_\moltoF <d e>
  <d e>2..
}
```



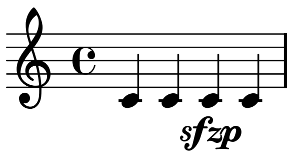
In markup mode, editorial dynamics (within parentheses or square brackets) can be created. The syntax for markup mode is described in Section 1.8.2 [Formatting text], page 167.

```
roundF = \markup { \center-align \concat { \bold { \italic ( }
           \dynamic f \bold { \italic ) } } }
boxF = \markup { \bracket { \dynamic f } }
\relative c' {
  c1_\roundF
  c1_\boxF
}
```



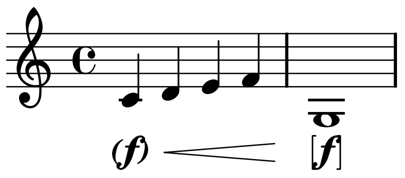
Simple, centered dynamic marks are easily created with the `make-dynamic-script` function. The dynamic font only contains the characters `f,m,p,r,s` and `z`.

```
sfzp = #(make-dynamic-script "sfzp")
\relative c' {
  c4 c c\sfzp c
}
```



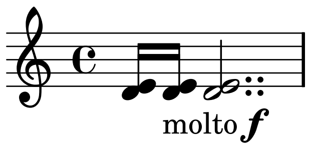
In general, `make-dynamic-script` takes any markup object as its argument. In the following example, using `make-dynamic-script` ensures the vertical alignment of markup objects and hairpins that are attached to the same note head.

```
roundF = \markup { \center-align \concat {
           \normal-text { \bold { \italic ( } }
           \dynamic f
           \normal-text { \bold { \italic ) } } } }
boxF = \markup { \bracket { \dynamic f } }
roundFdynamic = #(make-dynamic-script roundF)
boxFdynamic = #(make-dynamic-script boxF)
\relative c' {
  c4_\roundFdynamic\< d e f
  g,1_\boxFdynamic
}
```



The Scheme form of markup mode may be used instead. Its syntax is explained in Section 6.4.1 [Markup construction in Scheme], page 428.

```
moltoF = #(make-dynamic-script
            (markup #:normal-text "molto"
                    #:dynamic "f"))
\relative c' {
  <d e>16 <d e>
  <d e>2..\moltoF
}
```



Font settings in markup mode are described in [Selecting font and font size], page 168.

See also

Notation Reference: Section 1.8.2 [Formatting text], page 167, [Selecting font and font size], page 168, Section 6.4.1 [Markup construction in Scheme], page 428, Section 3.5.3 [What goes into the MIDI output?], page 326, Section 3.5.5 [Controlling MIDI dynamics], page 328.

Snippets: Section "Expressive marks" in *Snippets*.

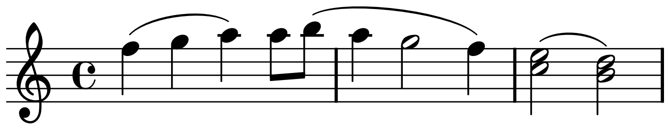
1.3.2 Curves

This section explains how to create various expressive marks that are curved: normal slurs, phrasing slurs, breath marks, falls, and doits.

Slurs

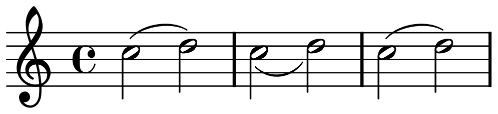
Slurs are entered using parentheses:

```
f4( g a) a8 b(
a4 g2 f4)
<c e>2( <b d>2)
```



Slurs may be manually placed above or below the notes, see Section 5.4.2 [Direction and placement], page 394.

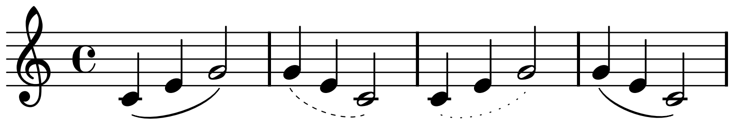
```
c2( d)
\slurDown
c2( d)
\slurNeutral
c2( d)
```



Simultaneous or overlapping slurs are not permitted, but a phrasing slur can overlap a slur. This permits two slurs to be printed at once. For details, see [Phrasing slurs], page 90.

Slurs can be solid, dotted, or dashed. Solid is the default slur style:

```
c4( e g2)
\slurDashed
g4( e c2)
\slurDotted
c4( e g2)
\slurSolid
g4( e c2)
```



Predefined commands

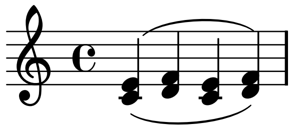
`\slurUp`, `\slurDown`, `\slurNeutral`, `\slurDashed`, `\slurDotted`, `\slurSolid`.

Selected Snippets

Using double slurs for legato chords

Some composers write two slurs when they want legato chords. This can be achieved by setting `doubleSlurs`.

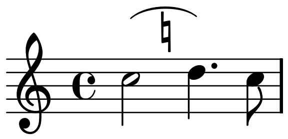
```
\relative c' {
  \set doubleSlurs = ##t
  <c e>4( <d f> <c e> <d f>)
}
```



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
}
```



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 5.4.2 [Direction and placement], page 394, [Phrasing slurs], page 90.

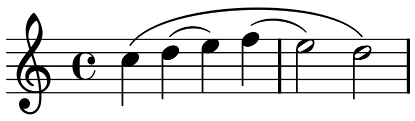
Snippets: Section “Expressive marks” in *Snippets*.

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

Phrasing slurs

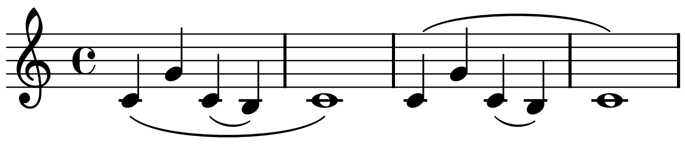
Phrasing slurs (or phrasing marks) that indicate a musical sentence are written using the commands `\(` and `\)` respectively:

```
c4\( d( e) f(
e2) d\)
```



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 slurs may be manually placed above or below the notes, see Section 5.4.2 [Direction and placement], page 394.

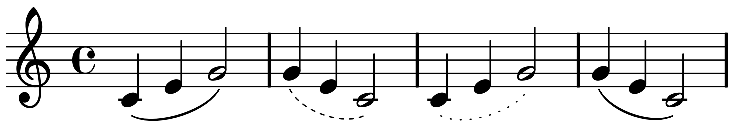
```
c4\( g' c,( b) | c1\)
\phrasingSlurUp
c4\( g' c,( b) | c1\)
```



Simultaneous or overlapping phrasing slurs are not permitted.

Phrasing slurs can be solid, dotted, or dashed. Solid is the default style for phrasing slurs:

```
c4\( e g2\)
\phrasingSlurDashed
g4\( e c2\)
\phrasingSlurDotted
c4\( e g2\)
\phrasingSlurSolid
g4\( e c2\)
```



Predefined commands

`\phrasingSlurUp`, `\phrasingSlurDown`, `\phrasingSlurNeutral`, `\phrasingSlurDashed`, `\phrasingSlurDotted`, `\phrasingSlurSolid`.

See also

Learning Manual: Section "On the un-nestedness of brackets and ties" in *Learning Manual*.

Notation Reference: Section 5.4.2 [Direction and placement], page 394.

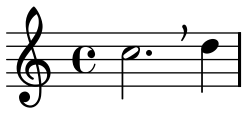
Snippets: Section "Expressive marks" in *Snippets*.

Internals Reference: Section "PhrasingSlur" in *Internals Reference*.

Breath marks

Breath marks are entered using `\breathe`:

```
c2. \breathe d4
```



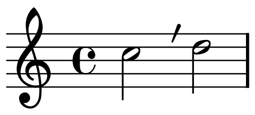
Musical indicators for breath marks in ancient notation, divisiones, are supported. For details, see [Divisiones], page 286.

Selected Snippets

Changing the breath mark symbol

The glyph of the breath mark can be tuned by overriding the text property of the `BreathingSign` layout object with any markup text.

```
\relative c'' {
  c2
  \override BreathingSign #'text = \markup { \musicglyph #"scripts.rvarcomma" }
  \breathe
  d2
}
```

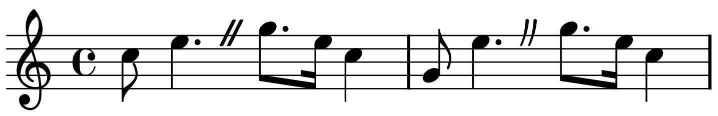


Inserting a caesura

Caesura marks can be created by overriding the `'text` property of the `BreathingSign` object. A curved caesura mark is also available.

```
\relative c'' {
  \override BreathingSign #'text = \markup {
    \musicglyph #"scripts.caesura.straight"
  }
  c8 e4. \breathe g8. e16 c4

  \override BreathingSign #'text = \markup {
    \musicglyph #"scripts.caesura.curved"
  }
  g8 e'4. \breathe g8. e16 c4
}
```



See also

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

Notation Reference: [Divisiones], page 286.

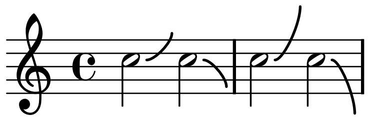
Snippets: Section "Expressive marks" in *Snippets*.

Internals Reference: Section "BreathingSign" 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.

```
c2-\bendAfter #+4
c2-\bendAfter #-4
c2-\bendAfter #+8
c2-\bendAfter #-8
```



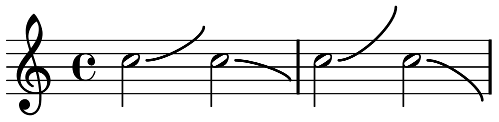
The dash - immediately preceding the `\bendAfter` command is *required* when writing falls and doits.

Selected Snippets

Adjusting the shape of falls and doits

The `shortest-duration-space` property may have to 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 #-3
  c2-\bendAfter #+8
  c2-\bendAfter #-6
}
```



See also

Music Glossary: Section "fall" in *Music Glossary*, Section "doit" in *Music Glossary*.

Snippets: Section "Expressive marks" in *Snippets*.

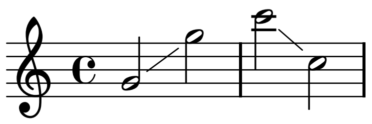
1.3.3 Lines

This section explains how to create various expressive marks that follow a linear path: glissandos, arpeggios, and trills.

Glissando

A *glissando* is created by attaching `\glissando` to a note:

```
g2\glissando g'
c2\glissando c,
```



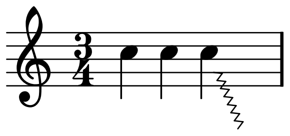
Different styles of glissandi can be created. For details, see Section 5.4.7 [Line styles], page 405.

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 "|"
}
```



See also

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

Notation Reference: Section 5.4.7 [Line styles], page 405.

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

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

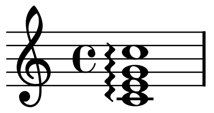
Known issues and warnings

Printing text over the line (such as *gliss.*) is not supported.

Arpeggio

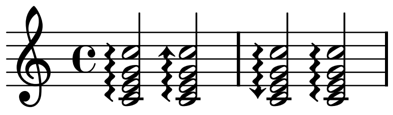
An *arpeggio* on a chord (also known as a broken chord) is denoted by appending `\arpeggio` to the chord construct:

```
<c e g c>1\arpeggio
```



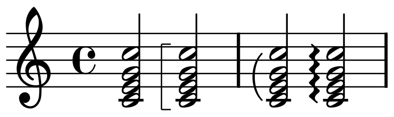
Different types of arpeggios may be written. `\arpeggioNormal` reverts to a normal arpeggio:

```
<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
```



Special *bracketed* arpeggio symbols can be created:

```
<c e g c>2
\arpeggioBracket
<c e g c>2\arpeggio
\arpeggioParenthesis
<c e g c>2\arpeggio
\arpeggioNormal
<c e g c>2\arpeggio
```



Arpeggios can be explicitly written out with ties. For more information, see [Ties], page 35.

Predefined commands

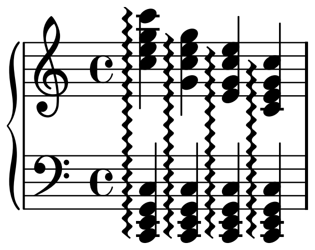
`\arpeggio`, `\arpeggioArrowUp`, `\arpeggioArrowDown`, `\arpeggioNormal`, `\arpeggioBracket`, `\arpeggioParenthesis`.

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`.

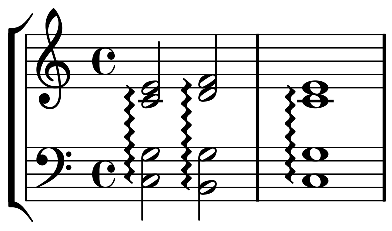
```
\new PianoStaff \relative c'' <<
  \set PianoStaff.connectArpeggios = ##t
  \new Staff {
    <c e g c>4\arpeggio
    <g c e g>4\arpeggio
    <e g c e>4\arpeggio
    <c e g c>4\arpeggio
  }
  \new Staff {
    \clef bass
    \repeat unfold 4 {
      <c,, e g c>4\arpeggio
    }
  }
>>
```



Creating cross-staff arpeggios in other contexts

Cross-staff arpeggios can be created in contexts other than `PianoStaff` if the `Span_arpeggio_engraver` is included in the `Score` context.

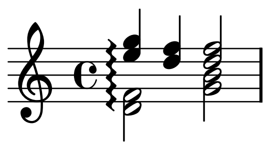
```
\score {
  \new StaffGroup {
    \set Score.connectArpeggios = ##t
    <<
      \new Voice \relative c' {
        <c e>2\arpeggio
        <d f>2\arpeggio
        <c e>1\arpeggio
      }
      \new Voice  \relative c {
        \clef bass
         <c g'>2\arpeggio
         <b g'>2\arpeggio
         <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 moved 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: [Ties], page 35.

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

Internals Reference: Section “Arpeggio” in *Internals Reference*, Section “PianoStaff” in *Internals Reference*.

Known issues and warnings

It is not possible to mix connected arpeggios and unconnected arpeggios in one `PianoStaff` at the same point in time.

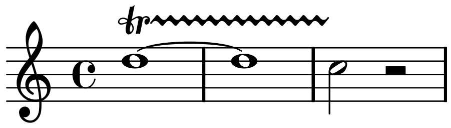
The parenthesis-style arpeggio brackets do not work for cross-staff arpeggios.

Trills

Short *trills* without an extender line are printed with `\trill`; see [Articulations and ornamentations], page 81.

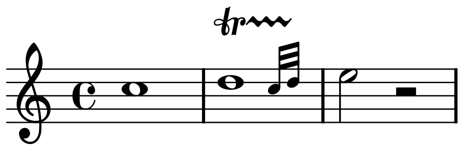
Longer trills with an extender line are made with `\startTrillSpan` and `\stopTrillSpan`:

```
d1~\startTrillSpan
d1
c2\stopTrillSpan r2
```



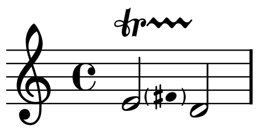
In the following example, a trill is combined with grace notes. The syntax of this construct and the method to precisely position the grace notes are described in [Grace notes], page 75.

```
c1 \afterGrace
d1\startTrillSpan { c32[ d]\stopTrillSpan }
e2 r2
```



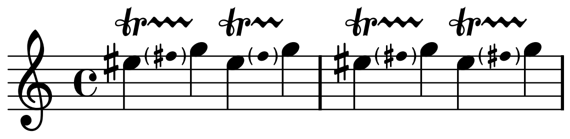
Trills that require an auxiliary note with an explicit pitch can be typeset with the `\pitchedTrill` command. The first argument is the main note, and the second is the *trilled* note, printed as a stemless note head in parentheses.

```
\pitchedTrill e2\startTrillSpan fis
d\stopTrillSpan
```



In the following example, the second pitched trill is ambiguous; the accidental of the trilled note is not printed. As a workaround, the accidentals of the trilled notes can be forced. The second measure illustrates this method:

```
\pitchedTrill eis4\startTrillSpan fis
g\stopTrillSpan
\pitchedTrill eis4\startTrillSpan fis
g\stopTrillSpan
\pitchedTrill eis4\startTrillSpan fis
g\stopTrillSpan
\pitchedTrill eis4\startTrillSpan fis!
g\stopTrillSpan
```



Predefined commands

`\startTrillSpan`, `\stopTrillSpan`.

See also

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

Notation Reference: [Articulations and ornamentations], page 81, [Grace notes], page 75.

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

Internals Reference: Section “TrillSpanner” 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` The repeated music is not written out but enclosed between repeat bar lines. If the repeat is at the beginning of a piece, a repeat bar line is only printed at the end of the repeat. Alternative endings (volte) are printed left to right with brackets. This is the standard notation for repeats with alternatives.

`unfold` The repeated music is fully written out, as many times as specified by *repeatcount*. This is useful when entering repetitious music.

`percent` These are beat or measure repeats. They look like single slashes or percent signs.

`tremolo` This is used to write tremolo beams.

1.4.1 Long repeats

This section discusses how to input long (usually multi-measure) repeats. The repeats can take two forms: repeats enclosed between repeat signs; or written out repeats, used to input repetitious music. Repeat signs can also be controlled manually.

Normal repeats

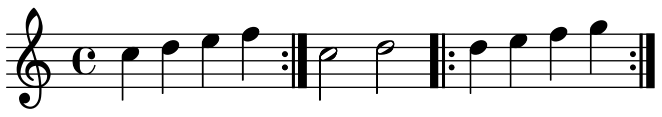
The syntax for a normal repeat is

`\repeat volta` *`repeatcount musicexpr`*

where *musicexpr* is a music expression. Alternate endings can be produced using `\alternative`. In order to delimit the alternate endings, the group of alternatives must be enclosed in a set of braces. If there are more repeats than there are alternate endings, the earliest repeats are given the first alternative.

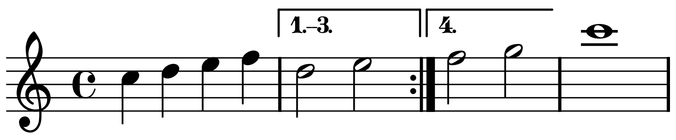
Normal repeats without alternate endings:

```
\repeat volta 2 { c4 d e f }
c2 d
\repeat volta 2 { d4 e f g }
```



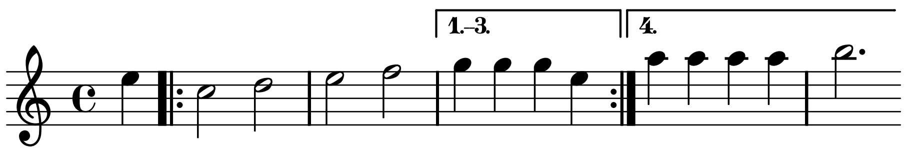
Normal repeats with alternate endings:

```
\repeat volta 4 { c4 d e f }
\alternative {
  { d2 e }
  { f2 g }
}
c1
```



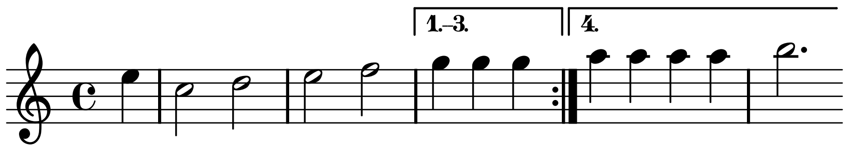
Repeats with upbeats can be entered in two ways:

```
\partial 4
e |
\repeat volta 4 { c2 d | e2 f | }
\alternative {
  { g4 g g e }
  { a4 a a a | b2. }
}
```



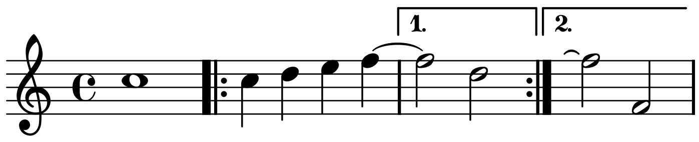
or

```
\partial 4
\repeat volta 4 { e4 | c2 d | e2 f | }
\alternative {
  { \partial 4*3 g4 g g }
  { a4 a a a | b2. }
}
```



Ties may be added to a second ending:

```
c1
\repeat volta 2 { c4 d e f ~ }
\alternative {
  { f2 d }
  { f2\repeatTie f, }
}
```

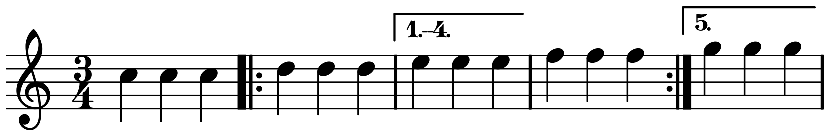


Selected Snippets

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.

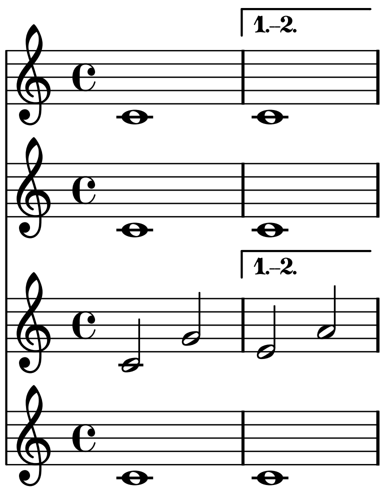
```
\relative c'' {
  \time 3/4
  c4 c c
  \set Score.voltaSpannerDuration = #(ly:make-moment 3 4)
  \repeat volta 5 { d4 d d }
  \alternative {
    {
      e4 e e
      f4 f f
    }
    { g4 g g }
  }
}
```



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' } }
>>
```



See also

Music Glossary: Section "repeat" in *Music Glossary*, Section "volta" in *Music Glossary*.

Notation Reference: [Bar lines], page 68, Section 5.1.3 [Modifying context plug-ins], page 378.

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

A nested repeat like

```
\repeat ...
\repeat ...
\alternative
```

is ambiguous, since it is 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.

Timing information is not remembered at the start of an alternative, so after a repeat timing information must be reset by hand; for example, by setting `Score.measurePosition` or entering `\partial`. Similarly, slurs are also not repeated.

Manual repeat marks

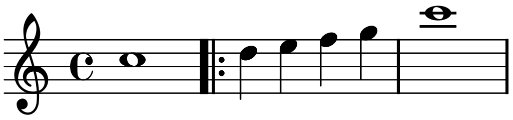
Note: These methods are only used for displaying unusual repeat constructs, and may produce unexpected behavior. In most cases, repeats should be created using the standard `\\repeat` command or by printing the relevant bar lines. For more information, see [Bar lines], page 68.

The property `repeatCommands` can be used to control the layout of repeats. Its value is a Scheme list of repeat commands.

`start-repeat`

Print a `|:` bar line.

```
c1
\set Score.repeatCommands = #'(start-repeat)
d4 e f g
c1
```

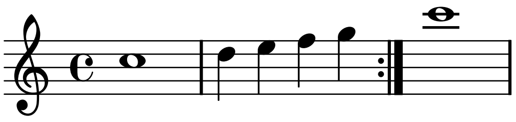


As per standard engraving practice, repeat signs are not printed at the beginning of a piece.

`end-repeat`

Print a `:|` bar line:

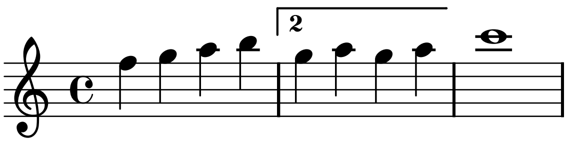
```
c1
d4 e f g
\set Score.repeatCommands = #'(end-repeat)
c1
```



`(volta` *`number`*`) ... (volta #f)`

Create a new volta with the specified number. The volta bracket must be explicitly terminated, or it will not be printed.

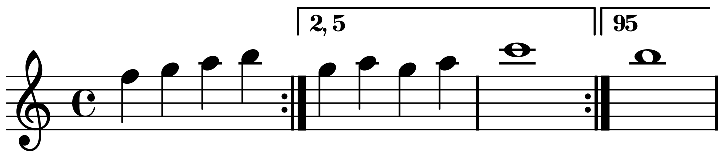
```
f4 g a b
\set Score.repeatCommands = #'((volta "2"))
g4 a g a
\set Score.repeatCommands = #'((volta #f))
c1
```



Multiple repeat commands may occur at the same point:

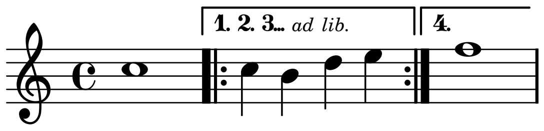
```
f4 g a b
\set Score.repeatCommands = #'((volta "2, 5") end-repeat)
g4 a g a
```

```
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 167. 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'' {
  c1
  \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))
}
```

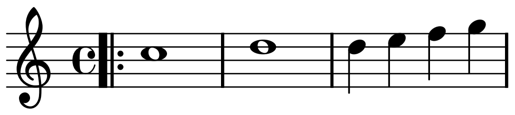


Selected Snippets

Printing a repeat sign at the beginning of a piece

A |: bar line can be printed at the beginning of a piece, by overriding the relevant property:

```
\relative c'' {
  \once \override Score.BreakAlignment #'break-align-orders =
        #(make-vector 3 '(instrument-name
                          left-edge
                          ambitus
                          span-bar
                          breathing-sign
                          clef
                          key-signature
                          time-signature
                          staff-bar
                          custos
                          span-bar))
  \bar "|:"
  c1
  d1
  d4 e f g
}
```



See also

Notation Reference: [Bar lines], page 68, Section 1.8.2 [Formatting text], page 167.

Snippets: Section "Repeats" in *Snippets*.

Internals Reference: Section "VoltaBracket" in *Internals Reference*, Section "RepeatedMusic" in *Internals Reference*, Section "VoltaRepeatedMusic" in *Internals Reference*.

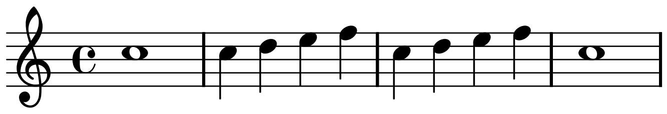
Written-out repeats

By using the `unfold` command, repeats can be used to simplify the writing out of repetitious music. The syntax is

```
\repeat unfold repeatcount musicexpr
```

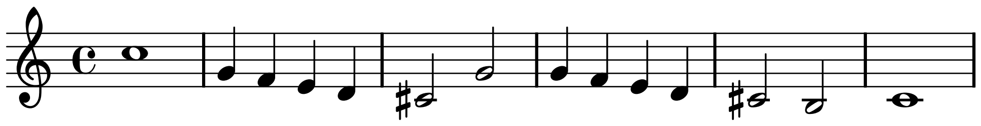
where *musicexpr* is a music expression and *repeatcount* is the number of times *musicexpr* is repeated.

```
c1
\repeat unfold 2 { c4 d e f }
c1
```



Unfold repeats can be made with alternate endings. If there are more repeats than there are alternate endings, the first alternative ending is applied to the earliest endings.

```
c1
\repeat unfold 2 { g4 f e d }
  \alternative {
    { cis2 g' }
    { cis,2 b }
  }
c1
```



See also

Snippets: Section "Repeats" in *Snippets*.

Internals Reference: Section "RepeatedMusic" in *Internals Reference*, Section "UnfoldedRepeatedMusic" in *Internals Reference*.

1.4.2 Short repeats

This section discusses how to input short repeats. Short repeats can take two basic forms: repeats of a single note to two measures, represented by slashes or percent signs; and tremolos.

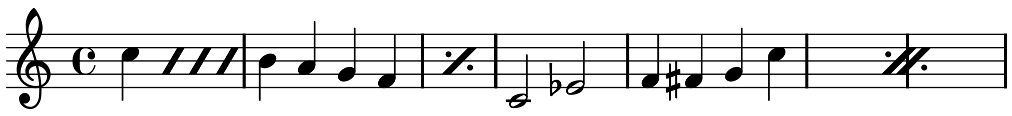
Percent repeats

Repeated short patterns of notes are supported. The music is printed once, and the pattern is replaced with a special sign. Patterns that are shorter than one measure are replaced by slashes, and patterns of one or two measures are replaced by percent-like signs. The syntax is

`\repeat percent number musicexpr`

where *musicexpr* is a music expression.

```
\repeat percent 4 { c4 }
\repeat percent 2 { b4 a g f }
\repeat percent 2 { c2 es | f4 fis g c | }
```

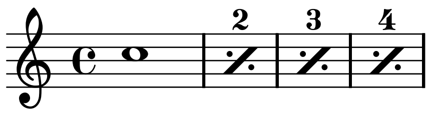


Selected Snippets

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:

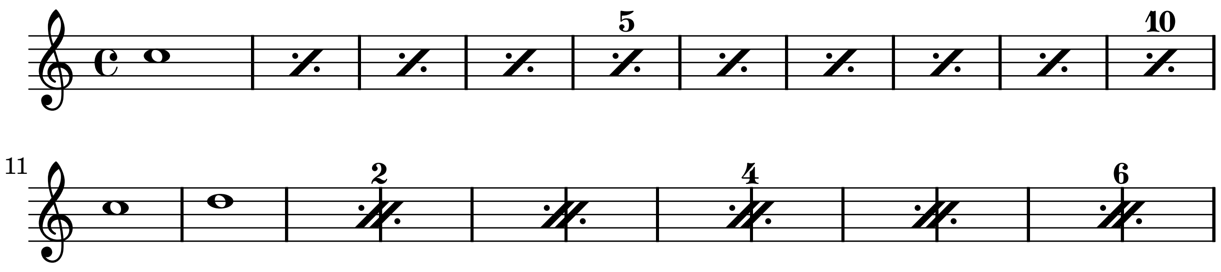
```
\relative c'' {
  \set countPercentRepeats = ##t
  \repeat percent 4 { c1 }
}
```



Percent repeat count visibility

Percent repeat counters can be shown at regular intervals by setting the context property `repeatCountVisibility`.

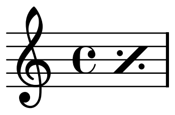
```
\relative c'' {
  \set countPercentRepeats = ##t
  \set repeatCountVisibility = #(every-nth-repeat-count-visible 5)
  \repeat percent 10 { c1 } \break
  \set repeatCountVisibility = #(every-nth-repeat-count-visible 2)
  \repeat percent 6 { c1 d1 }
}
```



Isolated percent repeats

Isolated percents can also be printed. This is done by entering a multi-measure rest with a different print function:

```
\relative c'' {
  \override MultiMeasureRest #'stencil
    = #ly:multi-measure-rest::percent
  \override MultiMeasureRest #'thickness = #0.48
  R1
}
```



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 "PercentRepeat" in *Internals Reference*, Section "DoublePercentRepeat" in *Internals Reference*, Section "DoublePercentRepeatCounter" in *Internals Reference*, Section "PercentRepeatCounter" in *Internals Reference*, Section "PercentRepeatedMusic" in *Internals Reference*.

Known issues and warnings

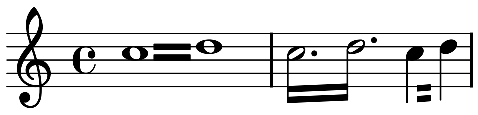
Only three kinds of percent repeats are supported: a single slash representing a single beat (regardless of the duration of the repeated notes); a single slash with dots representing one full measure; and two slashes with dots crossing a bar line representing two full measures. Neither multiple slashes representing single beat repeats consisting of sixteenth or shorter notes, nor two slashes with dots representing single beat repeats consisting of notes of varying durations, are supported.

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:

```
\repeat tremolo 8 { c16 d }
\repeat tremolo 6 { c16 d }
\repeat tremolo 2 { c16 d }
```

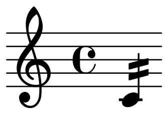


The `\repeat tremolo` syntax expects exactly two notes within the braces, and the number of repetitions must correspond to a note value that can be expressed with plain or dotted notes. Thus, `\repeat tremolo 7` is valid and produces a double dotted note, but `\repeat tremolo 9` is not.

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.

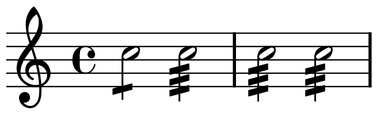
There are two ways to put tremolo marks on a single note. The `\repeat tremolo` syntax is also used here, in which case the note should not be surrounded by braces:

```
\repeat tremolo 4 c'16
```



The same output can be obtained by adding ‘`:`[*number*]’ after the note. The number indicates the duration of the subdivision, and it must be at least 8. A *number* value of 8 gives one line across the note stem. If the length is omitted, the last value (stored in `tremoloFlags`) is used

```
c2:8 c:32
c: c:
```



See also

Snippets: Section “Repeats” in *Snippets*.

Known issues and warnings

Cross-staff tremolos do not work well.

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.

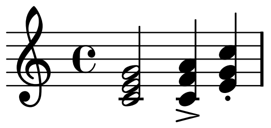
1.5.1 Single voice

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 and/or a set of articulations, just like simple notes:

```
<c e g>2 <c f a>4-> <e g c>-.
```



Relative mode can be used for pitches in chords. The octave of each pitch is chosen using the preceding pitch as a reference except in the case of the first pitch in a chord: the reference for the first pitch is the *first* pitch of the preceding chord.

For more information about chords, see Section 2.7 [Chord notation], page 255.

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 255.

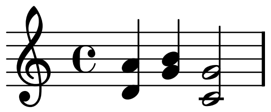
Snippets: Section "Simultaneous notes" in *Snippets*.

Simultaneous expressions

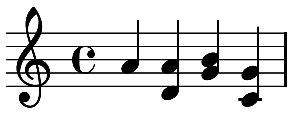
One or more music expressions enclosed in double angle brackets are taken to be simultaneous. If the first expression begins with a single note or if the whole simultaneous expression appears explicitly within a single voice, the whole expression is placed on a single staff; otherwise the elements of the simultaneous expression are placed on separate staves.

The following examples show simultaneous expressions on one staff:

```
\new Voice {  % explicit single voice
  << {a4 b g2} {d4 g c,2} >>
}
```



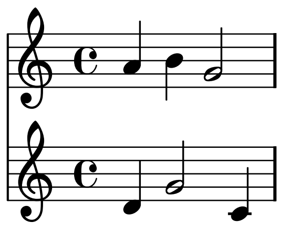
```
% single first note
a << {a4 b g}  {d4 g c,} >>
```



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.

The following example shows how simultaneous expressions can generate multiple staves implicitly:

```
% no single first note
<< {a4 b g2}  {d4 g2 c,4} >>
```

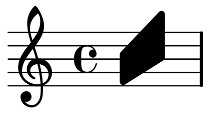


Here different rhythms cause no problems.

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.,

```
\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

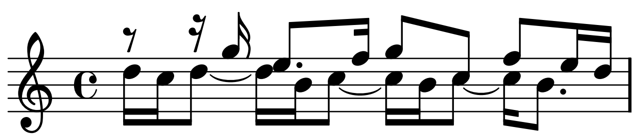
This section discusses simultaneous notes in multiple voices or multiple staves.

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"
    { \voiceOne r8 r16 g e8. f16 g8[ c,] f e16 d }
  \new Voice= "second"
    { \voiceTwo d16 c d8~ d16 b c8~ c16 b c8~ c16 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.

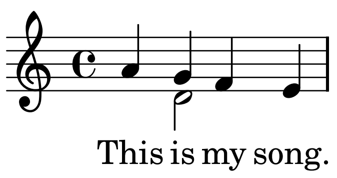
Temporary polyphonic passages

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:

```
<<
  \new Voice = "melody" {
    a4
    <<
      {
        \voiceOne
        g f
      }
      \new Voice {
        \voiceTwo
        d2
      }
    >>
    \oneVoice
    e4
  }
  \new Lyrics \lyricsto "melody" {
  This is my song.
  }
>>
```



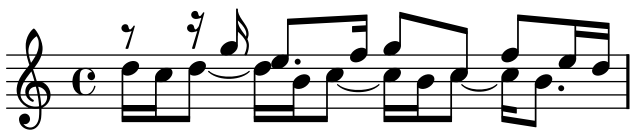
Here, the `\voiceOne` and `\voiceTwo` commands are required to define the settings of each voice.

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 contruct are assigned to new `Voice` contexts. These new `Voice` contexts are created implicitly and are given the fixed names `"1"`, `"2"`, etc.

The first example could be typeset as follows:

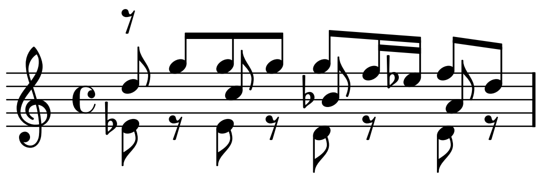
```
<<
  { r8 r16 g e8. f16 g8[ c,] f e16 d }
  \\
  { d16 c d8~ d16 b c8~ c16 b c8~ c16 b8. }
>>
```



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.

```
<<
  { r8 g g  g g f16 ees f8 d }
  \\
  { ees,8 r ees r d r d r }
  \\
  { d'8 s c s bes s a s }
>>
```

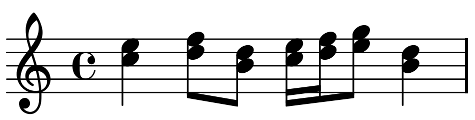


In all but the simplest works it is advisable to create explicit `Voice` contexts as explained in Section "Contexts and engravers" in *Learning Manual* and Section "Explicitly instantiating voices" in *Learning Manual*.

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 <<
  { e4 f8 d e16 f g8 d4 }
  { c4 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*.

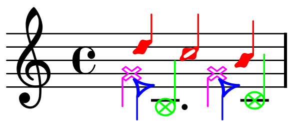
Notation Reference: [Percussion staves], page 245, [Invisible rests], page 39, [Stems], page 155.

Snippets: Section “Simultaneous notes” in *Snippets*.

Voice styles

Voices may be given distinct colors and shapes, allowing them to be easily identified:

```
<<
  { \voiceOneStyle d4 c2 b4 }
  \\
  { \voiceTwoStyle e,2 e }
  \\
  { \voiceThreeStyle b2. c4 }
  \\
  { \voiceFourStyle g'2 g }
>>
```



The `\voiceNeutralstyle` command is used to revert to the standard presentation.

Predefined commands

`\voiceOneStyle`, `\voiceTwoStyle`, `\voiceThreeStyle`, `\voiceFourStyle`, `\voiceNeutralStyle`.

See also

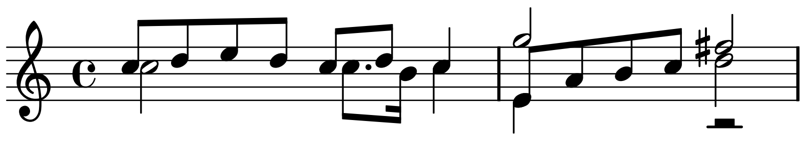
Learning Manual: Section “I’m hearing Voices” in *Learning Manual*, Section “Other sources of information” in *Learning Manual*.

Snippets: Section “Simultaneous notes” in *Snippets*.

Collision resolution

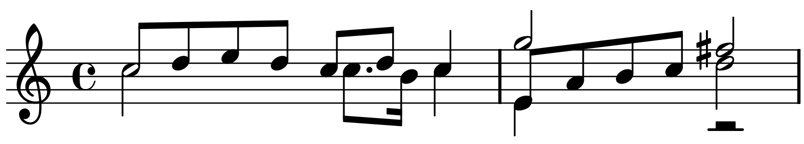
The note heads of notes in different voices with the same pitch, same note head and opposite stem direction are automatically merged, but notes with different note heads or the same stem direction are not. Rests opposite a stem in a different voice are shifted vertically.

```
<<
  {
    c8 d e d c d c4
    g'2 fis
  } \\ {
    c2 c8. b16 c4
    e,2 r
  } \\ {
    \oneVoice
    s1
    e8 a b c d2
  }
>>
```



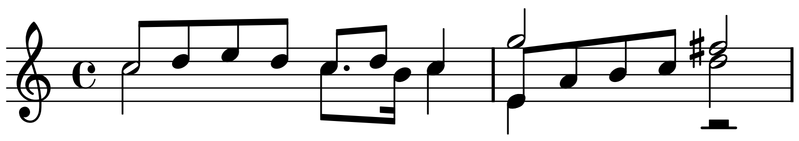
Notes with different note heads may be merged, with the exception of half-note heads and quarter-note heads:

```
<<
  {
    \mergeDifferentlyHeadedOn
    c8 d e d c d c4
    g'2 fis
  } \\ {
    c2 c8. b16 c4
    e,2 r
  } \\ {
    \oneVoice
    s1
    e8 a b c d2
  }
>>
```



Note heads with different dots may be merged:

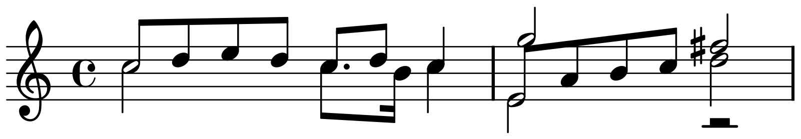
```
<<
  {
    \mergeDifferentlyHeadedOn
    \mergeDifferentlyDottedOn
    c8 d e d c d c4
    g'2 fis
  } \\ {
    c2 c8. b16 c4
    e,2 r
  } \\ {
    \oneVoice
    s1
    e8 a b c d2
  }
>>
```



The half note and eighth note at the start of the second measure are incorrectly merged because `\mergeDifferentlyHeadedOn` cannot successfully complete the merge when three or more notes line up in the same column, and in this case a warning is given. To allow the merge to work properly 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.

```
<<
  {
    \mergeDifferentlyHeadedOn
    \mergeDifferentlyDottedOn
    c8 d e d c d c4
    \shiftOn
    g'2 fis
  } \\ {
    c2 c8. b16 c4
    e,2 r
  } \\ {
    \oneVoice
    s1
    e8 a b c d2
  }

>>
```



The `\shiftOn`, `\shiftOnn`, and `\shiftOnnn` commands specify the degree to which chords of the current voice should be shifted. The outer voices (normally: voices one and two) have `\shiftOff`, while the inner voices (three and four) have `\shiftOn`. `\shiftOnn` and `\shiftOnnn` define further shift levels.

Notes are only merged if they have opposing stem directions (e.g. in `Voice` 1 and 2).

Predefined commands

`\mergeDifferentlyDottedOn`, `\mergeDifferentlyDottedOff`, `\mergeDifferentlyHeadedOn`, `\mergeDifferentlyHeadedOff`.

`\shiftOn`, `\shiftOnn`, `\shiftOnnn`, `\shiftOff`.

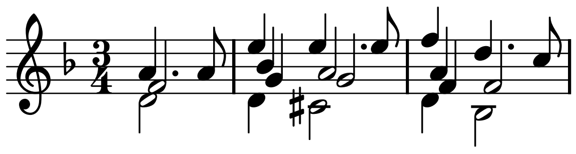
Selected Snippets

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
  <<
    { \voiceOne
      a4. a8
      e'4 e4. e8
      f4 d4. c8
    } \\ {
      \voiceThree
      f,2
      bes4 a2
```

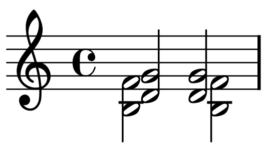
```
        a4 s2
      } \\ {
        \voiceFive
        s2
        g4 g2
        f4 f2
      } \\ {
        \voiceTwo
        d2
        d4 cis2
        d4 bes2
      }
    >>
}
```



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 “Collisions of objects” 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

When using `\mergeDifferentlyHeadedOn` with an upstem eighth or a shorter note, and a downstem half note, the eighth note stem gets a slightly wrong offset because of the different width of the half note head symbol.

There is no support for chords where the same note occurs with different accidentals in the same chord. In this case, it is recommended to use enharmonic transcription, or to use special cluster notation (see [Clusters], page 109).

Automatic part combining

Automatic part combining is used to merge two parts of music onto a staff. It is aimed at typesetting orchestral scores. When the two parts are identical for a period of time, only one is shown. In places where the two parts differ, they are typeset as separate voices, and stem directions are set automatically. Also, solo and *a due* parts are identified and marked by default.

The syntax for part combining is:

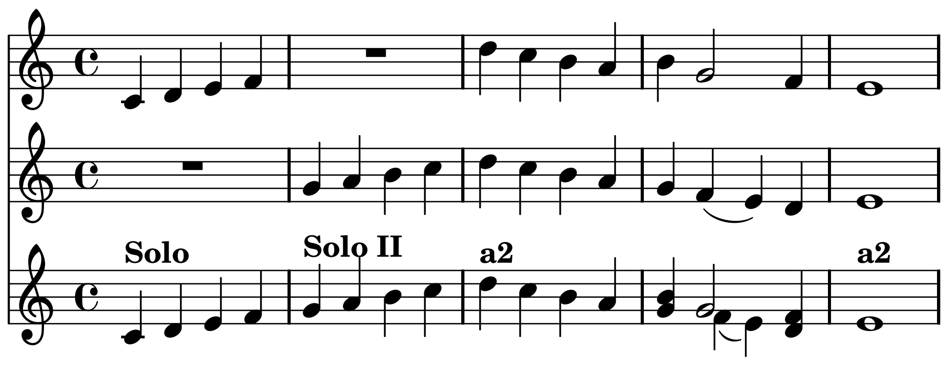
`\partcombine` *`musicexpr1 musicexpr2`*

The following example demonstrates the basic functionality of the part combiner: putting parts on one staff and setting stem directions and polyphony. The same variables are used for the independent parts and the combined staff.

```
instrumentOne = \relative c' {
  c4 d e f
  R1
  d'4 c b a
  b4 g2 f4
  e1
}

instrumentTwo = \relative g' {
  R1
  g4 a b c
  d c b a
  g f( e) d
  e1
}

<<
  \new Staff \instrumentOne
  \new Staff \instrumentTwo
  \new Staff \partcombine \instrumentOne \instrumentTwo
>>
```



The notes in the third measure appear only once, although they were specified in both parts. Stem, slur, and tie directions are set automatically, depending whether there is a solo or unison. When needed in polyphony situations, the first part (with context called `one`) always 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 unisono (*a due*) parts are marked by default with the text "a2".

Both arguments to `\partcombine` will be interpreted as `Voice` contexts. If using relative octaves, `\relative` should be specified for both music expressions, i.e.,

```
\partcombine
  \relative ... musicexpr1
  \relative ... musicexpr2
```

A `\relative` section that is outside of `\partcombine` has no effect on the pitches of *musicexpr1* and *musicexpr2*.

Selected Snippets

Combining two parts on the same staff

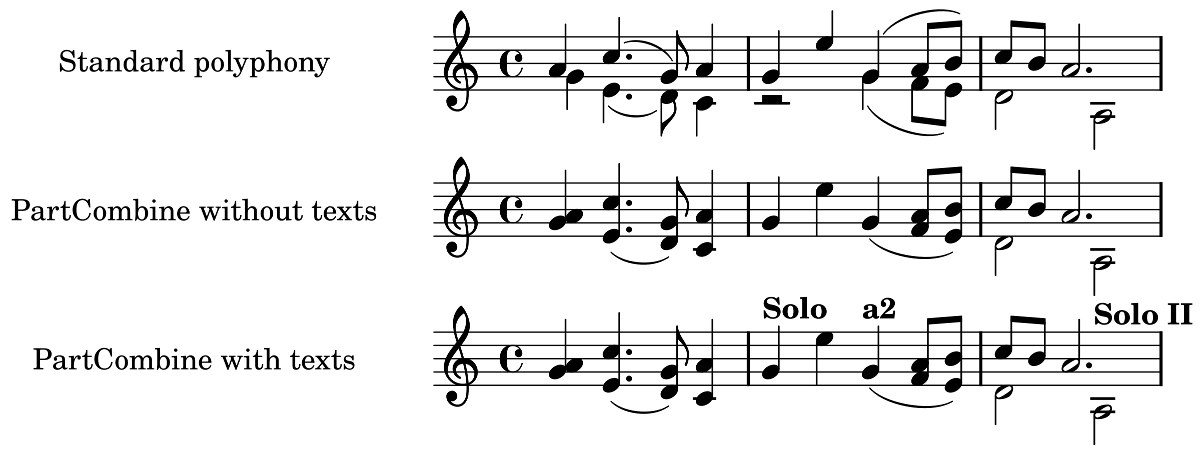
The part combiner tool (`\partcombine` command) allows the combination of several different parts on the same staff. Text directions such as "solo" or "a2" are added by default; to remove them, simply set the property `printPartCombineTexts` to "false". For vocal scores (hymns), there is no need to add "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.

```
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
}

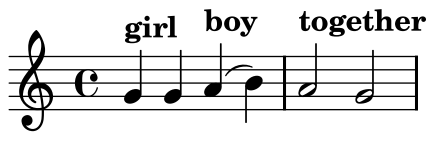
\score {
  <<
    <<
    \new Staff {
      \set Staff.instrumentName = "Standard polyphony  "
      << \musicUp \\ \musicDown >>
    }
    \new Staff \with { printPartCombineTexts = ##f } {
      \set Staff.instrumentName = "PartCombine without texts  "
      \partcombine \musicUp \musicDown
    }
    \new Staff {
      \set Staff.instrumentName = "PartCombine with texts  "
      \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 137.

Snippets: Section "Simultaneous notes" in *Snippets*.

Internals Reference: Section "PartCombineMusic" in *Internals Reference*, Section "Voice" in *Internals Reference*.

Known issues and warnings

`\partcombine` can only accept two voices.

When `printPartCombineTexts` is set, if the two voices play the same notes on and off, the part combiner may typeset `a2` more than once in a measure.

`\partcombine` cannot be inside `\times`.

`\partcombine` cannot be inside `\relative`.

Internally, the `\partcombine` interprets both arguments as `Voice`s and decides when the parts can be combined. When they have different durations they cannot be combined and are given the names `one` and `two`. Consequently, if the arguments switch to differently named Section "Voice" in *Internals Reference* contexts, the events in those will be ignored. Likewise, partcombining isn't designed to work with lyrics; when one of the voices is explicitly named in order to attach lyrics to it, the partcombining stops working.

`\partcombine` only observes onset times of notes. It cannot determine whether a previously started note is playing or not, leading to various problems.

Writing music in parallel

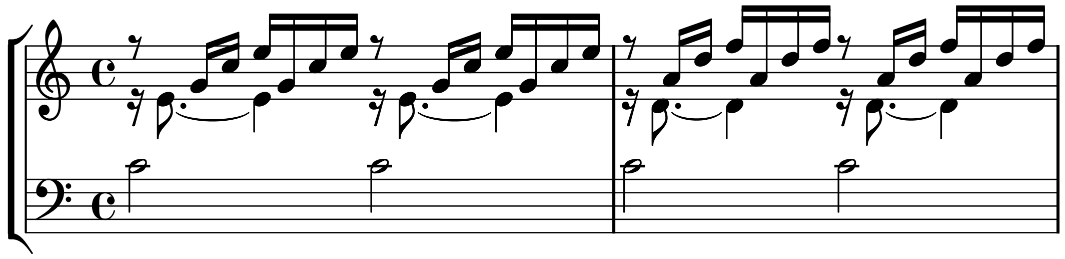
Music for multiple parts can be interleaved in input code. The function `\parallelMusic` accepts a list with the names of a number of variables to be created, and a musical expression. The content of alternate measures from the expression become the value of the respective variables, so you can use them 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.~   e'4            r16 e'8.~   e'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.~   d'4            r16 d'8.~   d'4            |
  c'2                        c'2                        |

}
\new StaffGroup <<
  \new Staff << \voiceA \\ \voiceB >>
  \new Staff { \clef bass \voiceC }
>>
```

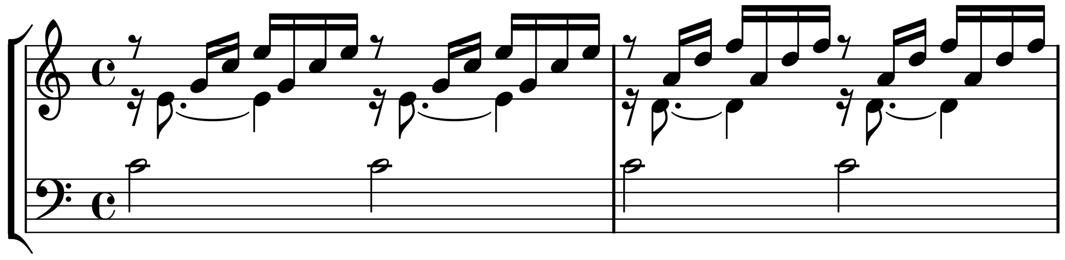


Relative mode may be used. Note that the `\relative` command is not used inside `\parallelMusic` itself. The notes are relative to the preceding note in the voice, not to the previous note in the input – in other words, relative notes for `voiceA` ignore the notes in `voiceB`.

```
\parallelMusic #'(voiceA voiceB voiceC) {
  % Bar 1
  r8 g16 c e g, c e r8 g,16 c e g, c e  |
  r16 e8.~ e4       r16 e8.~  e4        |
  c2                c                   |

  % Bar 2
  r8 a,16 d f a, d f r8 a,16 d f a, d f |
  r16 d8.~  d4       r16 d8.~  d4       |
  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:

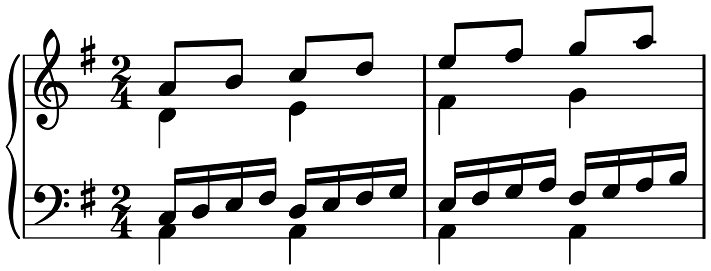
```
global = {
  \key g \major
  \time 2/4
}

\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

Trumpet B♭
Tambourine
Piano
Comodo
p grazioso
p

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

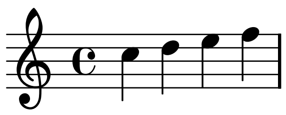
This section describes the different methods of creating and grouping staves.

Instantiating new staves

Staves (singular: *staff*) are created with the `\new` or `\context` commands. For details, see Section 5.1.2 [Creating contexts], page 377.

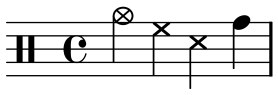
The basic staff context is `Staff`:

```
\new Staff { c4 d e f }
```



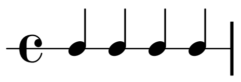
The `DrumStaff` context creates a five-line staff set up for a typical drum set. Each instrument is shown with a different symbol. The instruments are entered in drum mode following a `\drummode` command, with each instrument specified by name. For details, see [Percussion staves], page 245.

```
\new DrumStaff {
  \drummode { cymc hh ss tomh }
}
```



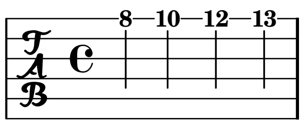
`RhythmicStaff` creates a single-line staff that only displays the rhythmic values of the input. Real durations are preserved. For details, see [Showing melody rhythms], page 51.

```
\new RhythmicStaff { c4 d e f }
```



`TabStaff` creates a tablature with six strings in standard guitar tuning. For details, see [Default tablatures], page 217.

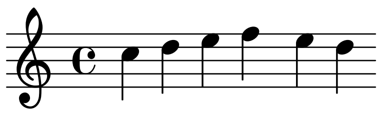
```
\new TabStaff { c4 d e f }
```



There are two staff contexts specific for the notation of ancient music: `MensuralStaff` and `VaticanaStaff`. They are described in [Pre-defined contexts], page 275.

The `GregorianTranscriptionStaff` context creates a staff to notate modern Gregorian chant. It does not show bar lines.

```
\new GregorianTranscriptionStaff { c4 d e f e d }
```



New single staff contexts may be defined. For details, see Section 5.1.5 [Defining new contexts], page 380.

See also

Music Glossary: Section “staff” in *Music Glossary*, Section “staves” in *Music Glossary*.

Notation Reference: Section 5.1.2 [Creating contexts], page 377, [Percussion staves], page 245, [Showing melody rhythms], page 51, [Default tablatures], page 217, [Pre-defined contexts], page 275, [Staff symbol], page 128, [Gregorian chant contexts], page 284, [Mensural contexts], page 277, Section 5.1.5 [Defining new contexts], page 380.

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

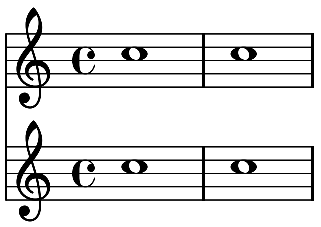
Internals Reference: Section “Staff” in *Internals Reference*, Section “DrumStaff” in *Internals Reference*, Section “GregorianTranscriptionStaff” in *Internals Reference*, Section “RhythmicStaff” in *Internals Reference*, Section “TabStaff” in *Internals Reference*, Section “MensuralStaff” in *Internals 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-stave systems. Each grouping context sets the style of the system start delimiter and the behavior of bar lines.

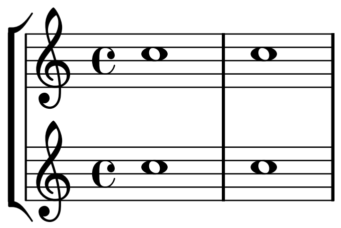
If no context is specified, the default properties will be used: the group is started with a vertical line, and the bar lines are not connected.

```
<<
  \new Staff { c1 c }
  \new Staff { c1 c }
>>
```



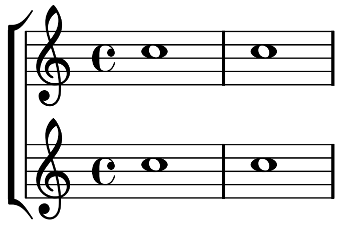
In the `StaffGroup` context, the group is started with a bracket and bar lines are drawn through all the staves.

```
\new StaffGroup <<
  \new Staff { c1 c }
  \new Staff { c1 c }
>>
```



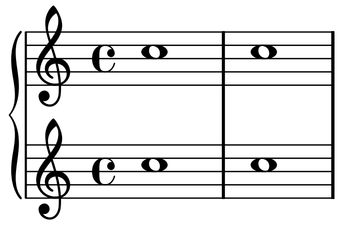
In a `ChoirStaff`, the group starts with a bracket, but bar lines are not connected.

```
\new ChoirStaff <<
  \new Staff { c1 c }
  \new Staff { c1 c }
>>
```



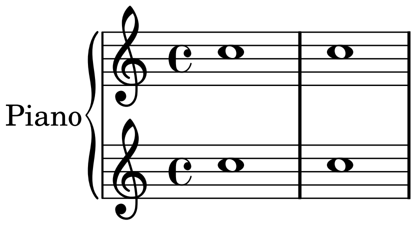
In a `GrandStaff`, the group begins with a brace, and bar lines are connected between the staves.

```
\new GrandStaff <<
  \new Staff { c1 c }
  \new Staff { c1 c }
>>
```



The `PianoStaff` is identical to a `GrandStaff`, except that it supports printing the instrument name directly. For details, see [Instrument names], page 140.

```
\new PianoStaff <<
  \set PianoStaff.instrumentName = #"Piano"
  \new Staff { c1 c }
  \new Staff { c1 c }
>>
```



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.

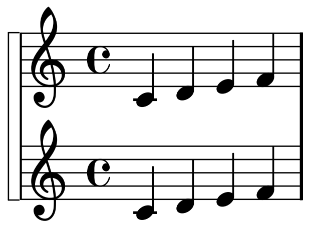
New staff group contexts may be defined. For details, see Section 5.1.5 [Defining new contexts], page 380.

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 `ChoirStaffGroup` context.

```
\score {
  \new StaffGroup { <<
  \set StaffGroup.systemStartDelimiter = #'SystemStartSquare
    \new Staff { c'4 d' e' f' }
    \new Staff { c'4 d' e' f' }
  >> }
}
```

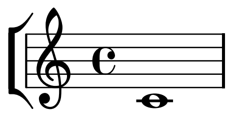


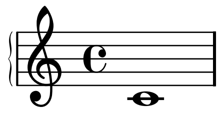
Display bracket with only one staff in a system

If there is only one staff in one of the staff types `ChoirStaff` or `StaffGroup`, the bracket and the starting bar line will not be displayed as standard behavior. This can be changed by overriding the relevant properties.

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.

```
\markup \left-column {
  \score {
    \new StaffGroup <<
      % Must be lower than the actual number of staff lines
      \override StaffGroup.SystemStartBracket #'collapse-height = #1
      \override Score.SystemStartBar #'collapse-height = #1
      \new Staff {
        c'1
      }
    >>
    \layout { }
  }
  \null
  \score {
    \new PianoStaff <<
      \override PianoStaff.SystemStartBrace #'collapse-height = #1
      \override Score.SystemStartBar #'collapse-height = #1
      \new Staff {
        c'1
      }
    >>
    \layout { }
  }
}
```

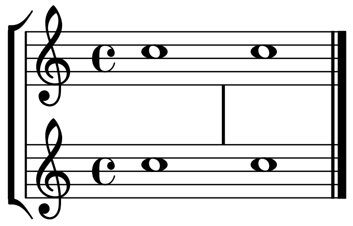




Mensurstriche layout (bar lines between the staves)

The mensurstriche-layout where the bar lines do not show on the staves but between staves can be achieved with a `StaffGroup` instead of a `ChoirStaff`. The bar line on staves is blanked out by setting the `transparent` property.

```
global = {
  \override Staff.BarLine #'transparent = ##t
  s1 s
  % the final bar line is not interrupted
  \revert Staff.BarLine #'transparent
  \bar "|."
}
\new StaffGroup \relative c'' {
  <<
    \new Staff { << \global { c1 c } >> }
    \new Staff { << \global { c c } >> }
  >>
}
```



See also

Music Glossary: Section "brace" in *Music Glossary*, Section "bracket" in *Music Glossary*, Section "grand staff" in *Music Glossary*.

Notation Reference: [Instrument names], page 140, Section 5.1.5 [Defining new contexts], page 380.

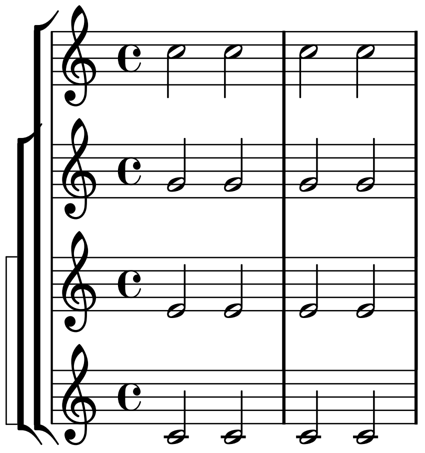
Snippets: Section "Staff notation" in *Snippets*.

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 "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 { c2 c | c2 c }
  \new StaffGroup <<
    \new Staff { g2 g | g2 g }
    \new StaffGroup \with {
      systemStartDelimiter = #'SystemStartSquare
    }
    <<
      \new Staff { e2 e | e2 e }
      \new Staff { c2 c | c2 c }
    >>
  >>
>>
```



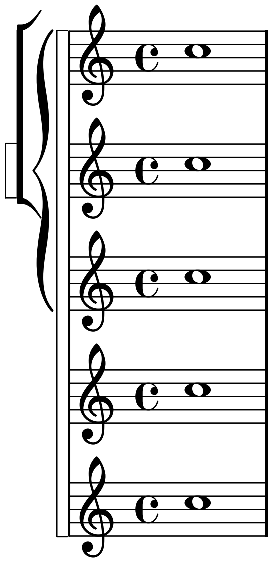
New nested staff group contexts can be defined. For details, see Section 5.1.5 [Defining new contexts], page 380.

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'' <<
  \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 123, [Instrument names], page 140, Section 5.1.5 [Defining new contexts], page 380.

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

Internals Reference: Section “StaffGroup” in *Internals Reference*, Section “ChoirStaff” in *Internals Reference*, Section “SystemStartBar” in *Internals Reference*, Section “SystemStart-Brace” in *Internals Reference*, Section “SystemStartBracket” in *Internals Reference*, Section “SystemStartSquare” in *Internals Reference*.

1.6.2 Modifying single staves

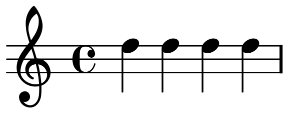
This section explains how to change specific attributes of one staff: for example, modifying the number of staff lines or the staff size. Methods to start and stop staves and set ossia sections are also described.

Staff symbol

The lines of a staff belong to the `StaffSymbol` grob. `StaffSymbol` properties can be modified to change the appearance of a staff, but they must be modified before the staff is created.

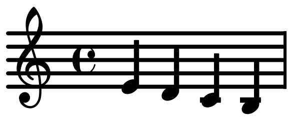
The number of staff lines may be changed. The clef position and the position of middle C may need to be modified to fit the new staff. For an explanation, refer to the snippet section in [Clef], page 11.

```
\new Staff \with {
  \override StaffSymbol #'line-count = #3
}
{ d4 d d d }
```



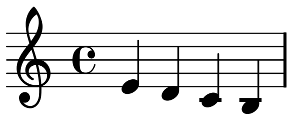
Staff line thickness can be modified. The thickness of ledger lines and stems are also affected, since they depend on staff line thickness.

```
\new Staff \with {
  \override StaffSymbol #'thickness = #3
}
{ e4 d c b }
```



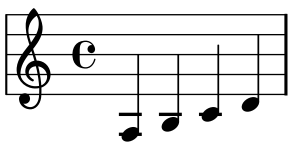
Ledger line thickness can be set independently of staff line thickness. In the example the two numbers are factors multiplying the staff line thickness and the staff line spacing. The two contributions are added to give the ledger line thickness.

```
\new Staff \with {
  \override StaffSymbol #'ledger-line-thickness = #'(1 . 0.2)
}
{ e4 d c b }
```



The distance between staff lines can be changed. This setting affects the spacing of ledger lines as well.

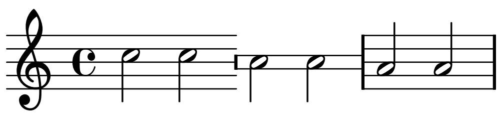
```
\new Staff \with {
  \override StaffSymbol #'staff-space = #1.5
}
{ a4 b c d }
```



Further details about the properties of `StaffSymbol` can be found in Section "staff-symbol-interface" in *Internals Reference*.

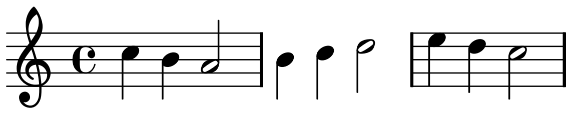
Modifications to staff properties in the middle of a score can be placed between `\stopStaff` and `\startStaff`:

```
c2 c
\stopStaff
\override Staff.StaffSymbol #'line-count = #2
\startStaff
b2 b
\stopStaff
\revert Staff.StaffSymbol #'line-count
\startStaff
a2 a
```



In general, `\startStaff` and `\stopStaff` can be used to stop or start a staff in the middle of a score.

```
c4 b a2
\stopStaff
b4 c d2
\startStaff
e4 d c2
```



Predefined commands

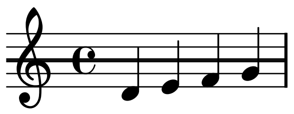
`\startStaff`, `\stopStaff`.

Selected Snippets

Making some staff lines thicker than the others

For pedagogical 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 11.

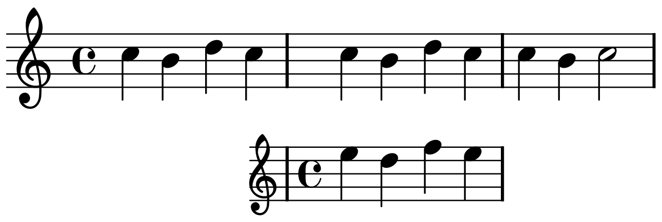
Snippets: Section "Staff notation" in *Snippets*.

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'' {
  c4 b d c
  <<
    { c4 b d c }
    \new Staff { e4 d f e }
  >>
  c4 b c2
}
```

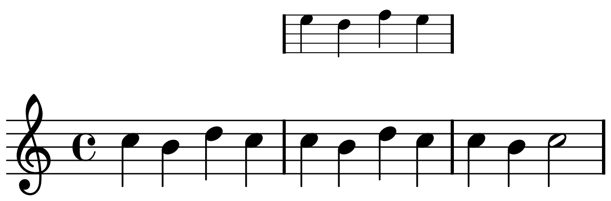


However, the above example is not what is usually desired. To create ossia staves that are above the original staff, have no time signature or clef, and have a smaller font size, tweaks must be used. The Learning Manual describes a specific technique to achieve this goal, beginning with Section "Nesting 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'' {
  c4 b d c
  <<
    { c4 b d c }

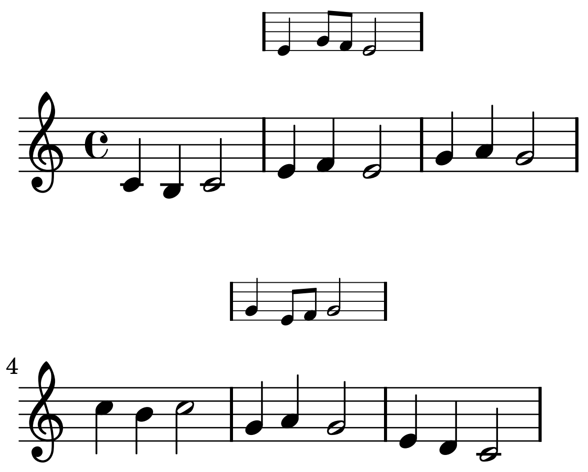
    \new Staff \with {
      \remove "Time_signature_engraver"
      alignAboveContext = #"main"
      fontSize = #-3
      \override StaffSymbol #'staff-space = #(magstep -3)
      \override StaffSymbol #'thickness = #(magstep -3)
      firstClef = ##f
    }
    { e4 d f e }
  >>
  c4 b c2
}
```



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"
    \override Clef #'transparent = ##t
    fontSize = #-3
    \override StaffSymbol #'staff-space = #(magstep -3)
    \override StaffSymbol #'thickness = #(magstep -3)
  }
  { \stopStaff s1*6 }

  \new Staff \relative c' {
    c4 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
  }
>>
```

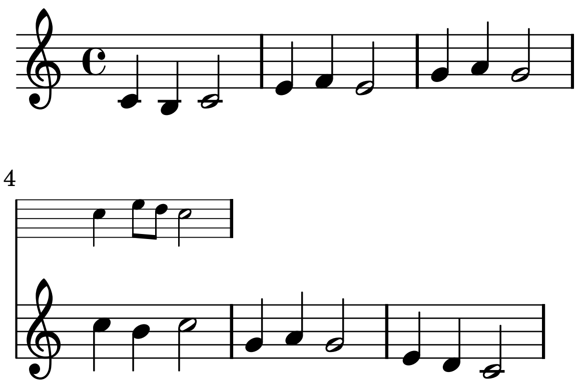


Using the \RemoveEmptyStaffContext command to create ossia staves may be used as an alternative. This method is most convenient when ossia staves occur immediately following a line break. In this case, spacer rests do not need to be used at all; only \startStaff and \stopStaff are necessary. For more information about \RemoveEmptyStaffContext, see [Hiding staves], page 134.

```
<<
  \new Staff = ossia \with {
    \remove "Time_signature_engraver"
    \override Clef #'transparent = ##t
    fontSize = #-3
    \override StaffSymbol #'staff-space = #(magstep -3)
    \override StaffSymbol #'thickness = #(magstep -3)
  }
  \new Staff \relative c' {
    c4 b c2
    e4 f e2
    g4 a g2 \break
    <<
```

```
      { c4 b c2 }
      \context Staff = ossia {
        c4 e8 d c2 \stopStaff
      }
    >>
    g4 a g2
    e4 d c2
  }
>>

\layout {
  \context {
    \RemoveEmptyStaffContext
    \override VerticalAxisGroup #'remove-first = ##t
  }
}
```



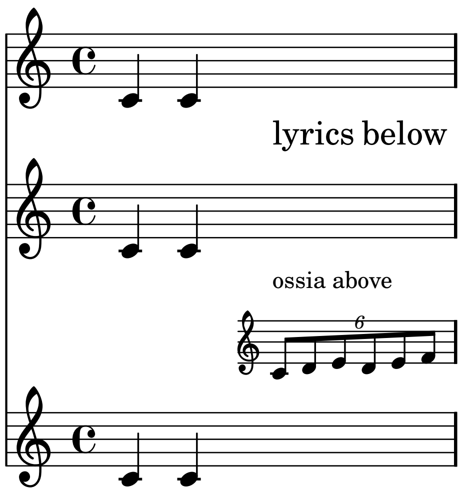
Selected Snippets

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"
      } {
        \times 4/6 {
          \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 134.

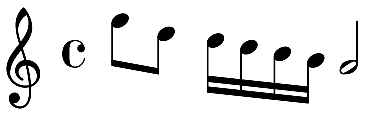
Snippets: Section “Staff notation” in *Snippets*.

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 c''' { a8 f e16 d c b a2 }
```

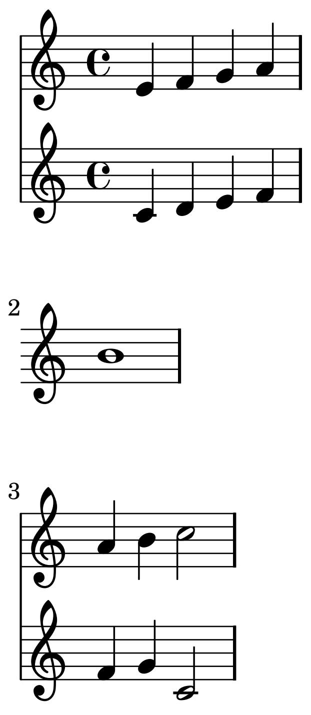


Empty staves can be hidden by setting the `\RemoveEmptyStaffContext` command in the `\layout` block. In orchestral scores, this style is known as ‘Frenched Score’. By default, this command hides and removes all empty staves in a score except for those in the first system.

Note: A staff is considered empty when it contains only multi-measure rests, skips, spacer rests, or a combination of these elements.

```
\layout {
  \context {
    \RemoveEmptyStaffContext
  }
}

\relative c' <<
  \new Staff {
    e4 f g a \break
    b1 \break
    a4 b c2
  }
  \new Staff {
    c,4 d e f \break
    R1 \break
    f4 g c,2
  }
>>
```



`\RemoveEmptyStaffContext` can also be used to create ossia sections for a staff. For details, see [Ossia staves], page 130.

The `\AncientRemoveEmptyStaffContext` command may be used to hide empty staves in ancient music contexts. Similarly, `\RemoveEmptyRhythmicStaffContext` may be used to hide empty `RhythmicStaff` contexts.

Predefined commands

`\RemoveEmptyStaffContext`, `\AncientRemoveEmptyStaffContext`, `\RemoveEmptyRhythmicStaffContext`.

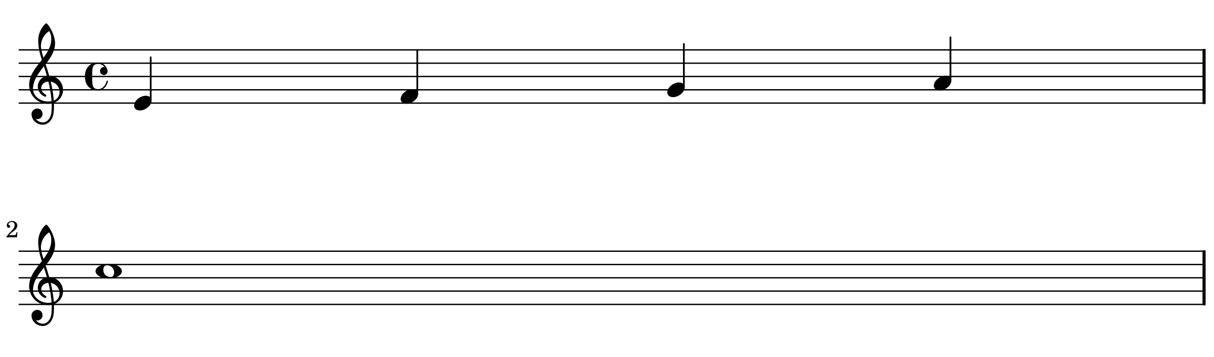
Selected Snippets

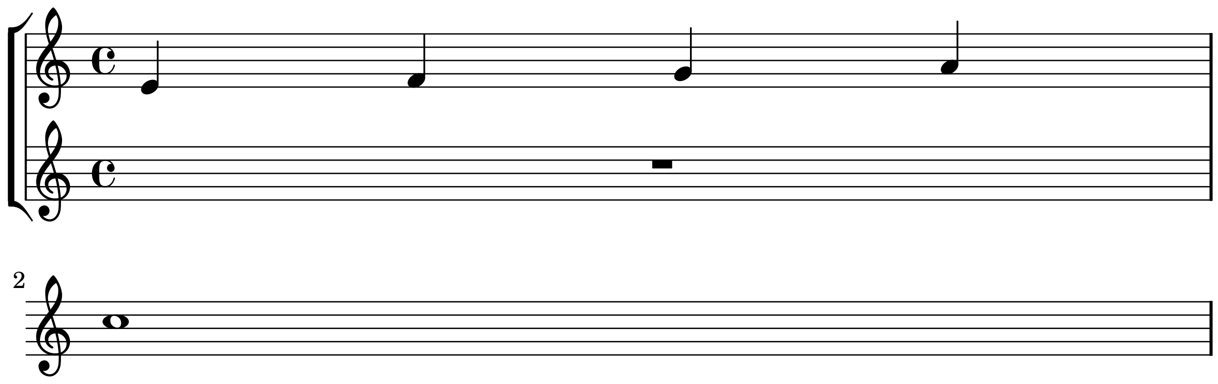
Removing the first empty line

The first empty staff can also be removed from the score by setting the `VerticalAxisGroup` property `remove-first`. This can be done globally inside the `\layout` block, or locally inside the specific staff that should be removed. In the latter case, you have to specify the context (`Staff` applies only to the current staff) in front of the property.

The lower staff of the second staff group is not removed, because the setting applies only to the specific staff inside of which it is written.

```
\layout {
  \context {
    \RemoveEmptyStaffContext
    % To use the setting globally, uncomment the following line:
    % \override VerticalAxisGroup #'remove-first = ##t
  }
}
\new StaffGroup <<
  \new Staff \relative c' {
    e4 f g a \break
    c1
  }
  \new Staff {
    % To use the setting globally, comment this line,
    % uncomment the line in the \layout block above
    \override Staff.VerticalAxisGroup #'remove-first = ##t
    R1 \break
    R
  }
>>
\new StaffGroup <<
  \new Staff \relative c' {
    e4 f g a \break
    c1
  }
  \new Staff {
    R1 \break
    R
  }
>>
```





See also

Music Glossary: Section "Frenched staff" in *Music Glossary*.

Notation Reference: [Staff symbol], page 128, [Ossia staves], page 130.

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*.

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:

```
\override StaffSymbol #'stencil = ##f
\override NoteHead #'no-ledgers = ##t
```

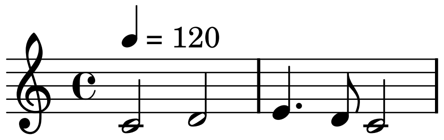
1.6.3 Writing parts

This section explains how to insert tempo indications and instrument names into a score. Methods to quote other voices and format cue notes are also described.

Metronome marks

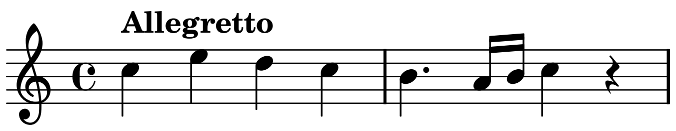
A basic metronome mark is simple to write:

```
\tempo 4 = 120
c2 d
e4. d8 c2
```



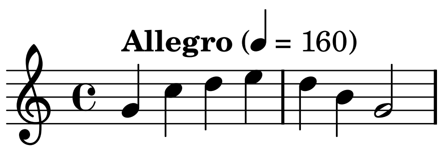
Tempo indications with text can be used instead:

```
\tempo "Allegretto"
c4 e d c
b4. a16 b c4 r4
```



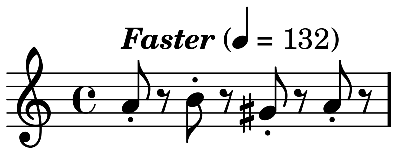
Combining a metronome mark and text will automatically place the metronome mark within parentheses:

```
\tempo "Allegro" 4 = 160
g4 c d e
d4 b g2
```



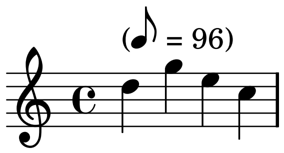
In general, the text can be any markup object:

```
\tempo \markup { \italic Faster } 4 = 132
a8-. r8 b-. r gis-. r a-. r
```



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

```
\tempo "" 8 = 96
d4 g e c
```



Selected Snippets

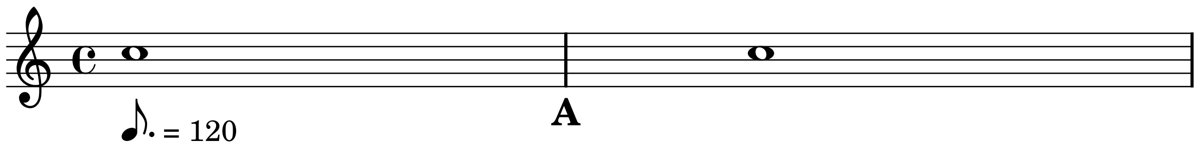
Printing metronome and rehearsal marks below the staff

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 { ragged-right = ##f }

{
  % Metronome marks below the staff
  \override Score.MetronomeMark #'direction = #DOWN
  \tempo 8. = 120
  c''1

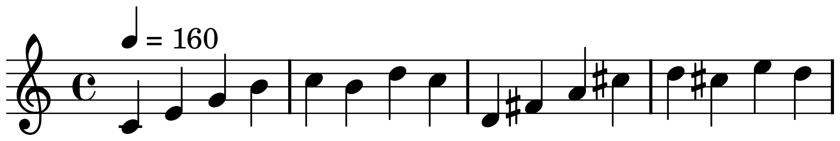
  % Rehearsal marks below the staff
  \override Score.RehearsalMark #'direction = #DOWN
  \mark \default
  c''1
}
```



Changing the tempo without a metronome mark

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

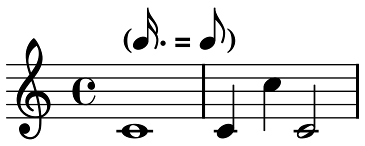
```
\score {
  \new Staff \relative c' {
    \tempo 4 = 160
    c4 e g b
    c4 b d c
    \set Score.tempoHideNote = ##t
    \tempo 4 = 96
    d,4 fis a cis
    d4 cis e d
  }
  \layout { }
  \midi { }
}
```



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 167.

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 167, Section 3.5 [MIDI output], page 323.

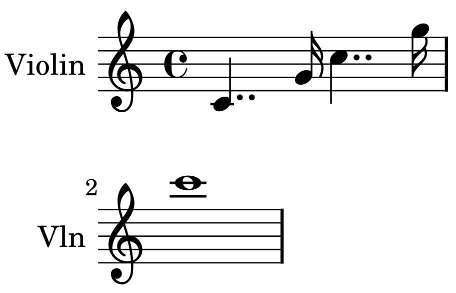
Snippets: Section "Staff notation" in *Snippets*.

Internals Reference: Section "MetronomeMark" in *Internals Reference*.

Instrument names

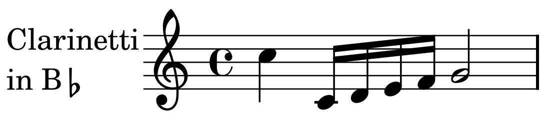
Instrument names can be printed on the left side of staves in the `Staff` and `PianoStaff` contexts. The value of `instrumentName` is used for the first staff, and the value of `shortInstrumentName` is used for all succeeding staves.

```
\set Staff.instrumentName = #"Violin "
\set Staff.shortInstrumentName = #"Vln "
c4.. g'16 c4.. g'16
\break
c1
```



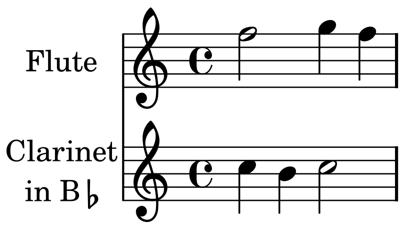
Markup mode can be used to create more complicated instrument names:

```
\set Staff.instrumentName = \markup {
  \column { "Clarinetti"
            \line { "in B" \smaller \flat } } }
c4 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:

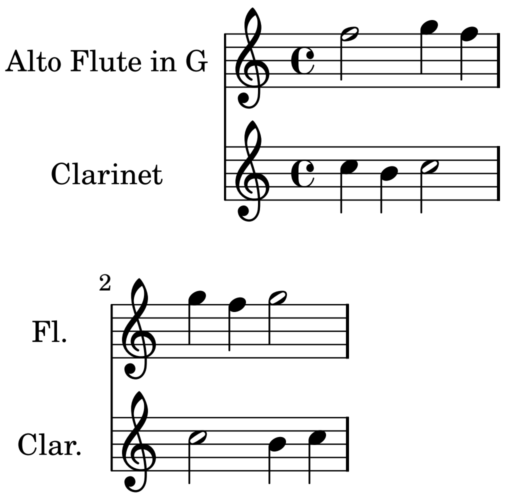
```
<<
  \new Staff {
    \set Staff.instrumentName = #"Flute"
    f2 g4 f
  }
  \new Staff {
    \set Staff.instrumentName = \markup \center-column {
      Clarinet
      \line { "in B" \smaller \flat }
    }
    c4 b c2
  }
>>
```



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 [Horizontal dimensions], page 336.

```
\layout {
  indent = 3.0\cm
  short-indent = 1.5\cm
}

\relative c'' <<
  \new Staff {
    \set Staff.instrumentName = #"Alto Flute in G"
    \set Staff.shortInstrumentName = #"Fl."
    f2 g4 f \break
    g4 f g2
  }
  \new Staff {
    \set Staff.instrumentName = #"Clarinet"
    \set Staff.shortInstrumentName = #"Clar."
    c,4 b c2 \break
    c2 b4 c
  }
>>
```

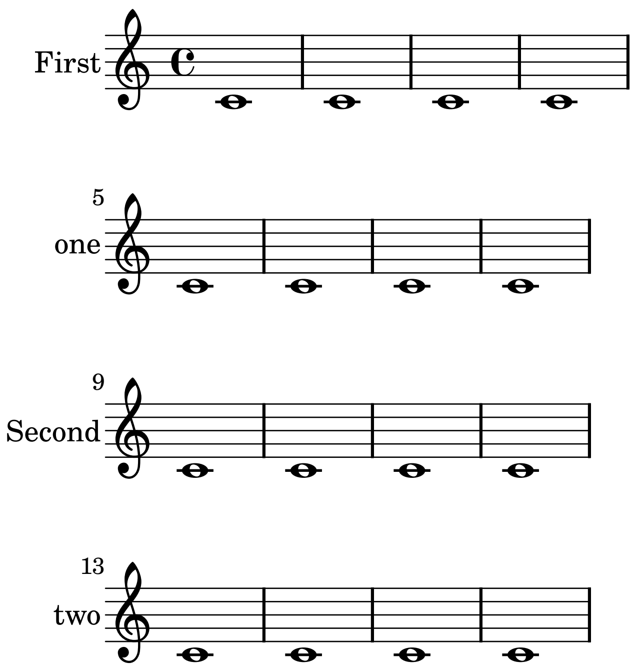


To add instrument names to other contexts (such as GrandStaff, ChoirStaff, or StaffGroup), Instrument_name_engraver must be added to that context. For details, see Section 5.1.3 [Modifying context plug-ins], page 378.

Instrument names may be changed in the middle of a piece:

```
\set Staff.instrumentName = #"First"
\set Staff.shortInstrumentName = #"one"
c1 c c c \break
c1 c c c \break
\set Staff.instrumentName = #"Second"
```

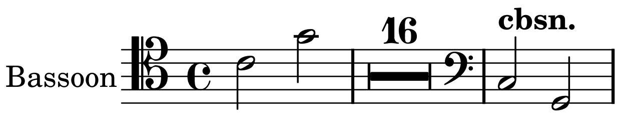
```
\set Staff.shortInstrumentName = #"two"
c1 c c c \break
c1 c c c \break
```

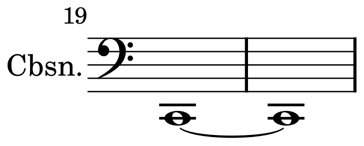


If an instrument *switch* is needed, `\addInstrumentDefinition` may be used in combination with `\instrumentSwitch` to create a detailed list of the necessary changes for the switch. The `\addInstrumentDefinition` command has two arguments: an identifying string, and an association list of context properties and values to be used for the instrument. It must be placed in the toplevel scope. `\instrumentSwitch` is used in the music expression to declare the instrument switch:

```
\addInstrumentDefinition #"contrabassoon"
  #`((instrumentTransposition . ,(ly:make-pitch -1 0 0))
     (shortInstrumentName . "Cbsn.")
     (clefGlyph . "clefs.F")
     (middleCPosition . 6)
     (clefPosition . 2)
     (instrumentCueName . ,(make-bold-markup "cbsn."))
     (midiInstrument . "bassoon"))

\new Staff \with {
  instrumentName = #"Bassoon"
}
\relative c' {
  \clef tenor
  \compressFullBarRests
  c2 g'
  R1*16
  \instrumentSwitch "contrabassoon"
  c,,2 g \break
  c,1 ~ | c1
}
```





See also

Notation Reference: [Horizontal dimensions], page 336, Section 5.1.3 [Modifying context plug-ins], page 378.

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 double some of the music from another voice. For example, the first and second violins may play the same notes during a passage of music. In LilyPond this is accomplished by letting one voice *quote* the other voice without having to re-enter it.

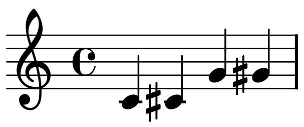
Before a part can be quoted, the `\addQuote` command must be used to initialize the quoted fragment. This command must be used in the toplevel scope. The first argument is an identifying string, and the second is a music expression:

```
flute = \relative c'' {
  a4 gis g gis
}
\addQuote "flute" { \flute }
```

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 that indicates the duration of the quote, usually spacer rests or multi-measure rests. The corresponding music from the quoted voice is inserted into the music expression:

```
flute = \relative c'' {
  a4 gis g gis
}
\addQuote "flute" { \flute }

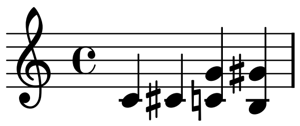
\relative c' {
  c4 cis \quoteDuring #"flute" { s2 }
}
```



If the music expression used for `\quoteDuring` contains anything but a spacer rest or multi-measure rest, a polyphonic situation is created, which is often not desirable:

```
flute = \relative c'' {
  a4 gis g gis
}
\addQuote "flute" { \flute }
```

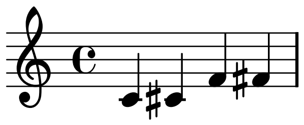
```
\relative c' {
  c4 cis \quoteDuring #"flute" { c4 b }
}
```



Quotations recognize instrument transposition settings for both the source and target instruments if the `\transposition` command is used. For details about `\transposition`, see [Instrument transpositions], page 17.

```
clarinet = \relative c'' {
  \transposition bes
  a4 gis g gis
}
\addQuote "clarinet" { \clarinet }

\relative c' {
  c4 cis \quoteDuring #"clarinet" { s2 }
}
```



It is possible to tag quotations with unique names in order to process them in different ways. For details about this procedure, see [Using tags], page 318.

Selected Snippets

Quoting another voice with transposition

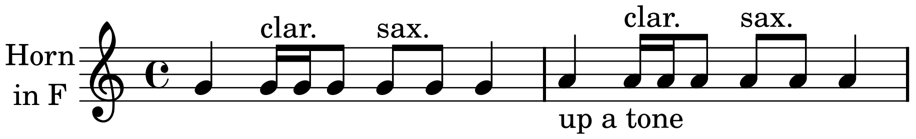
Quotations take into account the transposition of both source and target. In this example, all instruments play sounding middle C; the target is an instrument in F. The target part may be transposed using `\transpose`. In this case, all the pitches (including the quoted ones) are transposed.

```
\addQuote clarinet {
  \transposition bes
  \repeat unfold 8 { d'16 d' d'8 }
}

\addQuote sax {
  \transposition es'
  \repeat unfold 16 { a8 }
}

quoteTest = {
  % french horn
  \transposition f
  g'4
  << \quoteDuring #"clarinet" { \skip 4 } s4^"clar." >>
  << \quoteDuring #"sax" { \skip 4 } s4^"sax." >>
  g'4
}

{
  \set Staff.instrumentName =
    \markup {
      \center-column { Horn \line { in F } }
    }
  \quoteTest
  \transpose c' d' << \quoteTest s4_"up a tone" >>
}
```



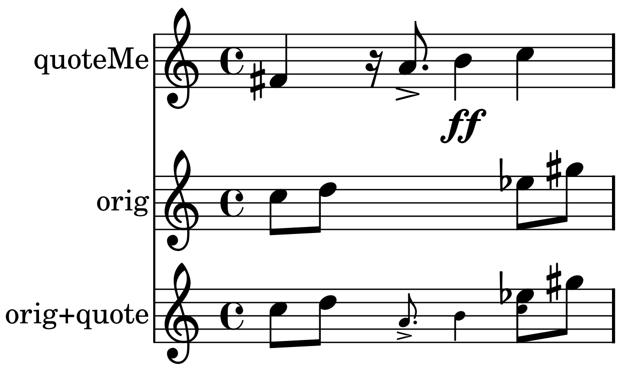
Quoting another voice

The `quotedEventTypes` property determines the music event types that are quoted. The default value is `(note-event rest-event)`, which means that only notes and rests of the quoted voice appear in the `\quoteDuring` expression. In the following example, a 16th rest is not quoted since `rest-event` is not in `quotedEventTypes`.

```
quoteMe = \relative c' {
  fis4 r16 a8.-> b4\ff c
}
\addQuote quoteMe \quoteMe

original = \relative c'' {
  c8 d s2
  \once \override NoteColumn #'ignore-collision = ##t
  es8 gis8
}

<<
  \new Staff {
    \set Staff.instrumentName = #"quoteMe"
    \quoteMe
  }
  \new Staff {
    \set Staff.instrumentName = #"orig"
    \original
  }
  \new Staff \relative c'' <<
    \set Staff.instrumentName = #"orig+quote"
    \set Staff.quotedEventTypes =
      #'(note-event articulation-event)
    \original
    \new Voice {
      s4
      \set fontSize = #-4
      \override Stem #'length-fraction = #(magstep -4)
      \quoteDuring #"quoteMe" { \skip 2. }
    }
  >>
>>
```



See also

Notation Reference: [Instrument transpositions], page 17, [Using tags], page 318.

Snippets: Section "Staff notation" in *Snippets*.

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 *music* cannot contain `\new` and `\context Voice` statements that would switch to a different Voice.

Quoting grace notes is broken and can even cause LilyPond to crash.

Quoting nested triplets may result in poor notation.

In earlier versions of LilyPond (pre 2.11), `addQuote` was written entirely in lower-case letters: `\addquote`.

Formatting cue notes

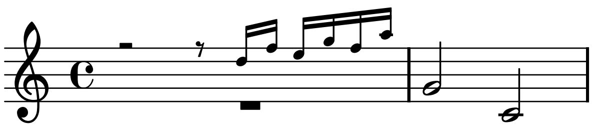
The previous section explains how to create quotations. The `\cueDuring` command is a more specialized form of `\quoteDuring`, being particularly useful for inserting cue notes into a part. The syntax is as follows:

`\cueDuring #`*`partname`*` #`*`voice music`*

This command copies the corresponding measures from *partname* into a `CueVoice` context. The `CueVoice` is created implicitly, and occurs simultaneously with *music*, which creates a polyphonic situation. The *voice* argument determines whether the cue notes should be notated as a first or second voice; `UP` corresponds to the first voice, and `DOWN` corresponds to the second.

```
oboe = \relative c'' {
  r2 r8 d16 f e g f a
  g8 g16 g g2.
}
\addQuote "oboe" { \oboe }

\new Voice \relative c'' {
  \cueDuring #"oboe" #UP { R1 }
  g2 c,
}
```

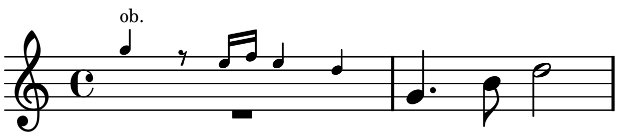


In the above example, the `Voice` context had to be explicitly declared, or else the entire music expression would belong to the `CueVoice` context.

The name of the cued instrument can be printed by setting the `instrumentCueName` property in the `CueVoice` context.

```
oboe = \relative c''' {
  g4 r8 e16 f e4 d
}
\addQuote "oboe" { \oboe }

\new Staff \relative c'' <<
  \new CueVoice \with {
    instrumentCueName = "ob."
  }
  \new Voice {
    \cueDuring #"oboe" #UP { R1 }
    g4. b8 d2
  }
>>
```

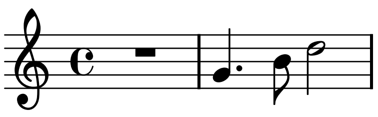


In addition to printing the name of the cued instrument, when cue notes end, the name of the original instrument should be printed, and any other changes introduced by the cued part should be undone. This can be accomplished by using `\addInstrumentDefinition` and `\instrumentSwitch`. For an example and explanation, see [Instrument names], page 140.

The `\killCues` command removes cue notes from a music expression. This can be useful if cue notes need to be removed from a part but may be restored at a later time.

```
flute = \relative c''' {
  r2 cis2 r2 dis2
}
\addQuote "flute" { \flute }

\new Voice \relative c'' {
  \killCues {
    \cueDuring #"flute" #UP { R1 }
    g4. b8 d2
  }
}
```

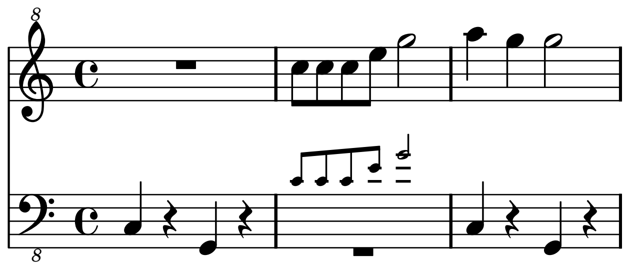


The `\transposedCueDuring` command is useful for adding instrumental cues from a completely different register. The syntax is similar to `\cueDuring`, but it requires one extra argument to specify the transposition of the cued instrument. For more information about transposition, see [Instrument transpositions], page 17.

```
piccolo = \relative c''' {
  \clef "treble^8"
  R1
  c8 c c e g2
  a4 g g2
}
\addQuote "piccolo" { \piccolo }

cbassoon = \relative c, {
  \clef "bass_8"
  c4 r g r
  \transposedCueDuring #"piccolo" #UP c,, { R1 }
  c4 r g r
}

<<
  \new Staff = "piccolo" \piccolo
  \new Staff = "cbassoon" \cbassoon
>>
```



It is possible to tag cued parts with unique names in order to process them in different ways. For details about this procedure, see [Using tags], page 318.

See also

Notation Reference: [Instrument transpositions], page 17, [Instrument names], page 140, [Using tags], page 318.

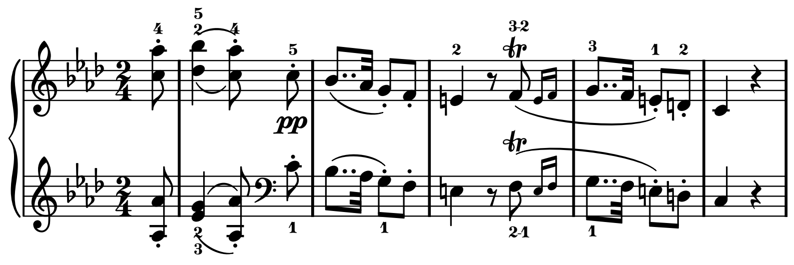
Snippets: Section "Staff notation" in *Snippets*.

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.

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

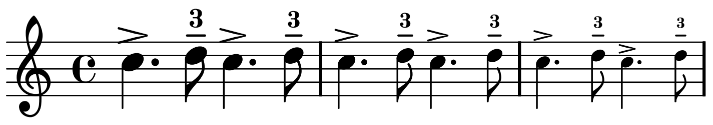
This section discusses how to add emphasis to elements that are inside the staff.

Selecting notation font size

The font size of notation elements may be altered. It does not change the size of variable symbols, such as beams or slurs.

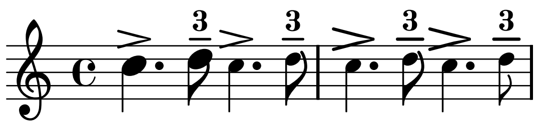
Note: For font sizes of text, see [Selecting font and font size], page 168.

```
\huge
c4.-> d8---3
\large
c4.-> d8---3
\normalsize
c4.-> d8---3
\small
c4.-> d8---3
\tiny
c4.-> d8---3
\teeny
c4.-> d8---3
```



Internally, this sets the `fontSize` property. This in turn causes the `font-size` property to be set in all layout objects. The value of `font-size` is a number indicating the size relative to the standard size for the current staff height. Each step up is an increase of approximately 12% of the font size. Six steps is exactly a factor of two. The Scheme function `magstep` converts a `font-size` number to a scaling factor. The `font-size` property can also be set directly, so that only certain layout objects are affected.

```
\set fontSize = #3
c4.-> d8---3
\override NoteHead #'font-size = #-4
c4.-> d8---3
\override Script #'font-size = #2
c4.-> d8---3
\override Stem #'font-size = #-5
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 20pt staff, a 10pt font is selected.

The `font-size` property can only be set on layout objects that use fonts. These are the ones supporting the `font-interface` layout interface.

Predefined commands

`\teeny`, `\tiny`, `\small`, `\normalsize`, `\large`, `\huge`.

See also

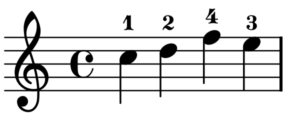
Snippets: Section "Editorial annotations" in *Snippets*.

Internals Reference: Section "font-interface" in *Internals Reference*.

Fingering instructions

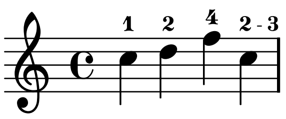
Fingering instructions can be entered using *note-digit*:

```
c4-1 d-2 f-4 e-3
```



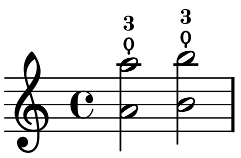
Markup texts may be used for finger changes.

```
c4-1 d-2 f-4 c^\markup { \finger "2 - 3" }
```



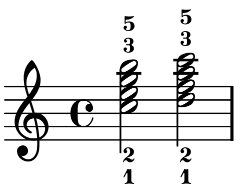
A thumb-script can be added (e.g., in cello music) to indicate that a note should be played with the thumb.

```
<a_\thumb a'-3>2 <b_\thumb b'-3>
```



Fingerings for chords can also be added to individual notes of the chord by adding them after the pitches.

```
<c-1 e-2 g-3 b-5>2 <d-1 f-2 a-3 c-5>
```



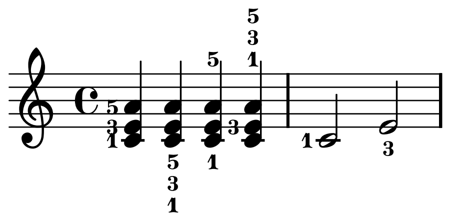
Fingering instructions may be manually placed above or below the staff, see Section 5.4.2 [Direction and placement], page 394.

Selected Snippets

Controlling the placement of chord fingerings

The placement of fingering numbers can be controlled precisely.

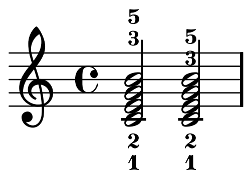
```
\relative c' {
  \set fingeringOrientations = #'(left)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(down)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(down right up)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(up)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(left)
  <c-1>2
  \set fingeringOrientations = #'(down)
  <e-3>2
}
```



Allowing fingerings to be printed inside the staff

By default, vertically oriented fingerings are positioned outside the staff. However, this behavior can be canceled.

```
\relative c' {
  <c-1 e-2 g-3 b-5>2
  \once \override Fingering #'staff-padding = #'()
  <c-1 e-2 g-3 b-5>2
}
```

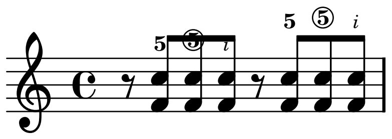


Avoiding collisions with chord fingerings

Fingerings and string numbers applied to individual notes will automatically avoid beams and stems, but this is not true by default for fingerings and string numbers applied to the individual notes of chords. The following example shows how this default behavior can be overridden.

```
\relative c' {
  \set fingeringOrientations = #'(up)
  \set stringNumberOrientations = #'(up)
  \set strokeFingerOrientations = #'(up)
  % Default behavior
  r8
  <f c'-5>8
  <f c'\5>8
  <f c'-\rightHandFinger #2 >8

  % Corrected to avoid collisions
  r8
  \override Fingering #'add-stem-support = ##t
  <f c'-5>8
  \override StringNumber #'add-stem-support = ##t
  <f c'\5>8
  \override StrokeFinger #'add-stem-support = ##t
  <f c'-\rightHandFinger #2 >8
}
```



See also

Notation Reference: Section 5.4.2 [Direction and placement], page 394

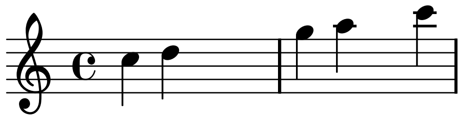
Snippets: Section “Editorial annotations” in *Snippets*.

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*.

Hidden notes

Hidden (or invisible or transparent) notes can be useful in preparing theory or composition exercises.

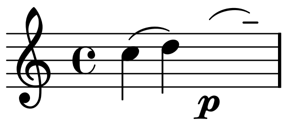
```
c4 d
\hideNotes
e4 f
\unHideNotes
g a
\hideNotes
b
\unHideNotes
c
```



Notation objects which are attached to invisible notes are still visible.

```
c4( d)
\hideNotes
```

```
e4(\p f)--
```



Predefined commands

`\hideNotes`, `\unHideNotes`.

See also

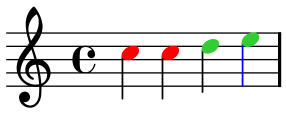
Snippets: Section "Editorial annotations" in *Snippets*.

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 B.5 [List of colors], page 445.

```
\override NoteHead #'color = #red
c4 c
\override NoteHead #'color = #(x11-color 'LimeGreen)
d
\override Stem #'color = #blue
e
```

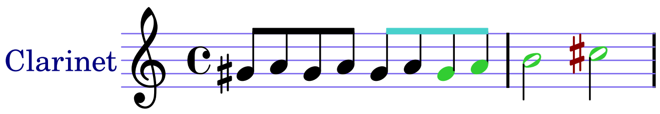


The full range of colors defined for X11 can be accessed by using the Scheme function `x11-color`. The function takes one argument; this can be a symbol in the form *'FooBar* or a string in the form "*FooBar*". The first form is quicker to write and is more efficient. However, using the second form it is possible to access X11 colors by the multi-word form of its name.

If `x11-color` cannot make sense of the parameter then the color returned defaults to black.

```
\override Staff.StaffSymbol #'color = #(x11-color 'SlateBlue2)
\set Staff.instrumentName = \markup {
  \with-color #(x11-color 'navy) "Clarinet"
}

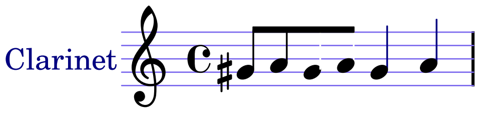
gis8 a
\override Beam #'color = #(x11-color "medium turquoise")
gis a
\override Accidental #'color = #(x11-color 'DarkRed)
gis a
\override NoteHead #'color = #(x11-color "LimeGreen")
gis a
% this is deliberate nonsense; note that the stems remain black
\override Stem #'color = #(x11-color 'Boggle)
b2 cis
```



Exact RGB colors can be specified using the Scheme function `rgb-color`.

```
\override Staff.StaffSymbol #'color = #(x11-color 'SlateBlue2)
\set Staff.instrumentName = \markup {
  \with-color #(x11-color 'navy) "Clarinet"
}

\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 B.5 [List of colors], page 445, Section 5.3.4 [The tweak command], page 390.

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.

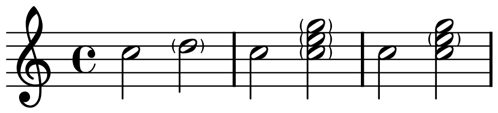
Not all X11 colors are distinguishable in a web browser, i.e., a web browser might not display a difference between `'LimeGreen` and `'ForestGreen`. For web use normal colors are recommended (i.e., `#blue`, `#green`, `#red`).

Notes in a chord cannot be colored with `\override`; use `\tweak` instead, see Section 5.3.4 [The tweak command], page 390.

Parentheses

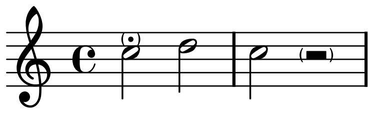
Objects may be parenthesized by prefixing `\parenthesize` to the music event. When prefixed to a chord, it parenthesizes every note. Individual notes inside a chord may also be parenthesized.

```
c2 \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.

```
c2-\parenthesize -. d
c2 \parenthesize r
```



See also

Snippets: Section "Editorial annotations" in *Snippets*.

Internals Reference: Section "Parenthesis_engraver" in *Internals Reference*, Section "ParenthesesItem" in *Internals Reference*, Section "parentheses-interface" in *Internals Reference*.

Known issues and warnings

Parenthesizing a chord prints parentheses around each individual note, instead of a single large parenthesis around the entire chord.

Stems

Whenever a note is found, a `Stem` object is created automatically. For whole notes and rests, they are also created but made invisible.

Predefined commands

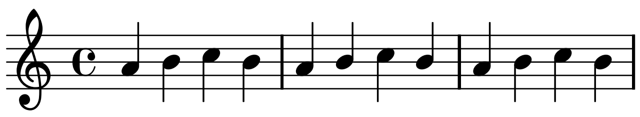
`\stemUp`, `\stemDown`, `\stemNeutral`.

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
}
```



See also

Notation Reference: Section 5.4.2 [Direction and placement], page 394.

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*.

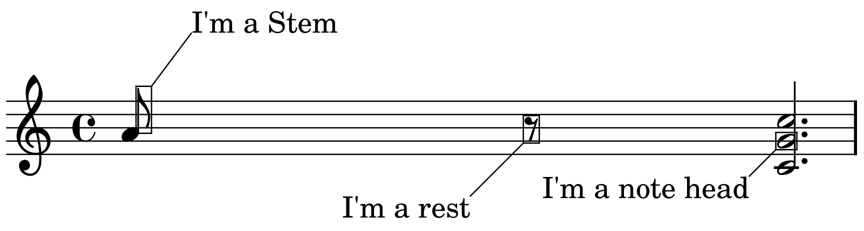
1.7.2 Outside the staff

This section discusses how to add emphasis to elements in the staff from outside of the staff.

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.

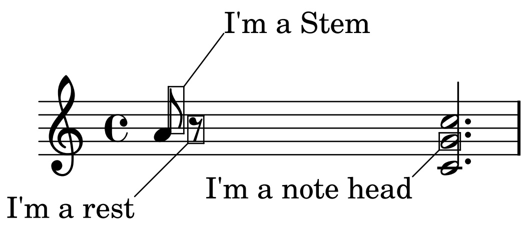
```
\new Voice \with { \consists "Balloon_engraver" }
{
  \balloonGrobText #'Stem #'(3 . 4) \markup { "I'm a Stem" }
  a8
  \balloonGrobText #'Rest #'(-4 . -4) \markup { "I'm a rest" }
  r
  <c, g'-\balloonText #'(-2 . -2) \markup { "I'm a note head" } c>2.
}
```



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 normally influences note spacing, but this can be altered:

```
\new Voice \with { \consists "Balloon_engraver" }
{
  \balloonLengthOff
  \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.
}
```



Predefined commands

`\balloonLengthOn`, `\balloonLengthOff`.

See also

Snippets: Section "Editorial annotations" in *Snippets*.

Internals Reference: Section "Balloon_engraver" in *Internals Reference*, Section "BalloonTextItem" in *Internals Reference*, Section "balloon-interface" in *Internals Reference*.

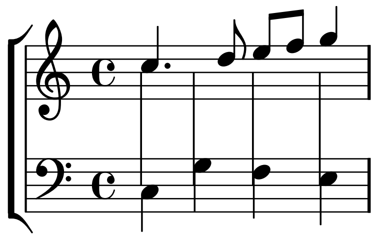
Grid lines

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 = #(ly:make-moment 1 4)
  }
  \context {
    \Score
    \consists "Grid_line_span_engraver"
  }
}

\score {
  \new ChoirStaff <<
    \new Staff \relative c'' {
      \stemUp
      c4. d8 e8 f g4
    }
    \new Staff \relative c {
      \clef bass
      \stemDown
      c4 g' f e
    }
  >>
}
```

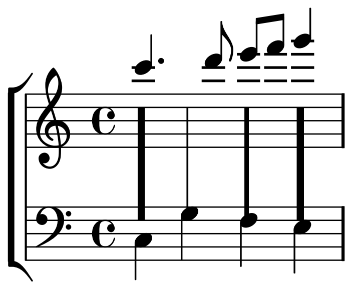


Selected Snippets

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 = #(ly:make-moment 1 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

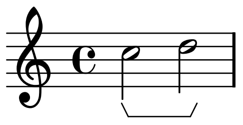
Snippets: Section "Editorial annotations" in *Snippets*.

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

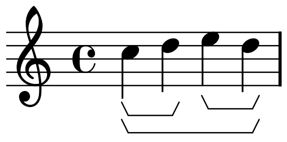
Brackets are used in musical analysis to indicate structure in musical pieces. Simple horizontal brackets are supported.

```
\layout {
  \context {
    \Voice
    \consists "Horizontal_bracket_engraver"
  }
}
\relative c'' {
  c2\startGroup
  d\stopGroup
}
```



Analysis brackets may be nested.

```
\layout {
  \context {
    \Voice
    \consists "Horizontal_bracket_engraver"
  }
}
\relative c'' {
  c4\startGroup\startGroup
  d4\stopGroup
  e4\startGroup
  d4\stopGroup\stopGroup
}
```

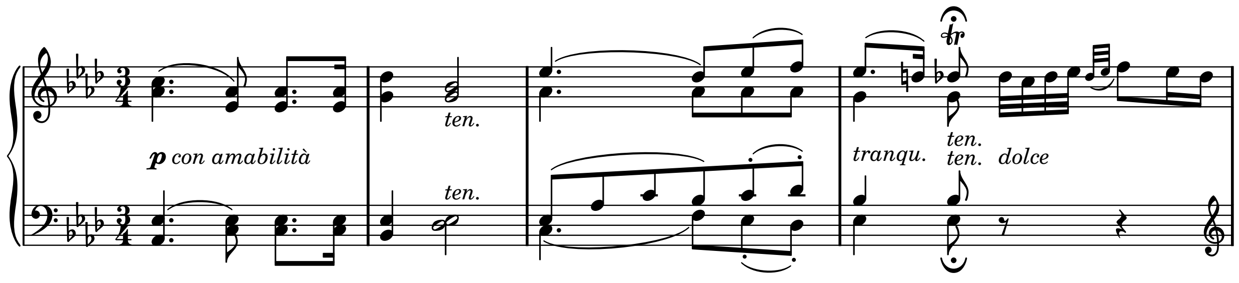


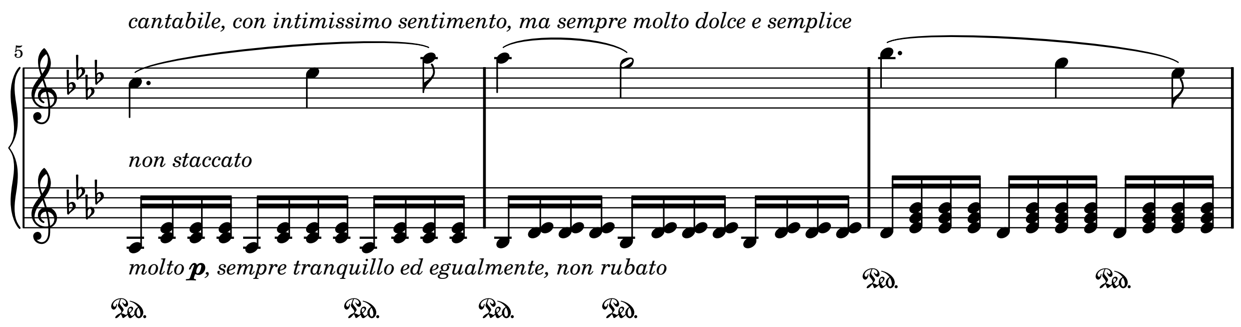
See also

Snippets: Section “Editorial annotations” in *Snippets*.

Internals Reference: Section “Horizontal_bracket_engraver” in *Internals Reference*, Section “HorizontalBracket” in *Internals Reference*, Section “horizontal-bracket-interface” in *Internals Reference*, Section “Staff” in *Internals Reference*.

1.8 Text




cantabile, con intimissimo sentimento, ma sempre molto dolce e semplice
5
non staccato
molto p, sempre tranquillo ed egualmente, non rubato
Ped.
Ped.
Ped.
Ped.
Ped.
Ped.

This section explains how to include text (with various formatting) in music scores.

Some text elements that are not dealt with here are discussed in other specific sections: Section 2.1 [Vocal music], page 183, Section 3.2 [Titles and headers], page 309.

1.8.1 Writing text

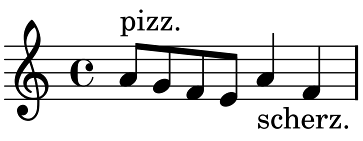
This section introduces different ways of adding text to a score.

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 Section 3.3.3 [Text encoding], page 321.

Text scripts

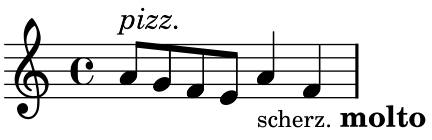
Simple "quoted text" indications may be added to a score, as demonstrated in the following example. Such indications may be manually placed above or below the staff, using the syntax described in Section 5.4.2 [Direction and placement], page 394.

```
a8^"pizz." g f e a4-"scherz." f
```



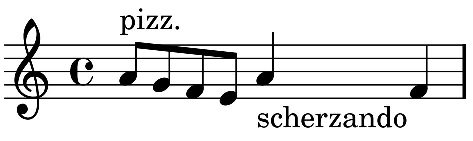
This syntax is actually a shorthand; more complex text formatting may be added to a note by explicitly using a `\markup` block, as described in Section 1.8.2 [Formatting text], page 167.

```
a8^\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.

```
a8^"pizz." g f e
\textLengthOn
a4_"scherzando" f
```



Predefined commands

`\textLengthOn`, `\textLengthOff`.

See also

Notation Reference: Section 1.8.2 [Formatting text], page 167, Section 5.4.2 [Direction and placement], page 394.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "TextScript" in *Internals Reference*.

Known issues and warnings

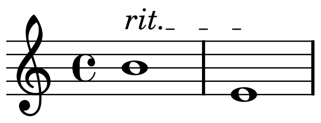
Checking to make sure that text scripts and lyrics are within the margins is a relatively large computational task. To speed up processing, LilyPond does not perform such calculations by default; to enable it, use

```
\override Score.PaperColumn #'keep-inside-line = ##t
```

Text spanners

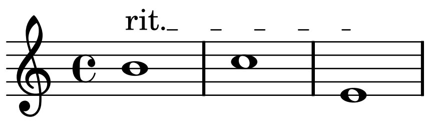
Some performance indications, e.g., *rallentando* or *accelerando*, are written as text and are extended over multiple notes with dotted lines. Such objects, called "spanners", may be created from one note to another using the following syntax:

```
\override TextSpanner #'(bound-details left text) = "rit."
b1\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 167.

```
\override TextSpanner #'(bound-details left text) =
  \markup { \upright "rit." }
b1\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 5.4.7 [Line styles], page 405.

Predefined commands

`\textSpannerUp`, `\textSpannerDown`, `\textSpannerNeutral`.

See also

Notation Reference: Section 5.4.7 [Line styles], page 405, [Dynamics], page 83.

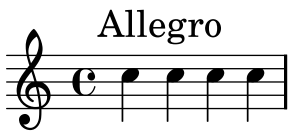
Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "TextSpanner" in *Internals Reference*.

Text marks

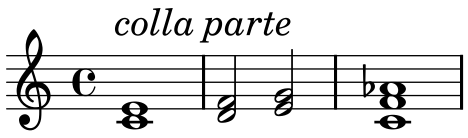
Various text elements may be added to a score using the syntax described in [Rehearsal marks], page 74:

```
c4
\mark "Allegro"
c c c
```



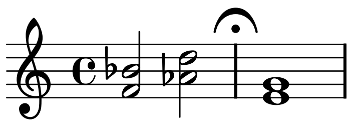
This syntax makes it possible to put any text on a bar line; more complex text formatting may be added using a `\markup` block, as described in Section 1.8.2 [Formatting text], page 167:

```
<c e>1
\mark \markup { \italic { colla parte } }
<d f>2 <e g>
<c f aes>1
```



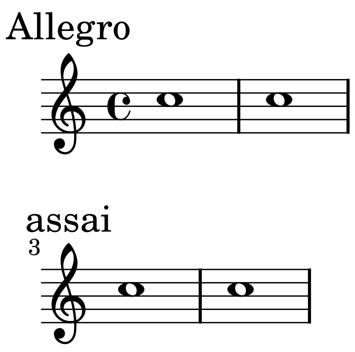
This syntax also allows to print special signs, like coda, segno or fermata, by specifying the appropriate symbol name as explained in [Music notation inside markup], page 176:

```
<bes f>2 <aes d>
\mark \markup { \musicglyph #"scripts.ufermata" }
<e g>1
```



Such objects are only typeset above the top staff of the score; depending on whether they are specified at the end or the middle of a bar, they can be placed above the bar line or between notes. When specified at a line break, the mark will be printed at the beginning of the next line.

```
\mark "Allegro"
c1 c
\mark "assai" \break
c c
```



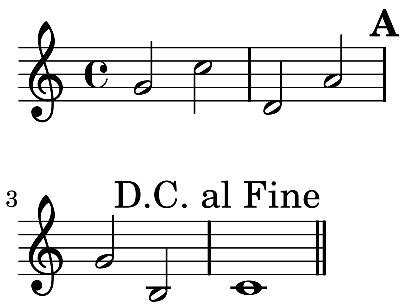
Selected Snippets

Printing marks at the end of a line or a score

Marks can be printed at the end of the current line, instead of the beginning of the following line. This is particularly useful when a mark has to be added at the end of a score – when there is no next line.

In such cases, the right end of the mark has to be aligned with the final bar line, as demonstrated on the second line of this example.

```
\relative c'' {
  \override Score.RehearsalMark #'break-visibility = #begin-of-line-invisible
  g2 c
  d,2 a'
  \mark \default
  \break
  g2 b,
  c1 \bar "||"
  \override Score.RehearsalMark #'self-alignment-X = #RIGHT
  \mark "D.C. al Fine"
}
```



Aligning marks with various notation objects

If specified, text marks may be aligned with notation objects other than bar lines. These objects include `ambitus`, `breathing-sign`, `clef`, `custos`, `staff-bar`, `left-edge`, `key-cancellation`, `key-signature`, and `time-signature`.

In such cases, text marks will be horizontally centered above the object. However this can be changed, as demonstrated on the second line of this example (in a score with multiple staves, this setting should be done for all the staves).

```
\relative c' {
  e1

  % the RehearsalMark will be centered above the Clef
  \override Score.RehearsalMark #'break-align-symbols = #'(clef)
  \key a \major
  \clef treble
  \mark ""
  e1

  % the RehearsalMark will be centered above the TimeSignature
  \override Score.RehearsalMark #'break-align-symbols = #'(time-signature)
  \key a \major
  \clef treble
  \time 3/4
  \mark ""
  e2.

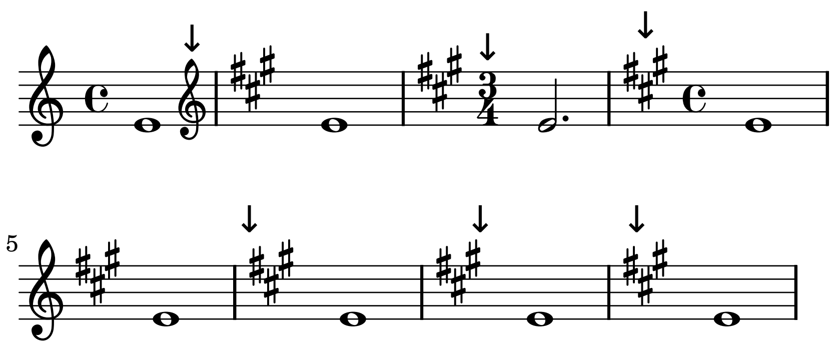
  % the RehearsalMark will be centered above the KeySignature
  \override Score.RehearsalMark #'break-align-symbols = #'(key-signature)
  \key a \major
  \clef treble
  \time 4/4
  \mark ""
  e1

  \break
  e1

  % the RehearsalMark will be aligned with the left edge of the KeySignature
  \once \override Score.KeySignature #'break-align-anchor-alignment = #LEFT
  \mark ""
  \key a \major
  e1

  % the RehearsalMark will be aligned with the right edge of the KeySignature
  \once \override Score.KeySignature #'break-align-anchor-alignment = #RIGHT
  \key a \major
  \mark ""
  e1

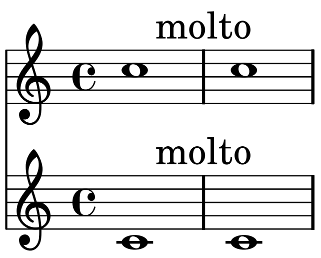
  % the RehearsalMark will be aligned with the left edge of the KeySignature
  % and then shifted right by one unit.
  \once \override Score.KeySignature #'break-align-anchor = #1
  \key a \major
  \mark ""
  e1
}
```



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 { c''1 \mark "molto" c'' }
    \new Staff { c'1 \mark "molto" c' }
  >>
  \layout {
    \context {
      \Score
      \remove "Mark_engraver"
      \remove "Staff_collecting_engraver"
    }
    \context {
      \Staff
      \consists "Mark_engraver"
      \consists "Staff_collecting_engraver"
    }
  }
}
```



See also

Notation Reference: [Rehearsal marks], page 74, Section 1.8.2 [Formatting text], page 167, [Music notation inside markup], page 176, Section B.6 [The Feta font], page 446.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "RehearsalMark" in *Internals Reference*.

Known issues and warnings

If a mark is entered at the end of the last bar of the score (where there is no next line), then the mark will not be printed at all.

Separate text

A `\markup` block can exist by itself, outside of any any `\score` block, as a "top-level expression". This syntax is described in Section 3.1.3 [File structure], page 307.

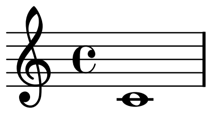
```
\markup {
  Tomorrow, and tomorrow, and tomorrow...
}
```

Tomorrow, and tomorrow, and tomorrow...

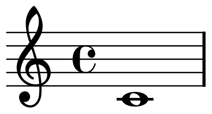
This allows printing text separately from the music, which is particularly useful when the input file contains several music pieces, as described in Section 3.1.2 [Multiple scores in a book], page 306.

```
\score {
  c'1
}
```

```
\markup {
  Tomorrow, and tomorrow, and tomorrow...
}
\score {
  c'1
}
```



Tomorrow, and tomorrow, and tomorrow...



Separate text blocks can be spread over multiple pages, making it possible to print text documents or books entirely within LilyPond. This feature, and the specific syntax it requires, are described in [Multi-page markup], page 179.

Predefined commands

`\markup`, `\markuplines`.

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 {
      \line { \italic { O sacred feast } }
      \line { \italic { in which Christ is received, } }
      \line { \italic { the memory of His Passion is renewed, } }
      \line { \italic { the mind is filled with grace, } }
      \line { \italic { and a pledge of future glory is given to us. } }
      \line { \italic { 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 167, Section 3.1.3 [File structure], page 307, Section 3.1.2 [Multiple scores in a book], page 306, [Multi-page markup], page 179.

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.

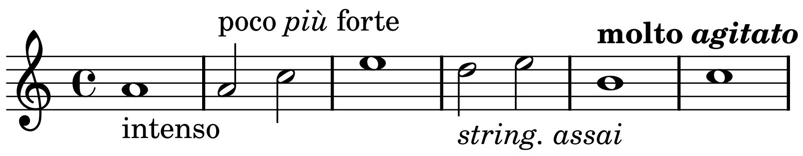
Text markup introduction

A `\markup` block is used to typeset text with an extensible syntax called "markup mode".

The markup syntax is similar to LilyPond's usual syntax: a `\markup` expression is enclosed in curly braces `{ ... }`. A single word is regarded as a minimal expression, and therefore does not need to be enclosed with braces.

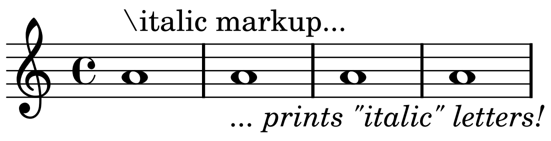
Unlike simple "quoted text" indications, `\markup` blocks may contain nested expressions or markup commands, entered using the backslash `\` character. Such commands only affect the first following expression.

```
a1-\markup intenso
a2^\markup { poco \italic più forte  }
c e1
d2_\markup { \italic "string. assai" }
e
b1^\markup { \bold { molto \italic  agitato } }
c
```



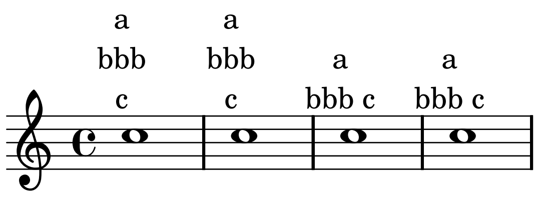
A `\markup` block may also contain quoted text strings. Such strings are treated as minimal text expressions, and therefore any markup command or special character (such as `\` and `#`) will be printed verbatim without affecting the formatting of the text. Double quotation marks themselves may be printed by preceding them with backslashes.

```
a1^"\italic markup..."
a_\markup { \italic "... prints \"italic\" letters!" }
a a
```



To be treated as a distinct expression, a list of words needs to be enclosed with double quotes or preceded by a command. The way markup expressions are defined affects how these expressions will be stacked, centered and aligned; in the following example, the second `\markup` expression is treated the same as the first one:

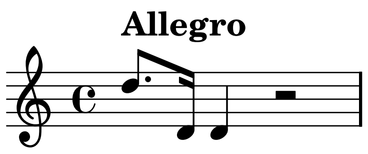
```
c1^\markup { \center-column { a bbb c } }
c1^\markup { \center-column { a { bbb c } } }
c1^\markup { \center-column { a \line { bbb c } } }
c1^\markup { \center-column { a "bbb c" } }
```



Markups can be stored in variables. Such variables may be directly attached to notes:

```
allegro = \markup { \bold \large Allegro }

{
  d''8.^\allegro
  d'16 d'4 r2
}
```



An exhaustive list of `\markup`-specific commands can be found in Section B.8 [Text markup commands], page 463.

See also

Notation Reference: Section B.8 [Text markup commands], page 463.

Snippets: Section “Text” in *Snippets*.

Installed files: ‘`scm/markup.scm`’.

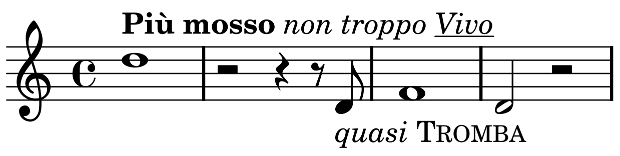
Known issues and warnings

Syntax errors for markup mode can be confusing.

Selecting font and font size

Basic font switching is supported in markup mode:

```
d1^\markup {
  \bold { Più mosso }
  \italic { non troppo \underline Vivo }
}
r2 r4 r8
d,_\markup { \italic quasi \smallCaps Tromba }
f1 d2 r
```

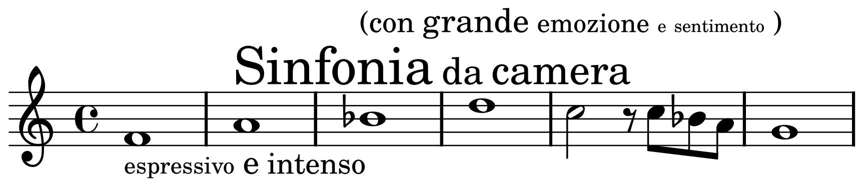


The size of the characters can also be altered in different ways:

- the font size can be set to predefined standard sizes,
- the font size can be set to an absolute value,
- the font size can also be changed relatively to its previous value.

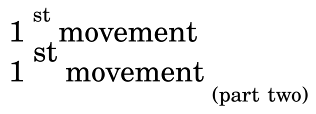
The following example demonstrates these three methods:

```
f1_\markup {
  \tiny espressivo
  \large e
  \normalsize intenso
}
a^\markup {
  \fontsize #5 Sinfonia
  \fontsize #2 da
  \fontsize #3 camera
}
bes^\markup { (con
  \larger grande
  \smaller emozione
  \magnify #0.6 { e sentimento } )
}
d c2 r8 c bes a g1
```



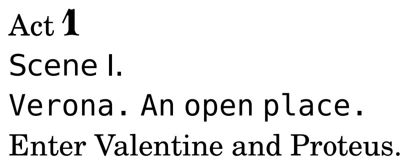
Text may be printed as subscript or superscript. By default these are printed in a smaller size, but a normal size can be used as well:

```
\markup {
  \column {
    \line { 1 \super st movement }
    \line { 1 \normal-size-super st movement
      \sub { (part two) }  }
  }
}
```



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.

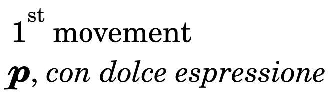
```
\markup {
  \column {
    \line { Act \number 1 }
    \line { \sans { Scene I. } }
    \line { \typewriter { Verona. An open place. } }
    \line { Enter \roman Valentine and Proteus. }
  }
}
```


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 87 and [Manual repeat marks], page 102.

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 }
    }
  }
}
```


1st movement
p, con dolce espressione

An exhaustive list of font switching, and custom font usage commands can be found in Section B.8.1 [Font], page 463.

Defining custom font sets is also possible, as explained in Section 1.8.3 [Fonts], page 179.

Predefined commands

`\teeny`, `\tiny`, `\small`, `\normalsize`, `\large`, `\huge`, `\smaller`, `\larger`.

See also

Notation Reference: Section B.8.1 [Font], page 463, [New dynamic marks], page 87, [Manual repeat marks], page 102, Section 1.8.3 [Fonts], page 179.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "TextScript" in *Internals Reference*.

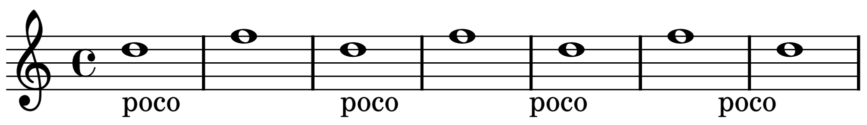
Installed files: '`scm/define-markup-commands.scm`'.

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*.

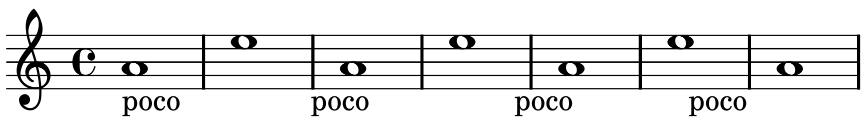
Markup objects may be aligned in different ways. By default, a text indication is aligned on its left edge: in the following example, there is no difference between the first and the second markup.

```
d1-\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:

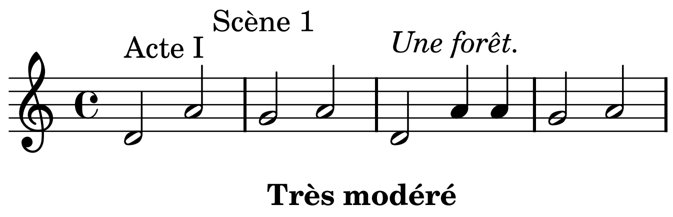
```
a1-\markup { \halign #-1 poco }
e'
a,-\markup { \halign #0 poco }
e'
a,-\markup { \halign #0.5 poco }
e'
a,-\markup { \halign #2 poco }
```



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 162.

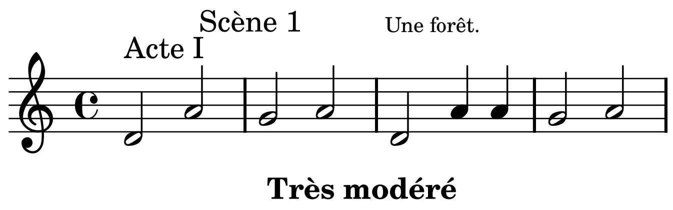
Vertical alignment is a bit more complex. As stated above, markup objects can be moved as a whole; however, it is also possible to move specific elements inside a markup block. In this case, the element to be moved needs to be preceded with an *anchor point*, that can be another markup element or an invisible object. The following example demonstrates these two possibilities; the last markup in this example has no anchor point, and therefore is not moved.

```
d2^\markup {
  Acte I
  \raise #2 { Scène 1 }
}
a'
g_\markup {
  \null
  \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. Any object affected by these commands must be preceded with an anchor point:

```
d2^\markup {
  Acte I
  \translate #'(-1 . 2) "Scène 1"
}
a'
g_\markup {
  \null
  \general-align #Y #3.2 \bold "Très modéré"
}
a
d,^\markup {
  \null
  \translate-scaled #'(-1 . 2) \teeny "Une forêt."
}
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 a
b c b c
d e f 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 }
}
```

William S. Gilbert THE MIKADO Sir Arthur Sullivan

or

THE TOWN OF TITIPU

1885

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 B.8.2 [Align], page 471.

See also

Learning Manual: Section "Moving objects" in *Learning Manual*.

Notation Reference: Section B.8.2 [Align], page 471, [Text marks], page 162.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "TextScript" in *Internals Reference*.

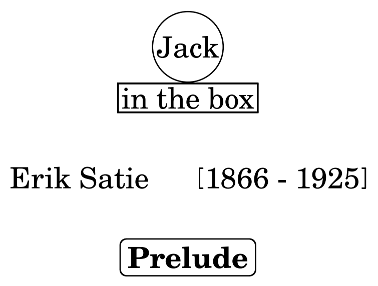
Installed files: 'scm/define-markup-commands.scm'.

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
  }
}
```



Some commands may require an increase in the padding around the text; this is achieved with some markup commands exhaustively described in Section B.8.2 [Align], page 471.

```
\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"
  }
  \pad-around #3
      "String quartet keeps very even time,
Flute quartet keeps very uneven time."
}
```

Charles Ives (1874 - 1954)

THE UNANSWERED QUESTION

A Cosmic Landscape

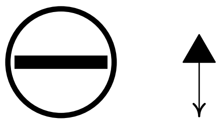
Largo to Presto

String quartet keeps very even time, Flute quartet keeps very uneven time.

Other graphic elements or symbols may be printed without requiring any text. As with any markup expression, such objects can be combined.

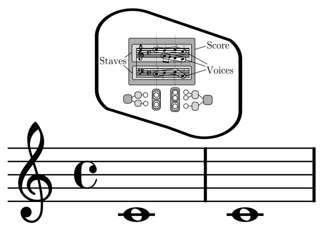
```
\markup {
  \combine
    \draw-circle #4 #0.4 ##f
    \filled-box #'(-4 . 4) #'(-0.5 . 0.5) #1
  \hspace #5

  \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 explicitely specify the size of the drawing, as demonstrated below:

```
c1^\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 B.8.3 [Graphic], page 485.

See also

Notation Reference: Section B.8.3 [Graphic], page 485, Section 1.7 [Editorial annotations], page 148.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "TextScript" in *Internals Reference*.

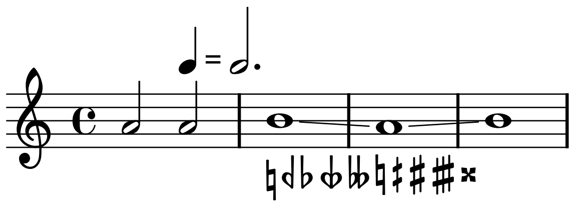
Installed files: 'scm/define-markup-commands.scm', 'scm/stencil.scm'.

Music notation inside markup

Various musical notation elements may be added to a score, inside a markup object.

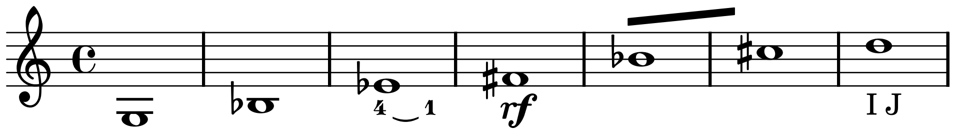
Notes and accidentals can be entered using markup commands:

```
a2 a^\markup {
  \note #"4" #1
  =
  \note-by-number #1 #1 #1.5
}
b1_\markup {
  \natural \semiflat \flat
  \sesquiflat \doubleflat
}
\glissando
a1_\markup {
  \natural \semisharp \sharp
  \sesquisharp \doublesharp
}
\glissando b
```



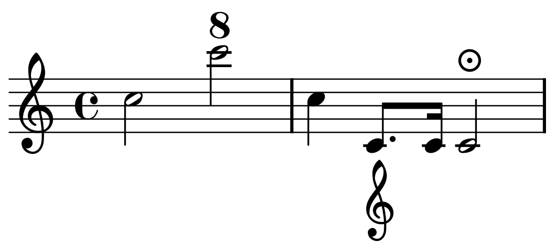
Other notation objects may also be printed in markup mode:

```
g1 bes
ees-\markup {
  \finger 4
  \tied-lyric #"~"
  \finger 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 B.6 [The Feta font], page 446.

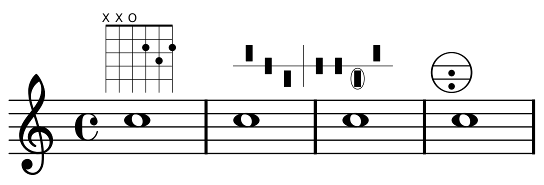
```
c2
c'^\markup { \musicglyph #"eight" }
c,4
c,8._\markup { \musicglyph #"clefs.G_change" }
c16
c2^\markup { \musicglyph #"timesig.neomensural94" }
```



Another way of printing non-text glyphs is described in [Fonts explained], page 180. This is useful for printing braces of various sizes.

The markup mode also supports diagrams for specific instruments:

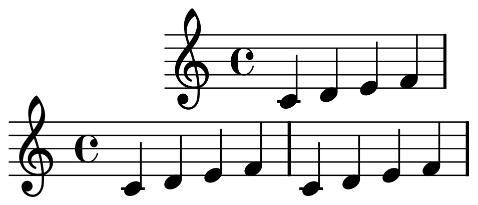
```
c1^\markup {
  \fret-diagram-terse #"x;x;o;2;3;2;"
}
c^\markup {
  \harp-pedal #"^-v|--ov^"
}
c
c^\markup {
  \combine
    \musicglyph #"accordion.accDiscant"
    \combine
      \raise #0.5 \musicglyph #"accordion.accDot"
      \raise #1.5 \musicglyph #"accordion.accDot"
}
```



Such diagrams are documented in Section B.8.5 [Instrument Specific Markup], page 492.

A whole score can even be nested inside a markup object. In such a case, the nested \score block must contain a \layout block, as demonstrated here:

```
c4 d^\markup {
  \score {
    \relative c' { c4 d e f }
    \layout { }
  }
}
e f |
c d e f
```



An exhaustive list of music notation related commands can be found in Section B.8.4 [Music], page 489.

See also

Notation Reference: Section B.8.4 [Music], page 489, Section B.6 [The Feta font], page 446, [Fonts explained], page 180.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "TextScript" in *Internals Reference*.

Installed files: '`scm/define-markup-commands.scm`', '`scm/fret-diagrams.scm`', '`scm/harp-pedals.scm`'.

Multi-page markup

Although standard markup objects are not breakable, a specific syntax makes it possible to enter lines of text that can spread over multiple pages:

```
\markuplines {
  \justified-lines {
    A very long text of justified lines.
    ...
  }
  \wordwrap-lines {
    Another very long paragraph.
    ...
  }
  ...
}
```

A very long text of justified lines. ...

Another very long paragraph. ...

...

This syntax accepts a list of markups, that can be

- the result of a markup list command,
- a list of markups,
- a list of markup lists.

An exhaustive list of markup list commands can be found in Section B.9 [Text markup list commands], page 499.

See also

Notation Reference: Section B.9 [Text markup list commands], page 499, Section 6.4.4 [New markup list command definition], page 431.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "TextScript" in *Internals Reference*.

Installed files: '`scm/define-markup-commands.scm`'.

Predefined commands

`\markuplines`.

1.8.3 Fonts

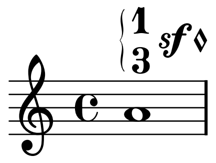
This section presents the way fonts are handled, and how they may be changed in scores.

Fonts explained

Fonts are handled through several libraries. FontConfig is used to detect available fonts on the system; the selected fonts are rendered using Pango.

Music notation fonts can be described as a set of specific glyphs, ordered in several families. The following syntax allows various LilyPond `feta` non-text fonts to be used directly in markup mode:

```
a1^\markup {
  \vcenter {
    \override #'(font-encoding . fetaBraces)
    \lookup #"brace120"
    \override #'(font-encoding . fetaNumber)
    \column { 1 3 }
    \override #'(font-encoding . fetaDynamic)
    sf
    \override #'(font-encoding . fetaMusic)
    \lookup #"noteheads.s0petrucci"
  }
}
```



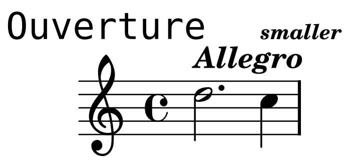
However, all these glyphs except the braces of various sizes contained in `fetaBraces` are available using the simpler syntax described in [Music notation inside markup], page 176.

When using the glyphs contained in `fetaBraces`, 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, `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 406.

Three families of text fonts are made available: the *roman* (serif) font, that defaults to New Century Schoolbook, the *sans* font and the monospaced *typewriter* font – these last two families are determined by the Pango installation.

Each family may include different shapes and series. The following example demonstrates the ability to select alternate families, shapes, series and sizes. The value supplied to `font-size` is the required change from the default size.

```
\override Score.RehearsalMark #'font-family = #'typewriter
\mark \markup "Ouverture"
\override Voice.TextScript #'font-shape = #'italic
\override Voice.TextScript #'font-series = #'bold
d2.^\markup "Allegro"
\override Voice.TextScript #'font-size = #-3
c4^smaller
```



A similar syntax may be used in markup mode, however in this case it is preferable to use the simpler syntax explained in [Selecting font and font size], page 168:

```
\markup {
  \column {
    \line {
      \override #'(font-shape . italic)
      \override #'(font-size . 4)
      Idomeneo,
    }
    \line {
      \override #'(font-family . typewriter)
      {
        \override #'(font-series . bold)
        re
        di
      }
      \override #'(font-family . sans)
      Creta
    }
  }
}
```

Idomeneo,
re di Creta

Although it is easy to switch between preconfigured fonts, it is also possible to use other fonts, as explained in the following sections: [Single entry fonts], page 181 and [Entire document fonts], page 182.

See also

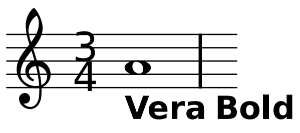
Notation Reference: Section B.6 [The Feta font], page 446, [Music notation inside markup], page 176, [Selecting font and font size], page 168, Section B.8.1 [Font], page 463.

Single entry fonts

Any font that is installed on the operating system and recognized by FontConfig may be used in a score, using the following syntax:

```
\override Staff.TimeSignature #'font-name = #"Charter"
\override Staff.TimeSignature #'font-size = #2
\time 3/4

a1_\markup {
  \override #'(font-name . "Vera Bold")
    { Vera Bold }
}
```



The following command displays a list of all available fonts on the operating system:

```
lilypond -dshow-available-fonts x
```

The last argument of the command can be anything, but has to be present.

See also

Notation Reference: [Fonts explained], page 180, [Entire document fonts], page 182.

Snippets: Section "Text" in *Snippets*.

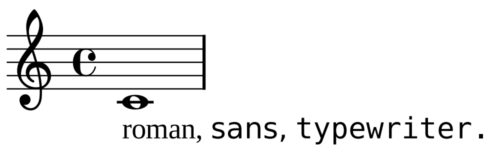
Installed files: '`lily/font-config-scheme.cc`'.

Entire document fonts

It is possible to change the fonts to be used as the default fonts in the *roman*, *sans* and *typewriter* font families by specifying them, in that order, as shown in the example below. For an explanation of fonts, see [Fonts explained], page 180.

```
\paper  {
  myStaffSize = #20
  #(define fonts
    (make-pango-font-tree "Times New Roman"
                          "Nimbus Sans"
                          "Luxi Mono"
                           (/ myStaffSize 20)))
}

\relative c'{
  c1-\markup {
    roman,
    \sans sans,
    \typewriter typewriter. }
}
```



See also

Notation Reference: [Fonts explained], page 180, [Single entry fonts], page 181, [Selecting font and font size], page 168, Section B.8.1 [Font], page 463.

2 Specialist notation

This chapter explains how to create musical notation for specific types of instrument or in specific styles.

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 related to vocal music in general, and to some particular styles of vocal music.

References for vocal music and lyrics

Various issues may arise when engraving vocal music. Some of these are discussed in this section, while others are explained elsewhere:

- 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 of for other text elements (character’s names, etc.). This syntax is described in [Text markup introduction], page 167.
- Lead sheets may be printed by combining vocal parts and ‘chord mode’; this syntax is explained in Section 2.7 [Chord notation], page 255.
- ‘Ambitus’ may be added at the beginning of vocal staves, as explained in [Ambitus], page 24.
- Vocal parts may be printed using traditional clefs, as shown in [Clef], page 11.
- Ancient vocal music is supported, as explained in Section 2.8 [Ancient notation], page 274.

Opera

TBC

Song books

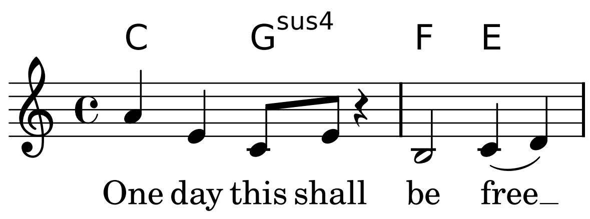
TBC

Selected Snippets

Simple lead sheet

When put together, chord names, a melody, and lyrics form a lead sheet:

```
<<
  \chords { c2 g:sus4 f e }
  \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 255.

Spoken music

Such effects as 'parlato' or 'Sprechgesang' require perfomers to speak without pitch but still with rhythm; these are notated by cross note heads, as demonstrated in [Special note heads], page 26.

Chants

TBC

Ancient vocal music

TBC

See also

Notation Reference: Section 2.8 [Ancient notation], page 274.

2.1.2 Entering lyrics

Lyrics explained

Since LilyPond input files are text, there is at least one issue to consider when working with vocal music: song texts must be interpreted as text, not notes. For example, the input `d` should be interpreted as a one letter syllable, not the note D. Therefore, a special lyric mode has to be used, either explicitely or using some abbreviated methods.

Lyrics are entered in a special input mode, which can be introduced by the keyword `\lyricmode`, or by using `\addlyrics` or `\lyricsto`. In this mode you can enter lyrics, with punctuation and accents, and the input `d` is not parsed as a pitch, but rather as a one letter syllable. Syllables are entered like notes, but with pitches replaced by text. For example,

```
\lyricmode { Twin-4 kle4 twin- kle litt- le star2 }
```

There are two main methods to specify the horizontal placement of the syllables, either by specifying the duration of each syllable explicitly, like in the example above, or by automatically aligning the lyrics to a melody or other voice of music, using `\addlyrics` or `\lyricsto`.

A word or syllable of lyrics begins with an alphabetic character, and ends with any space or digit. The following characters can be any character that is not a digit or white space.

Any character that is not a digit or white space will be regarded as part of the syllable; one important consequence of this is that a word can end with `}`, which often leads to the following mistake:

```
\lyricmode { 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.

Similarly, a period which follows an alphabetic sequence is included in the resulting string. As a consequence, spaces must be inserted around property commands: do *not* write

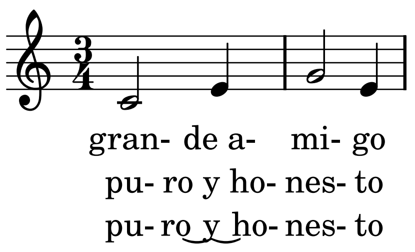
```
\override Score.LyricText #'font-shape = #'italic
```

but instead use

```
\override Score . LyricText #'font-shape = #'italic
```

In order to assign more than one syllable to a single note, you can surround them with quotes or use a _ character, to get spaces between syllables, or use tilde symbol (~) to get a lyric tie.

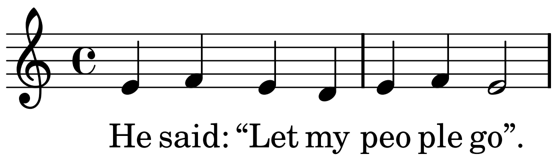
```
\time 3/4
\relative c' { c2 e4 g2 e4 }
\addlyrics { gran- de_a- mi- go }
\addlyrics { pu- "ro y ho-" nes- to }
\addlyrics { pu- ro~y~ho- nes- to }
```



The lyric tie is implemented with the Unicode character U+203F; therefore a font that includes this glyph (such as DejaVuLGC) has to be used. More explanations about text and non-text fonts can be found in Section 1.8.3 [Fonts], page 179.

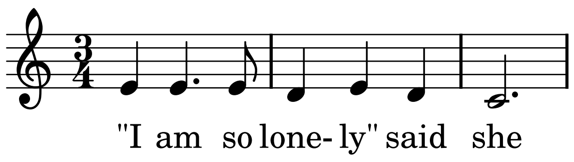
To enter lyrics with characters from non-English languages, or with accented and special characters (such as the heart symbol or slanted quotes), simply insert the characters directly into the input file and save it with UTF-8 encoding. See Section 3.3.3 [Text encoding], page 321, for more info.

```
\relative c' { e4 f e d e f e2 }
\addlyrics { He said: \Let my peo ple go". }
```



To use normal quotes in lyrics, add a backslash before the quotes. For example,

```
\relative c' { \time 3/4 e4 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 begins with: an alphabetic character, _, ?, !, :, ', the control characters ^A through ^F, ^Q through ^W, ^Y, ^^, any 8-bit character with ASCII code over 127, or a two-character combination of a backslash followed by one of `, ', ", or ^.

To define variables containing lyrics, the function lyricmode must be used.

```
verseOne = \lyricmode { Joy to the world the Lord is come }
\score {
  <<
```

```
    \new Voice = "one" \relative c'' {
      \autoBeamOff
      \time 2/4
      c4 b8. a16 g4. f8 e4 d c2
    }
    \addlyrics { \verseOne }
  >>
}
```

See also

Notation Reference: Section 1.8.3 [Fonts], page 179.

Internals Reference: Section "LyricText" in *Internals Reference*, Section "LyricSpace" in *Internals Reference*.

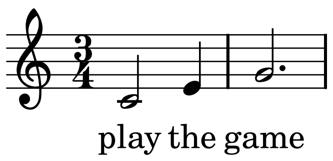
Setting simple songs

The easiest way to add lyrics to a melody is to append

`\addlyrics {` *the lyrics* `}`

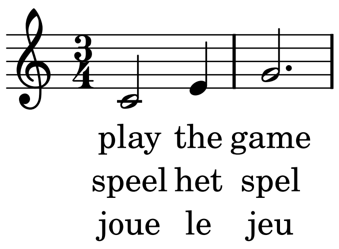
to a melody. Here is an example,

```
\time 3/4
\relative c' { c2 e4 g2. }
\addlyrics { play the game }
```



More stanzas can be added by adding more `\addlyrics` sections

```
\time 3/4
\relative c' { c2 e4 g2. }
\addlyrics { play the game }
\addlyrics { speel het spel }
\addlyrics { joue le jeu }
```



The command `\addlyrics` cannot handle polyphony settings. For these cases you should use `\lyricsto` and `\lyricmode`, as will be introduced in [Lyrics explained], page 184.

Working with lyrics and variables

To define variables containing lyrics, the function `\lyricmode` must be used. You do not have to enter durations though, if you add `\addlyrics` or `\lyricsto` when invoking your variable.

```
verseOne = \lyricmode { Joy to the world the Lord is come }
\score {
 <<
   \new Voice = "one" \relative c'' {
     \autoBeamOff
     \time 2/4
     c4 b8. a16 g4. f8 e4 d c2
   }
   \addlyrics { \verseOne }
 >>
}
```

For different or more complex orderings, the best way is to setup the hierarchy of staves and lyrics first, e.g.,

```
\new ChoirStaff <<
  \new Voice = "soprano" { music }
  \new Lyrics = "sopranoLyrics" { s1 }
  \new Lyrics = "tenorLyrics" { s1 }
  \new Voice = "tenor" { music }
>>
```

and then combine the appropriate melodies and lyric lines

```
\context Lyrics = sopranoLyrics \lyricsto "soprano"
the lyrics
```

The final input would resemble

```
<<\new ChoirStaff << setup the music >>
 \lyricsto "soprano" etc
 \lyricsto "alto" etc
etc
>>
```

See also

Internals Reference: Section "LyricCombineMusic" in *Internals Reference*, Section "Lyrics" in *Internals Reference*.

2.1.3 Aligning lyrics to a melody

Aligning of text with melodies can be made automatically, but if you specify the durations of the syllables it can also be made manually. Lyrics aligning and typesetting are prepared with the help of skips, hyphens and extender lines.

Lyrics are printed by interpreting them in the context called Section "Lyrics" in *Internals Reference*.

```
\new Lyrics \lyricmode ...
```

There are two main methods to specify the horizontal placement of the syllables:

- by automatically aligning the lyrics to a melody or other voice of music, using `\addlyrics` or `\lyricsto`.
- or by specifying the duration of each syllable explicitly, using `\lyricmode`

Automatic syllable durations

The lyrics can be aligned under a given melody automatically. This is achieved by combining the melody and the lyrics with the `\lyricsto` expression

`\new Lyrics \lyricsto name ...`

This aligns the lyrics to the notes of the Section "Voice" in *Internals Reference* context called *name*, which must already exist. Therefore normally the `Voice` is specified first, and then the lyrics are specified with `\lyricsto`. The command `\lyricsto` switches to `\lyricmode` mode automatically, so the `\lyricmode` keyword may be omitted.

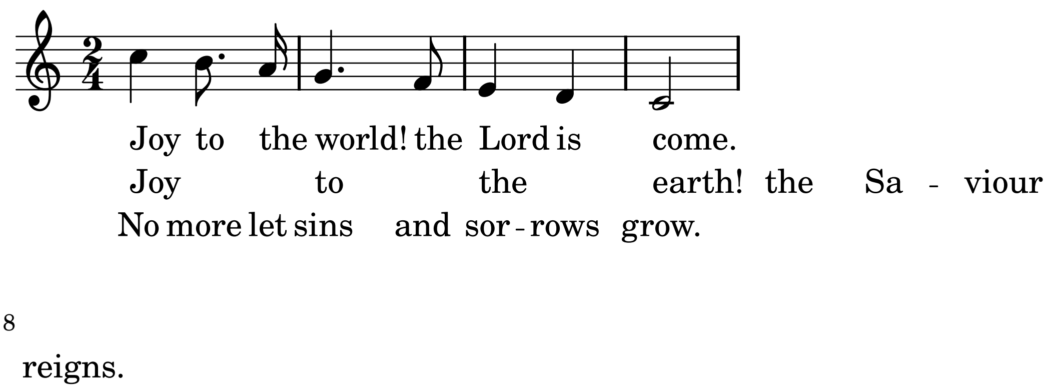
The following example uses different commands for entering lyrics.

```
<<
  \new Voice = "one" \relative c'' {
    \autoBeamOff
    \time 2/4
    c4 b8. a16 g4. f8 e4 d c2
  }

% not recommended: left aligns syllables
  \new Lyrics \lyricmode { Joy4 to8. the16 world!4. the8 Lord4 is come.2 }

% wrong: durations needed
  \new Lyrics \lyricmode { Joy to the earth! the Sa -- viour reigns. }

%correct
  \new Lyrics \lyricsto "one" { No more let sins and sor -- rows grow. }
>>
```


Joy to the world! the Lord is come.
Joy to the earth! the Sa - viour
No more let sins and sor - rows grow.
8
reigns.

The second stanza is not properly aligned because the durations were not specified. A solution for that would be to use `\lyricsto`.

The `\addlyrics` command is actually just a convenient way to write a more complicated LilyPond structure that sets up the lyrics.

```
{ MUSIC }
\addlyrics { LYRICS }
```

is the same as

```
\new Voice = "blah" { music }
\new Lyrics \lyricsto "blah" { LYRICS }
```

Manual syllable durations

Lyrics can also be entered without `\addlyrics` or `\lyricsto`. In this case, syllables are entered like notes – but with pitches replaced by text – and the duration of each syllable must be entered explicitly. For example:

```
play2 the4 game2.
sink2 or4 swim2.
```

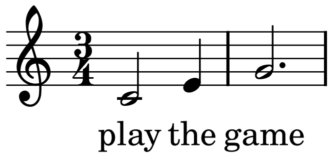
The alignment to a melody can be specified with the `associatedVoice` property,

```
\set associatedVoice = #"lala"
```

The value of the property (here: `"lala"`) should be the name of a Section "Voice" in *Internals Reference* context. Without this setting, extender lines will not be formatted properly.

Here is an example demonstrating manual lyric durations,

```
<< \new Voice = "melody" {
    \time 3/4
    c2 e4 g2.
 }
 \new Lyrics \lyricmode {
   \set associatedVoice = #"melody"
   play2 the4 game2.
 } >>
```



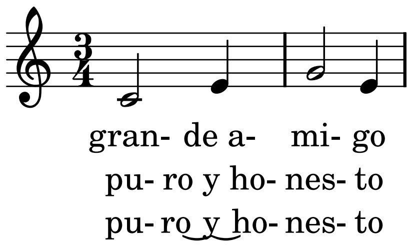
See also

Internals Reference: Section "Lyrics" in *Internals Reference*.

Multiple syllables to one note

In order to assign more than one syllable to a single note, you can surround them with quotes or use a _ character, to get spaces between syllables, or use tilde symbol (~) to get a lyric tie[1].

```
\time 3/4
\relative c' { c2 e4 g2 e4 }
\addlyrics { gran- de_a- mi- go }
\addlyrics { pu- "ro y ho-" nes- to }
\addlyrics { pu- ro~y~ho- nes- to }
```



See also

Internals Reference: Section "LyricCombineMusic" in *Internals Reference*.

[1] The lyric ties is implemented with the Unicode character U+203F, so be sure to have a font (Like DejaVuLGC) installed that includes this glyph.

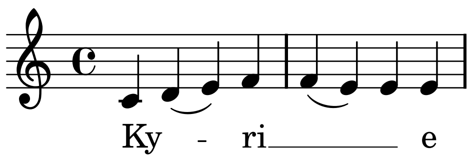
Multiple notes to one syllable

Sometimes, particularly in Medieval music, several notes are to be sung on one single syllable; such vocalises are called melismas, or melismata.

You can define melismata entirely in the lyrics, by entering _ for every extra note that has to be added to the melisma.

Additionaly, you can make an extender line to be typeset to indicate the melisma in the score, writing a double underscore next to the first syllable of the melisma. This example shows the three elements that are used for this purpose (all of them surrounded by spaces): double hyphens to separate syllables in a word, underscores to add notes to a melisma, and a double underscore to put an extender line.

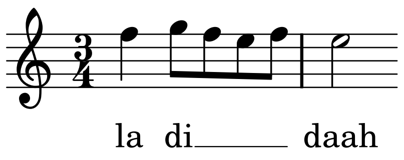
```
{ \set melismaBusyProperties = #'()
 c d( e) f f( e) e e  }
\addlyrics
 { Ky -- _ _ ri __ _ _ _  e }
```



In this case, you can also have ties and slurs in the melody if you set `melismaBusyProperties`, as is done in the example above.

However, the `\lyricsto` command can also detect melismata automatically: it only puts one syllable under a tied or slurred group of notes. If you want to force an unslurred group of notes to be a melisma, insert `\melisma` after the first note of the group, and `\melismaEnd` after the last one, e.g.,

```
<<
  \new Voice = "lala" {
    \time 3/4
    f4 g8
    \melisma
    f e f
    \melismaEnd
    e2
  }
  \new Lyrics \lyricsto "lala" {
    la di __ daah
  }
>>
```



In addition, notes are considered a melisma if they are manually beamed, and automatic beaming (see [Setting automatic beam behavior], page 56) is switched off.

A complete example of a SATB score setup is in section Section "Vocal ensembles" in *Learning Manual*.

Predefined commands

`\melisma`, `\melismaEnd`.

See also

Known issues and warnings

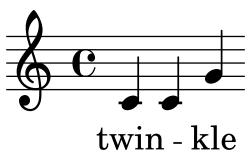
Melismata are not detected automatically, and extender lines must be inserted by hand.

Skipping notes

Making a lyric line run slower than the melody can be achieved by inserting `\skip`s into the lyrics. For every `\skip`, the text will be delayed another note. The `\skip` command must be followed by a valid duration, but this is ignored when `\skip` is used in lyrics.

For example,

```
\relative c' { c c g' }
\addlyrics {
  twin -- \skip 4
  kle
}
```



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).

See also

Internals Reference: Section “LyricExtender” in *Internals Reference*, Section “LyricHyphen” in *Internals Reference*

Lyrics and repeats

TBC

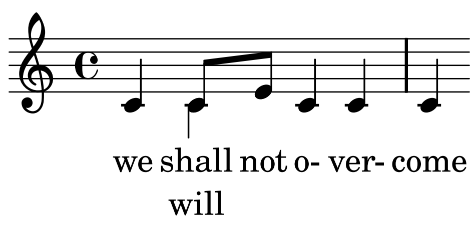
2.1.4 Specific uses of lyrics

Often, different stanzas of one song are put to one melody in slightly differing ways. Such variations can still be captured with `\lyricsto`.

Divisi lyrics

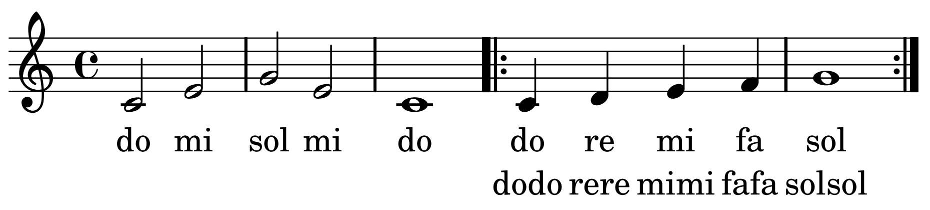
You can display alternate (or divisi) lyrics by naming voice contexts and attaching lyrics to those specific contexts.

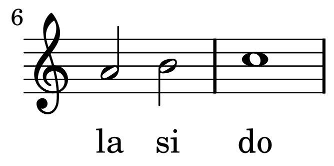
```
\score{ <<
  \new Voice = "melody" {
    \relative c' {
      c4
      <<
        { \voiceOne c8 e }
        \new Voice = "splitpart" { \voiceTwo c4 }
      >>
      \oneVoice c4 c | c
    }
  }
  \new Lyrics \lyricsto "melody" { we shall not o- ver- come }
  \new Lyrics \lyricsto "splitpart" { will }
>> }
```



You can use this trick to display different lyrics for a repeated section.

```
\score{ <<
  \new Voice = "melody" \relative c' {
    c2 e | g e | c1 |
    \new Voice = "verse" \repeat volta 2 {c4 d e f | g1 | }
    a2 b | c1}
  \new Lyrics = "mainlyrics" \lyricsto melody \lyricmode {
    do mi sol mi do
    la si do }
  \context Lyrics = "mainlyrics" \lyricsto verse \lyricmode {
   do re mi fa sol }
  \new Lyrics = "repeatlyrics" \lyricsto verse \lyricmode {
   dodo rere mimi fafa solsol }
>>
}
```





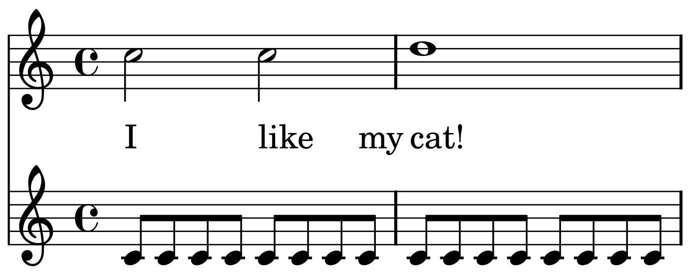
Lyrics independent of notes

In some complex vocal music, it may be desirable to place lyrics completely independently of notes. Music defined inside `lyricrhythm` disappears into the `Devnull` context, but the rhythms can still be used to place the lyrics.

```
voice = {
  c''2
  \tag #'music { c''2 }
  \tag #'lyricrhythm { c''4. c''8 }
  d''1
}

lyr = \lyricmode { I like my cat! }

<<
  \new Staff \keepWithTag #'music \voice
  \new Devnull="nowhere" \keepWithTag #'lyricrhythm \voice
  \new Lyrics \lyricsto "nowhere" \lyr
  \new Staff { c'8 c' c' c' c' c' c' c'
  c' c' c' c' c' c' c' c' }
>>
```

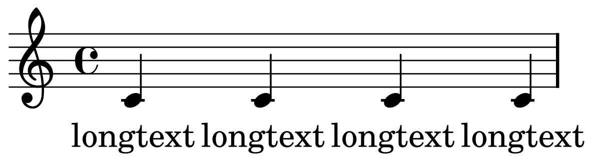


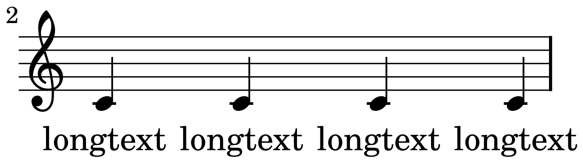
This method is recommended only if the music in the `Devnull` context does not contain melismata. Melismata are defined by the `Voice` context. Connecting lyrics to a `Devnull` context makes the voice/lyrics links to get lost, and so does the info on melismata. Therefore, if you link lyrics to a `Devnull` context, the implicit melismata get ignored.

Spacing out syllables

To increase the spacing between lyrics, set the minimum-distance property of LyricSpace.

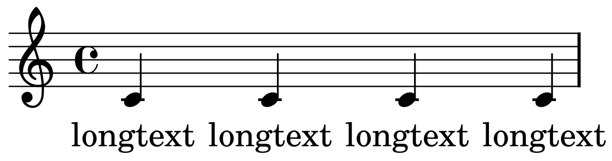
```
{
  c c c c
  \override Lyrics.LyricSpace #'minimum-distance = #1.0
  c c c c
}
\addlyrics {
  longtext longtext longtext longtext
  longtext longtext longtext longtext
}
```

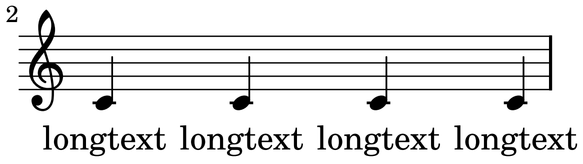




To make this change for all lyrics in the score, set the property in the layout.

```
\score {
  \relative c' {
  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

Checking to make sure that text scripts and lyrics are within the margins is a relatively large computational task. To speed up processing, LilyPond does not perform such calculations by default; to enable it, use

```
\override Score.PaperColumn #'keep-inside-line = ##t
```

To make lyrics avoid bar lines as well, use

```
\layout {
  \context {
    \Lyrics
      \consists "Bar_engraver"
      \consists "Separating_line_group_engraver"
      \override BarLine #'transparent = ##t
  }
}
```

Centering lyrics between staves

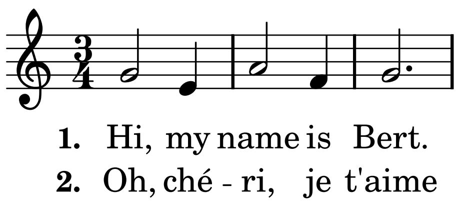
TBC

2.1.5 Stanzas

Adding stanza numbers

Stanza numbers can be added by setting `stanza`, e.g.,

```
\new Voice {
  \time 3/4 g2 e4 a2 f4 g2.
} \addlyrics {
  \set stanza = #"1. "
  Hi, my name is Bert.
} \addlyrics {
  \set stanza = #"2. "
  Oh, ché -- ri, je t'aime
}
```



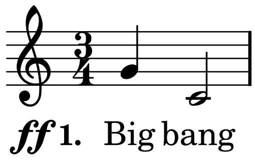
These numbers are put just before the start of the first syllable.

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
  }
}

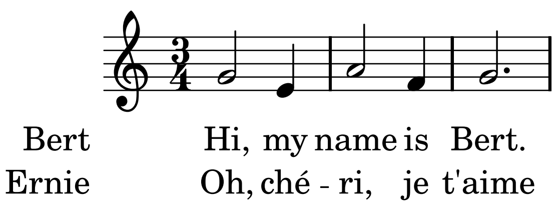
<<
  \new Voice = "tune" {
    \time 3/4
    g'4 c'2
  }
\new Lyrics \lyricsto "tune" \text
>>
```



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 {
  \time 3/4 g2 e4 a2 f4 g2.
} \addlyrics {
  \set vocalName = #"Bert "
  Hi, my name is Bert.
} \addlyrics {
  \set vocalName = #"Ernie "
  Oh, ché -- ri, je t'aime
}
```

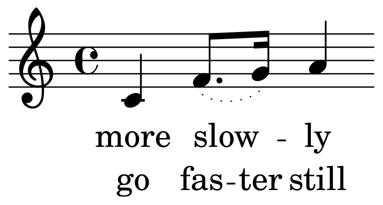


Stanzas with different rhythms

Ignoring melismata

One possibility is that the text has a melisma in one stanza, but multiple syllables in another one. One solution is to make the faster voice ignore the melisma. This is done by setting `ignoreMelismata` in the Lyrics context.

```
<<
  \relative c' \new Voice = "lahlah" {
    \set Staff.autoBeaming = ##f
    c4
    \slurDotted
    f8.[( g16])
    a4
  }
  \new Lyrics \lyricsto "lahlah" {
    more slow -- ly
  }
  \new Lyrics \lyricsto "lahlah" {
    go
    \set ignoreMelismata = ##t
    fas -- ter
    \unset ignoreMelismata
    still
  }
>>
```

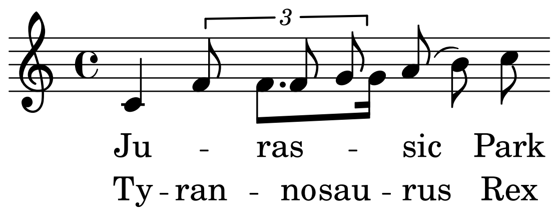


Known issues and warnings

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.

Switching to an alternative melody

More complex variations in text underlay are possible. It is possible to switch the melody for a line of lyrics during the text. This is done by setting the `associatedVoice` property. In the example



the text for the first stanza is set to a melody called 'lahlah',

```
\new Lyrics \lyricsto "lahlah" {
  Ju -- ras -- sic Park
}
```

The second stanza initially is set to the `lahlah` context, but for the syllable 'ran', it switches to a different melody. This is achieved with

```
\set associatedVoice = alternative
```

Here, `alternative` is the name of the `Voice` context containing the triplet.

This command must be one syllable too early, before 'Ty' in this case. In other words, changing the associatedVoice happens one step later than expected. This is for technical reasons, and it is not a bug.

```
\new Lyrics \lyricsto "lahlah" {
  \set associatedVoice = alternative % applies to "ran"
  Ty --
  ran --
  no --
  \set associatedVoice = lahlah % applies to "rus"
  sau -- rus Rex
}
```

The underlay is switched back to the starting situation by assigning `lahlah` to `associatedVoice`.

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 two different ways to force linebreaks when using `\markup`.

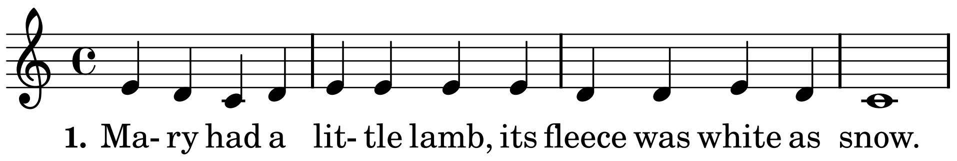
```
melody = \relative c' {
e d c d | e e e e |
d d e d | c1 |
}

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
>>
  \layout { }
}
\markup { \column{
  \line{ Verse 2. }
  \line{ All the children laughed and played }
  \line{ To see a lamb at school. }
  }
}
\markup{
  \wordwrap-string #"
  Verse 3.

  Mary took it home again,

  It was against the rule."
}
```


1. Ma- ry had a lit- tle lamb, its fleece was white as snow.

Verse 2.
All the children laughed and played
To see a lamb at school.

Verse 3.
Mary took it home again,
It was against the rule.

Printing stanzas at the end in multiple columns

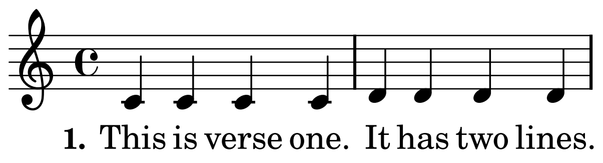
When a piece of music has many verses, they are often printed in multiple columns across the page. An outdented verse number often introduces each verse. The following example shows how to produce such output in LilyPond.

```
melody = \relative c' {
  c 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 {
    \hspace #0.1 % moves the column off the left margin;
        % can be removed if space on the page is tight
     \column {
      \line { \bold "2."
        \column {
          "This is verse two."
          "It has two lines."
        }
      }
      \hspace #0.1 % adds vertical spacing between verses
      \line { \bold "3."
        \column {
          "This is verse three."
          "It has two lines."
        }
      }
    }
    \hspace #0.1  % adds horizontal spacing between columns;
        % if they are still too close, add more " " pairs
        % until the result looks good
     \column {
      \line { \bold "4."
        \column {
          "This is verse four."
          "It has two lines."
        }
      }
      \hspace #0.1 % adds vertical spacing between verses
      \line { \bold "5."
        \column {
          "This is verse five."
          "It has two lines."
        }
      }
    }
  \hspace #0.1 % gives some extra space on the right margin;
      % can be removed if page space is tight
  }
}
```



2. This is verse two.
It has two lines.

3. This is verse three.
It has two lines.

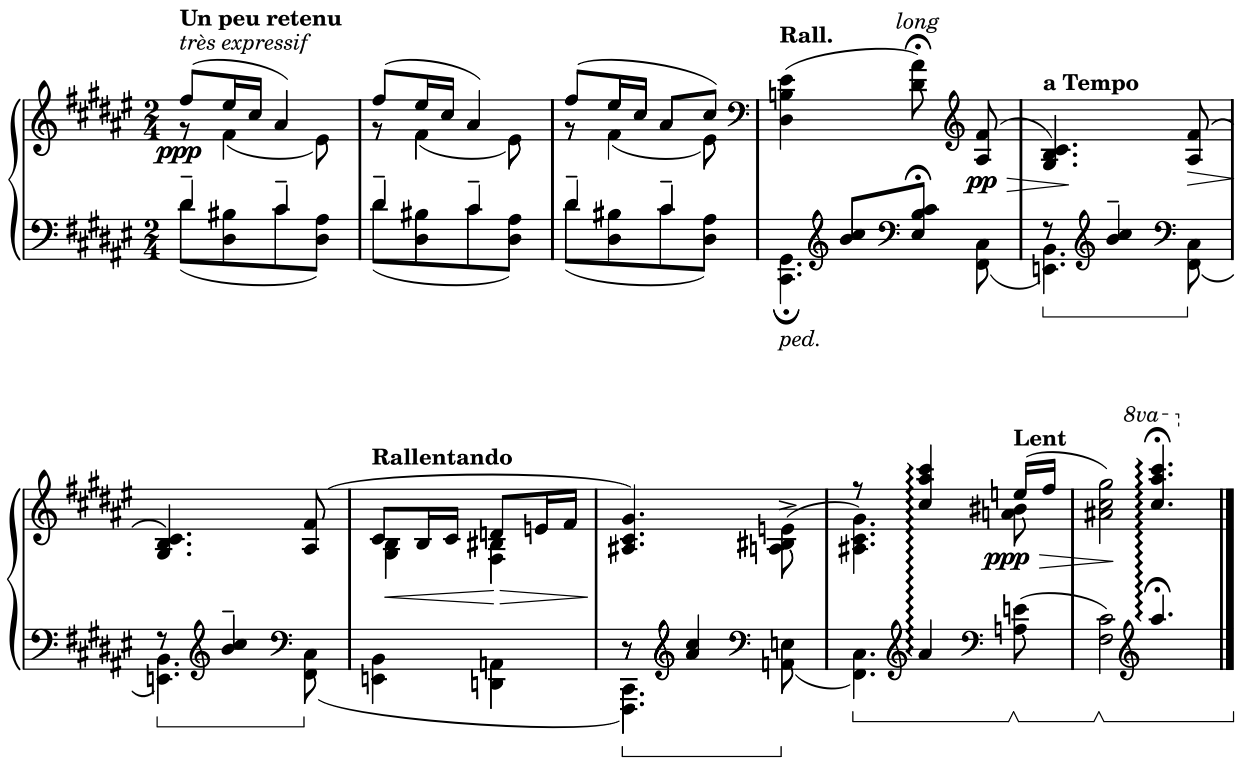
4. This is verse four.
It has two lines.

5. This is verse five.
It has two lines.

See also

Internals Reference: Section "LyricText" in *Internals Reference*, Section "StanzaNumber" in *Internals Reference*.

2.2 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 112.
- Keyboard music can be written in parallel, as described in [Writing music in parallel], page 119.
- Fingerings are indicated with [Fingering instructions], page 150.
- Organ pedal indications are inserted as articulations, see Section B.10 [List of articulations], page 500.
- Vertical grid lines can be shown with [Grid lines], page 156.
- Keyboard music often contains *Laissez vibrer* ties as well as ties on arpeggios and tremolos, described in [Ties], page 35.
- Placing arpeggios across multiple voices and staves is covered in [Arpeggio], page 94.
- Tremolo marks are described in [Tremolo repeats], page 106.
- 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 123, [Instrument names], page 140, [Collision resolution], page 112, [Writing music in parallel], page 119, [Fingering instructions], page 150, Section B.10 [List of articulations], page 500, [Grid lines], page 156, [Ties], page 35, [Arpeggio], page 94, [Tremolo repeats], page 106.

Internals Reference: Section "PianoStaff" in *Internals Reference*.

Snippets: Section "Keyboards" in *Snippets*.

Known issues and warnings

Dynamics are not automatically centered, but workarounds do exist. One option is the 'piano centered dynamics' template under Section "Piano templates" in *Learning Manual*; another option is to increase the `staff-padding` of dynamics as discussed in Section "Moving objects" in *Learning Manual*.

Changing staff manually

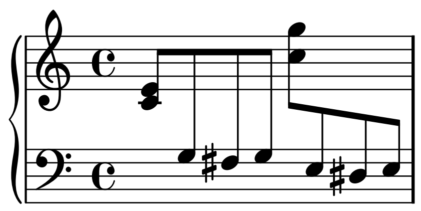
Voices can be switched between staves manually, using the command

```
\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"`.

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*.

See also

Learning Manual: Section "Fixing overlapping notation" in *Learning Manual*.

Notation Reference: [Stems], page 155, [Automatic beams], page 54.

Snippets: Section "Keyboards" in *Snippets*.

Internals Reference: Section "Beam" in *Internals Reference*, Section "ContextChange" in *Internals Reference*.

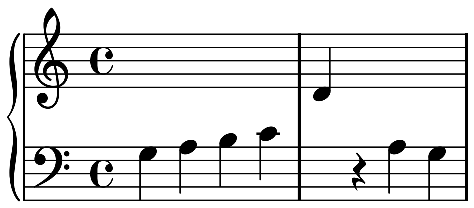
Changing staff automatically

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 autochanger 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
  }
}
```



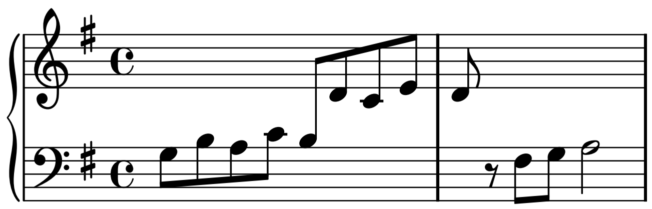
A `\relative` section that is outside of `\autochange` has no effect on the pitches of the music, so if necessary, put `\relative` inside `\autochange`.

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 c' {
        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 201.

Snippets: Section “Keyboards” in *Snippets*.

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

Known issues and warnings

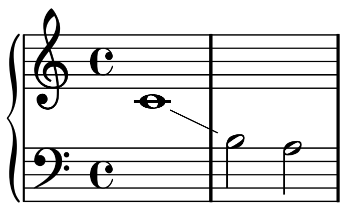
The staff switches may not end up in optimal places. For high quality output, staff switches should be specified manually.

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
    c1
    \change Staff = "two"
    b2 a
  }
  \new Staff = "two" {
    \clef bass
    s1*2
  }
>>
```



Predefined commands

`\showStaffSwitch`, `\hideStaffSwitch`.

See also

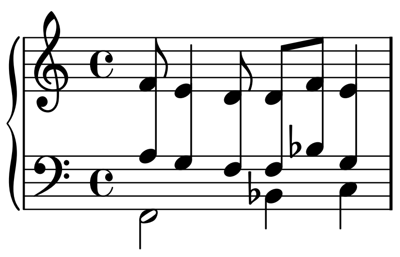
Snippets: Section "Keyboards" in *Snippets*.

Internals Reference: Section "Note_head_line_engraver" in *Internals Reference*, Section "VoiceFollower" in *Internals Reference*.

Cross-staff stems

Chords that cross staves may be produced:

```
\new PianoStaff <<
  \new Staff {
    \relative c' {
      f8 e4 d8 d f e4
    }
  }
  \new Staff {
    \relative c' {
      << {
        \clef bass
        % stems may overlap the other staff
        \override Stem #'cross-staff = ##t
        % extend the stems to reach other other staff
        \override Stem #'length = #12
        % do not print extra flags
        \override Stem #'flag-style = #'no-flag
        % prevent beaming as needed
        a8 g4 f8 f bes\noBeam g4
      }
      \\
      {
        f,2 bes4 c
      } >>
    }
  }
>>
```



Selected Snippets

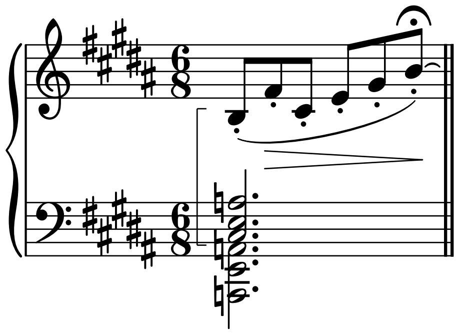
Indicating cross-staff chords with arpeggio bracket

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*.

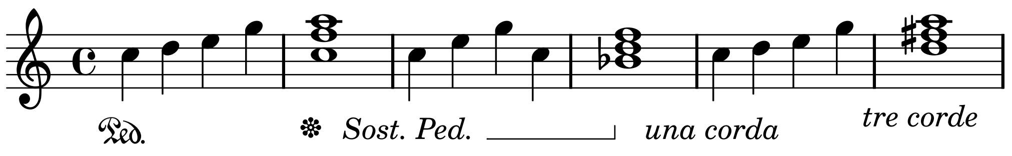
2.2.2 Piano

This section discusses notation issues that relate most directly to the piano.

Piano pedals

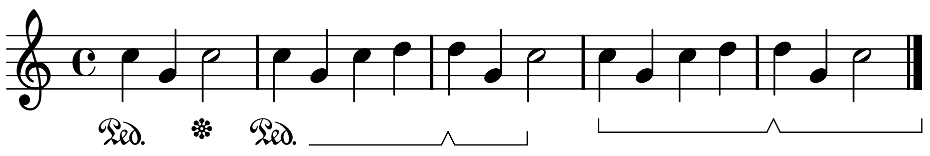
Pianos generally have three pedals that alter the way sound is produced: *sustain*, *sostenuto* (*sos.*), and *una corda* (*U.C.*). Sustain pedals are also found on vibraphones and celestas.

```
c4\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.

```
c4\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. Pedalling to the final bar line is indicated by omitting the final pedal up command.

See also

Notation Reference: [Ties], page 35.

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.

Selected Snippets

Accordion-discant symbols

Accordion discant-specific symbols are added using `\markup`. The vertical placement of the symbols can be tweaked by changing the `\raise` arguments.

```
discant = \markup {
  \musicglyph #"accordion.accDiscant"
}
dot = \markup {
  \musicglyph #"accordion.accDot"
}

\layout { ragged-right = ##t }

% 16 voets register
accBasson = ^\markup {
  \combine
  \discant
  \raise #0.5 \dot
}

% een korig 8 en 16 voets register
accBandon = ^\markup {
  \combine
    \discant
    \combine
      \raise #0.5 \dot
      \raise #1.5 \dot
}

accVCello = ^\markup {
  \combine
    \discant
    \combine
      \raise #0.5 \dot
      \combine
        \raise #1.5 \dot
        \translate #'(1 . 0) \raise #1.5 \dot
}

% 4-8-16 voets register
accHarmon = ^\markup {
  \combine
    \discant
    \combine
      \raise #0.5 \dot
      \combine
        \raise #1.5 \dot
        \raise #2.5 \dot
}

accTrombon = ^\markup {
  \combine
    \discant
    \combine
      \raise #0.5 \dot
      \combine
        \raise #1.5 \dot
        \combine
          \translate #'(1 . 0) \raise #1.5 \dot
          \translate #'(-1 . 0) \raise #1.5 \dot
}

% eenkorig 4 en 16 voets register
accOrgan = ^\markup {
  \combine
    \discant
    \combine
      \raise #0.5 \dot
      \raise #2.5 \dot
}

accMaster = ^\markup {
  \combine
    \discant
    \combine
      \raise #0.5 \dot
      \combine
        \raise #1.5 \dot
        \combine
          \translate #'(1 . 0) \raise #1.5 \dot
          \combine
            \translate #'(-1 . 0) \raise #1.5 \dot
            \raise #2.5 \dot
}

accAccord = ^\markup {
  \combine
    \discant
    \combine
      \raise #1.5 \dot
      \combine
        \translate #'(1 . 0) \raise #1.5 \dot
        \combine
          \translate #'(-1 . 0) \raise #1.5 \dot
          \raise #2.5 \dot
}

accMusette = ^\markup {
  \combine
    \discant
    \combine
      \raise #1.5 \dot
      \combine
        \translate #'(1 . 0) \raise #1.5 \dot
        \translate #'(-1 . 0) \raise #1.5 \dot
}

accCeleste = ^\markup {
  \combine
    \discant
    \combine
      \raise #1.5 \dot
      \translate #'(-1 . 0) \raise #1.5 \dot
}

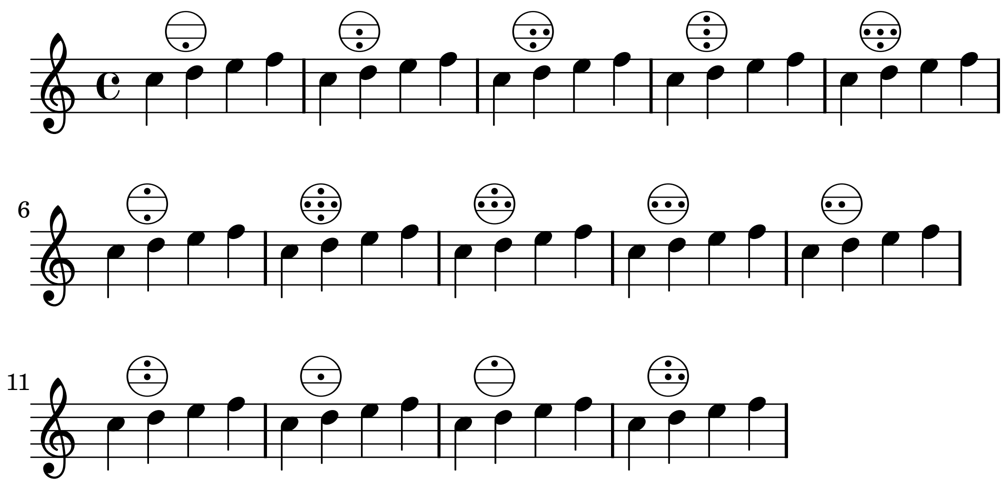
accOboe = ^\markup {
  \combine
    \discant
    \combine
      \raise #1.5 \dot
      \raise #2.5 \dot
}

accClarin = ^\markup {
  \combine
    \discant
    \raise #1.5 \dot
}

accPiccolo = ^\markup {
    \combine
       \discant
       \raise #2.5 \dot
}

accViolin = ^\markup {
  \combine
    \discant
    \combine
      \raise #1.5 \dot
      \combine
        \translate #'(1 . 0) \raise #1.5 \dot
        \raise #2.5 \dot
}

\relative c'' {
  c4 d\accBasson e f
  c4 d\accBandon e f
  c4 d\accVCello e f
  c4 d\accHarmon e f
  c4 d\accTrombon e f
  \break
  c4 d\accOrgan e f
  c4 d\accMaster e f
  c4 d\accAccord e f
  c4 d\accMusette e f
  c4 d\accCeleste e f
  \break
  c4 d\accOboe e f
  c4 d\accClarin e f
  c4 d\accPiccolo e f
  c4 d\accViolin e f
}
```



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 characterisic harp technique, [Glissando], page 93.
- A *bisbigliando* is written as a tremelo [Tremolo repeats], page 106
- Natural harmonics are covered under [Harmonics], page 213.
- For directional arpeggios and non-arpeggios, see [Arpeggio], page 94.

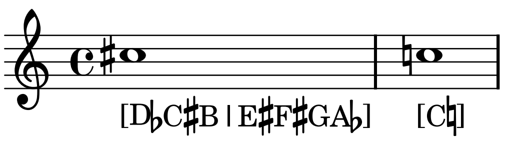
See also

Notation Reference: [Tremolo repeats], page 106 [Glissando], page 93 [Arpeggio], page 94 [Harmonics], page 213

Harp pedals

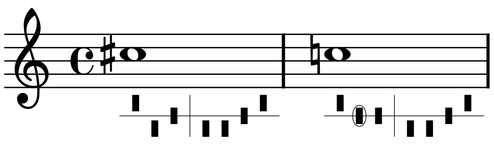
Harps have seven strings per octave that may be sounded at the natural, flattened, or sharpened pitch. In lever harps, each string is adjusted individually, but in pedal harps every string with the same pitch name is controlled by a single pedal. From the player's left to right, the pedals are D, C, 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
cis1_\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
cis1_\markup { \harp-pedal #"^v-|vv-^" }
c!1_\markup { \harp-pedal #"^o--|vv-^" }
```

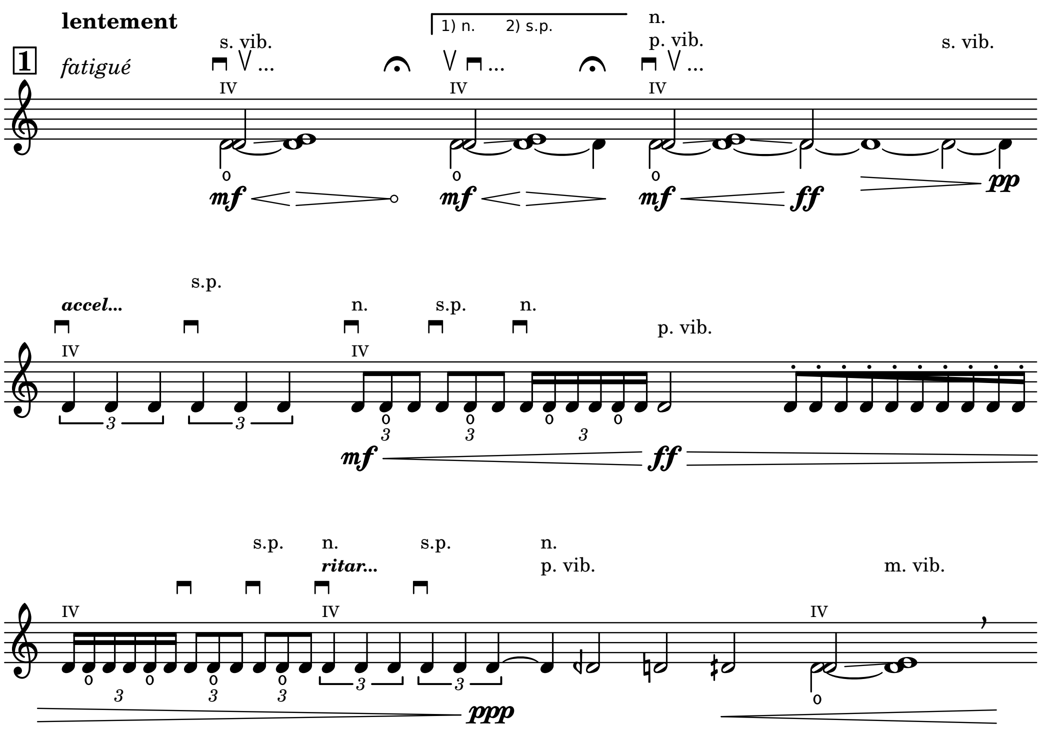


The `\harp-pedal` command accepts a string of characters, where `^` is the highest pedal position (flattened pitch), `-` is the middle pedal postion (natural pitch), `v` is the lowest pedal position (sharpened pitch), and `|` is the divider. A prefixed `o` will circle the following pedal symbol.

See also

Notation Reference: [Text scripts], page 160 Section B.8.5 [Instrument Specific Markup], page 492

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 160.
- Fingerings, including the thumb indication, are described in [Fingering instructions], page 150.
- Double stopping is normally indicated by writing a chord, see [Chorded notes], page 108. Directives for playing chords may be added, see [Arpeggio], page 94.
- A template for a string quartet can be found in Section "String quartet" in *Learning Manual*. Others are shown in the snippets.

See also

Learning Manual: Section "String quartet" in *Learning Manual*.

Notation Reference: [Text scripts], page 160, [Fingering instructions], page 150, [Chorded notes], page 108, [Arpeggio], page 94.

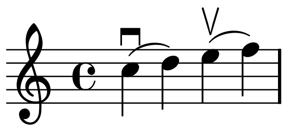
Snippets: Section "Unfretted strings" in *Snippets*.

Bowing indications

Bowing indications are created as articulations, which are described in [Articulations and ornamentations], page 81.

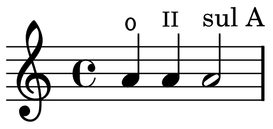
The bowing commands, `\upbow` and `\downbow`, are used with slurs as follows:

```
c4(\downbow d) e(\upbow f)
```



and the following example shows three ways in which an open A string on a violin might be indicated:

```
a4 \open
a^\markup { \teeny "II" }
a2^\markup { \small "sul A" }
```



Predefined commands

`\downbow`, `\upbow`, `\open`.

See also

Notation Reference: [Articulations and ornamentations], page 81, [Slurs], page 89.

Harmonics

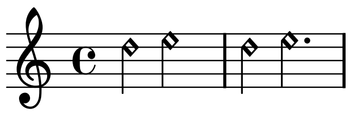
Natural harmonics

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.

Note: Harmonics **must** be defined inside a chord construct even if there is only a single note.

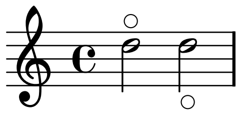
Dotted harmonics indicated with `\harmonic` do not show the dots. The context property `harmonicDots` should be set if dots are required.

```
<d\harmonic>4 <e\harmonic>2.
\set harmonicDots = ##t
<d\harmonic>4 <e\harmonic>2.
```



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:

```
d2^\flageolet d_\flageolet
```

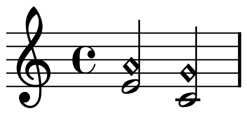


A smaller circle may be created, see the snippet list in [References for unfretted strings], page 212.

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.

```
<e a\harmonic>2  <c g'\harmonic>
```



See also

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

Notation Reference: [Special note heads], page 26, [References for unfretted strings], page 212.

Snap (Bartók) pizzicato

Selected Snippets

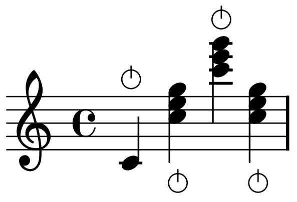
Snap-pizzicato markup ("Bartok pizzicato")

A snap-pizzicato (also known as "Bartok pizzicato") is a "strong pizzicato where the string is plucked vertically by snapping and rebounds off the fingerboard of the instrument" (Wikipedia). It is denoted by a cicle with a vertical line going from the center upwards outside the circle. While Lilypond does not have a pre-defined command to created this markup, it is easy to create a definition and place it directly into the lilypond file.

```
#(define-markup-command (snappizz layout props) ()
  (interpret-markup layout props
    (markup #:stencil
      (ly:stencil-translate-axis
        (ly:stencil-add
          (make-circle-stencil 0.7 0.1 #f)
          (ly:make-stencil
            (list 'draw-line 0.1 0 0.1 0 1)
            '(-0.1 . 0.1) '(0.1 . 1)))
        0.7 X))))

snapPizzicato = \markup \snappizz

% now it can be used as \snappizzicato after the note/chord
% Note that a direction (-, ^ or _) is required.
\relative c' {
  c4^\snapPizzicato
  % This does NOT work:
  %<c e g>\snapPizzicato
  <c' e g>-\snapPizzicato
  <c' e g>^\snapPizzicato
  <c, e g>_\snapPizzicato
}
```



2.4 Fretted string instruments

fp
fp
rit.
dim.
Andantino
il canto ben marcato
p
p dol.

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. Some other elements pertinent to fretted string instruments are covered elsewhere:

- Fingerings are indicated as shown in [Fingering instructions], page 150.
- Instructions for *Laissez vibrer* ties as well as ties on arpeggios and tremolos can be found in [Ties], page 35.
- Instructions for handling multiple voices can be found in [Collision resolution], page 112.
- Instructions for indicating harmonics can be found in [Harmonics], page 213.

See also

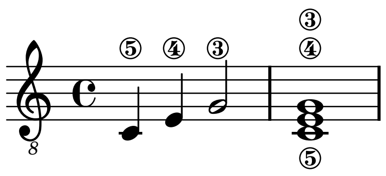
Notation Reference: [Fingering instructions], page 150, [Ties], page 35, [Collision resolution], page 112, [Instrument names], page 140, [Writing music in parallel], page 119, [Arpeggio], page 94, Section B.10 [List of articulations], page 500, [Clef], page 11.

String number indications

The string on which a note should be played may be indicated by appending *number* to a note inside a chord construct <>.

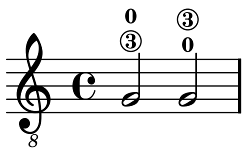
Note: String numbers **must** be defined inside a chord construct even if there is only a single note.

```
\clef "treble_8"
<c\5>4 <e\4> <g\3>2
<c,\5 e\4 g\3>1
```



When fingerings and string indications are used together, their placement is controlled by the order in which the two items appear in the code:

```
\clef "treble_8"
<g\3-0>2
<g-0\3>
```

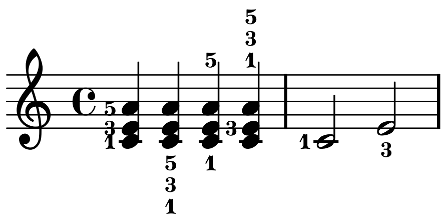


Selected Snippets

Controlling the placement of chord fingerings

The placement of fingering numbers can be controlled precisely.

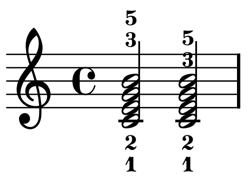
```
\relative c' {
  \set fingeringOrientations = #'(left)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(down)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(down right up)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(up)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(left)
  <c-1>2
  \set fingeringOrientations = #'(down)
  <e-3>2
}
```



Allowing fingerings to be printed inside the staff

By default, vertically oriented fingerings are positioned outside the staff. However, this behavior can be canceled.

```
\relative c' {
  <c-1 e-2 g-3 b-5>2
  \once \override Fingering #'staff-padding = #'()
  <c-1 e-2 g-3 b-5>2
}
```



See also

Notation Reference: [Fingering instructions], page 150.

Snippets: Section "Fretted strings" in *Snippets*.

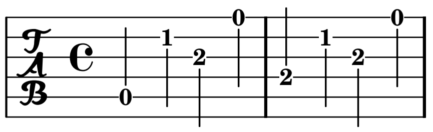
Internals Reference: Section "StringNumber" in *Internals Reference*, Section "Fingering" in *Internals Reference*.

Default tablatures

Tablature notation is used for notating music for plucked string instruments. Pitches are not denoted with note heads, but by numbers indicating on which string and fret a note must be played. LilyPond offers limited support for tablature.

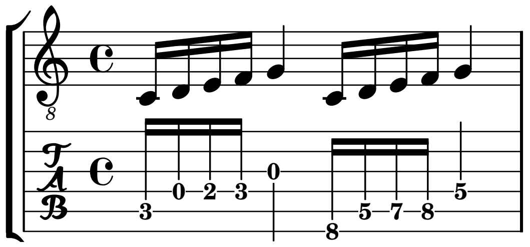
The string number associated with a note is given as a backslash followed by a number. By default, string 1 is the highest, and the tuning defaults to the standard guitar tuning (with 6 strings). The notes are printed as tablature, by using `TabStaff` and `TabVoice` contexts

```
\new TabStaff {
  a,4\5 c'\2 a\3 e'\1
  e\4 c'\2 a\3 e'\1
}
```



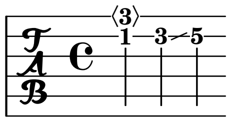
When no string is specified for a note, the note is assigned to the highest string that can generate the note with a fret number greater than or equal to the value of `minimumFret`. The default value for `minimumFret` is 0.

```
\new StaffGroup <<
   \new Staff \relative c {
     \clef "treble_8"
     c16 d e f g4
     c,16 d e f g4
   }
   \new TabStaff \relative c {
     c16 d e f g4
     \set TabStaff.minimumFret = #5
     c,16 d e f g4
   }
>>
```



Harmonic indications and slides can be added to tablature notation.

```
\new TabStaff {
  \new TabVoice {
    <c g'\harmonic> d\2\glissando e\2
  }
}
```

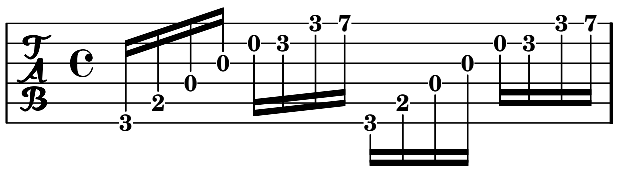


Selected Snippets

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 {
    g16 b d g b d g b
    \stemDown
    \override Beam #'damping = #+inf.0
    g,,16 b d g b d g b
  }
}
```



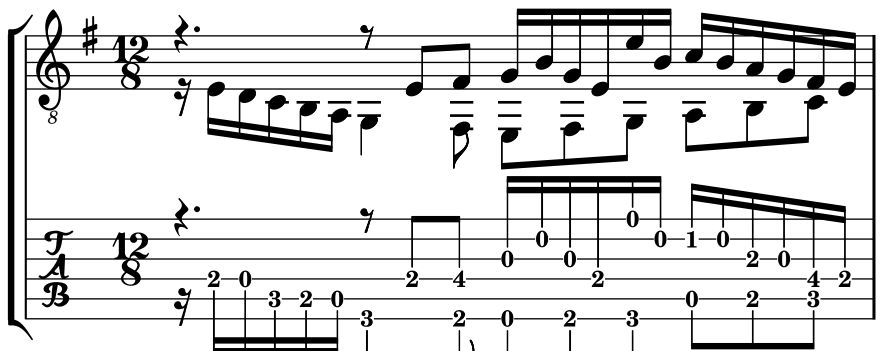
Polyphony in tablature

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"
        \context Voice = "upper" \upper
        \context Voice = "lower" \lower
      >>
      \new TabStaff = "guitar tab" <<
        \context TabVoice = "upper" \upper
        \context TabVoice = "lower" \lower
      >>
    >>
  >>
}
```



See also

Notation Reference: [Stems], page 155.

Snippets: Section “Fretted strings” in *Snippets*.

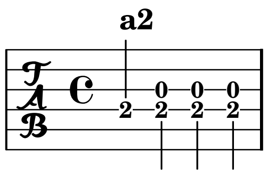
Internals Reference: Section “TabNoteHead” in *Internals Reference*, Section “TabStaff” in *Internals Reference*, Section “TabVoice” in *Internals Reference*, Section “Beam” in *Internals Reference*.

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 }
  >>
>>
```



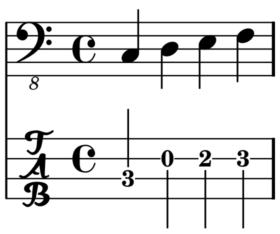
Guitar special effects are limited to harmonics and slides.

Custom tablatures

LilyPond tabulature 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 and bass guitar. Lilypond automatically sets the correct transposition for predefined tunings. The following example is for bass guitar, which sounds an octave lower than written.

```
<<
  \new Staff {
    \clef "bass_8"
    \relative c, {
      c4 d e f
    }
  }
  \new TabStaff {
    \set TabStaff.stringTunings = #bass-tuning
    \relative c, {
      c4 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 `scm/output-lib.scm`.

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.

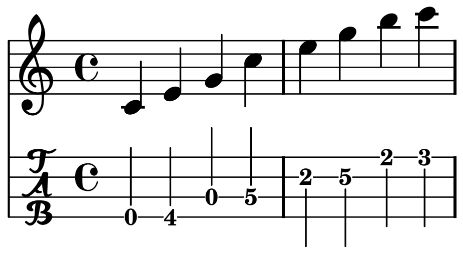
A string pitch in a string tuning list is the pitch difference of the open string from middle C measured in semitones. The string pitch must be an integer. Lilypond calculates the actual pitch of the string by adding the string tuning pitch to the actual pitch for middle C.

LilyPond automatically calculates the number of strings in the `TabStaff` as the number of elements in `stringTunings`.

Any desired string tuning can be created. 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'' g'' b'' c'''
}

<<
  \new Staff {
    \clef treble
    \mynotes
  }
  \new TabStaff {
    \set TabStaff.stringTunings = #'(21 14 7 0)
    \mynotes
  }
>>
```



See also

Installed Files: ‘`scm/output-lib.scm`’.

Snippets: Section “Fretted strings” in *Snippets*.

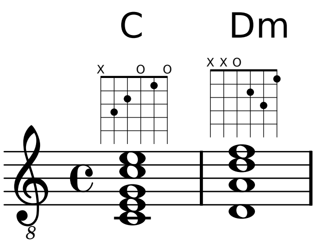
Internals Reference: Section “Tab_note_heads_engraver” in *Internals Reference*.

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 markup interfaces are found at Section B.8 [Text markup commands], page 463.

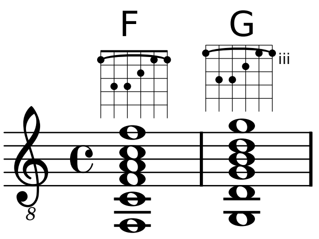
The standard fret diagram markup string indicates the string number and the fret number for each dot to be placed on the string. In addition, open and unplayed (muted) strings can be indicated.

```
<<
  \context ChordNames {
     \chordmode {
       c1 d:m
     }
  }
  \context 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'> ^\markup
      \fret-diagram #"6-x;5-x;4-o;3-2;2-3;1-1;"
  }
>>
```



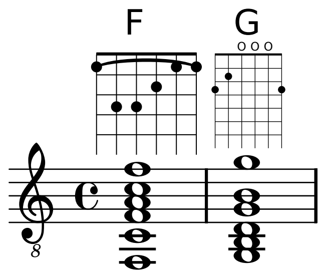
Barre indications can be added to the diagram from the fret-diagram markup string.

```
<<
  \context ChordNames {
     \chordmode {
       f1 g
     }
  }
  \context 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'> ^\markup
      \fret-diagram #"c:6-1-3;6-3;5-5;4-5;3-4;2-3;1-3;"
  }
>>
```



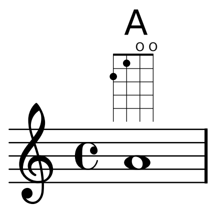
The size of the fret diagram, and the number of frets in the diagram can be changed in the fret-diagram markup string.

```
<<
  \context ChordNames {
     \chordmode {
       f1 g
     }
  }
  \context 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'> ^\markup
      \fret-diagram #"h:6;6-3;5-2;4-o;3-o;2-o;1-3;"
  }
>>
```



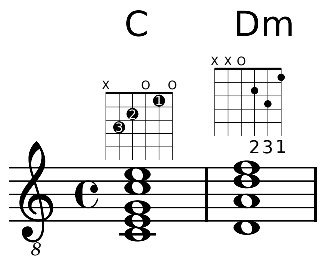
The number of strings in a fret diagram can be changed to accomodate different instruments such as banjos and ukeleles with the fret-diagram markup string.

```
<<
  \context ChordNames {
     \chordmode {
       a1
     }
  }
  \context Staff {
       %% A chord for ukelele
    a'1 ^\markup \fret-diagram #"w:4;4-2-2;3-1-1;2-o;1-o;"
  }
>>
```



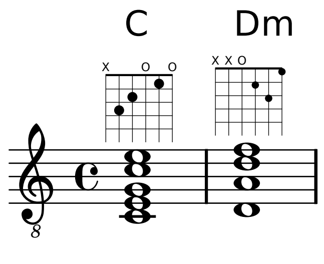
Fingering indications can be added, and the location of fingering labels can be controlled by the fret-diagram markup string.

```
<<
  \context ChordNames {
     \chordmode {
       c1 d:m
     }
  }
  \context 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'> ^\markup
      \fret-diagram #"f:2;6-x;5-x;4-o;3-2-2;2-3-3;1-1-1;"
  }
>>
```



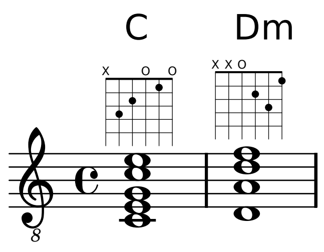
Dot radius and dot position can be controlled with the fret-diagram markup string.

```
<<
  \context ChordNames {
     \chordmode {
       c1 d:m
     }
  }
  \context 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'> ^\markup
      \fret-diagram #"p:0.2;6-x;5-x;4-o;3-2;2-3;1-1;"
  }
>>
```



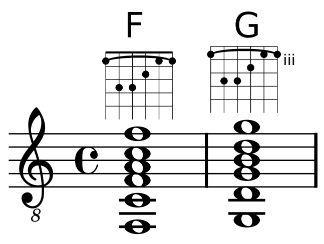
The fret-diagram-terse markup string omits string numbers; the string number is implied by the presence of semicolons. There is one semicolon for each string in the diagram. The first semicolon corresponds to the highest string number and the last semicolon corresponds to the first string. Mute strings, open strings, and fret numbers can be indicated.

```
<<
  \context ChordNames {
     \chordmode {
       c1 d:m
     }
  }
  \context Staff {
    \clef "treble_8"
    < c e g c' e' > 1 ^\markup
      \fret-diagram-terse #"x;3;2;o;1;o;"
    < d a d' f'> ^\markup
      \fret-diagram-terse #"x;x;o;2;3;1;"
  }
>>
```



Barre indicators can be included in the fret-diagram-terse markup string.

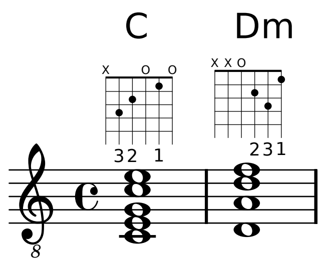
```
<<
  \context ChordNames {
     \chordmode {
       f1 g
     }
  }
  \context Staff {
    \clef "treble_8"
    < f, c f a c' f'>1 ^\markup
      \fret-diagram-terse #"1-(;3;3;2;1;1-);"
    < g, d g b d' g'> ^\markup
      \fret-diagram-terse #"3-(;5;5;4;3;3-);"
  }
>>
```



Fingering indications can be included in the fret-diagram-terse markup string.

```
<<
  \context ChordNames {
     \chordmode {
       c1 d:m
     }
  }
  \context Staff {
    \override Voice.TextScript
      #'(fret-diagram-details finger-code) = #'below-string
    \clef "treble_8"
    < c e g c' e' > 1 ^\markup
```

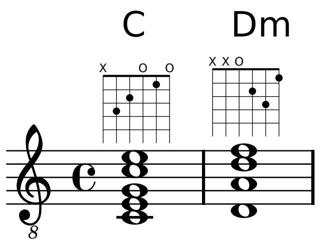
```
      \fret-diagram-terse #"x;3-3;2-2;o;1-1;o;"
    < d a d' f'> ^\markup
      \fret-diagram-terse #"x;x;o;2-2;3-3;1-1;"
  }
>>
```



Other fret diagram properties must be adjusted using `\override` when using the fret-diagram-terse markup.

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.

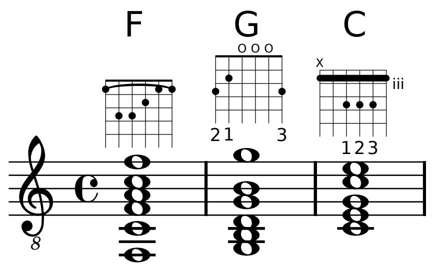
```
<<  \context ChordNames {
     \chordmode {
       c1 d:m
     }
  }
  \context Staff {
    \clef "treble_8"
    < c e g c' e' > 1 ^\markup
      \fret-diagram-verbose #'(
        (mute 6)
        (place-fret 5 3)
        (place-fret 4 2)
        (open 3)
        (place-fret 2 1)
        (open 1)
      )
    < d a d' f'> ^\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.

```
<<
  \context ChordNames {
     \chordmode {
       f1 g c
     }
  }
  \context 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'> ^\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 e g c' e'> ^\markup
      \fret-diagram-verbose #'(
        (capo 3)
        (mute 6)
        (place-fret 4 5 1)
        (place-fret 3 5 2)
        (place-fret 2 5 3)
      )
   }
>>
```



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

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 }

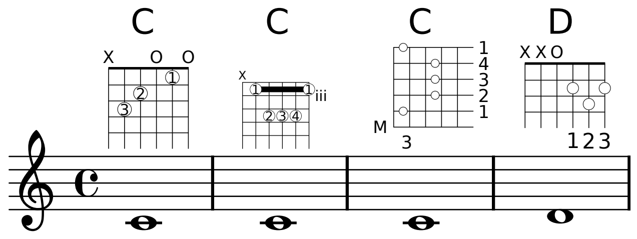
  \new Voice = "mel" {
    \textLengthOn
    % Set global properties of fret diagram
    \override TextScript #'size = #'1.2
    \override TextScript
      #'(fret-diagram-details finger-code) = #'in-dot
    \override TextScript
      #'(fret-diagram-details dot-color) = #'white

    %% 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 B.8 [Text markup commands], page 463.

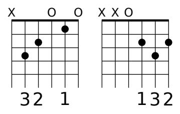
Snippets: Section "Fretted strings" in *Snippets*.

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:

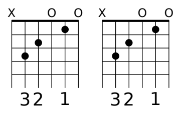
```
\include "predefined-guitar-fretboards.ly"
\context FretBoards {
  \chordmode {
    c1 d
  }
}
```



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.

Chord pitches can be entered either as simultaneous music or using chord mode (see [Chord mode overview], page 255).

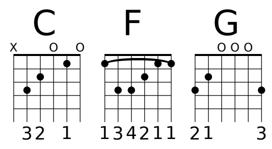
```
\include "predefined-guitar-fretboards.ly"
\context FretBoards {
  \chordmode {c1}
  <c' e' g'>1
}
```



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
}

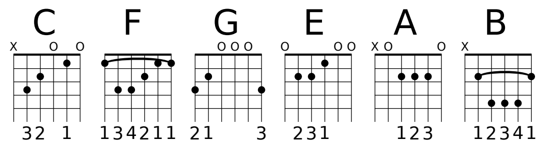
<<
  \context ChordNames {
    \mychords
  }
  \context FretBoards {
    \mychords
  }
>>
```



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
}

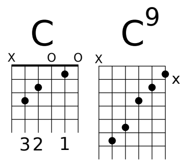
mychordlist = {
  \mychords
  \transpose c e { \mychords}
}
<<
  \context ChordNames {
    \mychordlist
  }
  \context FretBoards {
    \mychordlist
  }
>>
```



The predefined fret diagram table contains seven chords (major, minor, augmented, diminished, dominant seventh, major seventh, minor seventh) for each of 17 keys. A complete list of the predefined fret diagrams is shown in Section B.3 [Predefined fretboard diagrams], page 441. If there is no entry in the table for a chord, the FretBoards engraver will calculate a fret-diagram using the automatic fret diagram functionality described in [Automatic fret diagrams], page 237.

```
\include "predefined-guitar-fretboards.ly"
mychords = \chordmode{
  c1 c:9
}

<<
  \context ChordNames {
    \mychords
  }
  \context FretBoards {
    \mychords
  }
>>
```



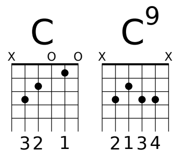
Fret diagrams can be added to the fret diagram table. To add a diagram, you must specify the chord for the diagram, the tuning to be used, and a definition for the diagram. The diagram definition can be either a fret-diagram-terse definition string or a fret-diagram-verbose marking list.

```
\include "predefined-guitar-fretboards.ly"

\storePredefinedDiagram \chordmode {c:9}
                        #guitar-tuning
                        #"x;3-2;2-1;3-3;3-4;x;"

mychords = \chordmode{
  c1 c:9
}

<<
  \context ChordNames {
    \mychords
  }
  \context FretBoards {
    \mychords
  }
>>
```



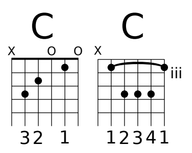
Different fret diagrams for the same chord name can be stored using different octaves of pitches. The different octave should be at least two octaves above or below the default octave, because the octaves above and below the default octave are used for transposing fretboards.

```
\include "predefined-guitar-fretboards.ly"

\storePredefinedDiagram \chordmode {c''}
                        #guitar-tuning
                        #(offset-fret 2 (chord-shape 'bes guitar-tuning))

mychords = \chordmode{
  c1 c''
}

<<
  \context ChordNames {
    \mychords
  }
  \context 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 posistions 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

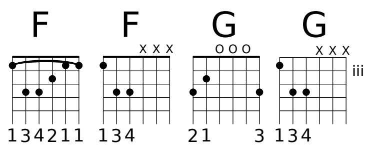
\addChordShape #'powerf #guitar-tuning #"1-1;3-3;3-4;x;x;x;"

% add some new chords based on the power chord shape

\storePredefinedDiagram \chordmode {f''}
                        #guitar-tuning
                        #(chord-shape 'powerf guitar-tuning)
\storePredefinedDiagram \chordmode {g''}
                        #guitar-tuning
                        #(offset-fret 2 (chord-shape 'powerf guitar-tuning))

mychords = \chordmode{
  f1 f'' g g''
}

<<
  \context ChordNames {
    \mychords
  }
  \context 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`.

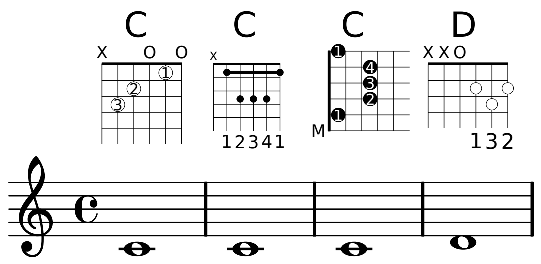
Selected Snippets

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 \chordmode { c' }
                        #guitar-tuning
                        #"x;1-1-(;3-2;3-3;3-4;1-1-);"
<<
  \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
      \once \override FretBoard #'size = #'1.0
      \once \override FretBoard
        #'(fret-diagram-details barre-type) = #'straight
      \once \override FretBoard
        #'(fret-diagram-details dot-color) = #'black
      \once \override FretBoard
        #'(fret-diagram-details finger-code) = #'below-string
      c'
      \once \override FretBoard
        #'(fret-diagram-details barre-type) = #'none
      \once \override FretBoard
        #'(fret-diagram-details number-type) = #'arabic
      \once \override FretBoard
        #'(fret-diagram-details orientation) = #'landscape
      \once \override FretBoard
        #'(fret-diagram-details mute-string) = #"M"
      \once \override FretBoard
        #'(fret-diagram-details label-dir) = #LEFT
      \once \override FretBoard
        #'(fret-diagram-details dot-color) = #'black
      c'
      \once \override FretBoard
        #'(fret-diagram-details finger-code) = #'below-string
      \once \override FretBoard
        #'(fret-diagram-details dot-radius) = #0.35
      \once \override FretBoard
        #'(fret-diagram-details dot-position) = #0.5
      \once \override 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 = #'(11 18 14 9)

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 \dSix
                        #cuatroTuning
                        #"o;o;o;o;"
\storePredefinedDiagram \dMajor
                        #cuatroTuning
                        #"o;o;o;3-3;"
\storePredefinedDiagram \aMajSeven
                        #cuatroTuning
                        #"o;2-2;1-1;2-3;"
\storePredefinedDiagram \dMajSeven
                        #cuatroTuning
                        #"o;o;o;1-1;"
\storePredefinedDiagram \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
    }

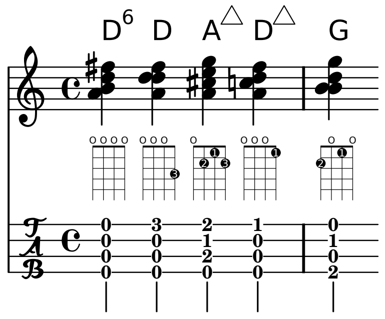
    \new Staff {
      \new Voice \with {
        \remove "New_fingering_engraver"
      }
      \relative c'' {
        \primeros
      }
    }

    \new FretBoards {
      \set 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 = #(ly:make-moment 1 16)
    }
  }
  \midi { }
}
```



See also

Notation Reference: [Custom tablatures], page 220, [Automatic fret diagrams], page 237, [Chord mode overview], page 255, Section B.3 [Predefined fretboard diagrams], page 441.

Installed Files: ‘ly/predefined-guitar-fretboards.ly’, ‘ly/predefined-guitar-ninth-fretboards.ly

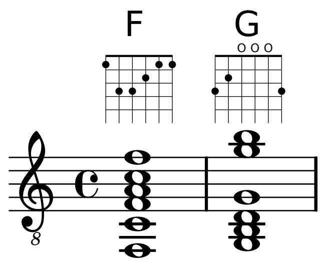
Snippets: Section “Fretted strings” in *Snippets*.

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.

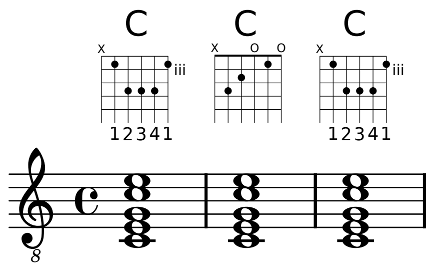
```
<<
  \context ChordNames {
     \chordmode {
       f1 g
     }
  }
  \context FretBoards {
    < f, c f a c' f'>1
    < g,\6 b, d g b g'>
  }
  \context Staff {
    \clef "treble_8"
    < f, c f a c' f'>1
    < g, b, d g b' g'>
  }
>>
```



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 <c e g c' e'>
                        #guitar-tuning
```

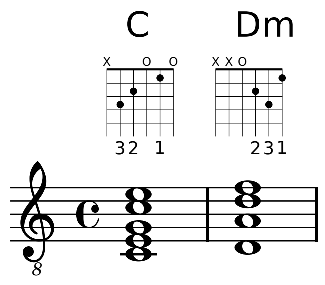
```
                          #"x;3-1-(;5-2;5-3;5-4;3-1-1);"
<<
  \context ChordNames {
     \chordmode {
       c1 c c
     }
  }
  \context FretBoards {
    <c e g c' e'>1
    \predefinedFretboardsOff
    <c e g c' e'>
    \predefinedFretboardsOn
    <c e g c' e'>
  }
  \context Staff {
    \clef "treble_8"
    <c e g c' e'>1
    <c e g c' e'>
    <c e g c' e'>
  }
>>
```



Sometimes the fretboard calculator will be unable to find an accceptable 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.

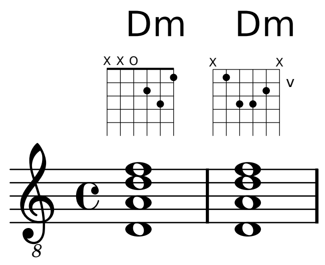
Fingerings can be added to FretBoard fret diagrams.

```
<<
  \context ChordNames {
     \chordmode {
       c1 d:m
     }
  }
  \context FretBoards {
    < c-3 e-2 g c'-1 e' > 1
    < d a-2 d'-3 f'-1>
  }
  \context Staff {
    \clef "treble_8"
    < c e g c' e' > 1
    < d a d' f'>
  }
>>
```



The minimum fret to be used in calculating strings and frets for the FretBoard context can be set with the `minimumFret` property.

```
<<
  \context ChordNames {
     \chordmode {
       d1:m d:m
     }
  }
  \context FretBoards {
    < d a d' f'>
    \set FretBoards.minimumFret = #5
    < d a d' f'>
  }
  \context Staff {
    \clef "treble_8"
    < d a d' f'>
    < d a d' f'>
  }
>>
```



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 220 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 220.

Snippets: Section "Fretted strings" in *Snippets*.

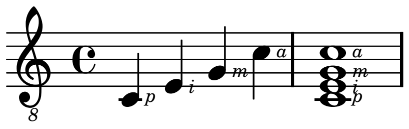
Internals Reference: Section "fret-diagram-interface" in *Internals Reference*.

Right-hand fingerings

Right-hand fingerings *p-i-m-a* must be entered within a chord construct `<>` for them to be printed in the score, even when applied to a single note.

Note: There **must** be a hyphen after the note and a space before the closing `>`.

```
\clef "treble_8"
<c-\rightHandFinger #1 >4
<e-\rightHandFinger #2 >
<g-\rightHandFinger #3 >
<c-\rightHandFinger #4 >
<c,-\rightHandFinger #1 e-\rightHandFinger #2
  g-\rightHandFinger #3 c-\rightHandFinger #4 >1
```



For convenience, you can abbreviate `\rightHandFinger` to something short, for example `RH`,

```
#(define RH rightHandFinger)
```

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.

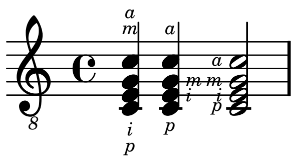
```
#(define RH rightHandFinger)

\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
}
```

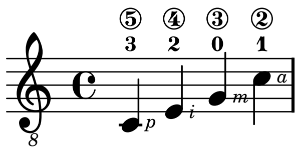


Fingerings, string indications, and right-hand fingerings

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

Snippets: Section “Fretted strings” in *Snippets*.

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

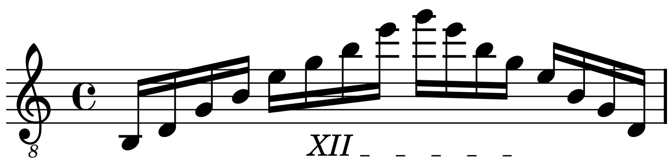
2.4.2 Guitar

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.

```
\clef "treble_8"
b16 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

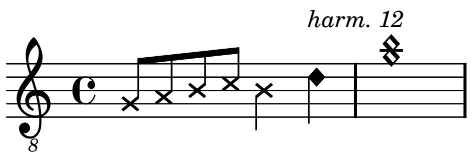
Notation Reference: [Text spanners], page 161.

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 c' {
  \clef "treble_8"
  \override Staff.NoteHead #'style = #'cross
  g8 a b c b4
  \override Staff.NoteHead #'style = #'harmonic-mixed
  d^\markup { \italic { \fontsize #-2 { "harm. 12" }}} <g b>1
}
```



See also

Snippets: Section "Fretted strings" in *Snippets*.

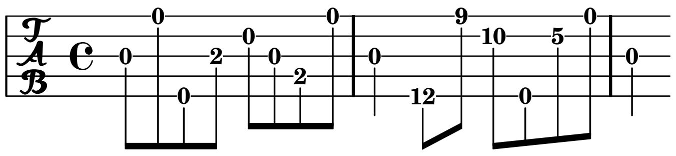
Notation Reference: [Special note heads], page 26, Section B.7 [Note head styles], page 462.

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:

```
\new TabStaff <<
  \set TabStaff.tablatureFormat = #fret-number-tablature-format-banjo
  \set TabStaff.stringTunings = #banjo-open-g-tuning
  {
    \stemDown
    g8 d' g'\5 a b g e d' |
    g4 d''8\5 b' a'\2 g'\5 e'\2 d' |
    g4
  }
>>
```



A number of common tunings for banjo are predefined in LilyPond: `banjo-c-tuning` (gCGBD), `banjo-modal-tuning` (gDGCD), `banjo-open-d-tuning` (aDF#AD) and `banjo-open-dm-tuning` (aDFAD).

These tunings may be converted to four-string banjo tunings using the `four-string-banjo` function:

```
\set TabStaff.stringTunings = #(four-string-banjo banjo-c-tuning)
```

See also

Snippets: Section “Fretted strings” in *Snippets*.

The file ‘`scm/output-lib.scm`’ contains predefined banjo tunings.

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

TODO add more.

- Some percussion may be notated on a rhythmic staff; this is discussed in [Showing melody rhythms], page 51, and [Instantiating new staves], page 122.
- MIDI output is discussed in a separate section; please see Section 3.5.6 [Percussion in MIDI], page 332.

See also

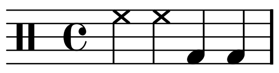
Notation Reference: [Showing melody rhythms], page 51, [Instantiating new staves], page 122. Section 3.5.6 [Percussion in MIDI], page 332.

Snippets: Section “Percussion” in *Snippets*.

Basic percussion notation

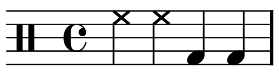
Percussion notes may be entered in `\drummode` mode, which is similar to the standard mode for entering notes. The simplest way to enter percussion notes is to use the `\drums` command, which creates the correct context and entry mode for percussion:

```
\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 B.11 [Percussion notes], page 501.

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` contex, but other clefs may also be used.

There are a few issues concerning MIDI support for percussion instruments; for details please see Section 3.5.6 [Percussion in MIDI], page 332.

See also

Notation Reference: Section 3.5.6 [Percussion in MIDI], page 332, Section B.11 [Percussion notes], page 501.

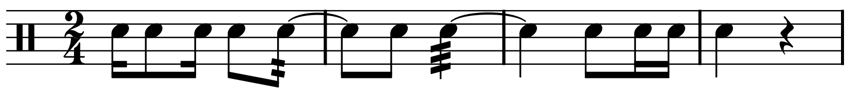
File: '`ly/drumpitch-init.ly`'

Snippets: Section "Percussion" in *Snippets*.

Drum rolls

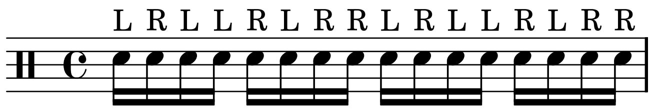
Drum rolls are indicated with three slashes across the stem. For quarter notes or longer the three slashes are shown explicitly, eighth notes are shown with two slashes (the beam being the third), and drum rolls shorter than eighths have one stem slash to supplement the beams. This is achieved with the tremolo notation, `:32`, as described in [Tremolo repeats], page 106. Here is an example of some snare rolls:

```
\drums {
  \time 2/4
  sn16 sn8 sn16 sn8 sn8:32 ~
  sn8 sn8 sn4:32 ~
  sn4 sn8 sn16 sn16
  sn4 r4
}
```



Sticking can be indicated by placing `^"R"` or `^"L"` after the note. The `staff-padding` property may be overridden to achieve a pleasing baseline.

```
\drums {
  \repeat unfold 2 {
    sn16 ^"L" sn^"R" sn^"L" sn^"L" sn^"R" sn^"L"  sn^"R" sn^"R"
  }
}
```



See also

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

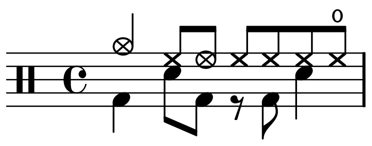
Notation Reference: Section 3.5.6 [Percussion in MIDI], page 332.

Snippets: Section "Percussion" in *Snippets*.

Percussion staves

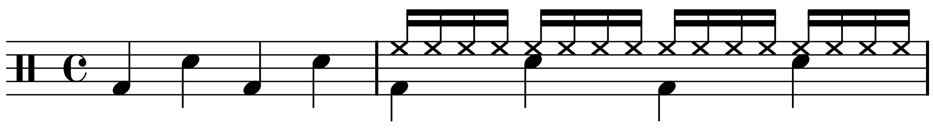
A percussion part for more than one instrument typically uses a multiline staff where each position in the staff refers to one piece of percussion. To typeset the music, the notes must be interpreted in DrumStaff and DrumVoice context.

```
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 }
>>
```



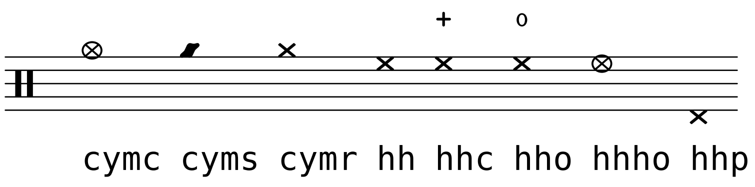
The above example shows verbose polyphonic notation. The short polyphonic notation, described in Section "I'm hearing Voices" in *Learning Manual*, can also be used if the voices are instantiated by hand first. For example,

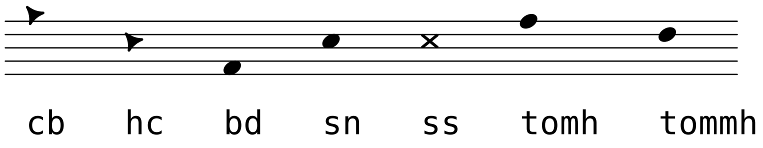
```
\new DrumStaff <<
  \new DrumVoice = "1" { s1*2 }
  \new DrumVoice = "2" { s1*2 }
  \drummode {
    bd4 sn4 bd4 sn4
    << {
      \repeat unfold 16 hh16
    } \\ {
      bd4 sn4 bd4 sn4
    } >>
  }
>>
```

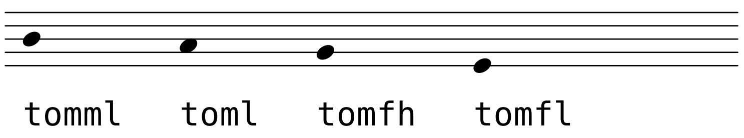


There are also other layout possibilities. To use these, set the property drumStyleTable in context DrumVoice. The following variables have been predefined:

`drums-style`
This is the default. It typesets a typical drum kit on a five-line staff:



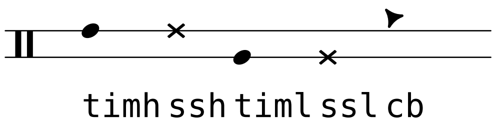




The drum scheme supports six different toms. When there are fewer toms, simply select the toms that produce the desired result. For example, to get toms on the three middle lines you use `tommh`, `tomml`, and `tomfh`.

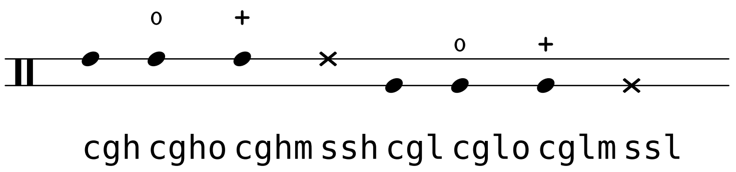
`timbales-style`

This typesets timbales on a two line staff:



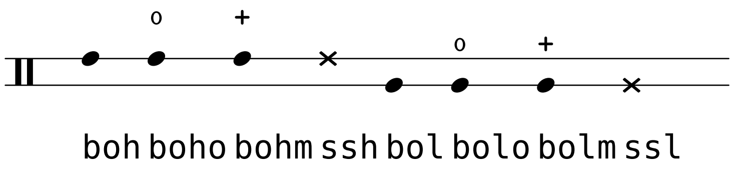
`congas-style`

This typesets congas on a two line staff:



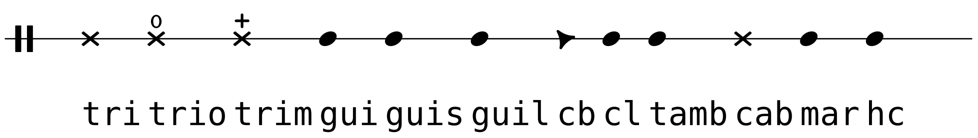
`bongos-style`

This typesets bongos on a two line staff:



`percussion-style`

To typeset all kinds of simple percussion on one line staves:

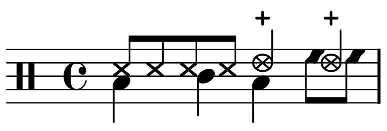


Custom percussion staves

If you do not like any of the predefined lists you can define your own list at the top of your file.

```
#(define mydrums '(
         (bassdrum     default   #f         -1)
         (snare        default   #f         0)
         (hihat        cross     #f         1)
         (pedalhihat   xcircle   "stopped"  2)
         (lowtom       diamond   #f         3)))
up = \drummode { hh8 hh hh hh hhp4 hhp }
down = \drummode { bd4 sn bd toml8 toml }

\new DrumStaff <<
  \set DrumStaff.drumStyleTable = #(alist->hash-table mydrums)
  \new DrumVoice { \voiceOne \up }
  \new DrumVoice { \voiceTwo \down }
>>
```



Selected Snippets

FIXME: MOVE ALL THESE TO LSR! -gp

Here are some examples:

Two Woodblocks, entered with wbh (high woodblock) and wbl (low woodblock)

```
% These lines define the position of the woodblocks in the stave;
% if you like, you can change it or you can use special note heads
% for the woodblocks.
#(define mydrums '((hiwoodblock default #t  3)
                   (lowoodblock default #t -2)))

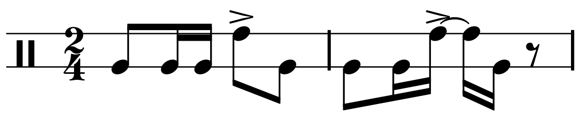
woodstaff = {
  % This defines a staff with only two lines.
  % It also defines the positions of the two lines.
  \override Staff.StaffSymbol #'line-positions = #'(-2 3)

  % This is neccessary; if not entered, the barline would be too short!
  \override Staff.BarLine #'bar-size = #3
}

\new DrumStaff {
  \set DrumStaff.drumStyleTable = #(alist->hash-table mydrums)

  % with this you load your new drum style table
  \woodstaff

  \drummode {
    \time 2/4
    wbl8 wbl16 wbl wbh8-> wbl |
    wbl8 wbl16 wbh-> ~ wbh wbl16 r8 |
  }
}
```



Note that in this special case the length of the barline must altered with `\override Staff.BarLine #'bar-size #number`. Otherwise it would be too short. And you have also to define the positions of the two stafflines. For more information about these delicate things have a look at [Staff symbol], page 128.

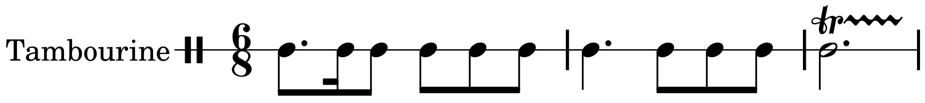
A tambourine, entered with 'tamb':

```
#(define mydrums '((tambourine default #t 0)))

tambustaff = {
  \override Staff.StaffSymbol #'line-positions = #'( 0 )
  \override Staff.BarLine #'bar-size = #3
  \set DrumStaff.instrumentName = #"Tambourine"
}

\new DrumStaff {
  \tambustaff
  \set DrumStaff.drumStyleTable = #(alist->hash-table mydrums)

  \drummode {
    \time 6/8
    tamb8. tamb16 tamb8 tamb tamb tamb |
    tamb4. tamb8 tamb tamb |
    % the trick with the scaled duration and the shorter rest
    % is neccessary for the correct ending of the trill-span!
    tamb2.*5/6 \startTrillSpan s8 \stopTrillSpan |
  }
}
```

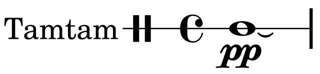


Music for Tam-Tam (entered with 'tt'):

```
#(define mydrums '((tamtam default #t 0)))

tamtamstaff = {
  \override Staff.StaffSymbol #'line-positions = #'( 0 )
  \override Staff.BarLine #'bar-size = #3
  \set DrumStaff.instrumentName = #"Tamtam"
}

\new DrumStaff {
  \tamtamstaff
  \set DrumStaff.drumStyleTable = #(alist->hash-table mydrums)
  \drummode {
    tt 1 \pp \laissezVibrer
  }
}
```

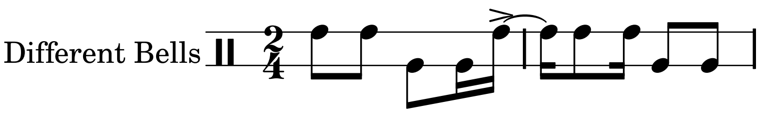


Two different bells, entered with ‘cb’ (cowbell) and ‘rb’ (ridebell)

```
#(define mydrums '((ridebell default #t  3)
                   (cowbell  default #t -2)))

bellstaff = {
  \override DrumStaff.StaffSymbol #'line-positions = #'(-2 3)
  \set DrumStaff.drumStyleTable = #(alist->hash-table mydrums)
  \override Staff.BarLine #'bar-size = #3
  \set DrumStaff.instrumentName = #"Different Bells"
}

\new DrumStaff {
  \bellstaff
  \drummode {
    \time 2/4
    rb8 rb cb cb16 rb-> ~ |
    rb16 rb8 rb16 cb8 cb |
  }
}
```



Here an short example by maestro Stravinsky (from ‘L’histoire du Soldat’)

```
#(define mydrums '((bassdrum   default #t  4)
                   (snare      default #t -4)
                   (tambourine default #t  0)))

global = {
  \time 3/8 s4.
  \time 2/4 s2*2
  \time 3/8 s4.
  \time 2/4 s2
}

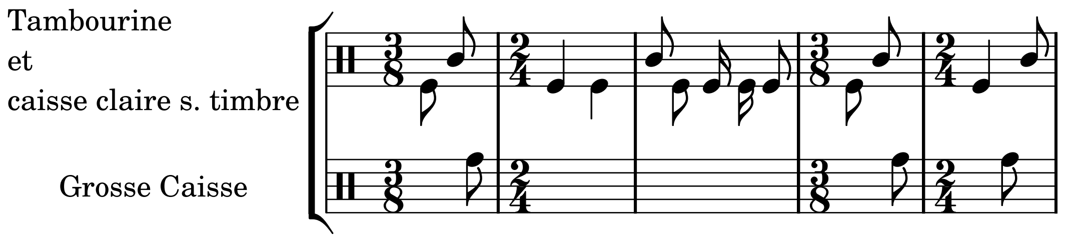
drumsA = {
  \context DrumVoice <<
    { \global }
    { \drummode {
        \autoBeamOff
        \stemDown sn8 \stemUp tamb s8 |
        sn4 \stemDown sn4 |
        \stemUp tamb8 \stemDown sn8 \stemUp sn16 \stemDown sn \stemUp sn8 |
        \stemDown sn8 \stemUp tamb s8 |
        \stemUp sn4 s8 \stemUp tamb
      }
    }
  >>
}

drumsB = {
  \drummode {
    s4 bd8 s2*2 s4 bd8 s4 bd8 s8
  }
}

\layout {
  indent = #40
}

\score {
  \new StaffGroup <<
    \new DrumStaff {
      \set DrumStaff.instrumentName = \markup {
        \column {
          "Tambourine"
          "et"
          "caisse claire s. timbre"
        }
      }
      \set DrumStaff.drumStyleTable = #(alist->hash-table mydrums)
      \drumsA
    }

   \new DrumStaff {
     \set DrumStaff.instrumentName = #"Grosse Caisse"
     \set DrumStaff.drumStyleTable = #(alist->hash-table mydrums)
     \drumsB }
  >>
}
```



See also

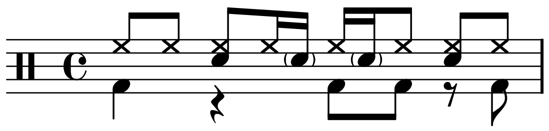
Snippets: Section "Percussion" in *Snippets*.

Internals Reference: Section "DrumStaff" in *Internals Reference*, Section "DrumVoice" in *Internals Reference*.

Ghost notes

Ghost notes for drums and percussion may be created using the `\parenthesize` command detailed in [Parentheses], page 154. However, the default `\drummode` does not include the `Parenthesis_engraver` plugin which allows this.

```
\new DrumStaff \with {
  \consists "Parenthesis_engraver"
}
<<
  \context DrumVoice  = "1" { s1 }
  \context DrumVoice  = "2" { s1 }
  \drummode {
    <<
      {
        hh8[ hh] <hh sn> hh16
        < \parenthesize sn > hh
        < \parenthesize sn > hh8 <hh sn> hh
      } \\
      {
        bd4 r4 bd8 bd r8 bd
      }
    >>
  }
>>
```

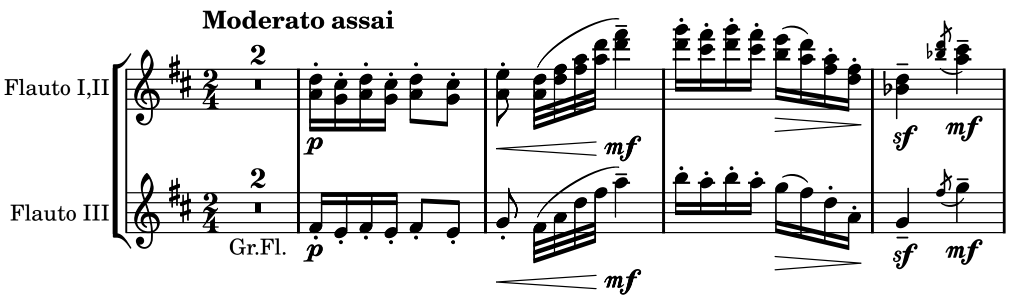


Also note that you must add chords (`< >` brackets) around each `\parenthesize` statement.

See also

Snippets: Section "Percussion" in *Snippets*.

2.6 Wind instruments



This section includes some elements of music notation that arise when writing for winds.

2.6.1 Common notation for wind instruments

This section discusses some issues 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 91.
- Legato playing is indicated by [Slurs], page 89.
- Different types of tonguings, ranging from legato to non-legato to stacatto are usually shown by articulation marks, sometimes combined with slurs, see [Articulations and ornamentations], page 81 and Section B.10 [List of articulations], page 500.
- Flutter tonguing is usually indicated by placing a tremolo mark and a text markup on the note. See [Tremolo repeats], page 106.

There are also other aspects of musical notation that can apply to wind instruments:

- Many wind instruments are transposing intruments, see [Instrument transpositions], page 17.
- The slide glissando are characteristic of the trombone, but other winds may perform keyed or valved glissandi. See [Glissando], page 93.
- Harmonic series glissandi, which are possible on all brass instruments but common for French Horns, are usually written out as [Grace notes], page 75.
- Pitch inflections at the end of a note are discussed in [Falls and doits], page 92.
- Key slaps or valve slaps are often shown by the `cross` style of [Special note heads], page 26.
- Woodwinds can overblow low notes to sound harmonics. These are shown by the `flageolet` articulation. See Section B.10 [List of articulations], page 500.
- 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 81 and Section B.10 [List of articulations], page 500.
- Stopped horns are indicated by the `stopped` articulation. See [Articulations and ornamentations], page 81.

Selected Snippets

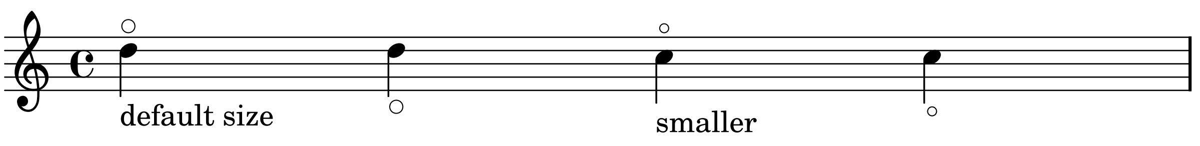
Changing \flageolet mark size

To make the `\flageolet` circle smaller use the following Scheme function.

```
smallFlageolet =
#(let ((m (make-music 'ArticulationEvent
                      'articulation-type "flageolet")))
   (ly:music-set-property! m 'tweaks
     (acons 'font-size -3
       (ly:music-property m 'tweaks)))
  m)

\layout { ragged-right = ##f }

\relative c'' {
  d4^\flageolet_\markup { default size } d_\flageolet
  c4^\smallFlageolet_\markup { smaller } c_\smallFlageolet
}
```



See also

Notation Reference: [Breath marks], page 91, [Slurs], page 89, [Articulations and ornamentations], page 81, Section B.10 [List of articulations], page 500, [Tremolo repeats], page 106, [Instrument transpositions], page 17, [Glissando], page 93, [Grace notes], page 75, [Falls and doits], page 92, [Special note heads], page 26,

Snippets: Section "Winds" in *Snippets*

Fingerings

All wind instruments other than the trombone require the use of several fingers to produce each pitch.

TBC

2.6.2 Bagpipes

This section includes extra information for writing for bagpipes.

Bagpipe definitions

LilyPond contains special definitions for music for the Scottish highland bagpipe; to use them, add

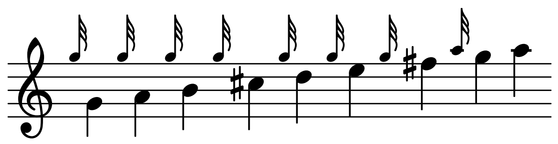
```
\include "bagpipe.ly"
```

at 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 `cflat` or `fflat`. Similarly, the piobaireachd high g can be written `gflat` when it occurs in light music.

See also

Section "Winds" in *Snippets*

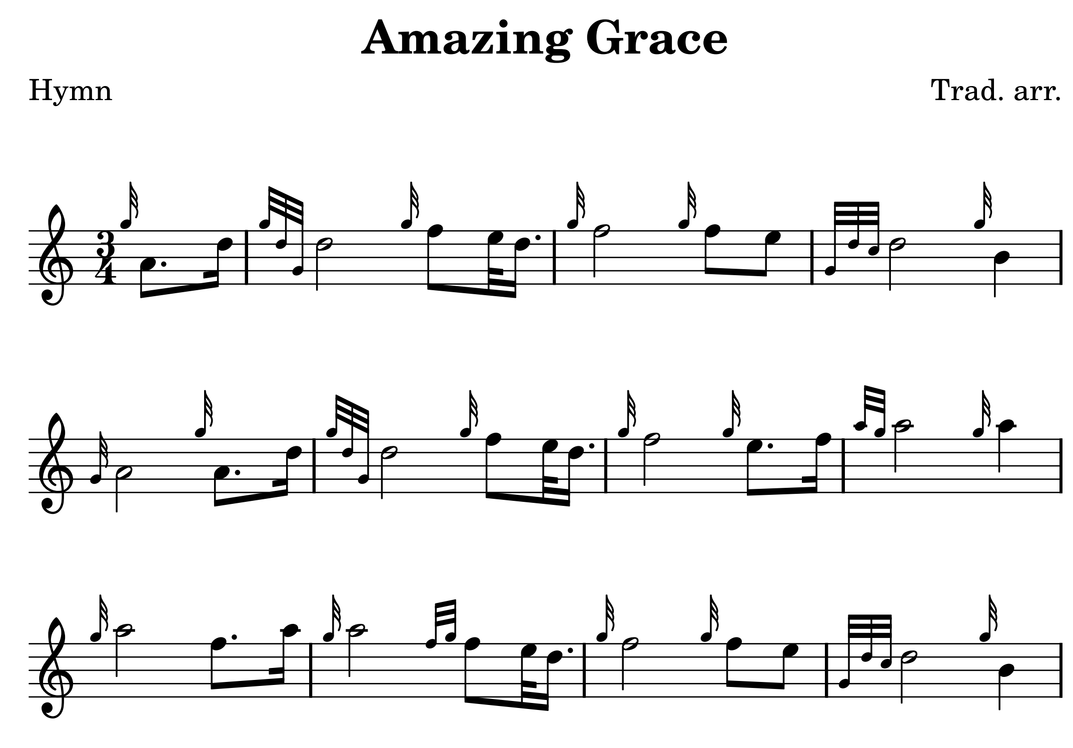
Bagpipe example

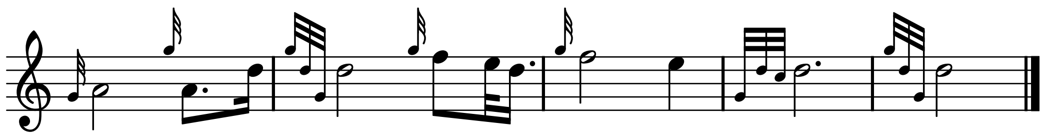
This is what the well known tune Amazing Grace looks like in bagpipe notation.

```
\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 "|."
}
```

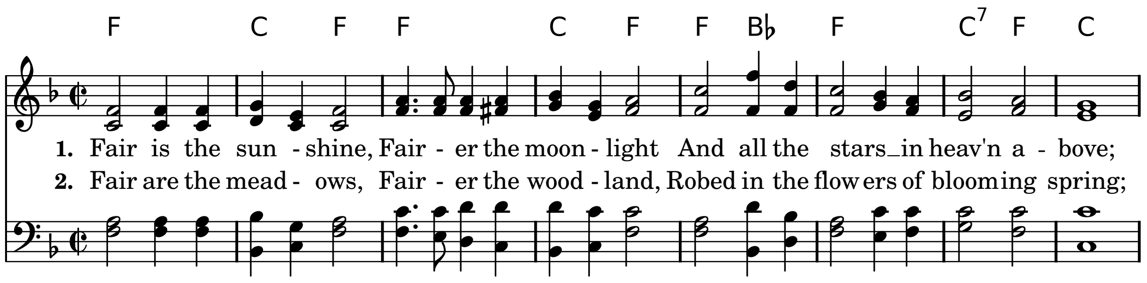




See also

Section "Winds" in *Snippets*

2.7 Chord notation


F C F F C F F B♭ F C7 F C
1. Fair is the sun - shine, Fair - er the moon - light And all the stars_in heav'n a - bove;
2. Fair are the mead - ows, Fair - er the wood - land, Robed in the flow ers of bloom ing spring;

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

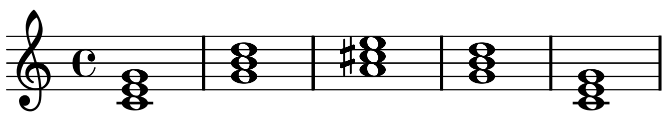
Chord mode is used to enter chords using an indicator of the chord structure, rather than the chord pitches.

Chord mode overview

Chords can be entered as simultaneous music, as discussed in [Chorded notes], page 108.

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 5.4.1 [Input modes], page 392.

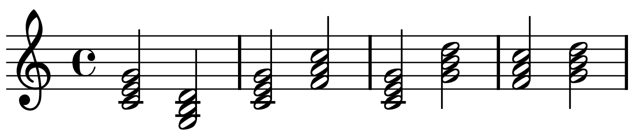
```
\chordmode { c1 g a g c }
```



Chords entered using chord mode are music elements, and can be transposed just like chords entered using simultaneous music.

Chord mode and note mode can be mixed in sequential music:

```
<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*.

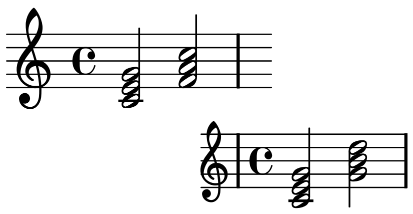
Notation Reference: [Chorded notes], page 108, Section 5.4.1 [Input modes], page 392.

Snippets: Section “Chords” in *Snippets*

Known issues and warnings

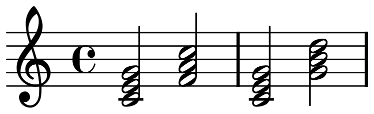
When chord mode and note mode are mixed in sequential music, and chord mode comes first, the note mode will create a new Staff context.

```
\chordmode { c2 f }
<c e g>2 <g' b d>
```



To avoid this behavior, explicitly create the Staff context:

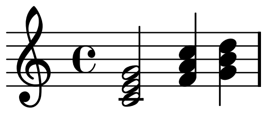
```
\new Staff {
  \chordmode { c2 f }
  <c e g>2  <g' b d>
}
```



Common chords

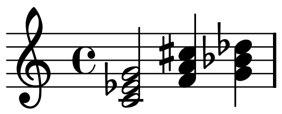
Major triads are entered by including the root and an optional duration:

```
\chordmode { c2 f4 g }
```



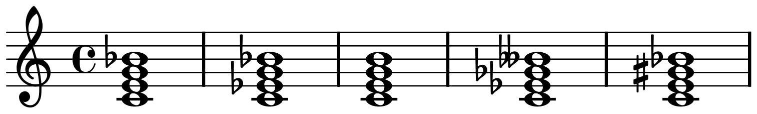
Minor, augmented, and diminished triads are entered by placing : and a quality modifier string after the duration:

```
\chordmode { c2:m f4:aug g:dim }
```

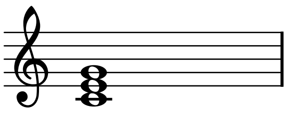
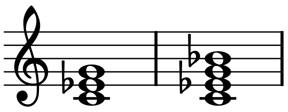
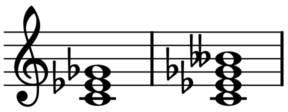
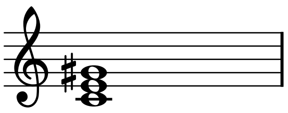
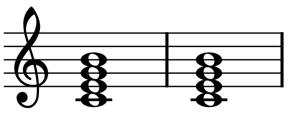


Seventh chords can be created:

```
\chordmode { c1:7 c:m7 c:maj7 c:dim7 c:aug7 }
```



The table belows 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 B.2 [Common chord modifiers], page 438.

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 B.2 [Common chord modifiers], page 438, [Extended and altered chords], page 257.

Snippets: Section "Chords" in *Snippets*.

Known issues and warnings

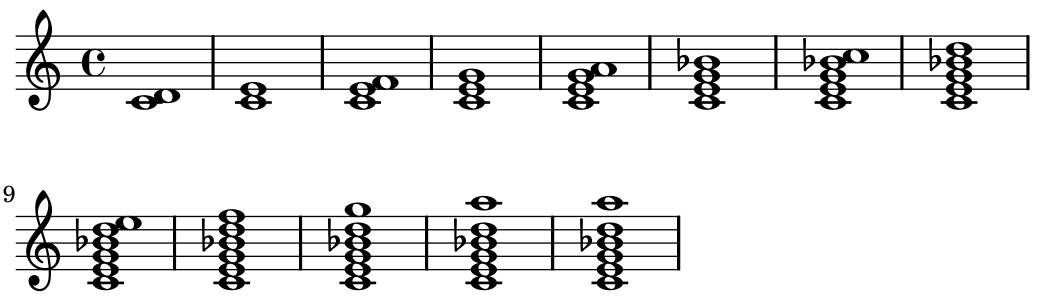
Only one quality modifier should be used per chord, typically on the highest step present in the chord. Chords with more than quality modifier will be parsed without an error or warning, but the results are unpredictable. Chords that cannot be achieved with a single quality modifier should be altered by individual pitches, as described in [Extended and altered chords], page 257.

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.

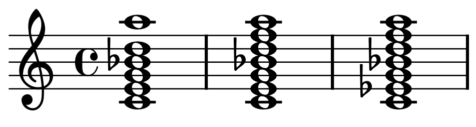
```
\chordmode {
  c1:2 c:3 c:4 c:5
  c1:6 c:7 c:8 c:9
  c1:10 c:11 c:12 c:13
  c1:14
}
```



Note that both `c:5` and `c` produce a C major triad.

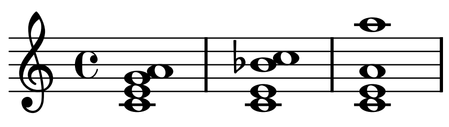
Since an unaltered 11 does not sound good when combined with an unaltered 13, the 11 is removed from a `:13` chord (unless it is added explicitly).

```
\chordmode {
  c1:13 c:13.11 c:m13
}
```



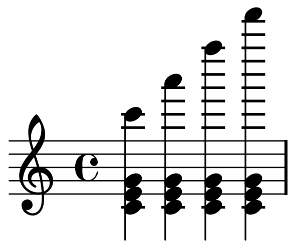
Individual steps can be added to a chord. Additions follow the extent and are prefixed by a dot (`.`). The basic seventh step added to a chord is the minor or flatted seventh, rather than the major seventh.

```
\chordmode {
  c1:5.6 c:3.7.8 c:3.6.13
}
```



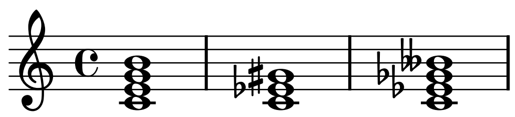
Added steps can be as high as desired.

```
\chordmode {
  c4:5.15 c:5.20 c:5.25 c:5.30
}
```



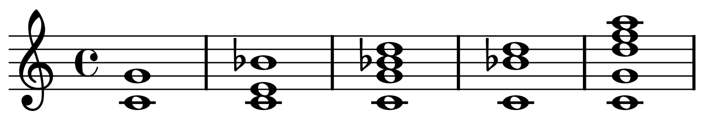
Added chord steps can be altered by suffixing a `-` or `+` sign to the number. To alter a step that is automatically included as part of the basic chord structure, add it as an altered step.

```
\chordmode {
  c1:7+ c:5+.3- c:3-.5-.7-
}
```



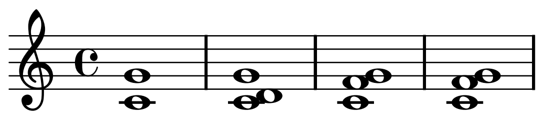
Following any steps to be added, a series of steps to be removed is introduced in a modifier string with a prefix of `^`. If more than one step is to be removed, the steps to be removed are separated by `.` following the initial `^`.

```
\chordmode {
  c1^3 c:7^5 c:9^3 c:9^3.5 c:13.11^3.7
}
```



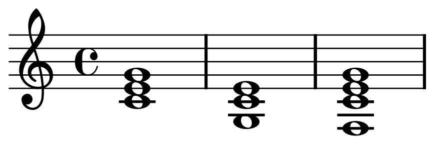
The modifier `sus` can be added to the modifier string to create suspended chords. This removes the 3rd step from the chord. Append either `2` or `4` to add the 2nd or 4th step to the chord. `sus` is equivalent to `^3`; `sus4` is equivalent to `.4^3`.

```
\chordmode {
  c1:sus c:sus2 c:sus4 c:5.4^3
}
```



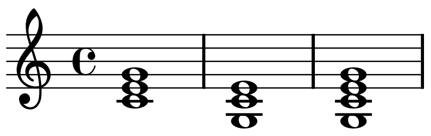
Inversions (putting a pitch other than the root on the bottom of the chord) and added bass notes can be specified by appending `/`*pitch* to the chord.

```
\chordmode {
  c1 c/g c/f
}
```



A bass note that is part of the chord can be added, instead of moved as part of an inversion, by using `/+`*pitch*.

```
\chordmode {
  c1 c/g c/+g
}
```



Chord modifiers that can be used to produce a variety of standard chords are shown in Section B.2 [Common chord modifiers], page 438.

See also

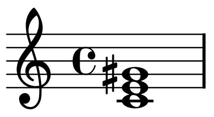
Notation Reference: Section B.2 [Common chord modifiers], page 438.

Snippets: Section "Chords" in *Snippets*

Known issues and warnings

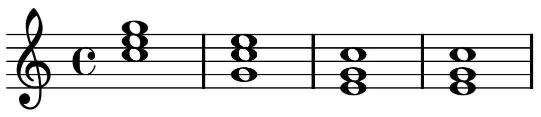
Each step can only be present in a chord once. The following simply produces the augmented chord, since `5+` is interpreted last.

```
\chordmode { c1:5.5-.5+ }
```



Only the second inversion can be created by adding a bass note. The first inversion requires changing the root of the chord.

```
\chordmode {
  c'1: c':/g e:6-3-^5 e:m6-^5
}
```



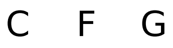
2.7.2 Displaying chords

Chords can be displayed by name, in addition to the standard display as notes on a staff.

Printing chord names

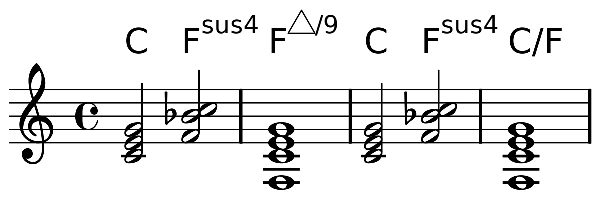
Chord names are printed in the `ChordNames` context:

```
\new ChordNames {
  \chordmode {
    c2 f4. g8
  }
}
```



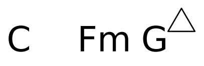
Chords can be entered as simultaneous notes or through the use of chord mode. The displayed chord name will be the same, regardless of the mode of entry, unless there are inversions or added bass notes:

```
<<
  \new ChordNames {
    <c e g>2  <f bes c>
    <f c' e g>1
    \chordmode {
      c2 f:sus4 c1:/f
    }
  }
  {
    <c e g>2  <f bes c>
    <f, c' e g>1
    \chordmode {
      c2 f:sus4 c1:/f
    }
  }
>>
```

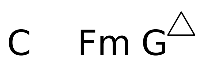


`\chords { ... }` is a shortcut notation for `\new ChordNames { \chordmode { ... } }`.

```
\chords {
  c2 f4.:m g8:maj7
}
```



```
\new ChordNames {
  \chordmode {
    c2 f4.:m g8:maj7
  }
}
```

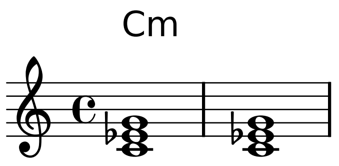


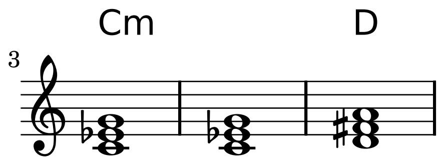
Selected Snippets

Showing chords at changes

Chord names can be displayed 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 }
  }
>>
```

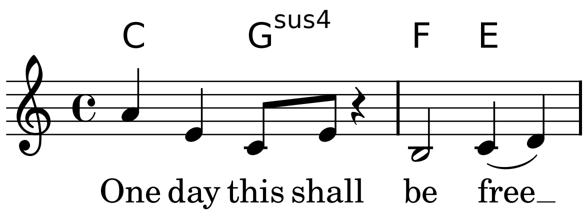




Simple lead sheet

When put together, chord names, a melody, and lyrics form a lead sheet:

```
<<
  \chords { c2 g:sus4 f e }
  \relative c'' {
    a4 e c8 e r4
    b2 c4( d)
  }
  \addlyrics { One day this shall be free __ }
>>
```



See also

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

Notation Reference: [Writing music in parallel], page 119.

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

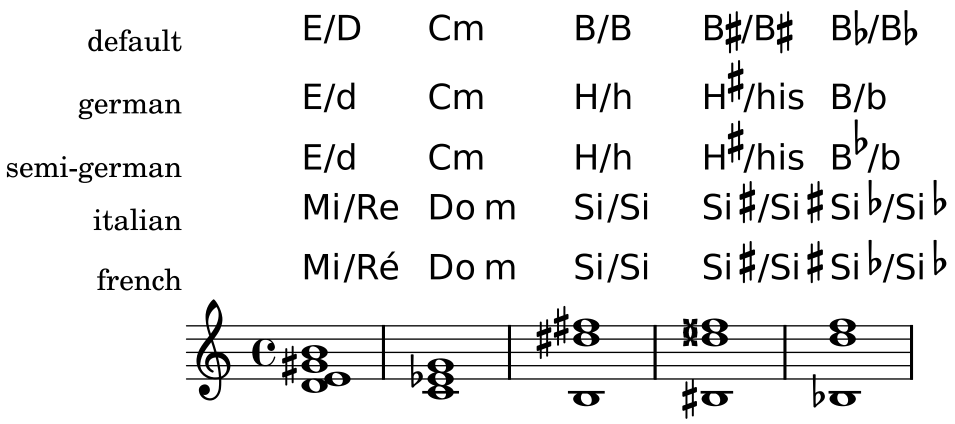
Chords containing inversions or altered bass notes are not named properly if entered using simultaneous music.

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 Appendix A [Literature list], page 436). The chord naming system can be modified as described below. An alternate jazz chord system has been developed using these modifications. The Ignatzek and alternate Jazz notation are shown on the chart in Section B.1 [Chord name chart], page 437.

In addition to the different naming systems, different note names are used for the root in different languages. The predefined variables `\germanChords`, `\semiGermanChords`, `\italianChords` and `\frenchChords` set these variables. The effect is demonstrated here:



If none of the existing settings give the desired output, the chord name display can 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`.

`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 slash. By setting `chordNameSeparator`, you can use any desired markup for a separator.

`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.

`chordPrefixSpacer`
: The 'm' for minor chords is usually printed immediately to the right of the root of the chord. A spacer can be placed between the root and 'm' 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.

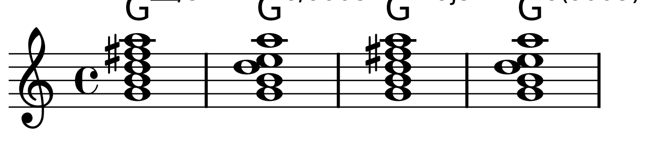
```
% modify maj9 and 6(add9)
% Exception music is chords with markups
chExceptionMusic = {
  <c e g b d'>1-\markup { \super "maj9" }
  <c e g a d'>1-\markup { \super "6(add9)" }
}

% 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
}

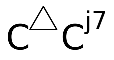
<< \context ChordNames \theMusic
   \context Voice \theMusic
>>
```



chord name major7

The layout of the major 7 can be tuned with `majorSevenSymbol`.

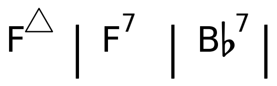
```
\chords {
  c:7+
  \set majorSevenSymbol = \markup { j7 }
  c:7+
}
```



Adding bar lines to ChordNames context

To add bar line indications in the `ChordNames` context, add the `Bar_engraver`.

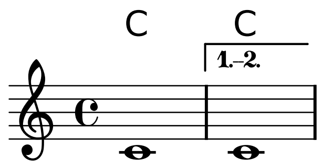
```
\new ChordNames \with {
  \override BarLine #'bar-size = #4
  \consists "Bar_engraver"
}
\chordmode {
  f1:maj7 f:7 bes:7
}
```



Volta below chords

By adding the `Volta_engraver` to the relevant staff, volte can be put under chords.

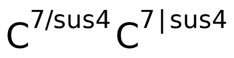
```
\score {
  <<
    \chords {
      c1
      c1
    }
    \new Staff \with {
      \consists "Volta_engraver"
    }
    {
      \repeat volta 2 { c'1 }
      \alternative { c' }
    }
  >>
  \layout {
    \context {
      \Score
      \remove "Volta_engraver"
    }
  }
}
```



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 B.1 [Chord name chart], page 437, Section B.2 [Common chord modifiers], page 438.

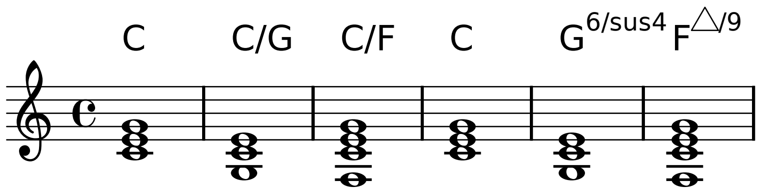
Installed Files: 'scm/chords-ignatzek.scm', 'scm/chord-entry.scm', 'ly/chord-modifier-init.ly'.

Snippets: Section "Chords" in *Snippets*.

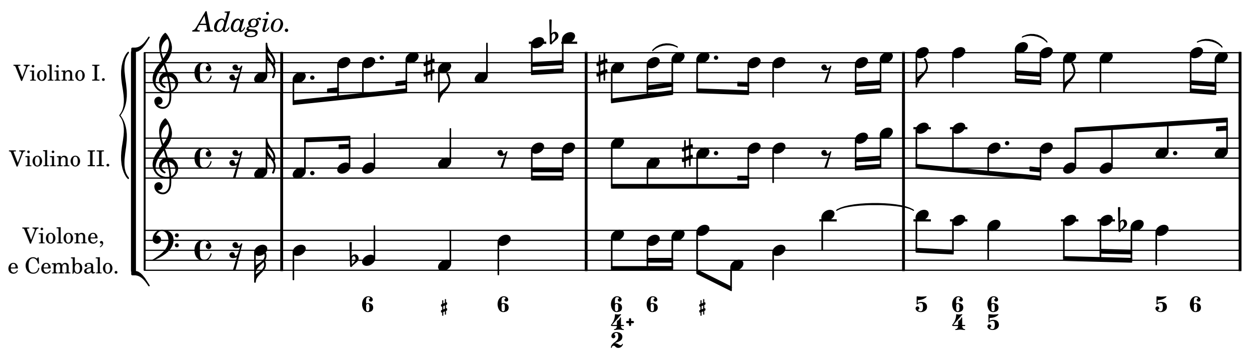
Known issues and warnings

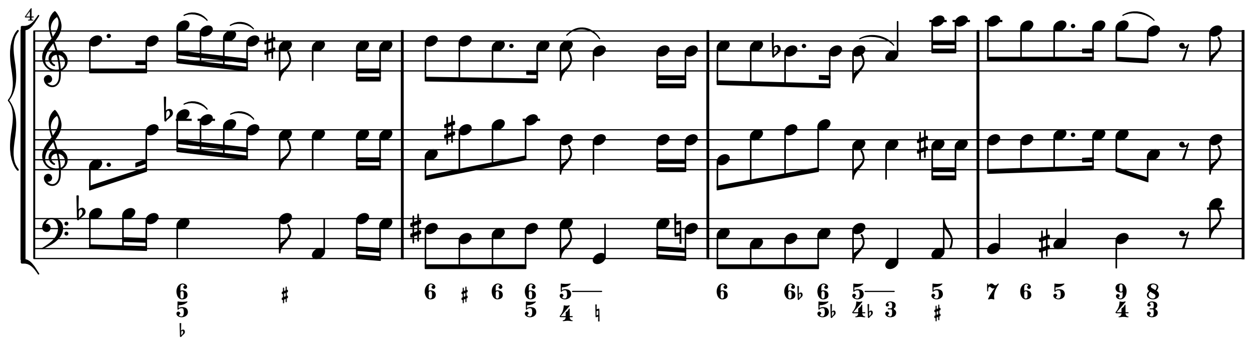
Chord names are determined from both the pitches that are present in the chord and the information on the chord structure that may have been entered in `\chordmode`. If the simultaneous pitches method of entering chords is used, undesired names result from inversions or bass notes.

```
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 }
>>
```



2.7.3 Figured bass



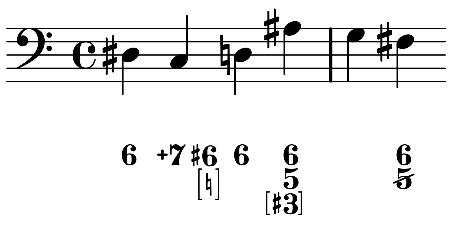


Figured bass notation can be displayed.

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*.

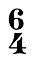
Snippets: Section “Chords” in *Snippets*

Entering figured bass

`\figuremode` is used to switch the input mode to figure mode. More information on different input modes can be found at Section 5.4.1 [Input modes], page 392.

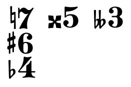
In figure mode, a group of bass figures is delimited by `<` and `>`. The duration is entered after the `>`.

```
\new FiguredBass {
  \figuremode {
    <6 4>2
  }
}
```



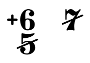
Accidentals (including naturals) can be added to figures:

```
\figures {
  <7! 6+ 4-> <5++> <3-->
}
```



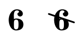
Augmented and diminished steps can be indicated:

```
\figures {
  <6\+ 5/> <7/>
}
```



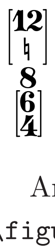
A backward slash through a figure (typically used for raised sixth steps) can be created:

```
\figures {
  <6> <6\\>
}
```



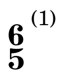
Vertical spaces and brackets can be be included in figures:

```
\figures {
  <[12 _!] 8 [6  4]>
}
```



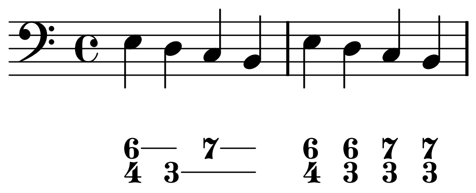
Any text markup can be inserted as a figure:

```
\figures {
  <\markup { \tiny \number 6 \super (1) } 5>
}
```



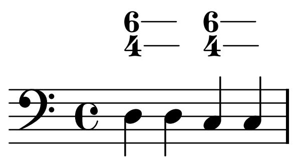
Continuation lines can be used to indicate repeated figures:

```
<<
  {
    \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>
  }
>>
```

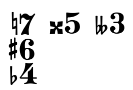


In this case, the extender lines replace existing figures, unless the continuation lines have been explicitly terminated.

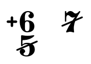
```
<<
  \figures {
    \bassFigureExtendersOn
    <6 4>4 <6 4> <6\! 4\!> <6 4>
  }
  {
    \clef bass
    d4 d c c
  }
>>
```



The table below summarizes the figure modifiers available.

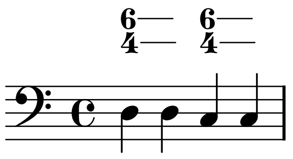
Modifier	Purpose	Example
+, -, !	Accidentals	

\+, /	Augmented and diminished steps



\\	Raised sixth step

\!	End of continuation line



Predefined commands

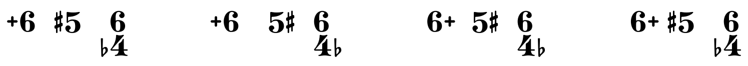
`\bassFigureExtendersOn`, `\bassFigureExtendersOff`.

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.

```
\figures {
  <6\+> <5+> <6 4-> r
  \set figuredBassAlterationDirection = #RIGHT
  <6\+> <5+> <6 4-> r
  \set figuredBassPlusDirection = #RIGHT
  <6\+> <5+> <6 4-> r
  \set figuredBassAlterationDirection = #LEFT
  <6\+> <5+> <6 4-> r
}
```



See also

Snippets: Section “Chords” in *Snippets*.

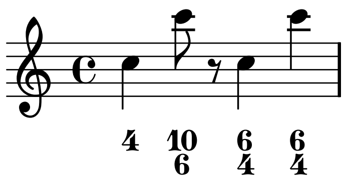
Internals Reference: Section “BassFigure” in *Internals Reference*, Section “BassFigureAlignment” in *Internals Reference*, Section “BassFigureLine” in *Internals Reference*, Section “BassFigureBracket” in *Internals Reference*, Section “BassFigureContinuation” in *Internals Reference*, Section “FiguredBass” in *Internals Reference*.

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.

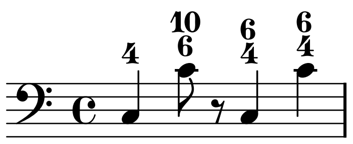
```
<<
  \relative c'' {
    c4 c'8 r8 c,4 c'
  }
  \new FiguredBass {
    \figuremode {
      <4>4 <10 6>8 s8
      <6 4>4 <6 4>
    }
  }
>>
```



In the example above, the `FiguredBass` context must be explicitly instantiated to avoid creating a second (empty) staff.

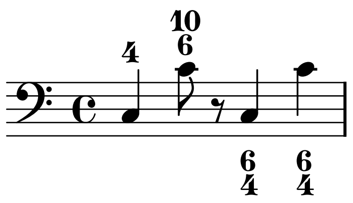
Figured bass can also be added to `Staff` contexts directly. In this case, the vertical position of the figures is adjusted automatically.

```
<<
  \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'
  }
>>
```



Predefined commands

`\bassFigureStaffAlignmentDown`, `\bassFigureStaffAlignmentUp`, `\bassFigureStaffAlignmentNeutral`.

See also

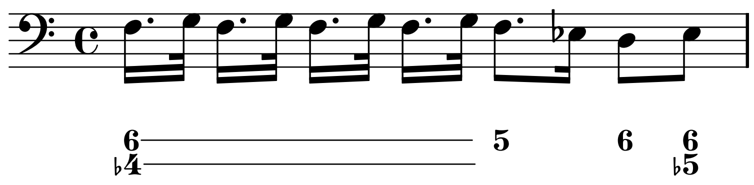
Snippets: Section "Chords" in *Snippets*.

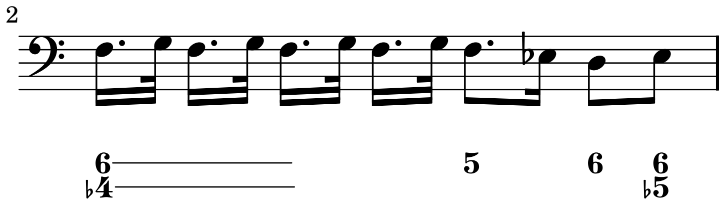
Internals Reference: Section "BassFigure" in *Internals Reference*, Section "BassFigureAlignment" in *Internals Reference*, Section "BassFigureLine" in *Internals Reference*, Section "BassFigureBracket" in *Internals Reference*, Section "BassFigureContinuation" in *Internals Reference*, Section "FiguredBass" 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.

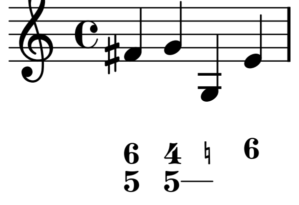
```
<<
  {
    \clef bass
    \repeat unfold 4 { f16. g32 } f8. es16 d8 es
  }
  \figures {
    \bassFigureExtendersOn
    % The extenders are correct here, with the same rhythm as the bass
    \repeat unfold 4 { <6 4->16. <6 4->32 }
    <5>8. r16 <6>8 <6\! 5->
  }
>>
<<
  {
    \clef bass
    \repeat 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->
  }
>>
```





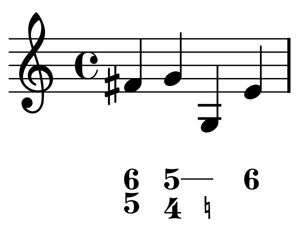
When using extender lines, adjacent figures with the same number in a different figure location can cause the figure positions to invert.

```
<<
 { fis4 g g, e' }
  \figures {
    \bassFigureExtendersOn
    <6 5>4 <5\! 4> < 5 _!> <6>
  }
>>
```

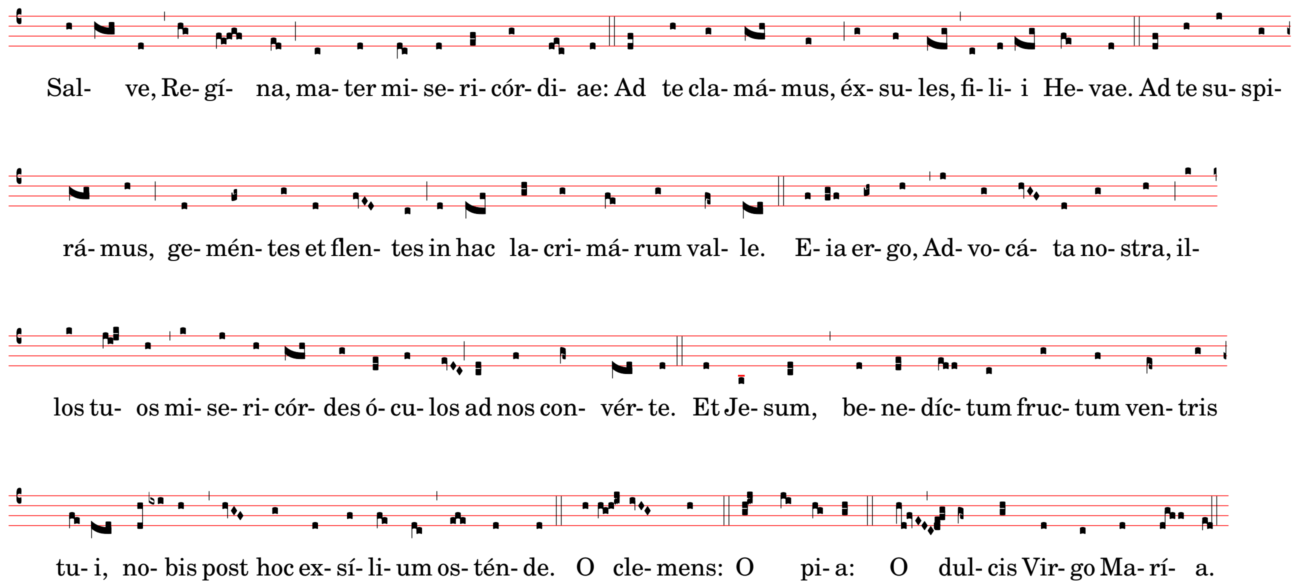


To avoid this problem, simply turn on extenders after the figure that begins the extender line and turn them off at the end of the extender line.

```
<<
 { fis4 g g, e' }
  \figures {
    <6 5>4 <5 4>
    \bassFigureExtendersOn
    < 5 _!>4 <6>
    \bassFigureExtendersOff
  }
>>
```



2.8 Ancient notation


Sal- ve, Re- gí- na, ma- ter mi- se- ri- cór- di- ae: Ad te cla- má- mus, éx- su- les, fi- li- i He- vae. Ad te su- spi-
rá- mus, ge- mén- tes et flen- tes in hac la- cri- má- rum val- le. E- ia er- go, Ad- vo- cá- ta no- stra, il-
los tu- os mi- se- ri- cór- des ó- cu- los ad nos con- vér- te. Et Je- sum, be- ne- díc- tum fruc- tum ven- tris
tu- i, no- bis post hoc ex- sí- li- um os- tén- de. O cle- mens: O pi- a: O dul- cis Vir- go Ma- rí- a.

Support for ancient notation includes features for mensural notation and Gregorian chant 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 pre-defined contexts for mensural or Gregorian notation.

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 280,
- [Mensural accidentals and key signatures], page 281,
- [Mensural rests], page 281,
- [Mensural clefs], page 278,
- [Gregorian clefs], page 285,
- [Mensural flags], page 280,
- [Mensural time signatures], page 279.

Some notational concepts are introduced specifically for ancient notation,

- [Custodes], page 276,
- [Divisiones], page 286,
- [Ligatures], page 275.

2.8.1 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 noteheads, 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 noteheads and its rests which approach a hand-drawn style.
- The *Neomensural* style is a modernized and stylized version of the former: the noteheads 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 noteheads (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 noteheads, classical rests and vaticana clefs in the same piece, if one wishes.

2.8.2 Ancient notation—common features

Pre-defined contexts

For Gregorian chant and mensural notation, there are pre-defined 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 pre-defined contexts `VaticanaVoice`, `VaticanaStaff`, `MensuralVoice`, and `MensuralStaff`. See further

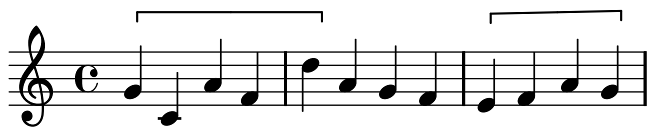
- [Gregorian chant contexts], page 284,
- [Mensural contexts], page 277.

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 Section "LigatureBracket" in *Internals Reference* engraver just puts a square bracket above the ligature.

```
\transpose c c' {
  \[ g c a f d' \]
  a g f
  \[ e f a g \]
}
```



Two other ligature styles are available: the Vaticana for Gregorian chant, and the Mensural for mensural music (only white mensural ligatures are supported for mensural music, and with certain limitations). To use any of these styles, the default `Ligature_bracket_engraver` has to be replaced with one of the specialized ligature engravers in the Section "Voice" in *Internals Reference* context, as explained in [White mensural ligatures], page 283 and [Gregorian square neume ligatures], page 288.

See also

Known issues and warnings

Ligatures need special spacing that has not yet been implemented. As a result, there is too much space between ligatures most of the time, and line breaking often is unsatisfactory. Also, lyrics do not correctly align with ligatures.

Accidentals must not be printed within a ligature, but instead need to be collected and printed in front of it.

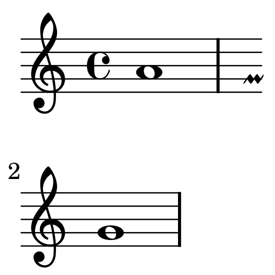
The syntax still uses the deprecated infix style `\[ music expr \]`. For consistency reasons, it will eventually be changed to postfix style `note\[ ... note\]`.

Custodes

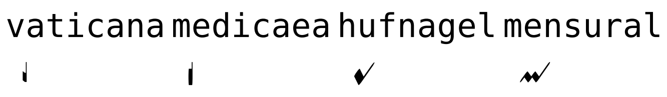
A *custos* (plural: *custodes*; Latin word for "guard") is a symbol that appears at the end of a staff. It anticipates the pitch of the first note of the following line, thus helping the performer to manage line breaks during performance.

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 Section "Custos_engraver" in *Internals Reference* into the Section "Staff" in *Internals Reference* context when declaring the `\layout` block, and change the style of the custos with an `\override` if desired, as shown in the following example:



The custos glyph is selected by the `style` property. The styles supported are `vaticana`, `medicaea`, `hufnagel`, and `mensural`. They are demonstrated in the following fragment



See also

Internals Reference: Section "Custos" in *Internals Reference*.

Examples: Section "Ancient notation" in *Snippets*.

Figured bass support

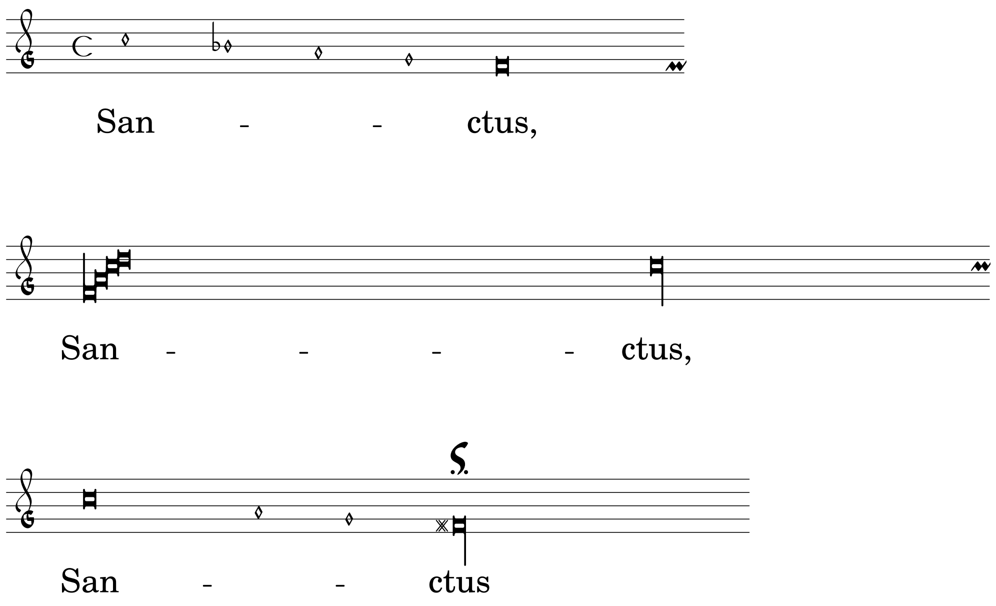
There is limited support for figured bass notation from the Baroque period; see Section 2.7.3 [Figured bass], page 266.

2.8.3 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" \transpose c c' {
      \override Score.BarNumber #'transparent = ##t {
        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
    }
  >>
}
```



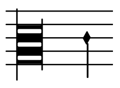
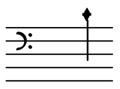
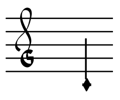
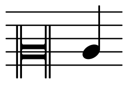
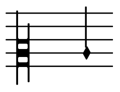
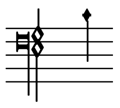
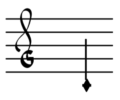
See also

TODO: nothing here yet ...

Mensural clefs

The following table shows all mensural 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 11. The note printed to the right side of each clef in the example column denotes the `c'` with respect to that clef.

Petrucci used C clefs with differently balanced left-side vertical beams, depending on which staff line it is printed.

Description	**Supported Clefs**	**Example**
mensural C clef	`mensural-c1`, `mensural-c2`, `mensural-c3`, `mensural-c4`	
mensural F clef	`mensural-f`	
mensural G clef	`mensural-g`	
neomensural C clef	`neomensural-c1`, `neomensural-c2`, `neomensural-c3`, `neomensural-c4`	
petrucci style C clefs, for use on different staff lines (the example shows the 2nd staff line C clef)	`petrucci-c1`, `petrucci-c2`, `petrucci-c3`, `petrucci-c4`, `petrucci-c5`	
petrucci style F clef	`petrucci-f`	
petrucci style G clef	`petrucci-g`	

See also

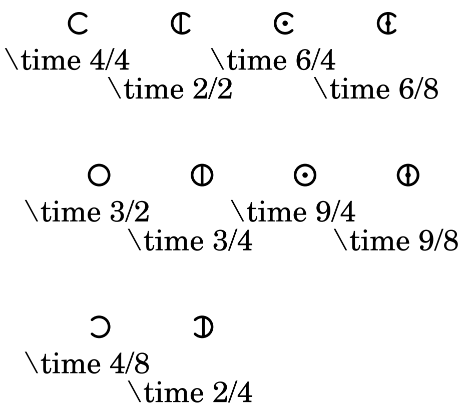
Notation Reference: see [Clef], page 11.

Known issues and warnings

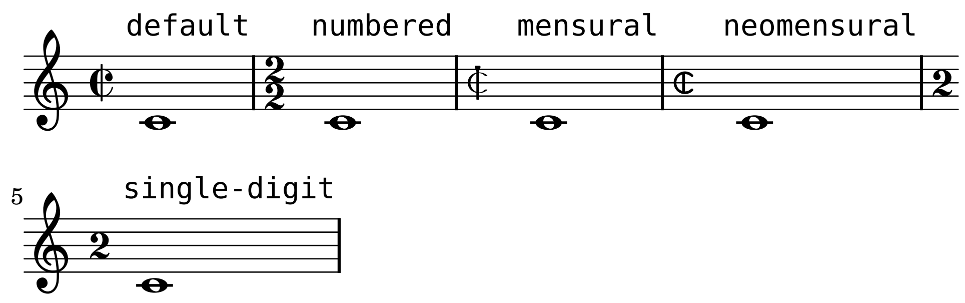
The mensural g clef is mapped to the Petrucci g clef.

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



Use the `style` property of grob Section "TimeSignature" in *Internals Reference* 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:



See also

Notation Reference: [Time signature], page 43, gives a general introduction to the use of time signatures.

Known issues and warnings

Ratios of note durations do not change with the time signature. For example, the ratio of 1 breve = 3 semibreves (*tempus perfectum*) must 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 Section "NoteHead" in *Internals Reference* object to `baroque`, `neomensural`, `mensural` or `petrucci`.

The `baroque` style differs from the `default` style by:

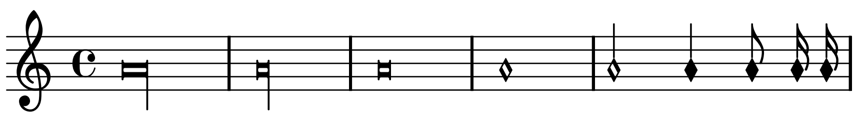
- Providing a `maxima` notehead, and
- Using a square shape for `\breve` note heads.

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 following example demonstrates the `petrucci` style:

```
\set Score.skipBars = ##t
\autoBeamOff
\override NoteHead #'style = #'petrucci
a'\maxima a'\longa a'\breve a'1 a'2 a'4 a'8 a'16 a'
```



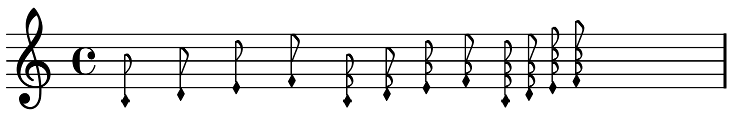
See also

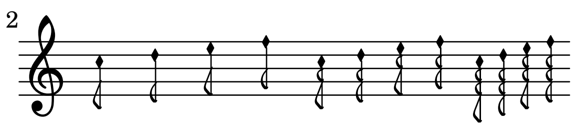
Section B.7 [Note head styles], page 462 gives an overview of all available note head styles.

Mensural flags

Use the `flag-style` property of grob Section "Stem" in *Internals Reference* to select ancient flags. Besides the `default` flag style, only the `mensural` style is supported.

```
\override Stem #'flag-style = #'mensural
\override Stem #'thickness = #1.0
\override NoteHead #'style = #'mensural
\autoBeamOff
c'8 d'8 e'8 f'8 c'16 d'16 e'16 f'16 c'32 d'32 e'32 f'32 s8
c''8 d''8 e''8 f''8 c''16 d''16 e''16 f''16 c''32 d''32 e''32 f''32
```





Note that the innermost flare of each mensural flag always 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

TODO: nothing here yet ...

Known issues and warnings

The attachment of ancient flags to stems is slightly off.

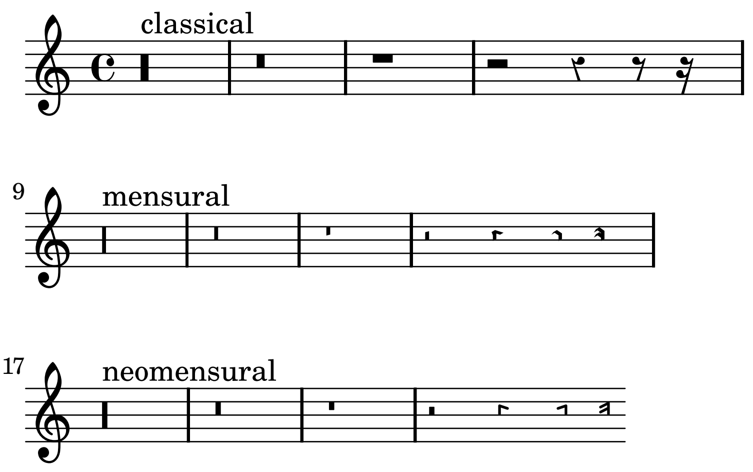
Vertically aligning each flag with a staff line assumes that stems always end either exactly on or exactly in the middle between two staff lines. This may not always be true when using advanced layout features of classical notation (which however are typically out of scope for mensural notation).

Mensural rests

Use the `style` property of grob Section "Rest" in *Internals Reference* to select ancient rests. Supported styles are `classical`, `neomensural`, and `mensural`. `classical` differs from the `default` style only in that the quarter rest looks like a horizontally mirrored 8th rest. The `mensural` and the `neomensural` styles mimic the appearance of rests in manuscripts and prints up to the 16th century.

The following example demonstrates the `mensural` and `neomensural` styles:

```
\set Score.skipBars = ##t
\override Rest #'style = #'classical
r\longa^"classical" r\breve r1 r2 r4 r8 r16 s \break
\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 32th and 64th rests specifically for the mensural or neo-mensural style. Instead, the rests from the default style will be taken.

See Section "Ancient notation" in *Snippets* for a chart of all rests.

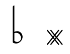
See also

Notation Reference: [Rests], page 37, gives a general introduction into the use of rests.

Mensural accidentals and key signatures

The `mensural` style provides a sharp and a flat sign different from the default style. If called for, the natural sign will be taken from the `vaticana` style.

mensural



The style for accidentals and key signatures is controlled by the `glyph-name-alist` property of the grobs Section "Accidental" in *Internals Reference* and Section "KeySignature" in *Internals Reference*, respectively; e.g.:

```
\override Staff.Accidental #'glyph-name-alist = #alteration-mensural-glyph-
name-alist
```

See also

Notation Reference: Section 1.1 [Pitches], page 1, [Accidentals], page 4, and [Automatic accidentals], page 18 give a general introduction of the use of accidentals. [Key signature], page 14 gives a general introduction of the use of key signatures.

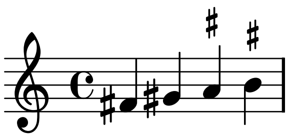
Internals Reference: Section "KeySignature" in *Internals Reference*.

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.

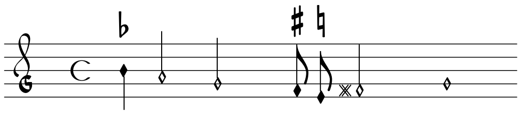
Support for such suggested accidentals is included, and can be switched on by setting `suggestAccidentals` to true.

```
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 c''
  \new MensuralVoice  {
        \once \set suggestAccidentals = ##t
  bes4 a2 g2 \ficta fis8 \ficta e! fis2 g1
  }
}
```



See also

Internals Reference: Section "Accidental_engraver" in *Internals Reference* engraver and the Section "AccidentalSuggestion" in *Internals Reference* object.

White mensural ligatures

There is limited support for white mensural ligatures.

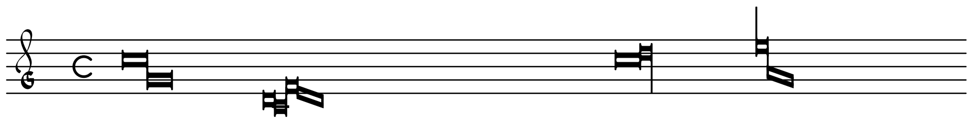
To engrave white mensural ligatures, in the layout block, replace the Section "Ligature_bracket_engraver" in *Internals Reference* with the Section "Mensural_ligature_engraver" in *Internals Reference* in the Section "Voice" in *Internals Reference* context:

```
\layout {
  \context {
    \Voice
    \remove Ligature_bracket_engraver
    \consists Mensural_ligature_engraver
  }
}
```

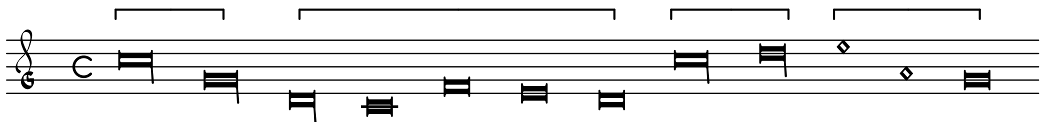
There is no additional input language to describe the shape of a white mensural ligature. The shape is rather determined solely from the pitch and duration of the enclosed notes. While this approach may take a new user a while to get accustomed to, it has the great advantage that the full musical information of the ligature is known internally. This is not only required for correct MIDI output, but also allows for automatic transcription of the ligatures.

For example,

```
\score {
  \transpose c c' {
    \set Score.timing = ##f
    \set Score.defaultBarType = "empty"
    \override NoteHead #'style = #'neomensural
    \override Staff.TimeSignature #'style = #'neomensural
    \clef "petrucci-g"
    \[ c'\maxima g \]
    \[ d\longa c\breve f e d \]
    \[ c'\maxima d'\longa \]
    \[ e'1 a g\breve \]
  }
  \layout {
    \context {
      \Voice
      \remove Ligature_bracket_engraver
      \consists Mensural_ligature_engraver
    }
  }
}
```



Without replacing Section "Ligature_bracket_engraver" in *Internals Reference* with Section "Mensural_ligature_engraver" in *Internals Reference*, the same music transcribes to the following



See also

TODO: nothing here yet ...

Known issues and warnings

Horizontal spacing of ligatures is poor.

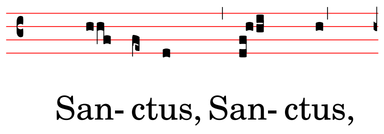
2.8.4 Typesetting Gregorian chant

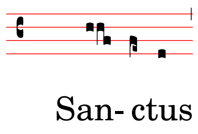
When typesetting a piece in Gregorian chant notation, the Section "Vaticana_ligature_engraver" in *Internals Reference* automatically selects the proper note heads, so there is no need to explicitly set the note head style. Still, the note head style can be set, e.g., to `vaticana_punctum` to produce punctum neumes. Similarly, the Section "Mensural_ligature_engraver" in *Internals Reference* automatically assembles mensural ligatures. See [Ligatures], page 275, for how ligature engravers work.

Gregorian chant contexts

The predefined `VaticanaVoiceContext` and `VaticanaStaffContext` can be used to engrave a piece of Gregorian chant in the style of the Editio Vaticana. 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:

```
\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 Lyrics \lyricsto "cantus" {
      San- ctus, San- ctus, San- ctus
    }
  >>
}
```



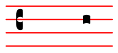
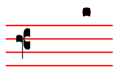
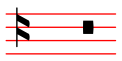
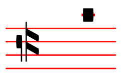
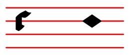
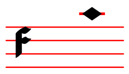
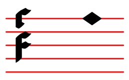


See also

TODO: nothing here yet ...

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 11. The note printed to the right side of each clef in the example column denotes the `c'` with respect to that clef.

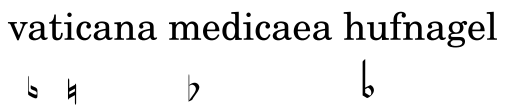
Description	**Supported Clefs**	**Example**
Editio Vaticana style do clef	`vaticana-do1`, `vaticana-do2`, `vaticana-do3`	
Editio Vaticana style fa clef	`vaticana-fa1`, `vaticana-fa2`	
Editio Medicaea style do clef	`medicaea-do1`, `medicaea-do2`, `medicaea-do3`	
Editio Medicaea style fa clef	`medicaea-fa1`, `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

Notation Reference: see [Clef], page 11.

Gregorian accidentals and key signatures

Accidentals for the three different Gregorian styles are available:



As shown, not all accidentals are supported by each style. When trying to access an unsupported accidental, LilyPond will switch to a different style.

The style for accidentals and key signatures is controlled by the `glyph-name-alist` property of the grobs Section "Accidental" in *Internals Reference* and Section "KeySignature" in *Internals Reference*, respectively; e.g.:

```
\override Staff.Accidental #'glyph-name-alist = #alteration-mensural-glyph-
name-alist
```

See also

Notation Reference: Section 1.1 [Pitches], page 1, [Accidentals], page 4, and [Automatic accidentals], page 18 give a general introduction of the use of accidentals. [Key signature], page 14 gives a general introduction of the use of key signatures.

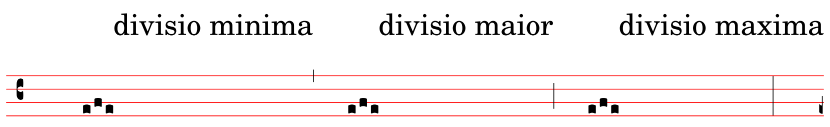
Internals Reference: Section "KeySignature" in *Internals Reference*.

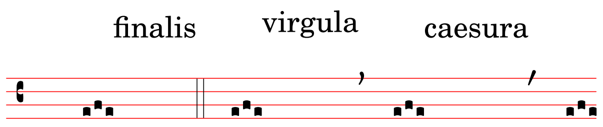
Divisiones

There are no rests in Gregorian chant notation; instead, it uses [Divisiones], page 286.

A *divisio* (plural: *divisiones*; Latin word for 'division') is a staff context symbol that is used to indicate 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, somewhat like the breathmarks from [Breath marks], page 91. 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 `\caesura`





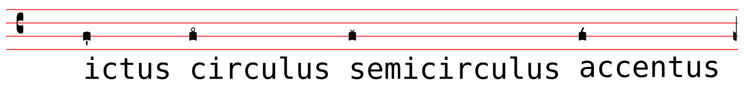
Predefined commands

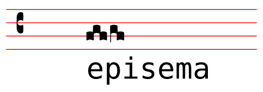
`\virgula`, `\caesura`, `\divisioMinima`, `\divisioMaior`, `\divisioMaxima`, `\finalis`.

Gregorian articulation signs

In addition to the standard articulation signs described in section [Articulations and ornamentations], page 81, articulation signs specifically designed for use with notation in *Editio Vaticana* style are provided.

```
\include "gregorian.ly"
\score {
  \new VaticanaVoice {
    \override TextScript #'font-family = #'typewriter
    \override TextScript #'font-shape = #'upright
    \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

TODO: nothing here yet ...

Known issues and warnings

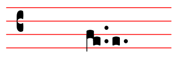
Some articulations are vertically placed too closely to the corresponding note heads.

The episema line is not displayed in many cases. If it is displayed, the right end of the episema line is often too far to the right.

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 91.

Internals Reference: Section "BreathingSign" in *Internals Reference*.

Examples: 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 `\include`ing `"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 diphtong 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 neums

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		

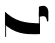
Two-note ligatures

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

```
\[ \quilisma g \pes \auctum
\descendens b \]
```

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

TODO: nothing here yet ...

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.

2.8.5 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

TBC

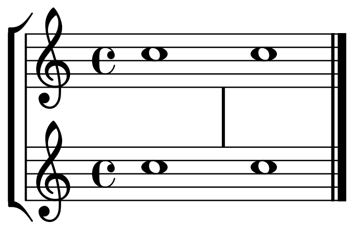
See also

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 the bar lines do not show on the staves but between staves can be achieved with a `StaffGroup` instead of a `ChoirStaff`. The bar line on staves is blanked out by setting the `transparent` property.

```
global = {
  \override Staff.BarLine #'transparent = ##t
  s1 s
  % the final bar line is not interrupted
  \revert Staff.BarLine #'transparent
  \bar "|."
}
\new StaffGroup \relative c'' {
  <<
    \new Staff { << \global { c1 c } >> }
    \new Staff { << \global { c c } >> }
  >>
}
```



See also

Transcribing Gregorian chant

Gregorian chant can be transcribed into modern notation with a number of simple tweaks.

Stems. Stems can be left out altogether by `\remove`-ing the `Stem_engraver` from the Voice context:

```
\layout {
  ...
  \context {
    \Voice
      \remove "Stem_engraver"
  }
}
```

However, 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 either `\override Stem #'transparent = ##t` or `\override Stem #'length = #0` instead, and restore the stem when needed with the corresponding `\once \override Stem #'transparent = ##f` (see example below).

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. Another alternative is to use `\\CadenzaOn` and `\CadenzaOff`.

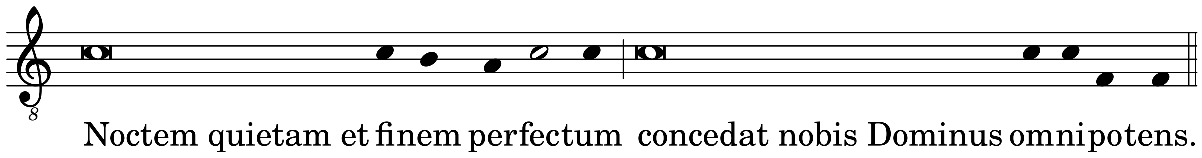
To remove the barlines, the radical approach is to `\remove` the Bar_engraver from the Staff context. Again, one may want to use `\override BarLine #'transparent = ##t` instead, if an occasional barline is wanted.

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 c' {
  \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 Staff <<
  \new Voice = "melody" \chant
  \new Lyrics = "one" \lyricsto melody \verba
  >>
  \layout {
    \context {
      \Staff
      \remove "Time_signature_engraver"
      \remove "Bar_engraver"
      \override Stem #'transparent = ##t
    }
  }
}
```

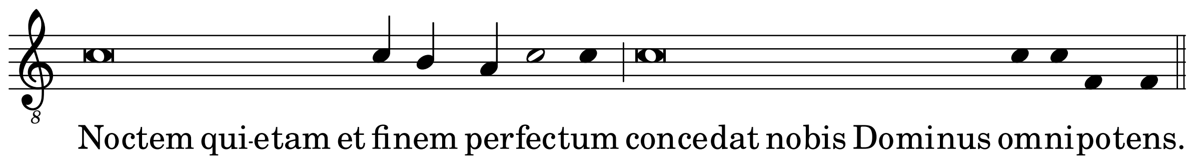

Noctem quietam et finem perfectum concedat nobis Dominus omnipotens.

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, here in combination with changing stem visibility:

```
\include "gregorian.ly"
chant = \relative c' {
  \clef "G_8"
  \set Score.timing = ##f
  c\breve \override NoteHead #'transparent = ##t  c c c c c
  \revert NoteHead #'transparent
  \override Stem #'transparent = ##f \stemUp c4 b4 a
  \override Stem #'transparent = ##t c2 c4  \divisioMaior
  c\breve \override NoteHead #'transparent = ##t c c c c c c c
  \revert NoteHead #'transparent 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 Staff <<
    \new Voice = "melody" \chant
    \new Lyrics \lyricsto "melody" \verba
  >>
  \layout {
    \context {
      \Staff
      \remove "Time_signature_engraver"
      \override BarLine #'transparent = ##t
      \override Stem #'transparent = ##t
    }
  }
}
```

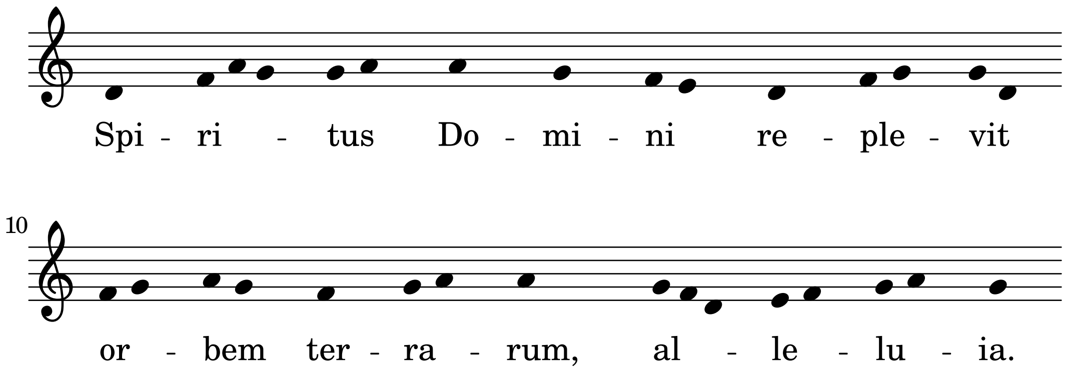

Noctem qui-etam et finem perfectum concedat nobis Dominus omnipotens.

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 barlines and all other rhythmical indications are made transparent, and the space around the barlines 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 c' {
  \time 1/4
  \override Lyrics.LyricText #'X-extent  = #'(0 . 3)
  d4 \times 2/3 { f8 a g } g a a4 g f8 e
  d4 f8 g g8 d f g a g f4 g8 a a4  s
  \times 2/3 { 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 Staff <<
    \new Voice = "chant" \spiritus
    \new Lyrics = "one" \lyricsto "chant" \spirLyr
  >>
  \layout {
    \context {
      \Staff
      \remove "Time_signature_engraver"
      \override BarLine #'X-extent = #'(-1 . 1)
      \override Stem #'transparent = ##t
      \override Beam #'transparent = ##t
      \override BarLine #'transparent = ##t
      \override TupletNumber #'transparent = ##t
    }
  }
}
```


10
Spi - ri - tus Do - mi - ni re - ple - vit
or - bem ter - ra - rum, al - le - lu - ia.

See also

Ancient and modern from one source

TBC

See also

Editorial markings

TBC

See also

2.9 World music

The purpose of this section is to highlight musical notation issues that are relevant to traditions outside the Western tradition.

2.9.1 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 [Note names in other languages], page 6.
- Additional key signatures can also be tailored as described in [Key signature], page 14.

- Complex time signatures may require that notes be grouped manually as described in [Manual beams], page 65.
- *Takasim* which are rhythmically free improvisations may be written down omitting bar lines as described in [Unmetered music], page 47.

See also

Notation Reference: [Note names in other languages], page 6, [Key signature], page 14, [Manual beams], page 65.

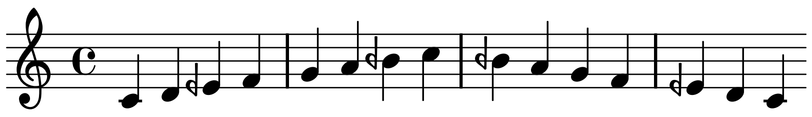
Snippets: Section "World music" in *Snippets*.

Arabic note names

The more traditional Arabic note names can be quite long and are not suitable for the purpose of music writing, so they are not used. English note names are not very familiar in Arabic music education, so Italian or Solfege note names (`do, re, mi, fa, sol, la, si`) are used instead. Modifiers (accidentals) can also be used, as discussed in [Note names in other languages], page 6.

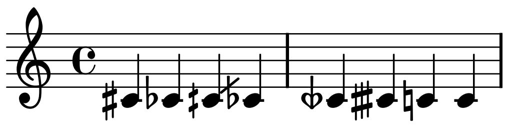
For example, this is how the Arabic *rast* scale can be notated:

```
\include "arabic.ly"
\relative do' {
  do re misb fa sol la sisb do sisb la sol fa misb re do
}
```



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 do' {
  \set Staff.extraNatural = ##f
  dod dob dosd \dwn dob dobsb dodsd do do
}
```



See also

Notation Reference: [Note names in other languages], page 6.

Snippets: Section "World music" in *Snippets*.

Arabic key signatures

In addition to the minor and major key signatures, the following key signatures are defined in `arabic.ly`: *bayati*, *rast*, *sikah*, *iraq*, and *kurd*. These key signatures define a small number of maqam groups rather than the large number of maqams that are in common use.

In general, a maqam uses the key signature of its group, or a neighbouring group, and varying accidentals are marked throughout the music.

For example to indicate the key signature of a maqam muhayer piece:

```
\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 appear in the title.

Other maqams in the same bayati group, as shown in the table below: (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 don't change their fundamental nature, as siblings.

The other maqam in the same group (Nawa) is related to bayati by modulation which is indicated in the table in parenthesis for those maqams that are modulations of their base maqam. Arabic maqams admit of only limited modulations, due to the nature of Arabic musical instruments. Nawa can be indicated as follows:

```
\key sol \bayati
```

In Arabic music, the same term such as bayati that is used to indicate a maqam group, is also a maqam which is usually the most important in the group, and can also be thought of as a base maqam.

Here is one suggested grouping that maps the more common maqams to key signatures:

maqam group	**key**	**finalis**	**Other maqmas in group (finalis)**
ajam	major	sib	jaharka (fa)
bayati	bayati	re	hussaini, muhayer, saba, ushaq, nawa (sol)
hijaz	kurd	re	shahnaz, shad arban (sol), hijazkar (do)
iraq	iraq	sisb	-
kurd	kurd	re	hijazkar kurd (do)
nahawand	minor	do	busalik (re), farah faza (sol)
nakriz	minor	do	nawa athar, hisar (re)
rast	rast	do	mahur, yakah (sol)
sikah	sikah	misb	huzam

Selected Snippets

Non-traditional key signatures

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

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

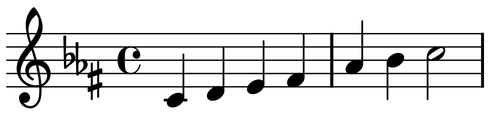
`\set Staff.keySignature = #`(((octave . step) . alter) ((octave . step) . alter) ...)` where, for each element in the list, `octave` specifies the octave (0 being the octave from middle C to the B above), `step` specifies the note within the octave (0 means C and 6 means B), and `alter` is `,SHARP ,FLAT ,DOUBLE-SHARP` etc. (Note the leading comma.) The accidentals in the key signature will appear in the reverse order to that in which they are specified.

Alternatively, for each item in the list, using the more concise format `(step . alter)` specifies that the same alteration should hold 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.

Here is an example of a possible key signature for generating a whole-tone scale:

```
\relative c' {
  \set Staff.keySignature = #`(((0 . 3) . ,SHARP)
                               ((0 . 5) . ,FLAT)
                               ((0 . 6) . ,FLAT))
  c4 d e fis
  aes4 bes c2
}
```



See also

Notation Reference: [Key signature], page 14.

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

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

Snippets: Section “World music” in *Snippets*, Section “Pitches” in *Snippets*.

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. You can override this by switching off automatic beaming and beaming the notes manually. Where matching existing typeset music is not an issue, you may still want to adjust the beaming behaviour and/or use compound time signatures.

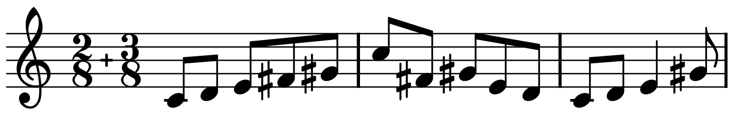
Selected Snippets

Compound time signatures

Odd 20th century time signatures (such as "5/8") can often be played as compound time signatures (e.g. "3/8 + 2/8"), which combine two or more inequal metrics. LilyPond can make such music quite easy to read and play, by explicitly printing the compound time signatures and adapting the automatic beaming behavior. (Graphic measure grouping indications can also be added; see the appropriate snippet in this database.)

```
#(define ((compound-time one two num) grob)
  (grob-interpret-markup grob
    (markup #:override '(baseline-skip . 0) #:number
      (#:line (
          (#:column (one num))
          #:vcenter "+"
          (#:column (two num))))))

\relative c' {
  \override Staff.TimeSignature #'stencil = #(compound-time "2" "3" "8")
  \time 5/8
  #(override-auto-beam-setting '(end 1 8 5 8) 1 4)
  c8 d e fis gis
  c8 fis, gis e d
  c8 d e4 gis8
}
```

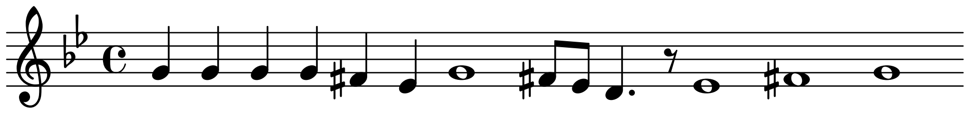


Arabic improvisation

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
  #(set-accidental-style 'forget)
  \cadenzaOn
  sol4 sol sol sol fad mib sol1 fad8 mib re4. r8 mib1 fad sol
}
```



See also

Notation Reference: [Manual beams], page 65, [Automatic beams], page 54, [Unmetered music], page 47, [Automatic accidentals], page 18, [Setting automatic beam behavior], page 56, [Time signature], page 43.

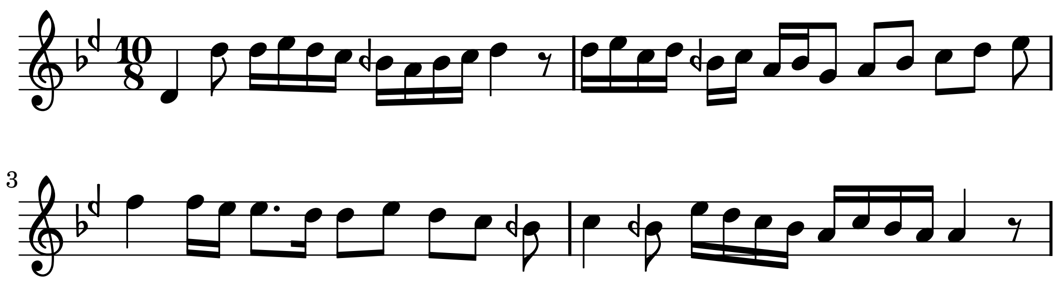
Snippets: Section "World music" in *Snippets*.

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 {
  \relative re' {
    \set Staff.extraNatural = ##f
    \set Staff.autoBeaming = ##f
    \key re \bayati
    \time 10/8

    re4 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
  }
  \header {
    title = "Semai Muhayer"
    composer = "Jamil Bek"
  }
}
```



See also

Snippets: Section "World music" in *Snippets*

Further reading

1. 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 various web sites that explain maqams and some provide audio examples such as :

   - `http://www.maqamworld.com/`
   - `http://www.turath.org/`

   There are some variations in the details of how maqams are grouped, despite agreement on the criteria of grouping maqams that are related through common lower tetra chords, or through modulation.

2. There is not a complete consistency, sometimes even in the same text on how key signatures for particular maqams should be specified. It is common, however, to use a key signature per group, rather than a different key signature for each different maqam.

   Oud methods by the following authors, contain examples of mainly Turkish and Arabic compositions.

   - Charbel Rouhana
   - George Farah
   - Ibrahim Ali Darwish Al-masri

3 General input and output

This section deals with general LilyPond input and output issues, rather than specific notation.

3.1 Input structure

The main format of input for LilyPond are text files. By convention, these files end with `.ly`.

3.1.1 Structure of a score

A `\score` block must contain a single music expression delimited by curly brackets:

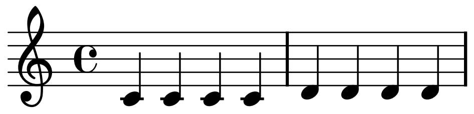
```
\score {
...
}
```

Note: There must be **only one** outer music expression in a `\score` block, and it **must** be surrounded by curly brackets.

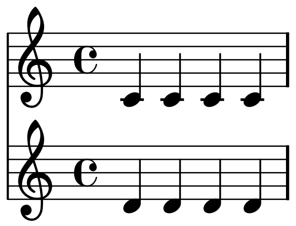
This single music expression may be of any size, and may contain other music expressions to any complexity. All of these examples are music expressions:

```
{ 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 3.1.3 [File structure], page 307.) 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.

See also

Learning Manual: Section "Working on input files" in *Learning Manual*, Section "Music expressions explained" in *Learning Manual*, Section "Score is a (single) compound musical expression" in *Learning Manual*.

3.1.2 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 {
  ..
}
```

However, 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. If you do not specify any `\book` block in the file, LilyPond will implicitly treat the full file as a single `\book` block, see Section 3.1.3 [File structure], page 307. 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 { ... }
  ...
}
```

3.1.3 File structure

A `.ly` file may contain any number of toplevel expressions, where a toplevel expression is one of the following:

- An output definition, such as `\paper`, `\midi`, and `\layout`. Such a definition at the toplevel changes the default book-wide settings. If more than one such definition of the same type is entered at the top level any definitions in the later expressions have precedence.
- 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 header block. This is the block containing the definitions for book-wide settings, like composer, title, etc.
- A `\score` block. This score will be collected with other toplevel scores, and combined as a single `\book`. This behavior can be changed by setting the variable `toplevel-score-handler` at toplevel. The default handler is defined in the init file '`../scm/lily.scm`'.
- A `\book` block logically combines multiple movements (i.e., multiple `\score` blocks) in one document. If there are a number of `\score`s, 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 toplevel. 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 toplevel `\score`s 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 { }
  \header { }
  }
  ```

  This behavior can be changed by setting the variable `toplevel-music-handler` at toplevel. 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 have alphabetic characters only; no numbers, underscores or dashes.

The following example shows three things that may be entered at toplevel

```
\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 `%{ .. %}`.

See also

Learning Manual: Section "How LilyPond input files work" in *Learning Manual*.

3.2 Titles and headers

Almost all printed music includes a title and the composer's name; some pieces include a lot more information.

3.2.1 Creating titles

Titles are created for each `\score` block, as well as for the full input file (or `\book` block) and book parts (created by `\bookpart` blocks).

The contents of the titles are taken from the `\header` blocks. The header block for a book supports the following

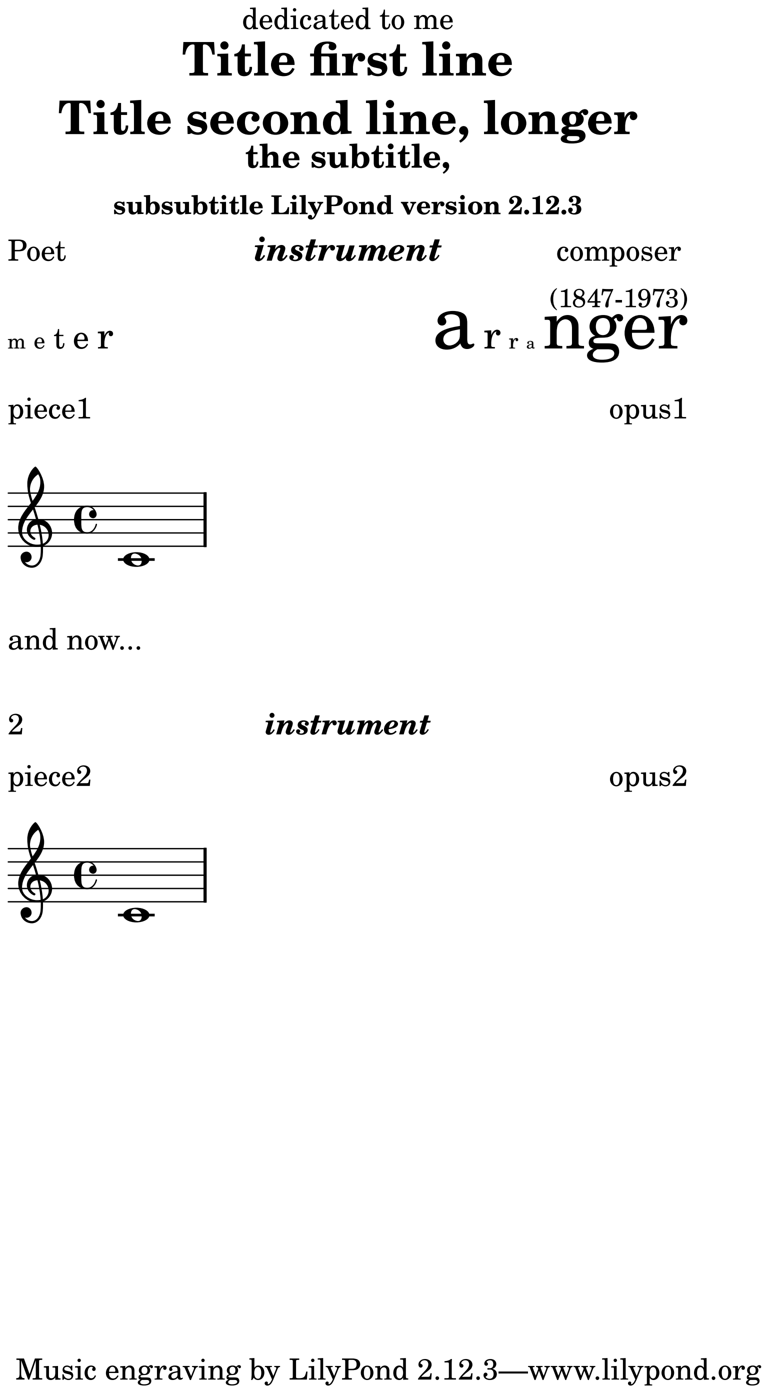
`dedication`	The dedicatee of the music, centered at the top of the first page.
`title`	The title of the music, centered just below the dedication.
`subtitle`	Subtitle, centered below the title.
`subsubtitle`	Subsubtitle, centered below the subtitle.
`poet`	Name of the poet, flush-left below the subsubtitle.
`instrument`	Name of the instrument, centered below the subsubtitle. Also centered at the top of pages (other than the first page).
`composer`	Name of the composer, flush-right below the subsubtitle.
`meter`	Meter string, flush-left below the poet.
`arranger`	Name of the arranger, flush-right below the composer.
`piece`	Name of the piece, flush-left below the meter.
`opus`	Name of the opus, flush-right below the arranger.
`breakbefore`	This forces the title to start on a new page (set to ##t or ##f).
`copyright`	Copyright notice, centered at the bottom of the first page. To insert the copyright symbol, see Section 3.3.3 [Text encoding], page 321.
`tagline`	Centered at the bottom of the last page.

Here is a demonstration of the fields available. Note that you may use any Section 1.8.2 [Formatting text], page 167, commands in the header.

```
\paper {
  line-width = 9.0\cm
  paper-height = 10.0\cm
}

\book {
  \header {
    dedication = "dedicated to me"
    title = \markup \center-column { "Title first line" "Title second line,
longer" }
    subtitle = "the subtitle,"
    subsubtitle = #(string-append "subsubtitle LilyPond version "
(lilypond-version))
    poet = "Poet"
    composer =  \markup \center-column { "composer" \small "(1847-1973)" }
    texttranslator = "Text Translator"
    meter = \markup { \teeny "m" \tiny "e" \normalsize "t" \large "e" \huge
"r" }
    arranger = \markup { \fontsize #8.5 "a" \fontsize #2.5 "r" \fontsize
#-2.5 "r" \fontsize #-5.3 "a" \fontsize #7.5 "nger" }
    instrument = \markup \bold \italic "instrument"
    piece = "Piece"
  }

  \score {
    { c'1 }
    \header {
      piece = "piece1"
      opus = "opus1"
    }
  }
  \markup {
      and now...
  }
  \score {
    { c'1 }
    \header {
      piece = "piece2"
      opus = "opus2"
    }
  }
}
```

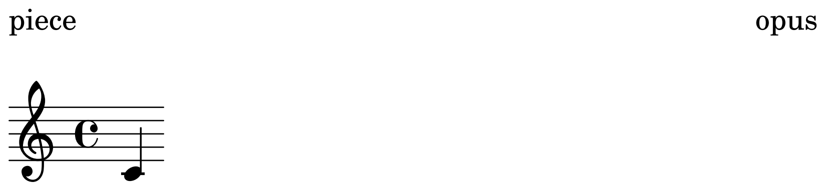


As demonstrated before, you can use multiple `\header` blocks. When same fields appear in different blocks, the latter is used. Here is a short example.

```
\header {
  composer = "Composer"
}
\header {
  piece = "Piece"
}
\score {
  \new Staff { c'4 }
  \header {
    piece = "New piece"  % overwrite previous one
  }
}
```

If you define the `\header` inside the `\score` block, then normally only the `piece` and `opus` headers will be printed. Note that the music expression must come before the `\header`.

```
\score {
  { c'4 }
  \header {
    title = "title"  % not printed
    piece = "piece"
    opus = "opus"
  }
}
```



You may change this behavior (and print all the headers when defining `\header` inside `\score`) by using

```
\paper{
  print-all-headers = ##t
}
```

The default footer is empty, except for the first page, where the `copyright` field from `\header` is inserted, and the last page, where `tagline` from `\header` is added. The default tagline is "Music engraving by LilyPond (*version*)".[1]

Headers may be completely removed by setting them to false.

```
\header {
  tagline = ##f
  composer = ##f
}
```

3.2.2 Custom titles

A more advanced option is to change the definitions of the following variables in the `\paper` block. The init file '`../ly/titling-init.ly`' lists the default layout.

`bookTitleMarkup`
: This is the title added at the top of the entire output document. Typically, it has the composer and the title of the piece

`scoreTitleMarkup`
: This is the title put over a `\score` block. Typically, it has the name of the movement (`piece` field).

`oddHeaderMarkup`
: This is the page header for odd-numbered pages.

`evenHeaderMarkup`
: This is the page header for even-numbered pages. If unspecified, the odd header is used instead.

  By default, headers are defined such that the page number is on the outside edge, and the instrument is centered.

[1] Nicely printed parts are good PR for us, so please leave the tagline if you can.

`oddFooterMarkup`
: This is the page footer for odd-numbered pages.

`evenFooterMarkup`
: This is the page footer for even-numbered pages. If unspecified, the odd header is used instead.

  By default, the footer has the copyright notice on the first, and the tagline on the last page.

The following definition will put the title flush left, and the composer flush right on a single line.

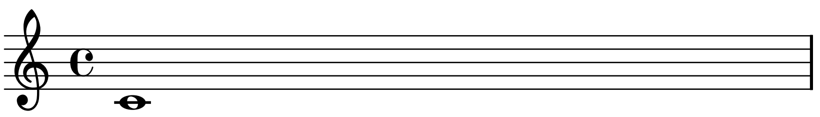
```
\paper {
  bookTitleMarkup = \markup {
   \fill-line {
     \fromproperty #'header:title
     \fromproperty #'header:composer
   }
  }
}
```

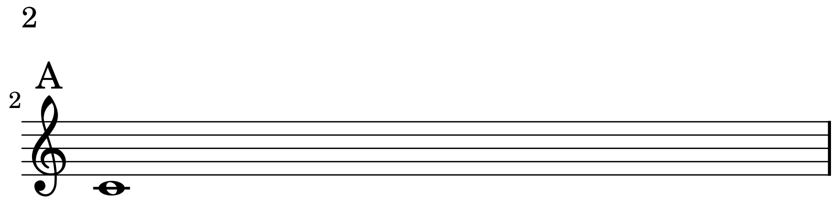
3.2.3 Reference to page numbers

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'
    }
  }

  \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, eg. `#'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", ie. a two digit number.

Predefined commands

`\label`, `\page-ref`.

3.2.4 Table of contents

A table of contents is included using the `\markuplines \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.

```
\markuplines \table-of-contents
\pageBreak

\tocItem \markup "First score"
\score {
  {
    c'  % ...
    \tocItem \markup "Some particular point in the first score"
    d'  % ...
  }
}

\tocItem \markup "Second score"
\score {
  {
    e' % ...
  }
}
```

The markups which are used to format the table of contents are defined in the `\paper` block. The default ones are `tocTitleMarkup`, for formatting the title of the table, and `tocItemMarkup`, for formatting the toc elements, composed of the element title and page number. These variables may be changed by the user:

```
\paper {
  %% Translate the toc title into French:
  tocTitleMarkup = \markup \huge \column {
    \fill-line { \null "Table des matières" \null }
    \hspace #1
  }
  %% use larger font size
  tocItemMarkup = \markup \large \fill-line {
    \fromproperty #'toc:text \fromproperty #'toc:page
  }
}
```

Note how the toc element text and page number are referred to in the `tocItemMarkup` definition.

New commands and markups may also be defined to build more elaborated table of contents:

- first, define a new markup variable in the `\paper` block
- then, define a music function which aims at adding a toc element using this markup paper variable.

In the following example, a new style is defined for entering act names in the table of contents of an opera:

```
\paper {
  tocActMarkup = \markup \large \column {
    \hspace #1
    \fill-line { \null \italic \fromproperty #'toc:text \null }
    \hspace #1
  }
}

tocAct =
#(define-music-function (parser location text) (markup?)
   (add-toc-item! 'tocActMarkup text))
```

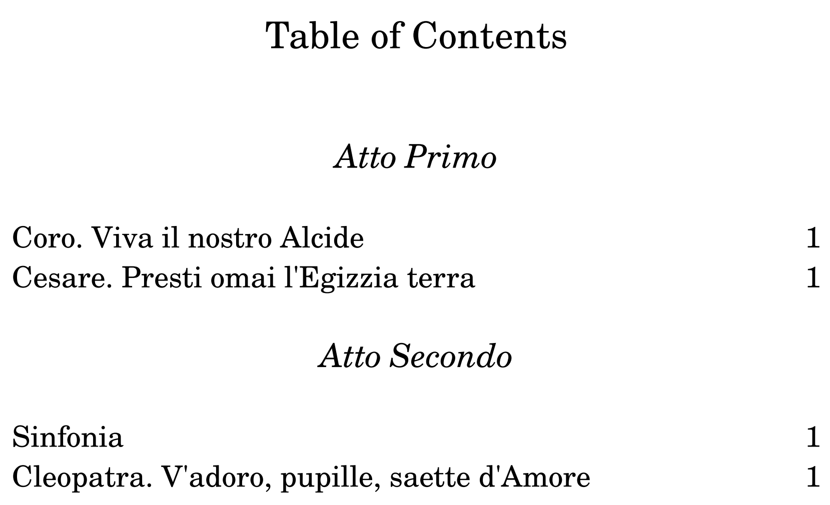


Table of Contents

Atto Primo

Coro. Viva il nostro Alcide 1
Cesare. Presti omai l'Egizzia terra 1

Atto Secondo

Sinfonia 1
Cleopatra. V'adoro, pupille, saette d'Amore 1

See also

Init files: ‘`../ly/toc-init.ly`’.

Predefined commands

`\table-of-contents`, `\tocItem`.

3.3 Working with input files

3.3.1 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 3.3.2 [Different editions from one source], page 317.

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. By default, these second-level `\include` statements are not interpreted until they have been brought into the main file, so the file names they specify must all be relative to the directory containing the main file, not the directory containing the included file. However, this behavior can be changed by passing the option `-drelative-includes` option at the command line (or by adding `#(ly:set-option 'relative-includes #t)` at the top of the main input file). With `relative-includes` set, the path for each `\include` command will be taken relative to the file containing that command. This behavior is recommended and it will become the default behavior in a future version of lilypond.

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, cd 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.

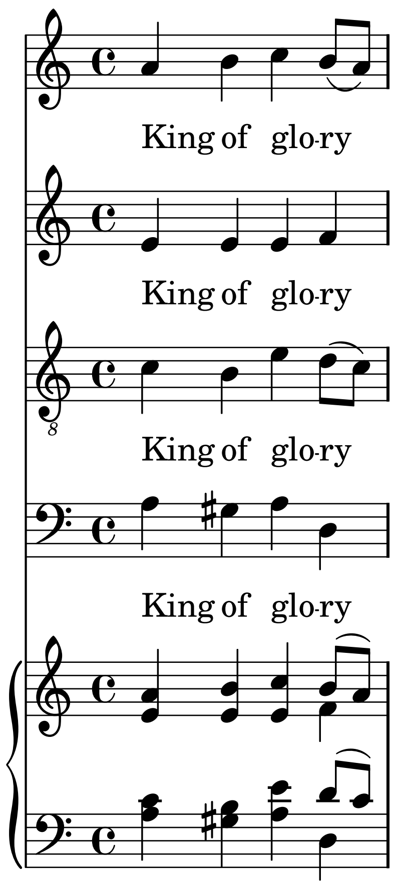
3.3.2 Different editions from one source

Several mechanisms are available to facilitate the generation of different versions of a score from the same music source. Variables are perhaps most useful for combining lengthy sections of music and/or annotation in various ways, while tags are more useful for selecting one from several alternative shorter sections of music. 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 116. Here is an example:

```
sopranoMusic = \relative c'' { a4 b c b8( a)}
altoMusic = \relative g' { e4 e e f }
tenorMusic = \relative c' { c4 b e d8( c) }
bassMusic = \relative c' { 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" {
      \set Staff.printPartCombineTexts = ##f
      \partcombine
      \sopranoMusic
      \altoMusic
    }
    \new Staff = "LH" {
      \set Staff.printPartCombineTexts = ##f
      \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 3.3.1 [Including LilyPond files], page 316.

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**

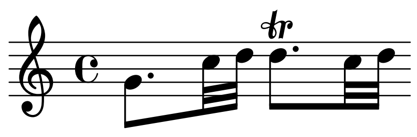
Tagged music preceded by `\keepWithTag #'`*name*	Untagged music and music tagged with *name* is included; music tagged with any other tag name is excluded.
Tagged music preceded by `\removeWithTag #'`*name*	Untagged music and music tagged with any tag name other than *name* is included; music tagged with *name* is excluded.
Tagged music not preceded by either `\keepWithTag` or `\removeWithTag`	All tagged and untagged music is included.

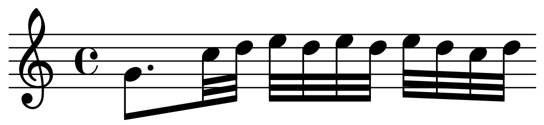
The arguments of the `\tag`, `\keepWithTag` and `\removeWithTag` commands should be a symbol (such as `#'score` or `#'part`), followed by a music expression.

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' {
  g8. c32 d
  \tag #'trills {d8.\trill }
  \tag #'expand {\repeat unfold 3 {e32 d} }
  c32 d
 }

\score {
  \keepWithTag #'trills \music
}
\score {
  \keepWithTag #'expand \music
}
```

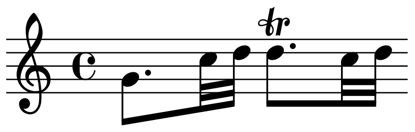


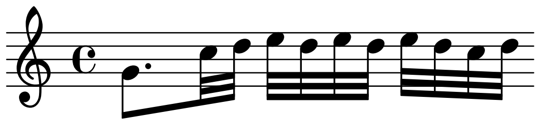


Alternatively, it is sometimes easier to exclude sections of music:

```
music = \relative g' {
  g8. 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

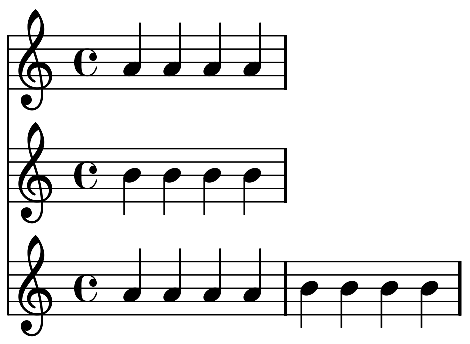
```
-\tag #'your-tag
```

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!"
```

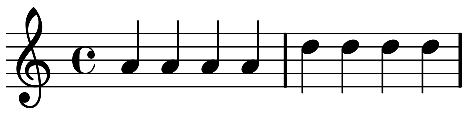
Multiple tags may be placed on expressions with multiple `\tag` entries:

```
music = \relative c'' {
  \tag #'a \tag #'both { a a a a }
  \tag #'b \tag #'both { b 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:

```
music = \relative c'' {
\tag #'A { a a a a }
\tag #'B { b b b b }
\tag #'C { c c c c }
\tag #'D { d d d d }
}
{
\removeWithTag #'B
\removeWithTag #'C
\music
}
```



Two or more `\keepWithTag` filters applied to a single music expression will cause *all* tagged sections to be removed, as the first filter will remove all tagged sections except the one named, and the second filter will remove even that tagged section.

See also

Learning Manual: Section “Organizing pieces with variables” in *Learning Manual*.

Notation Reference: [Automatic part combining], page 116, Section 3.3.1 [Including LilyPond files], page 316.

3.3.3 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.

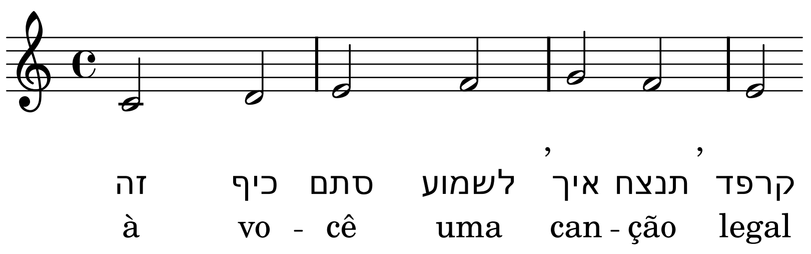
Lilypond does not perform any input-encoding conversions. This means that any text, be it title, lyric text, or musical instruction containing non-ASCII characters, must be encoded in UTF-8. The easiest way to enter such text is by using a Unicode-aware editor and saving the file with UTF-8 encoding. 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.

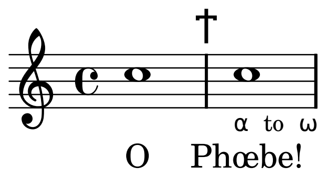
Here is an example showing Cyrillic, Hebrew and Portuguese text:



To enter a single character for which the Unicode escape sequence is known but which is not available in the editor being used, use `\char ##xhhhh` within a `\markup` block, where `hhhh` is the hexadecimal code for the character required. For example, `\char ##x03BE` enters the Unicode U+03BE character, which has the Unicode name “Greek Small Letter Xi”. Any Unicode hexadecimal code may be substituted, 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 UTF-8 coded characters being used in four places – in a rehearsal mark, as articulation text, in lyrics and as stand-alone text below the score:

```
\score {
  \relative c'' {
    c1 \mark \markup { \char ##x03EE }
    c1_\markup { \tiny { \char ##x03B1 " to " \char ##x03C9 } }
  }
  \addlyrics { O \markup { \concat{ Ph \char ##x0153 be! } } }
}
\markup { "Copyright 2008--2009" \char ##x00A9 }
```



Copyright 2008--2009 ©

To enter the copyright sign in the copyright notice use:

```
\header {
  copyright = \markup { \char ##x00A9 "2008" }
}
```

3.3.4 Displaying LilyPond notation

Displaying a music expression in LilyPond notation can be done using the music function `\displayLilyMusic`. For example,

```
{
  \displayLilyMusic \transpose c a, { c e g a bes }
}
```

will display

```
{ a, cis e fis g }
```

By default, LilyPond will print these messages to the console along with all the other messages. To split up these messages and save the results of `\display{STUFF}`, redirect the output to a file.

```
lilypond file.ly >display.txt
```

3.4 Controlling output

3.4.1 Extracting fragments of music

It is possible to quote small fragments of a large score directly from the output. This can be compared to clipping a piece of a paper score with scissors.

This is done by defining the measures that need to be cut out separately. For example, including the following definition

```
\layout {
  clip-regions
  = #(list
      (cons
       (make-rhythmic-location 5 1 2)
       (make-rhythmic-location 7 3 4)))
}
```

will extract a fragment starting halfway the fifth measure, ending in the seventh measure. The meaning of `5 1 2` is: after a 1/2 note in measure 5, and `7 3 4` after 3 quarter notes in measure 7.

More clip regions can be defined by adding more pairs of rhythmic-locations to the list.

In order to use this feature, LilyPond must be invoked with `-dclip-systems`. The clips are output as EPS files, and are converted to PDF and PNG if these formats are switched on as well.

For more information on output formats, see Section "Invoking lilypond" in *Application Usage*.

3.4.2 Skipping corrected music

When entering or copying music, usually only the music near the end (where you are adding notes) 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 putting

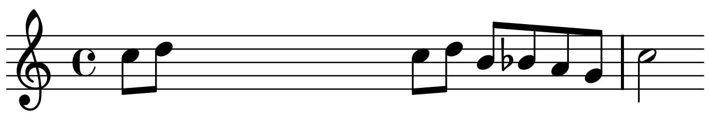
```
showLastLength = R1*5
\score { ... }
```

in your source file. This will render only the last 5 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 you have already typeset (e.g. 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.

This property is also used to control output to the MIDI file. Note that it skips all events, including tempo and instrument changes. You have been warned.

```
\relative c'' {
  c8 d
  \set Score.skipTypesetting = ##t
  e e e e e e e e
  \set Score.skipTypesetting = ##f
  c d b bes a g c2 }
```



In polyphonic music, `Score.skipTypesetting` will affect all voices and staves, saving even more time.

3.5 MIDI output

MIDI (Musical Instrument Digital Interface) is a standard for connecting and controlling digital instruments. A MIDI file is a series of notes in a number of tracks. It is not an actual sound file; you need special software to translate between the series of notes and actual sounds.

Pieces of music can be converted to MIDI files, so you can listen to what was entered. This is convenient for checking the music; octaves that are off or accidentals that were mistyped stand out very much when listening to the MIDI output.

The midi output allocates a channel for each staff, and one for global settings. Therefore the midi file should not have more than 15 staves (or 14 if you do not use drums). Other staves will remain silent.

3.5.1 Creating MIDI files

To create a MIDI output file from a LilyPond input file, add a `\midi` block to a score, for example,

```
\score {
  ...music...
  \midi { }
}
```

If there is a `\midi` block in a `\score` with no `\layout` block, only MIDI output will be produced. When notation is needed too, a `\layout` block must be also be present.

```
\score {
  ...music...
  \midi { }
  \layout { }
}
```

Pitches, rhythms, ties, dynamics, and tempo changes are interpreted and translated correctly to the MIDI output. Dynamic marks, crescendi and decrescendi translate into MIDI volume levels. Dynamic marks translate to a fixed fraction of the available MIDI volume range. Crescendi and decrescendi make the volume vary linearly between their two extremes. The effect of dynamic markings on the MIDI output can be removed completely, see Section 3.5.2 [MIDI block], page 326.

The initial tempo and later tempo changes can be specified with the `\tempo` command within the music notation. These are reflected in tempo changes in the MIDI output. This command will normally result in the metronome mark being printed, but this can be suppressed, see [Metronome marks], page 137. An alternative way of specifying the inital or overall MIDI tempo is described below, see Section 3.5.2 [MIDI block], page 326.

Instrument names

The MIDI instrument to be used is specified by setting the `Staff.midiInstrument` property to the instrument name. The name should be chosen from the list in Section B.4 [MIDI instruments], page 444.

```
\new Staff {
  \set Staff.midiInstrument = #"glockenspiel"
  ...notes...
}
```

```
\new Staff \with {midiInstrument = #"cello"} {
  ...notes...
}
```

If the selected instrument does not exactly match an instrument from the list of MIDI instruments, the Grand Piano (`"acoustic grand"`) instrument is used.

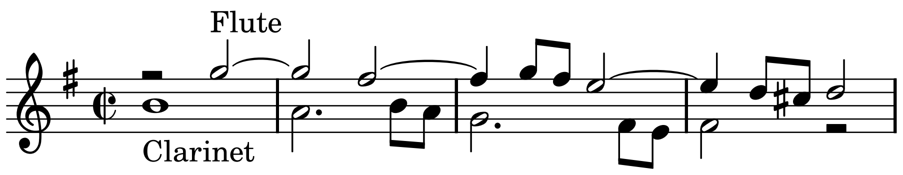
Selected Snippets

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"
    }
    \context {
      \Score
      tempoWholesPerMinute = #(ly:make-moment 72 2)
    }
  }
}
```



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.

Not all midi players correctly handle tempo changes in the midi output. Players that are known to work include MS Windows Media Player and timidity.

3.5.2 MIDI block

A \midi block must appear within a score block if MIDI output is required. It is analogous to the layout block, but somewhat simpler. Often, the \midi block is left empty, but it can contain context rearrangements, new context definitions or code to set the values of properties. For example, the following will set the initial tempo exported to a MIDI file without causing a tempo indication to be printed:

```
\score {
  ...music...
  \midi {
    \context {
      \Score
      tempoWholesPerMinute = #(ly:make-moment 72 4)
    }
  }
}
```

In this example the tempo is set to 72 quarter note beats per minute. This kind of tempo specification cannot take a dotted note length as an argument. If one is required, break the dotted note into smaller units. For example, a tempo of 90 dotted quarter notes per minute can be specified as 270 eighth notes per minute:

```
tempoWholesPerMinute = #(ly:make-moment 270 8)
```

Context definitions follow precisely the same syntax as those within a \layout block. Translation modules for sound are called performers. The contexts for MIDI output are defined in '../ly/performer-init.ly', see Section "Other sources of information" in *Learning Manual*. For example, to remove the effect of dynamics from the MIDI output, insert the following lines in the \midi{ } block.

```
\midi {
  ...
  \context {
    \Voice
    \remove "Dynamic_performer"
  }
}
```

MIDI output is created only when a \midi block is included within a score block defined with a \score command. If it is placed within an explicitly instantiated score context (i.e. within a \new Score block) the file will fail. To solve this, enclose the \new Score and the \midi commands in a \score block.

```
\score {
  \new Score { ...notes... }
  \midi { }
}
```

3.5.3 What goes into the MIDI output?

Supported in MIDI

The following items of notation are reflected in the MIDI output:

- Pitches
- Microtones (See [Accidentals], page 4. Rendering needs a player that supports pitch bend.)
- Chords entered as chord names
- Rhythms entered as note durations, including tuplets

- Tremolos entered without ‘:[*number*]’
- Ties
- Dynamic marks
- Crescendi, decrescendi over multiple notes
- Tempo changes entered with a tempo marking
- Lyrics

Unsupported in MIDI

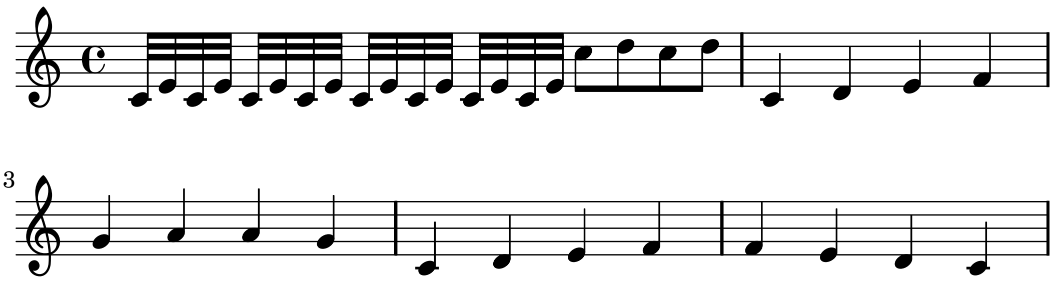
The following items of notation have no effect on the MIDI output:

- Rhythms entered as annotations, e.g. swing
- Tempo changes entered as annotations with no tempo marking
- Staccato and other articulations and ornamentations
- Slurs and Phrasing slurs
- Crescendi, decrescendi over a single note
- Tremolos entered with ‘:[*number*]’
- Figured bass
- Microtonal chords

3.5.4 Repeats in MIDI

With a few minor additions, all types of repeats can be represented in the MIDI output. This is achieved by applying the `\unfoldRepeats` music function. This function changes all repeats to unfold repeats.

```
\unfoldRepeats {
  \repeat tremolo 8 {c'32 e' }
  \repeat percent 2 { c''8 d'' }
  \repeat volta 2 {c'4 d' e' f'}
  \alternative {
    { g' a' a' g' }
    {f' e' d' c' }
  }
}
\bar "|."
```



When creating a score file using `\unfoldRepeats` for MIDI, it is necessary to make two `\score` blocks: one for MIDI (with unfolded repeats) and one for notation (with volta, tremolo, and percent repeats). For example,

```
\score {
  ..music..
  \layout { .. }
}
\score {
  \unfoldRepeats ..music..
  \midi { .. }
}
```

3.5.5 Controlling MIDI dynamics

MIDI dynamics are implemented by the Dynamic_performer which lives by default in the Voice context. It is possible to control the overall MIDI volume, the relative volume of dynamic markings and the relative volume of different instruments.

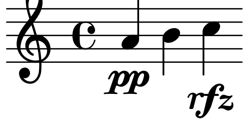
Dynamic marks

Dynamic marks are translated to a fixed fraction of the available MIDI volume range. The default fractions range from 0.25 for *ppppp* to 0.95 for *fffff*. The set of dynamic marks and the associated fractions can be seen in '`../scm/midi.scm`', see Section "Other sources of information" in *Learning Manual*. This set of fractions may be changed or extended by providing a function which takes a dynamic mark as its argument and returns the required fraction, and setting `Score.dynamicAbsoluteVolumeFunction` to this function.

For example, if a *rinforzando* dynamic marking, `\rfz`, is required, this will not by default have any effect on the MIDI volume, as this dynamic marking is not included in the default set. Similarly, if a new dynamic marking has been defined with `make-dynamic-script` that too will not be included in the default set. The following example shows how the MIDI volume for such dynamic markings might be added. The Scheme function sets the fraction to 0.9 if a dynamic mark of rfz is found, or calls the default function otherwise.

```
#(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 c'' {
         a\pp b c-\rfz
       }
    }
  }
  \layout {}
  \midi {}
}
```



Alternatively, if the whole table of fractions needs to be redefined, it would be better to use the *default-dynamic-absolute-volume* procedure in '`../scm/midi.scm`' and the associated table as a model. The final example in this section shows how this might be done.

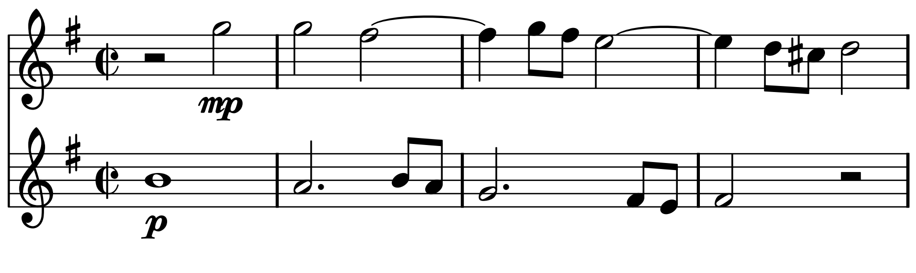
Overall MIDI volume

The minimum and maximum overall volume of MIDI dynamic markings is controlled by setting the properties `midiMinimumVolume` and `midiMaximumVolume` at the `Score` level. These properties have an effect only on dynamic marks, so if they are to apply from the start of the score a dynamic mark must be placed there. 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 {
      \key g \major
      \time 2/2
      \set Staff.midiInstrument = #"flute"
      \new Voice \relative c''' {
        r2 g\mp g fis ~
        fis4 g8 fis e2 ~
        e4 d8 cis d2
      }
    }
    \new Staff {
      \key g \major
      \set Staff.midiInstrument = #"clarinet"
      \new Voice \relative c'' {
        b1\p a2. b8 a
        g2. fis8 e
        fis2 r
      }
    }
  >>
  \layout { }
  \midi {
    \context {
      \Score
      tempoWholesPerMinute = #(ly:make-moment 72 2)
      midiMinimumVolume = #0.2
      midiMaximumVolume = #0.5
    }
  }
}
```

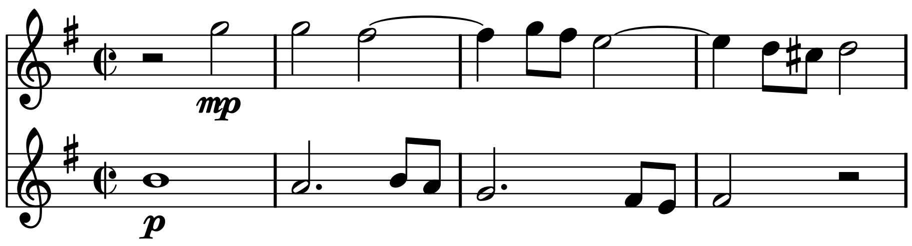


Equalizing different instruments (i)

If the minimum and maximum MIDI volume properties are set in the `Staff` context the relative volumes of the MIDI instruments can be controlled. This gives a basic instrument equalizer, which can enhance the quality of the MIDI output remarkably.

In this example the volume of the clarinet is reduced relative to the volume of the flute. There must be a dynamic mark on the first note of each instrument for this to work correctly.

```
\score {
  <<
    \new Staff {
      \key g \major
      \time 2/2
      \set Staff.midiInstrument = #"flute"
      \set Staff.midiMinimumVolume = #0.7
      \set Staff.midiMaximumVolume = #0.9
      \new Voice \relative c''' {
        r2 g\mp g fis ~
        fis4 g8 fis e2 ~
        e4 d8 cis d2
      }
    }
    \new Staff {
      \key g \major
      \set Staff.midiInstrument = #"clarinet"
      \set Staff.midiMinimumVolume = #0.3
      \set Staff.midiMaximumVolume = #0.6
      \new Voice \relative c'' {
        b1\p a2. b8 a
        g2. fis8 e
        fis2 r
      }
    }
  >>
  \layout { }
  \midi {
    \context {
      \Score
      tempoWholesPerMinute = #(ly:make-moment 72 2)
    }
  }
}
```



Equalizing different instruments (ii)

If the MIDI minimum and maximum volume properties are not set LilyPond will, by default, apply a small degree of equalization to a few instruments. The instruments and the equalization applied are shown in the table *instrument-equalizer-alist* in '`../scm/midi.scm`'.

This basic default equalizer can be replaced by setting `instrumentEqualizer` in the `Score` context to a new Scheme procedure which accepts a MIDI instrument name as its only argument and returns a pair of fractions giving the minimum and maximum volumes to be applied to that instrument. This replacement is done in the same way as shown for resetting the `dynamicAbsoluteVolumeFunction` at the start of this section. The default equalizer, *default-instrument-equalizer*, in '`../scm/midi.scm`' shows how such a procedure might be written.

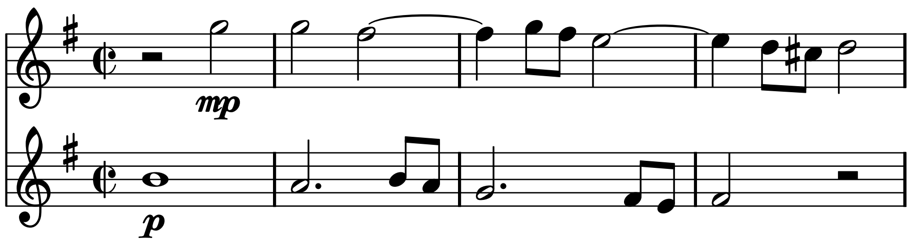
The following example sets the relative flute and clarinet volumes to the same values as the previous example.

```
#(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 c''' {
        r2 g\mp g fis ~
        fis4 g8 fis e2 ~
        e4 d8 cis d2
      }
    }
    \new Staff {
      \key g \major
      \set Staff.midiInstrument = #"clarinet"
      \new Voice \relative c'' {
        b1\p a2. b8 a
        g2. fis8 e
        fis2 r
      }
    }
  >>
  \layout { }
  \midi {
    \context {
      \Score
      tempoWholesPerMinute = #(ly:make-moment 72 2)
    }
  }
}
```



3.5.6 Percussion in MIDI

Percussion instruments are generally notated in a `DrumStaff` context and when notated in this way they are outputted correctly to MIDI channel 10, but some pitched percussion instruments, like the xylophone, marimba, vibraphone, timpani, etc., are treated like "normal" instruments and music for these instruments should be entered in a normal `Staff` context, not a `DrumStaff` context, to obtain the correct MIDI output.

Some non-pitched percussion sounds included in the general MIDI standard, like melodic tom, taiko drum, synth drum, etc., cannot be reached via MIDI channel 10, so the notation for such instruments should also be entered in a normal `Staff` context, using suitable normal pitches.

Many percussion instruments are not included in the general MIDI standard, e.g. castanets. The easiest, although unsatisfactory, method of producing some MIDI output when writing for such instruments is to substitute the nearest sound from the standard set.

Known issues and warnings

Because the general MIDI standard does not contain rim shots, the sidestick is used for this purpose instead.

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.

Settings which influence layout may be placed in two blocks. The `\paper {...}` block is placed outside any `\score {...}` blocks and contains settings that relate to the entire document. The `\layout {...}` block is placed within a `\score {...}` block and contains settings for that particular score. If you have only one `\score {...}` block the two have the same effect. In general the commands shown in this chapter can be placed in either.

4.1 Paper and pages

This section deals with the boundaries that define the area within which music can be printed.

4.1.1 Paper size

Two functions are available for changing the paper size: `set-default-paper-size` and `set-paper-size`. `set-default-paper-size` must be placed in the toplevel scope, and `set-paper-size` must be placed in a `\paper` block:

```
#(set-default-paper-size "a4")
\paper {
  #(set-paper-size "a4")
}
```

`set-default-paper-size` sets the size of all pages, whereas `set-paper-size` only sets the size of the pages that the `\paper` block applies to. For example, if the `\paper` block is at the top of the file, then it will apply the paper size to all pages. If the `\paper` block is inside a `\book`, then the paper size will only apply to that book.

Common paper sizes are available, including `a4`, `letter`, `legal`, and `11x17` (also known as tabloid). Many more paper sizes are supported by default. For details, see '`scm/paper.scm`', and search for the definition of `paper-alist`.

Note: The default paper size is `a4`.

Extra sizes may be added by editing the definition of `paper-alist` in the initialization file '`scm/paper.scm`', however they will be overridden on a subsequent install.

If the symbol `'landscape` is supplied as an argument to `set-default-paper-size`, pages will be rotated by 90 degrees, and wider line widths will be set accordingly.

```
#(set-default-paper-size "a6" 'landscape)
```

Setting the paper size will adjust a number of `\paper` variables, such as margins. To use a particular paper size with altered `\paper` variables, set the paper size before setting the variables.

See also

Installed Files: '`scm/paper.scm`'.

Snippets: Section "Spacing" in *Snippets*.

4.1.2 Page formatting

Margins, headers, and footers and other layout variables are automatically set according to the paper size.

This section lists and describes a number of paper variables that may be altered.

Vertical dimensions

These variables are used to set different vertical dimensions on a page:

`after-title-space`
: The amount of space between the title and the first system. Default: `5\mm`.

`before-title-space`
: Amount of space between the last system of the previous piece and the title of the next. Default: `10\mm`.

`between-system-padding`
: The minimum amount of white space that will always be present between the bottom-most symbol of one system, and the top-most of the next system. Default: `4\mm`.

  Increasing this will put systems whose bounding boxes almost touch farther apart.

`between-system-space`
: The distance between systems. It is the ideal distance between the center of the bottom staff of one system and the center of the top staff of the next system. Default: `20\mm`.

  Increasing this value will provide a more even appearance of the page at the cost of using more vertical space.

`between-title-space`
: Amount of space between consecutive titles (e.g., the title of the book and the title of a piece). Default: `2\mm`.

`bottom-margin`
: The margin between footer and bottom of the page. Default: `6\mm`.

`foot-separation`
: Distance between the bottom-most music system and the page footer. Default: `4\mm`.

`head-separation`
: Distance between the top-most music system and the page header. Default: `4\mm`.

`page-top-space`
: Distance from the top of the printable area to the center of the first staff. This only works for staves that are vertically small. Big staves are set with the top of their bounding box aligned to the top of the printable area. Default: `12\mm`.

`paper-height`
: The height of the page. Default: the height of the current paper size. For details, see Section 4.1.1 [Paper size], page 333.

`top-margin`
: The margin between header and top of the page. Default: `5\mm`.

Selected Snippets

The header and footer are created by the functions make-footer and make-header, defined in \paper. The default implementations are in ly/paper-defaults.ly and ly/titling-init.ly.

The page layout itself is done by two functions in the \paper block, page-music-height and page-make-stencil. The former tells the line-breaking algorithm how much space can be spent on a page, the latter creates the actual page given the system to put on it.

You can define paper block values in Scheme. In that case mm, in, pt, and cm are variables defined in paper-defaults.ly with values in millimeters. That is why the value 2 cm must be multiplied in the example

```
\paper {
 #(define bottom-margin (* 2 cm))
}
```

Example:

```
\paper{
  paper-width = 2\cm
  top-margin = 3\cm
  bottom-margin = 3\cm
  ragged-last-bottom = ##t
}
```

This second example centers page numbers at the bottom of every page.

```
\paper {
  print-page-number = ##t
  print-first-page-number = ##t
  oddHeaderMarkup = \markup \fill-line { " " }
  evenHeaderMarkup = \markup \fill-line { " " }
  oddFooterMarkup = \markup { \fill-line {
     \bold \fontsize #3 \on-the-fly #print-page-number-check-first
     \fromproperty #'page:page-number-string } }
  evenFooterMarkup = \markup { \fill-line {
     \bold \fontsize #3 \on-the-fly #print-page-number-check-first
     \fromproperty #'page:page-number-string } }
}
```

You can also define these values in Scheme. In that case `mm`, `in`, `pt`, and `cm` are variables defined in '`paper-defaults.ly`' with values in millimeters. That is why the value must be multiplied in the example

```
\paper {
  #(define bottom-margin (* 2 cm))
}
```

The header and footer are created by the functions `make-footer` and `make-header`, defined in `\paper`. The default implementations are in '`ly/paper-defaults.ly`' and '`ly/titling-init.ly`'.

The page layout itself is done by two functions in the `\paper` block, `page-music-height` and `page-make-stencil`. The former tells the line-breaking algorithm how much space can be spent on a page, the latter creates the actual page given the system to put on it.

See also

Notation Reference: Section 4.4.2 [Vertical spacing between systems], page 349.

Snippets: Section "Spacing" in *Snippets*.

Horizontal dimensions

Note: If `paper-width` is manually set, `line-width`, `left-margin`, `indent`, and `short-indent` may have to be adjusted as well.

There are a few variables that determine the horizontal dimensions on a page:

`horizontal-shift`
: The amount that all systems (including titles and system separators) are shifted to the right. Default: `0.0`.

`indent`
: The level of indentation for the first system in a score. Default: `paper-width` divided by `14`, as determined by `set-default-paper-size` or `set-paper-size`.

`left-margin`
: The margin between the left edge of the page and the beginning of each system. Default: `10\mm`, as determined by `set-default-paper-size` or `set-paper-size`.

`line-width`
: The width of music systems. Default: `paper-width` minus `20\mm`, as determined by `set-default-paper-size` or `set-paper-size`.

`paper-width`
: The width of the page. Default: the width of the current paper size. For details, see Section 4.1.1 [Paper size], page 333.

`short-indent`
: The level of indentation for all systems in a score besides the first system. Default: `0`, as determined by `set-default-paper-size` or `set-paper-size`.

See also

Snippets: Section "Spacing" in *Snippets*.

Known issues and warnings

The option `right-margin` is defined but doesn't set the right margin yet. The value for the right margin has to be defined by adjusting the values of `left-margin` and `line-width`.

Other layout variables

These variables can be used to adjust page layout in general.

`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`.

`blank-last-page-force`
: The penalty for ending the score on an odd-numbered page. Default: `0`.

`blank-page-force`
: The penalty for having a blank page in the middle of a score. This is not used by `ly:optimal-breaking` since it will never consider blank pages in the middle of a score. Default: `5`.

`first-page-number`
: The value of the page number on the first page. Default: `#1`.

`page-breaking-between-system-padding`
: Tricks the page breaker into thinking that `between-system-padding` is set to something different than it really is. For example, if this variable is set to something substantially larger than `between-system-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-limit-inter-system-space`
: If set to true, limits space between systems on a page with a lot of space left. Default: `##f`. For details, see Section 4.4.2 [Vertical spacing between systems], page 349.

`page-limit-inter-system-space-factor`
: The factor used by `page-limit-inter-system-space`. Default: `1.4`. For details, see Section 4.4.2 [Vertical spacing between systems], page 349.

`page-spacing-weight`
: The relative importance of page (vertical) spacing and line (horizontal) spacing. High values will make page spacing more important. Default: `#10`.

`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. Default: `##f`.

`print-first-page-number`
: If set to true, a page number is printed on the first page. Default: `##f`.

`print-page-number`
: If set to false, page numbers are not printed. Default: `##t`.

`ragged-bottom`
: If set to true, systems will not spread vertically across the page. This does not affect the last page. Default: `##f`.

  This should be set to true for pieces that have only two or three systems per page, for example orchestral scores.

`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`.

`ragged-last-bottom`
: If set to false, systems will spread vertically across the last page. Default: `##t`.

  Pieces that amply fill two pages or more should have this set to true.

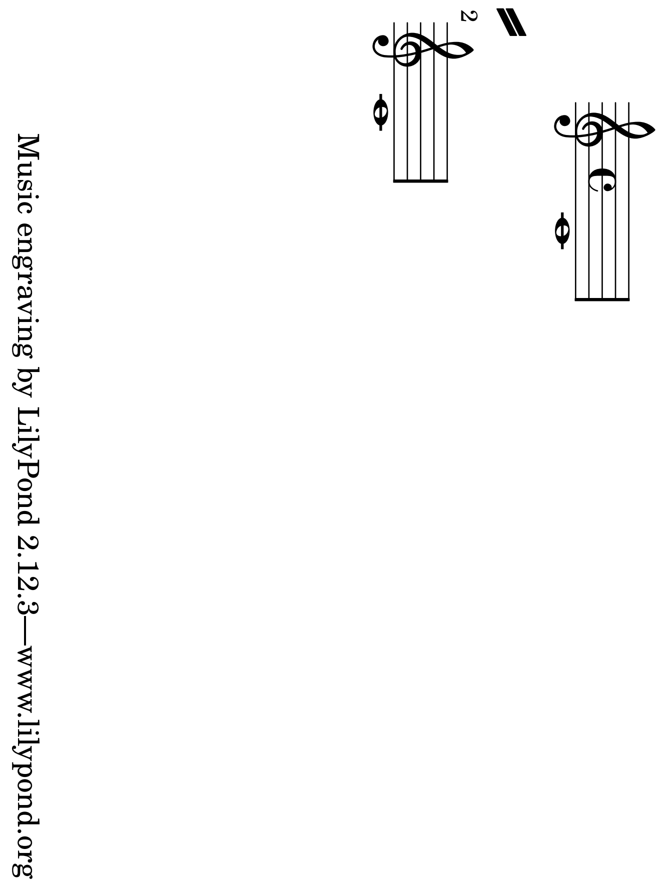
  It also affects the last page of book parts, ie parts of a book created with `\bookpart` blocks.

`ragged-right`
: If set to true, systems will not fill the line width. Instead, systems end at their natural horizontal length. Default: `##f`.

  If the score has only one system, the default value is `##t`.

`system-separator-markup`
: A markup object that is inserted between systems. This is often used for orchestral scores. Default: unset.

  The markup command `\slashSeparator` is provided as a sensible default, for example



`system-count`

The number of systems to be used for a score. Default: unset.

See also

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.

The titles (from the `\header{}` section) 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.

4.2 Music layout

4.2.1 Setting the staff size

The default **staff size** is set to 20 points. This may be changed in two ways:

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)
```

This sets the global default size to 14pt staff height and scales all fonts accordingly.

To set the staff size individually for each score, use

```
\score{
  ...
  \layout{
  #(layout-set-staff-size 15)
  }
}
```

The Feta font provides musical symbols at eight different sizes. Each font is tuned for a different staff size: at a smaller size the font becomes heavier, to match the relatively heavier staff lines. The recommended font 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	

These fonts are available in any sizes. The context property `fontSize` and the layout property `staff-space` (in Section "StaffSymbol" in *Internals Reference*) can be used to tune the size for individual staves. The sizes of individual staves are relative to the global size.

See also

Notation Reference: [Selecting notation font size], page 149.

Snippets: Section "Spacing" in *Snippets*.

Known issues and warnings

`layout-set-staff-size` does not change the distance between the staff lines.

4.2.2 Score layout

While `\paper` contains settings that relate to the page formatting of the whole document, `\layout` contains settings for score-specific layout.

```
\layout {
  indent = 2.0\cm
  \context { \Staff
    \override VerticalAxisGroup #'minimum-Y-extent = #'(-6 . 6)
  }
  \context { \Voice
    \override TextScript #'padding = #1.0
    \override Glissando #'thickness = #3
  }
}
```

See also

Notation Reference: Section 5.1.4 [Changing context default settings], page 380.

Snippets: Section "Spacing" in *Snippets*.

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. Occasionally you might want to override the automatic breaks; you can do this by specifying `\break`. This will force a line break at this point. However, line breaks can only occur at the end of 'complete' bars, i.e., where there are no notes or tuplets left 'hanging' over the bar line. If you want to have a line break where there is no bar line, you can force an invisible bar line by entering `\bar ""`, although again there must be no notes left hanging over in any of the staves at this point, or it will be ignored.

The opposite command, `\noBreak`, forbids a line break at the bar line where it is inserted.

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
line-width = #150
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 real music
>>
```

A linebreaking configuration can be saved as a `.ly` file automatically. This allows vertical alignments to be stretched to fit pages in a second formatting run. This is fairly new and complicated. More details are available in Section "Spacing" in *Snippets*.

Predefined commands

`\break`, `\noBreak`.

See also

Internals Reference: Section "LineBreakEvent" in *Internals Reference*.

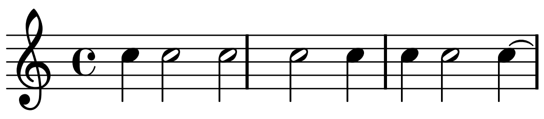
Snippets: Section "Spacing" in *Snippets*.

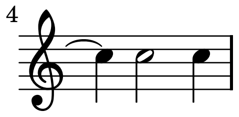
Known issues and warnings

Line breaks can only occur if there is a 'proper' bar line. A note which is hanging over a bar line is not proper, such as

```
c4 c2 << c2 {s4 \break } >>  % this does nothing
c2 c4 |           % a break here would work
c4 c2 c4 ~ \break % as does this break
```

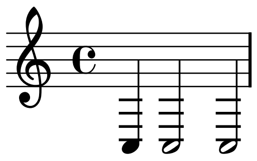
```
c4 c2 c4
```

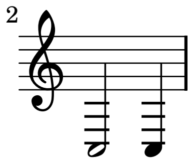




This can be avoided by removing the `Forbid_line_break_engraver`. Note that manually forced line breaks have to be added in parallel with the music.

```
\new Voice \with {
  \remove Forbid_line_break_engraver
} {
  c4 c2 << c2 {s4 \break } >>  % now the break is allowed
  c2 c4
}
```





Similarly, line breaks are normally forbidden when beams cross bar lines. This behavior can be changed by setting `\override Beam #'breakable = ##t`.

4.3.2 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. 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.

There are also analogous settings to `ragged-right` and `ragged-last` which have the same effect on vertical spacing: `ragged-bottom` and `ragged-last-bottom`. If set to `##t` the systems on all pages or just the last page respectively will not be justified vertically.

For more details see Section 4.4 [Vertical spacing], page 347.

Page breaks are computed by the `page-breaking` function. LilyPond provides three algorithms for computing page breaks, `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{
  #(define page-breaking ly:page-turn-breaking)
}
```

The old page breaking algorithm is called `optimal-page-breaks`. If you are having trouble with the new page breakers, you can enable the old one as a workaround.

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 prefered
     #(define 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`.

See also

Snippets: Section "Spacing" in *Snippets*.

4.3.3 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*.

4.3.4 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 341. 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 `#(ly:make-moment 1 1)`. If you want to disable page turns, you can 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 = #(ly:make-moment 5 2)
  R1 | % a page turn will not be allowed here
  a4 b r2 |
  R1*2 | % a page turn will be allowed here
  a1
}
```

The `Page_turn_engraver` detects volta repeats. It 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. The `Page_turn_engraver` can also disable page turns if the repeat is very short. If you set the context property `minimumRepeatLengthForPageTurn` then the `Page_turn_engraver` will only allow turns in repeats whose duration is longer than this value.

The page turning commands, `\pageTurn`, `\noPageTurn` and `\allowPageTurn`, may also be used at top-level, between scores and top-level markups.

Predefined commands

`\pageTurn`, `\noPageTurn`, `\allowPageTurn`.

See also

Snippets: Section "Spacing" in *Snippets*.

Known issues and warnings

There should only be one `Page_turn_engraver` in a score. If there is more than one, they will interfere with each other.

4.3.5 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 {
  #(define page-breaking ly:minimal-breaking)
}
```

See also

Snippets: Section “Spacing” in *Snippets*.

4.3.6 Explicit breaks

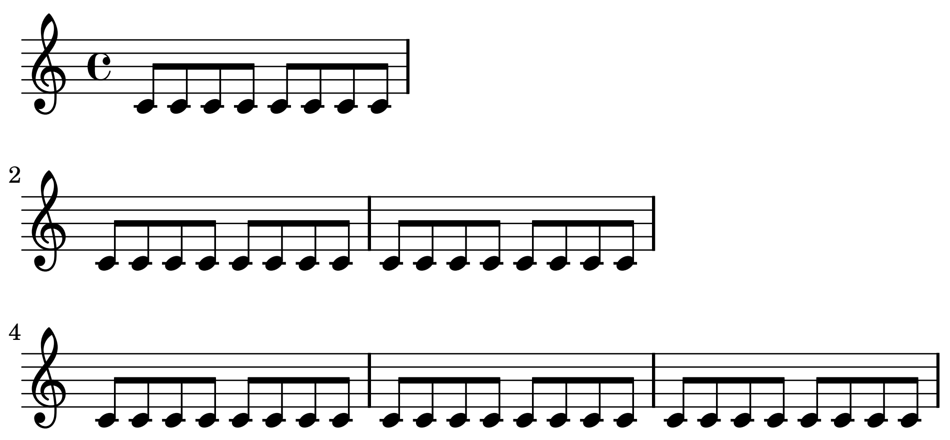
Lily sometimes rejects explicit `\break` and `\pageBreak` commands. There are two commands to override this behavior:

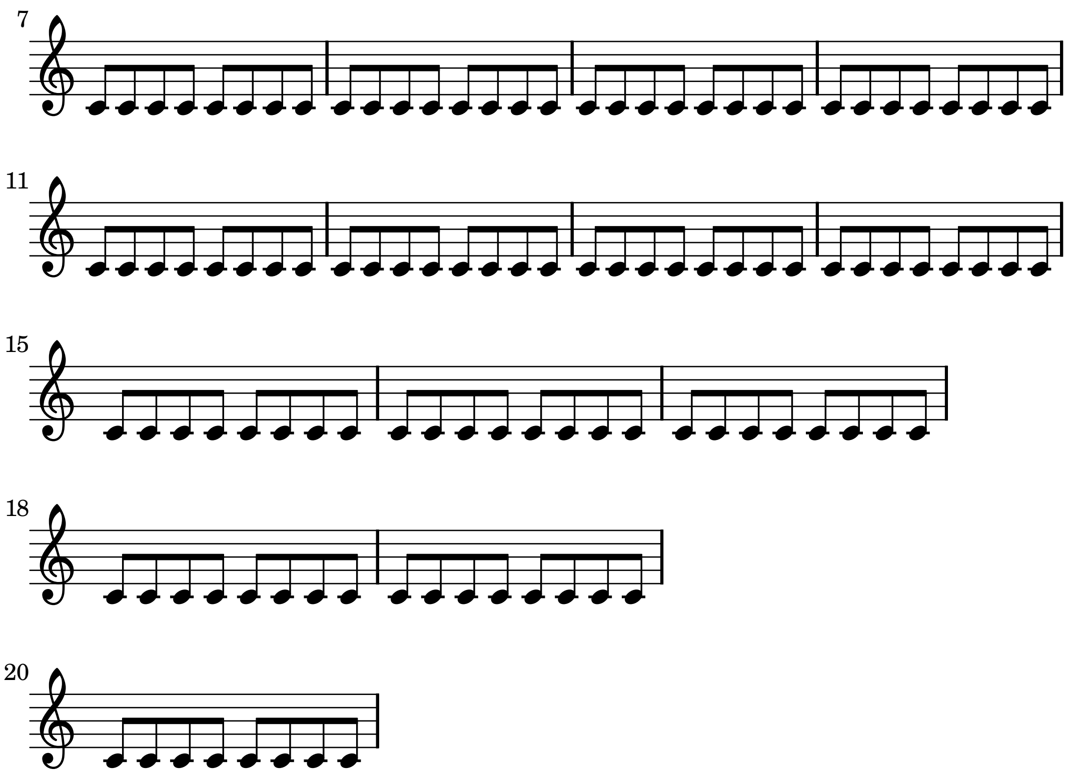
```
\override NonMusicalPaperColumn #'line-break-permission = ##f
\override NonMusicalPaperColumn #'page-break-permission = ##f
```

When `line-break-permission` is overridden to false, Lily will insert line breaks at explicit `\break` commands and nowhere else. When `page-break-permission` is overridden to false, Lily will insert page breaks at explicit `\pageBreak` commands and nowhere else.

```
\paper {
  indent = #0
  ragged-right = ##t
  ragged-bottom = ##t
}

\score {
  \new Score \with {
    \override NonMusicalPaperColumn #'line-break-permission = ##f
    \override NonMusicalPaperColumn #'page-break-permission = ##f
  } {
    \new Staff {
      \repeat unfold 2 { c'8 c'8 c'8 c'8 } \break
      \repeat unfold 4 { c'8 c'8 c'8 c'8 } \break
      \repeat unfold 6 { c'8 c'8 c'8 c'8 } \break
      \repeat unfold 8 { c'8 c'8 c'8 c'8 } \pageBreak
      \repeat unfold 8 { c'8 c'8 c'8 c'8 } \break
      \repeat unfold 6 { c'8 c'8 c'8 c'8 } \break
      \repeat unfold 4 { c'8 c'8 c'8 c'8 } \break
      \repeat unfold 2 { c'8 c'8 c'8 c'8 }
    }
  }
}
```





See also

Snippets: Section “Spacing” in *Snippets*.

4.3.7 Using an extra voice for breaks

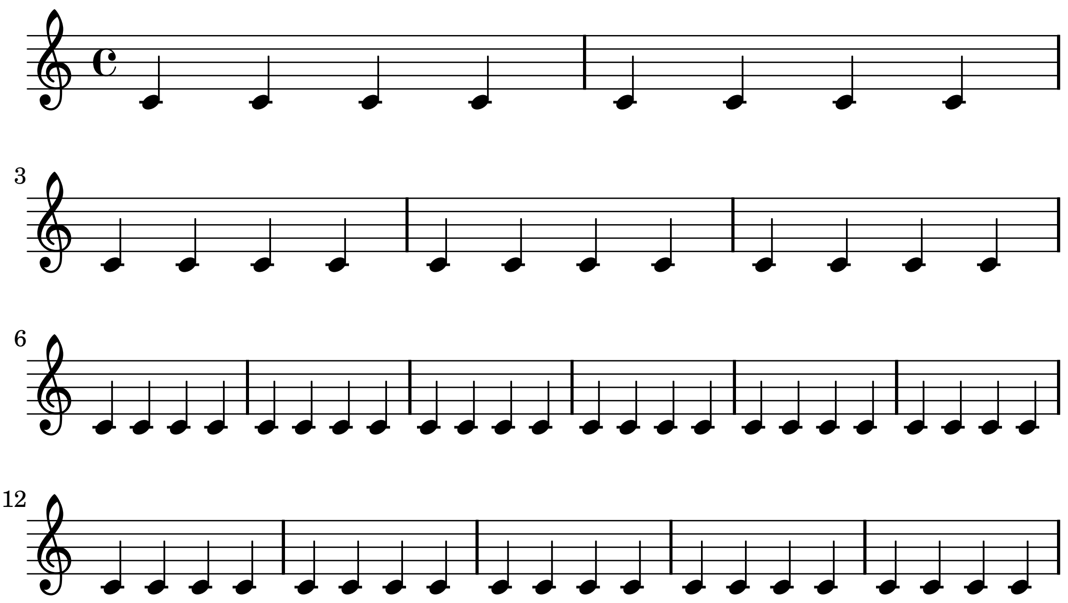
Line- and page-breaking information usually appears within note entry directly.

```
\new Score {
  \new Staff {
    \repeat unfold 2 { c'4 c'4 c'4 c'4 }
    \break
    \repeat unfold 3 { c'4 c'4 c'4 c'4 }
  }
}
```

This makes `\break` and `\pageBreak` commands easy to enter but mixes music entry with information that specifies how music should lay out on the page. You can keep music entry and line- and page-breaking information in two separate places by introducing an extra voice to contain the breaks. This extra voice contains only skips together with `\break`, `pageBreak` and other breaking layout information.

```
\new Score {
  \new Staff <<
     \new Voice {
        s1 * 2 \break
        s1 * 3 \break
        s1 * 6 \break
        s1 * 5 \break
     }
     \new Voice {
        \repeat unfold 2 { c'4 c'4 c'4 c'4 }
        \repeat unfold 3 { c'4 c'4 c'4 c'4 }
        \repeat unfold 6 { c'4 c'4 c'4 c'4 }
        \repeat unfold 5 { c'4 c'4 c'4 c'4 }
```

```
    }
  >>
}
```



This pattern becomes especially helpful when overriding `line-break-system-details` and the other useful but long properties of `NonMusicalPaperColumnGrob`, as explained in Section 4.4 [Vertical spacing], page 347.

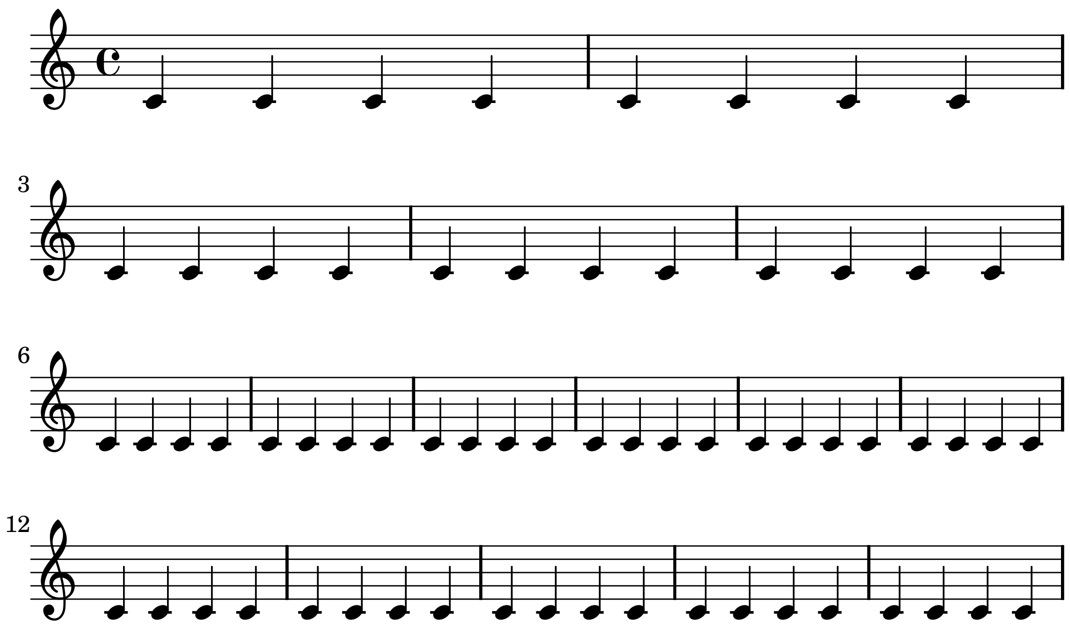
```
\new Score {
  \new Staff <<
    \new Voice {

      \overrideProperty "Score.NonMusicalPaperColumn"
      #'line-break-system-details #'((Y-offset . 0))
      s1 * 2 \break

      \overrideProperty "Score.NonMusicalPaperColumn"
      #'line-break-system-details #'((Y-offset . 35))
      s1 * 3 \break

      \overrideProperty "Score.NonMusicalPaperColumn"
      #'line-break-system-details #'((Y-offset . 70))
      s1 * 6 \break

      \overrideProperty "Score.NonMusicalPaperColumn"
      #'line-break-system-details #'((Y-offset . 105))
      s1 * 5 \break
    }
    \new Voice {
      \repeat unfold 2 { c'4 c'4 c'4 c'4 }
      \repeat unfold 3 { c'4 c'4 c'4 c'4 }
      \repeat unfold 6 { c'4 c'4 c'4 c'4 }
      \repeat unfold 5 { c'4 c'4 c'4 c'4 }
    }
  >>
}
```



See also

Notation Reference: Section 4.4 [Vertical spacing], page 347.

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 Vertical spacing inside a system

The height of each system is determined automatically. To prevent staves from bumping into each other, some minimum distances are set. By changing these, you can put staves closer together. This reduces the amount of space each system requires, and may result in having more systems per page.

Normally staves are stacked vertically. To make staves maintain a distance, their vertical size is padded. This is done with the property `minimum-Y-extent`. When applied to a Section "VerticalAxisGroup" in *Internals Reference*, it controls the size of a horizontal line, such as a staff or a line of lyrics. `minimum-Y-extent` takes a pair of numbers, so if you want to make it smaller than its default `#'(-4 . 4)` then you could set

```
\override Staff.VerticalAxisGroup #'minimum-Y-extent = #'(-3 . 3)
```

This sets the vertical size of the current staff to 3 staff spaces on either side of the center staff line. The value `(-3 . 3)` is interpreted as an interval, where the center line is the 0, so the first number is generally negative. The numbers need not match; for example, the staff can be made larger at the bottom by setting it to `(-6 . 4)`.

After page breaks are determined, the vertical spacing within each system is reevaluated in order to fill the page more evenly; if a page has space left over, systems are stretched in order to fill that space. The amount of stretching can be configured though the `max-stretch` property of the Section "VerticalAlignment" in *Internals Reference* grob. By default, `max-stretch` is set to zero, disabling stretching. To enable stretching, a sane value for `max-stretch` is `ly:align-interface::calc-max-stretch`.

In some situations, you may want to stretch most of a system while leaving some parts fixed. For example, if a piano part occurs in the middle of an orchestral score, you may want to leave the piano staves close to each other while stretching the rest of the score. The `keep-fixed-while-stretching` property of Section "VerticalAxisGroup" in *Internals Reference* can be used to achieve this. When set to `##t`, this property keeps its staff (or line of lyrics) from moving relative to the one directly above it. In the example above, you would override `keep-fixed-while-stretching` to `##t` in the second piano staff:

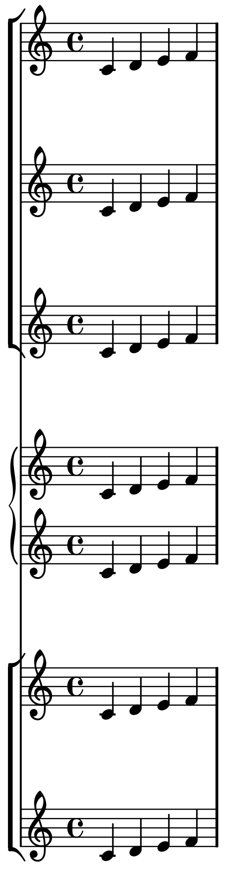
```
#(set-default-paper-size "a6")
#(set-global-staff-size 14.0)

\book {
\paper {
  ragged-last-bottom = ##f
}

\new Score \with
{
  \override VerticalAlignment #'max-stretch = #ly:align-interface::calc-max-stretch
}
{
\new GrandStaff
<<
  \new StaffGroup
  <<
    \new Staff {c' d' e' f'}
    \new Staff {c' d' e' f'}
    \new Staff {c' d' e' f'}
  >>

  \new PianoStaff
  <<
    \new Staff {c' d' e' f'}
    \new Staff \with {
      \override VerticalAxisGroup #'keep-fixed-while-stretching = ##t
    }
    {c' d' e' f'}
  >>

  \new StaffGroup
  <<
    \new Staff {c' d' e' f'}
    \new Staff {c' d' e' f'}
  >>
>>
}
}
```



Music engraving by LilyPond 2.12.3—www.lilypond.org

Vertical alignment of staves is handled by the `VerticalAlignment` object. The context parameters specifying the vertical extent are described in connection with the `Axis_group_engraver`.

See also

Snippets: Section “Spacing” in *Snippets*.

Internals Reference: Section “VerticalAlignment” in *Internals Reference*, Section “Axis_group_engraver” in *Internals Reference*.

4.4.2 Vertical spacing between systems

Space between systems are controlled by four `\paper` variables,

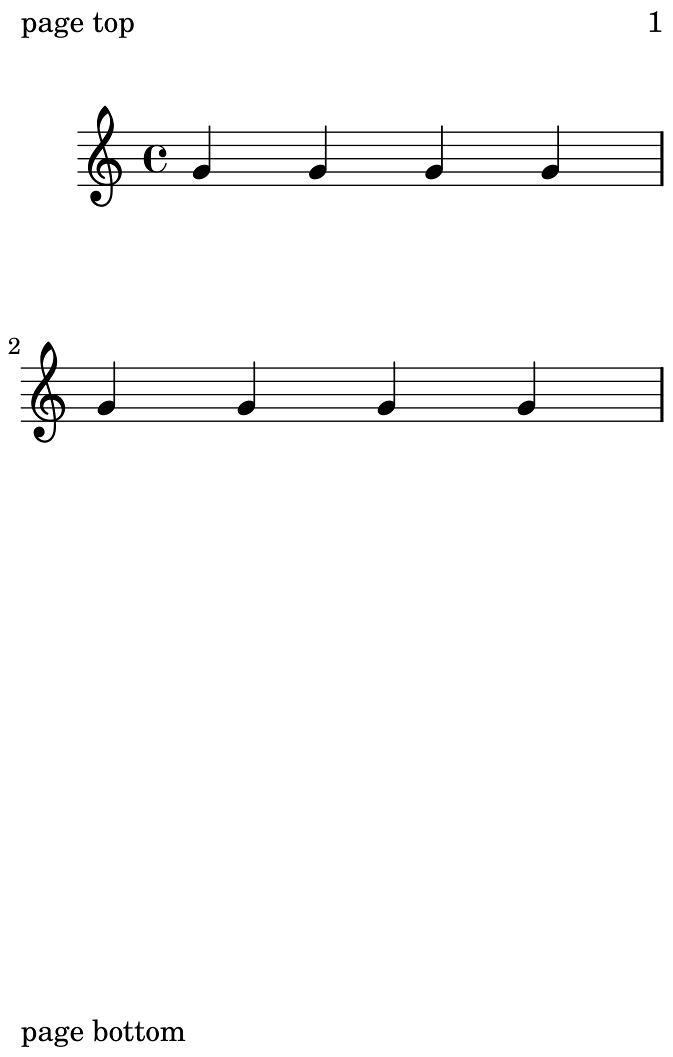
```
\paper {
  between-system-space = 1.5\cm
  between-system-padding = #1
  ragged-bottom=##f
  ragged-last-bottom=##f
}
```

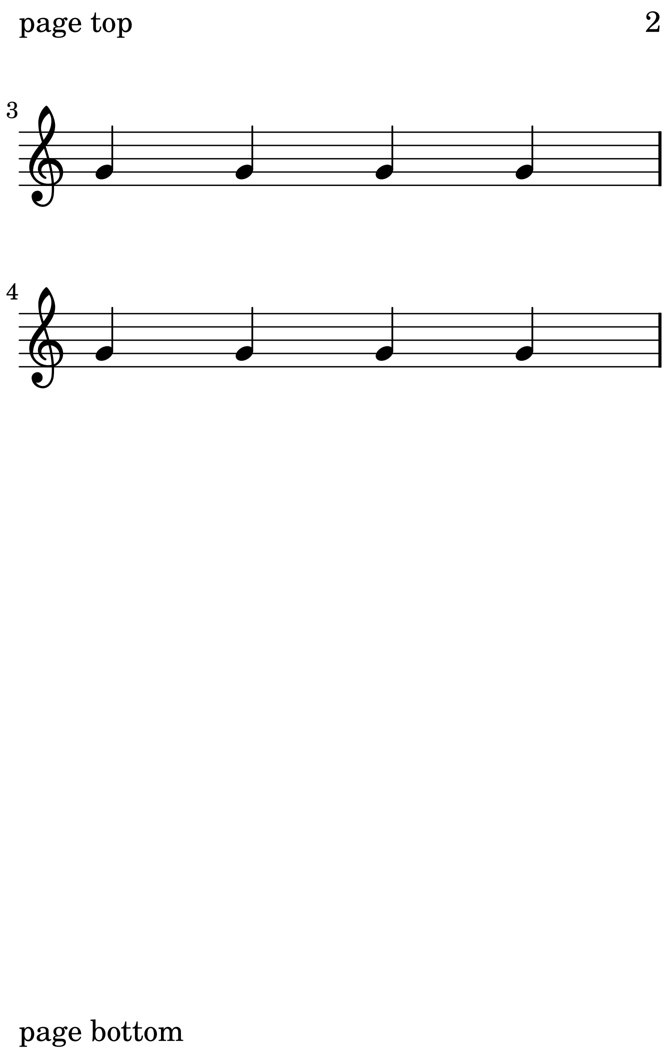
When only a couple of flat systems are placed on a page, the resulting vertical spacing may be non-elegant: one system at the top of the page, and the other at the bottom, with a huge gap between them. To avoid this situation, the space added between the systems can be limited. This feature is activated by setting to `#t` the `page-limit-inter-system-space` variable in the `\paper` block. The paper variable `page-limit-inter-system-space-factor` determines how much the space can be increased: for instance, the value `1.3` means that the space can be 30% larger than what it would be on a ragged-bottom page.

In the following example, if the inter system space were not limited, the second system of page 1 would be placed at the page bottom. By activating the space limitation, the second system is placed closer to the first one. By setting `page-limit-inter-system-space-factor` to `1`, the spacing would the same as on a ragged-bottom page, like the last one.

```
#(set-default-paper-size "a6")
\book {
  \paper {
    page-limit-inter-system-space = ##t
    page-limit-inter-system-space-factor = 1.3

    oddFooterMarkup = \markup "page bottom"
    evenFooterMarkup = \markup "page bottom"
    oddHeaderMarkup = \markup \fill-line {
      "page top" \fromproperty #'page:page-number-string }
    evenHeaderMarkup = \markup \fill-line {
      "page top" \fromproperty #'page:page-number-string }
  }
  \new Staff << \repeat unfold 4 { g'4 g' g' g' \break }
                { s1*2 \pageBreak } >>
}
```


page top
1
2
page bottom



See also

Snippets: Section “Spacing” in *Snippets*.

4.4.3 Explicit staff and system positioning

One way to understand the `VerticalAxisGroup` and `\paper` settings explained in the previous two sections is as a collection of different settings that primarily concern the amount of vertical padding different staves and systems running down the page.

It is possible to approach vertical spacing in a different way using `NonMusicalPaperColumn #'line-break-system-details`. Where `VerticalAxisGroup` and `\paper` settings specify vertical padding, `NonMusicalPaperColumn #'line-break-system-details` specifies exact vertical positions on the page.

`NonMusicalPaperColumn #'line-break-system-details` accepts an associative list of five different settings:

- `X-offset`
- `Y-offset`
- `alignment-offsets`
- `alignment-extra-space`
- `fixed-alignment-extra-space`

Grob overrides, including the overrides for `NonMusicalPaperColumn` below, can occur in any of three different places in an input file:

- in the middle of note entry directly

- in a `\context` block
- in the `\with` block

When we override `NonMusicalPaperColumn`, we use the usual `\override` command in `\context` blocks and in the `\with` block. On the other hand, when we override `NonMusicalPaperColumn` in the middle of note entry, use the special `\overrideProperty` command. Here are some example `NonMusicalPaperColumn` overrides with the special `\overrideProperty` command:

```
\overrideProperty NonMusicalPaperColumn
  #'line-break-system-details #'((X-offset . 20))

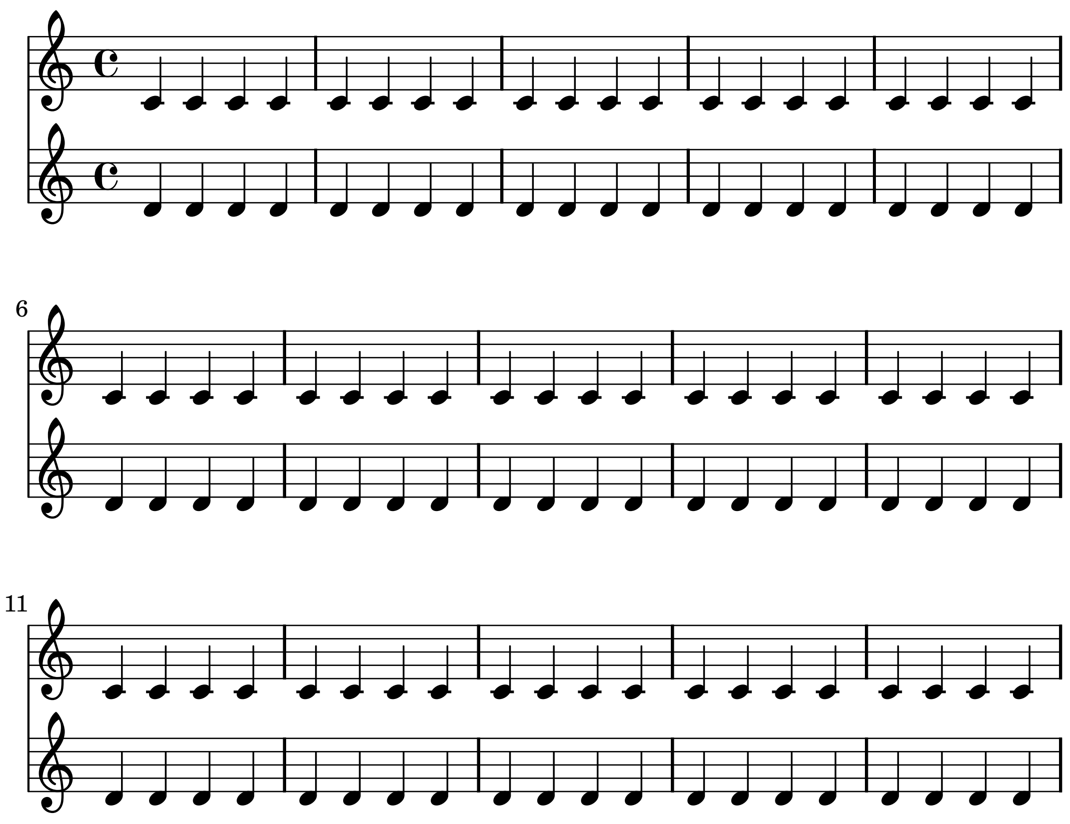
\overrideProperty NonMusicalPaperColumn
  #'line-break-system-details #'((Y-offset . 40))

\overrideProperty NonMusicalPaperColumn
  #'line-break-system-details #'((X-offset . 20) (Y-offset . 40))

\overrideProperty NonMusicalPaperColumn
  #'line-break-system-details #'((alignment-offsets . (0 -15)))

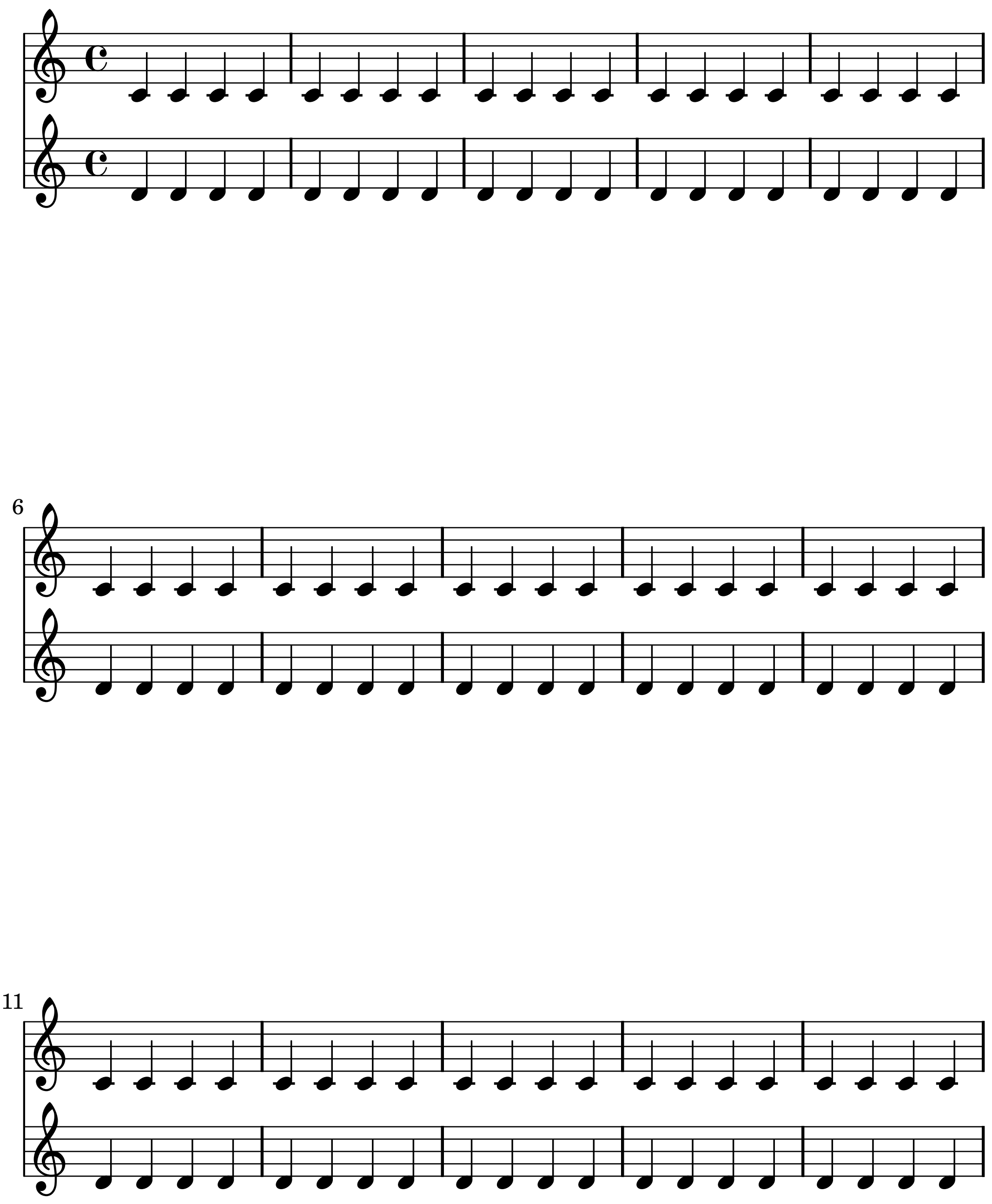
\overrideProperty NonMusicalPaperColumn
  #'line-break-system-details #'((X-offset . 20) (Y-offset . 40)
                                 (alignment-offsets . (0 -15)))
```

To understand how each of these different settings work, we begin by looking at an example that includes no overrides at all.



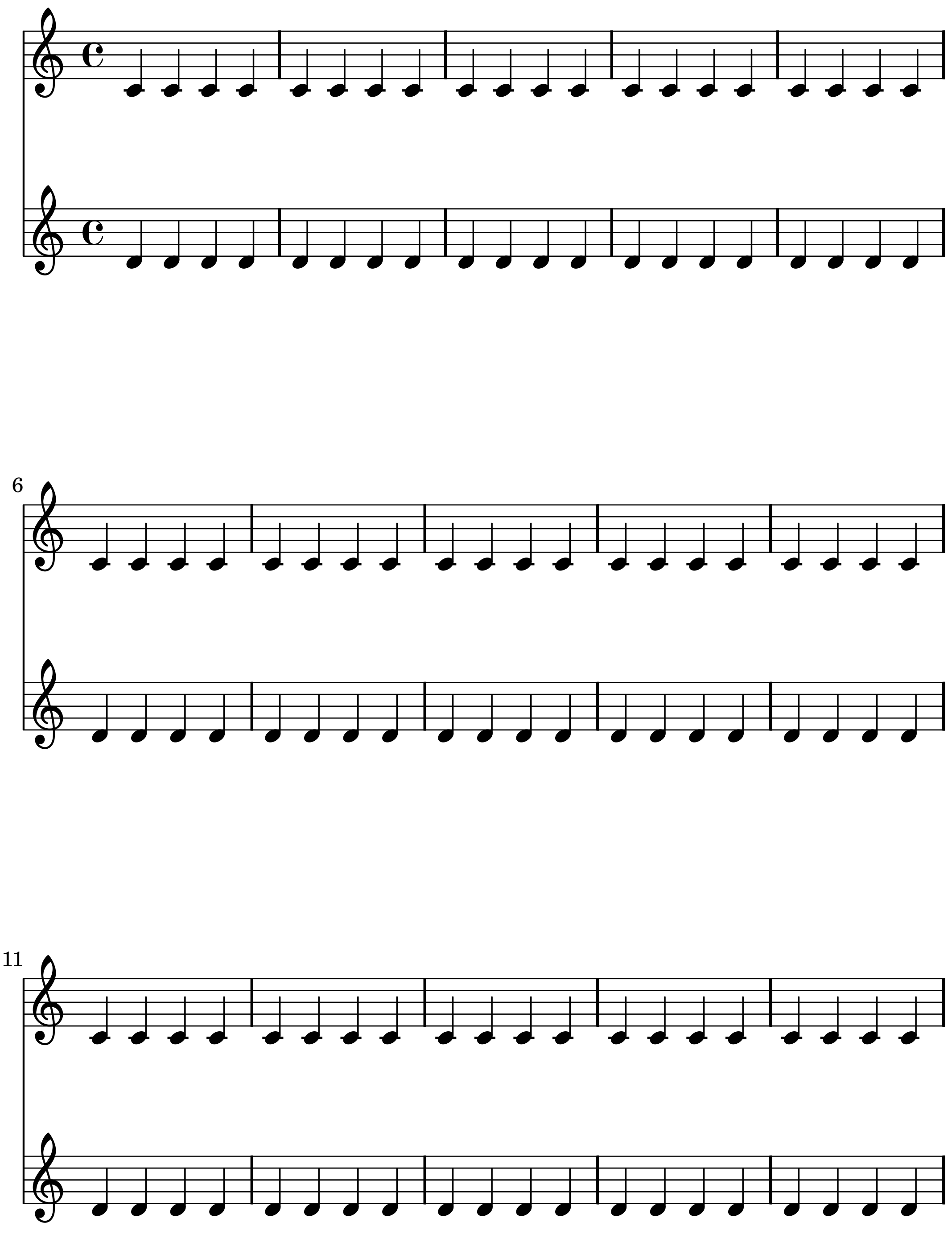
This score isolates line- and page-breaking information in a dedicated voice. This technique of creating a breaks voice will help keep layout separate from music entry as our example becomes more complicated. See Section 4.3.7 [Using an extra voice for breaks], page 345.

Explicit `\breaks` evenly divide the music into six measures per line. Vertical spacing results from LilyPond's defaults. To set the vertical startpoint of each system explicitly, we can set the `Y-offset` pair in the `line-break-system-details` attribute of the `NonMusicalPaperColumn` grob:

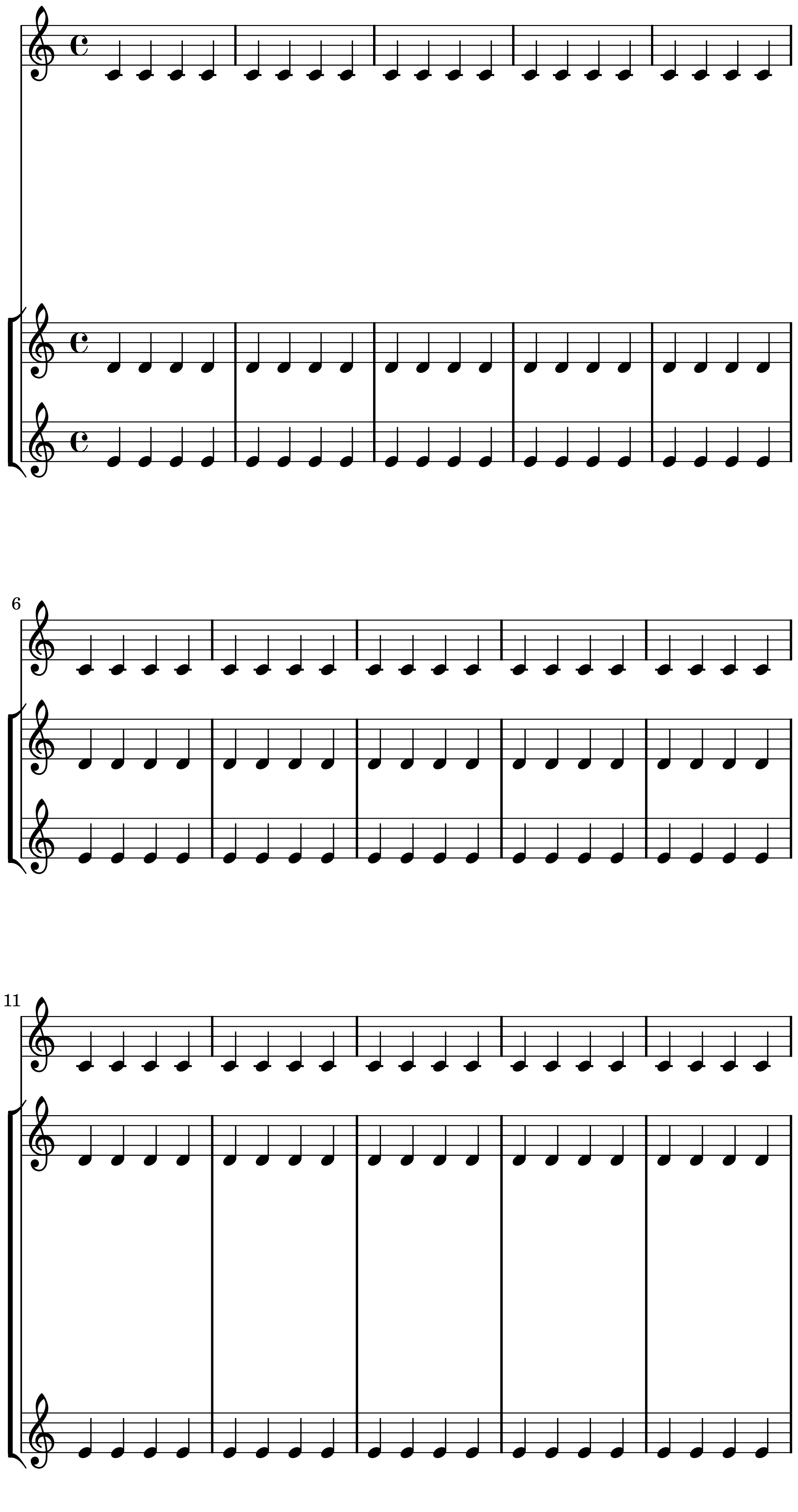


Note that `line-break-system-details` takes an associative list of potentially many values, but that we set only one value here. Note, too, that the `Y-offset` property here determines the exact vertical position on the page at which each new system will render.

Now that we have set the vertical startpoint of each system explicitly, we can also set the vertical startpoint of each staff within each system manually. We do this using the `alignment-offsets` subproperty of `line-break-system-details`.



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-offsets` pairs to control the vertical startpoint of every system and every staff. Finally, note that `alignment-offsets` specifies the vertical positioning of staves but not of staff groups.


6
11

Some points to consider:

- When using `alignment-offsets`, lyrics count as a staff.
- The units of the numbers passed to `X-offset`, `Y-offset` and `alignment-offsets` 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*.

4.4.4 Two-pass vertical spacing

Note: Two-pass vertical spacing is deprecated and will be removed in a future version of LilyPond. Systems are now stretched automatically in a single pass. See Section 4.4.1 [Vertical spacing inside a system], page 347.

In order to automatically stretch systems so that they should fill the space left on a page, a two-pass technique can be used:

1. In the first pass, the amount of vertical space used to increase the height of each system is computed and dumped to a file.
2. In the second pass, spacing inside the systems are stretched according to the data in the page layout file.

The `ragged-bottom` property adds space between systems, while the two-pass technique adds space between staves inside a system.

To allow this behavior, a `tweak-key` variable has to be set in each score `\layout` block, and the tweaks included in each score music, using the `\scoreTweak` music function.

```
%% include the generated page layout file:
\includePageLayoutFile

\score {
  \new StaffGroup <<
    \new Staff <<
      %% Include this score tweaks:
      \scoreTweak "scoreA"
      { \clef french c''1 \break c''1 }
    >>
    \new Staff { \clef soprano g'1 g'1 }
    \new Staff { \clef mezzosoprano e'1 e'1 }
    \new Staff { \clef alto g1 g1 }
    \new Staff { \clef bass c1 c1 }
  >>
  \header {
    piece = "Score with tweaks"
  }
  %% Define how to name the tweaks for this score:
  \layout { #(define tweak-key "scoreA") }
}
```

For the first pass, the `dump-tweaks` option should be set to generate the page layout file.

```
lilypond -dbackend=null -d dump-tweaks <file>.ly
lilypond <file>.ly
```

See also

Snippets: Section "Spacing" in *Snippets*.

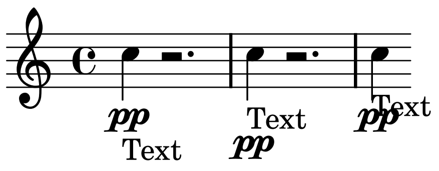
4.4.5 Vertical collision avoidance

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.

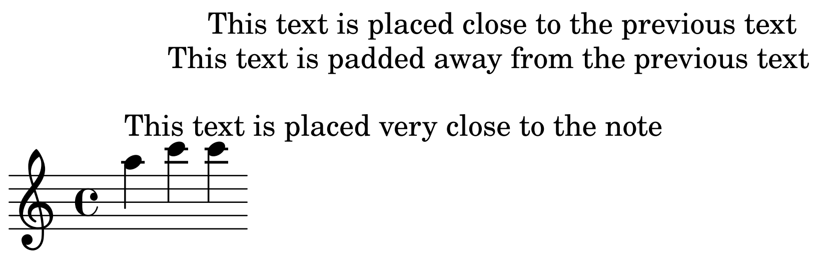
First, LilyPond places all the objects that do not belong outside the staff. Then it sorts the outside-staff objects according to their `outside-staff-priority` (in increasing order). One by one, LilyPond takes the outside-staff objects and places them so that they do not collide with any objects that 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.

```
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
```



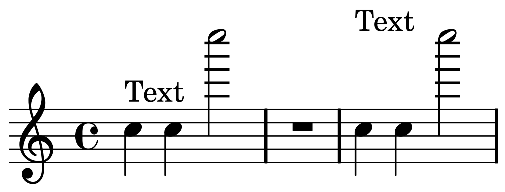
The vertical padding between an outside-staff object and the previously-positioned grobs can be controlled with `outside-staff-padding`.

```
\once \override TextScript #'outside-staff-padding = #0
a'^"This text is placed very close to the note"
\once \override TextScript #'outside-staff-padding = #3
c^"This text is padded away from the previous text"
c^"This text is placed close to the previous text"
```


This text is placed close to the previous text
This text is padded away from the previous text
This text is placed very close to the note

By default, outside-staff objects are placed only to avoid a horizontal collision with previously-positioned grobs. This can lead to situations in which objects are placed very close to each other horizontally. The vertical spacing between staffs can also be set so that outside staff objects are interleaved. Setting `outside-staff-horizontal-padding` causes an object to be offset vertically so that such a situation doesn't occur.

```
% the markup is too close to the following note
c4^"Text"
c4
c''2
% setting outside-staff-horizontal-padding fixes this
R1
\once \override TextScript #'outside-staff-horizontal-padding = #1
c,,4^"Text"
c4
c''2
```



See also

Snippets: Section "Spacing" in *Snippets*.

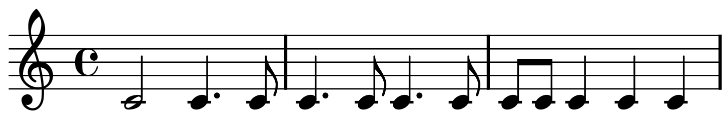
4.5 Horizontal spacing

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 a fixed amount (this amount is controlled by `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.

```
c2 c4. c8 c4. c8 c4. c8 c8
c8 c4 c4 c4
```



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.

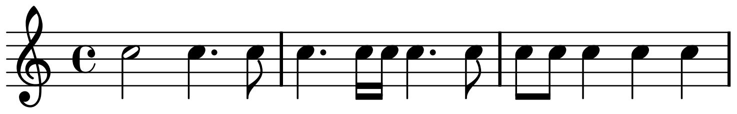
If one would follow the above procedure exactly, then adding a single 32nd note to a score that uses 8th and 16th notes, would widen up the entire score a lot. The shortest note is no longer a 16th, but a 32nd, thus adding 1 NHW to every note. To prevent this, the shortest duration for spacing is not 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. The shortest duration is printed when you run `lilypond` with the `--verbose` option.

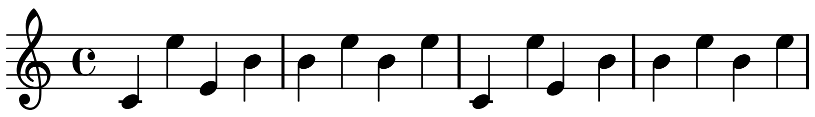
These durations may also be customized. If you set the `common-shortest-duration` in Section "SpacingSpanner" in *Internals Reference*, then this sets the base duration for spacing. The maximum duration for this base (normally an 8th), is set through `base-shortest-duration`.

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:

```
c2 c4. c8 c4. c16[ c] c4. c8 c8 c8 c4 c4 c4
```



In the introduction (see Section "Engraving" in *Learning Manual*), it was explained that stem directions influence spacing. This is controlled with the `stem-spacing-correction` property in the Section "NoteSpacing" in *Internals Reference*, object. These 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 these corrections, once with default settings, and once with exaggerated corrections:



Proportional notation is supported; see Section 4.5.5 [Proportional notation], page 365.

See also

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 work-around may be used to insert extra space into a score, adjusting the padding value as necessary.

```
\override Score.NonMusicalPaperColumn #'padding = #10
```

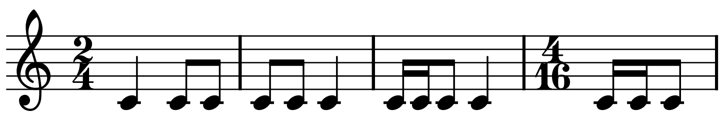
No work-around exists for decreasing the amount of space.

4.5.2 New spacing area

New sections with different spacing parameters can be started with `newSpacingSection`. This is useful when there are sections with a different notions of long and short notes.

In the following example, the time signature change introduces a new section, and hence the 16ths notes are spaced wider.

```
\time 2/4
c4 c8 c
c8 c c4 c16[ c c8] c4
\newSpacingSection
\time 4/16
c16[ c c8]
```



The `\newSpacingSection` command creates a new `SpacingSpanner` object, and hence new `\overrides` may be used in that location.

See also

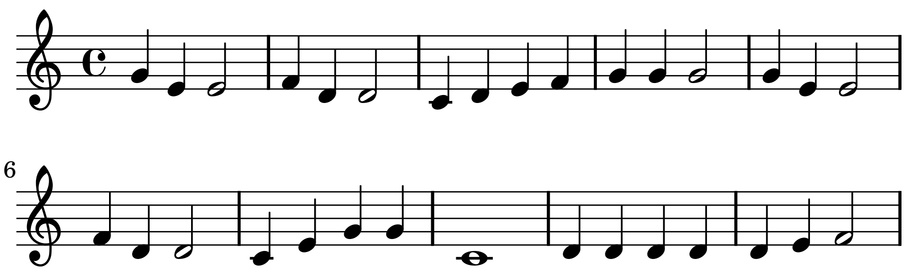
Snippets: Section "Spacing" in *Snippets*.

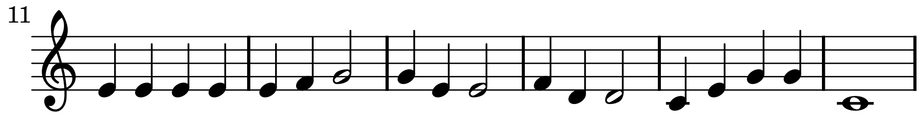
Internals Reference: Section "SpacingSpanner" in *Internals Reference*.

4.5.3 Changing horizontal spacing

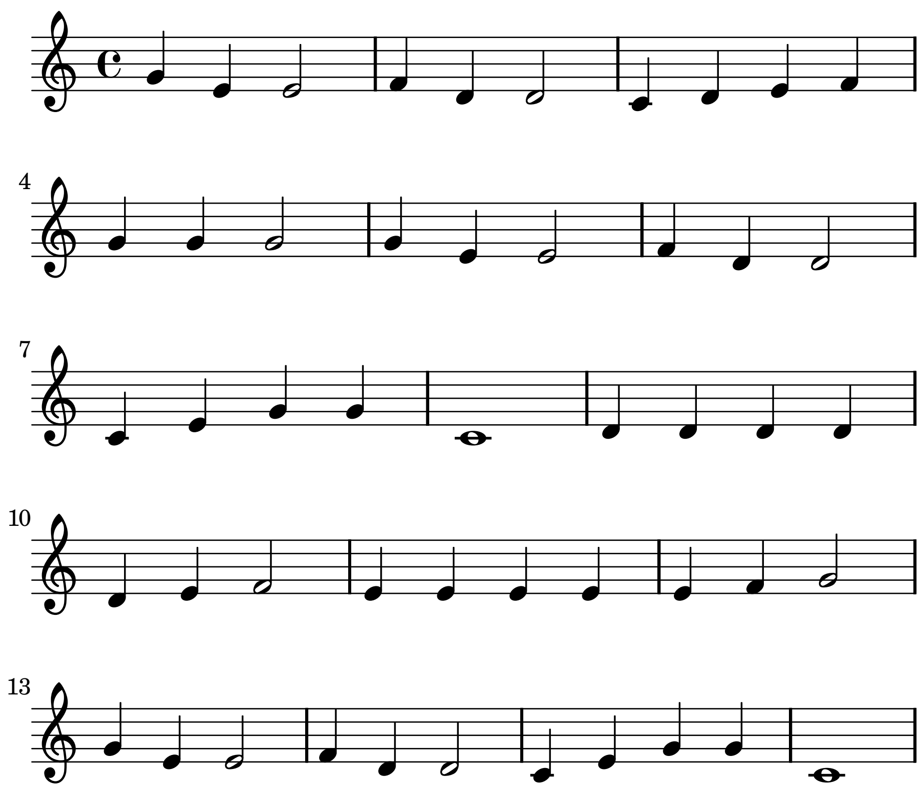
Horizontal spacing may be altered with the `base-shortest-duration` property. Here we compare the same music; once without altering the property, and then altered. Larger values of `ly:make-moment` will produce smaller music. Note that `ly:make-moment` constructs a duration, so `1 4` is a longer duration than `1 16`.

```
\score {
  \relative c'' {
    g4 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 |
  }
}
```





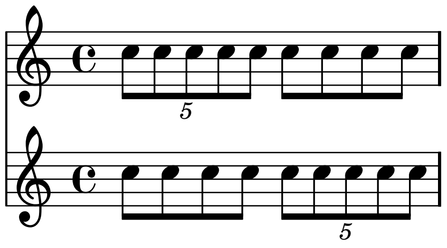
```
\score {
  \relative c'' {
    g4 e e2 | f4 d d2 | c4 d e f | g4 g g2 |
    g4 e e2 | f4 d d2 | c4 e g g | c,1 |
    d4 d d d | d4 e f2 | e4 e e e | e4 f g2 |
    g4 e e2 | f4 d d2 | c4 e g g | c,1 |
  }
  \layout {
    \context {
      \Score
      \override SpacingSpanner
                #'base-shortest-duration = #(ly:make-moment 1 16)
    }
  }
}
```



Selected Snippets

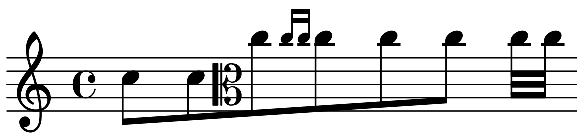
By default, spacing in tuplets depends on various non-duration factors (such as accidentals, clef changes, etc). To disregard such symbols and force uniform equal-duration spacing, use `Score.SpacingSpanner #'uniform-stretching`. This property can only be changed at the beginning of a score,

```
\new Score \with {
  \override SpacingSpanner #'uniform-stretching = ##t
} <<
  \new Staff{
    \times 4/5 {
      c8 c8 c8 c8 c8
    }
    c8 c8 c8 c8
  }
  \new Staff{
    c8 c8 c8 c8
    \times 4/5 {
      c8 c8 c8 c8 c8
    }
  }
>>
```



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 { c8[ c \clef alto c \grace { c16[ c] } c8 c c]  c32[ c32] }
```



See also

Snippets: Section "Spacing" in *Snippets*.

4.5.4 Line length

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 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*.

4.5.5 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.

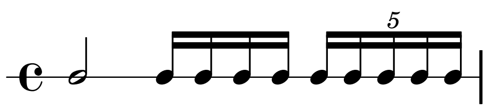
LilyPond supports five different settings for proportional notation, which may be used together or alone:

- `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.

```
\new Score <<
  \new RhythmicStaff {
    c'2
    c'16 c'16 c'16 c'16
    \times 4/5 {
      c'16 c'16 c'16 c'16 c'16
    }
  }
>>
```

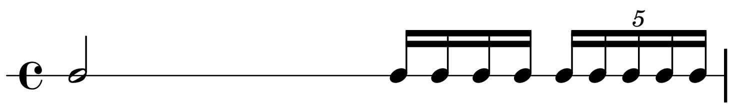


Notice that the half note which begins the measure takes up far less than half of the horizontal space of the measure. Likewise, the sixteenth notes and sixteenth-note quintuplets (or twentieth notes) which end the measure together take up far more than half the horizontal space of the measure.

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.

```
\new Score \with {
  proportionalNotationDuration = #(ly:make-moment 1 20)
} <<
  \new RhythmicStaff {
    c'2
    c'16 c'16 c'16 c'16
    \times 4/5 {
      c'16 c'16 c'16 c'16 c'16
    }
  }
>>
```



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`. Recall that context settings appear in one of three locations in 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`.

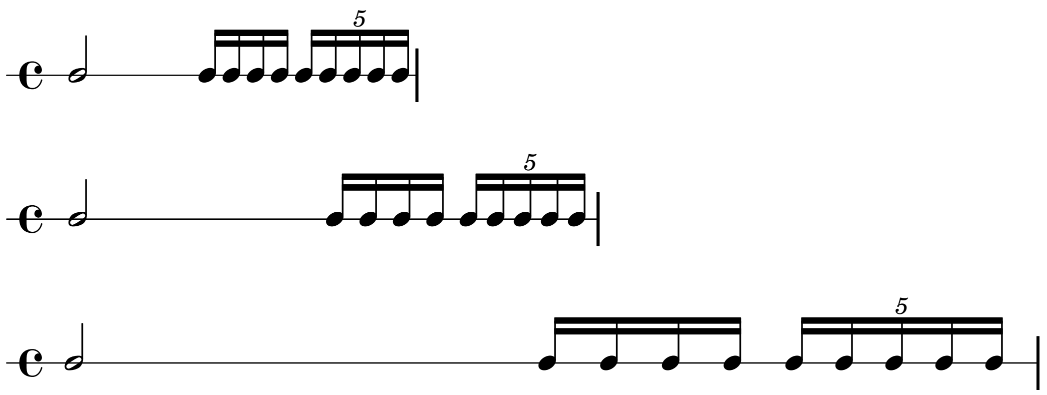
The `proportionalNotationDuration` setting takes a single argument, which is the reference duration against which all music will be spaced. The LilyPond Scheme function make-moment takes two arguments – a numerator and denominator which together express some fraction of a whole note. The call `#(ly:make-moment 1 20)` therefore produces a reference duration of a twentieth note. The values `#(ly:make-moment 1 16)`, `#(ly:make-moment 1 8)`, and `#(ly:make-moment 3 97)` are all 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.

```
\new Score \with {
  proportionalNotationDuration = #(ly:make-moment 1 8)
} <<
  \new RhythmicStaff {
    c'2
    c'16 c'16 c'16 c'16
    \times 4/5 {
      c'16 c'16 c'16 c'16 c'16
    }
  }
>>

\new Score \with {
  proportionalNotationDuration = #(ly:make-moment 1 16)
} <<
  \new RhythmicStaff {
    c'2
    c'16 c'16 c'16 c'16
    \times 4/5 {
      c'16 c'16 c'16 c'16 c'16
    }
  }
>>

\new Score \with {
  proportionalNotationDuration = #(ly:make-moment 1 32)
} <<
  \new RhythmicStaff {
    c'2
    c'16 c'16 c'16 c'16
    \times 4/5 {
      c'16 c'16 c'16 c'16 c'16
    }
  }
>>
```

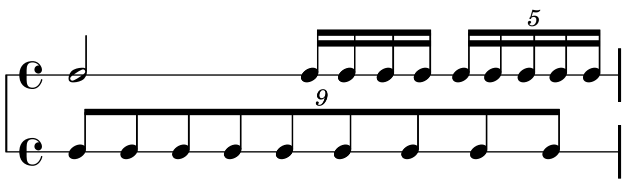


Note that too large a reference duration – such as the eighth note, above – spaces music too tightly and can cause note head collisions. Note also that proportional notation in general takes up more horizontal space that does classical spacing. Proportional spacing provides rhythmic clarity at the expense of horizontal space.

Next we examine how to optimally space overlapping tuplets.

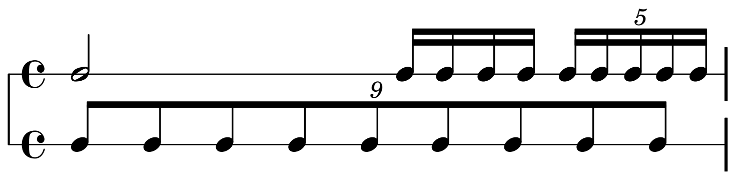
We start by examining what happens to our original example, with classical spacing, when we add a second staff with a different type of tuplet.

```
\new Score <<
  \new RhythmicStaff {
    c'2
    c'16 c'16 c'16 c'16
    \times 4/5 {
      c'16 c'16 c'16 c'16 c'16
    }
  }
  \new RhythmicStaff {
    \times 8/9 {
      c'8 c'8 c'8 c'8 c'8 c'8 c'8 c'8 c'8
    }
  }
>>
```



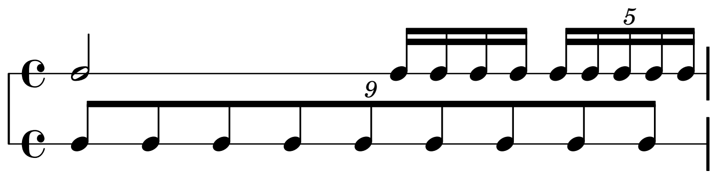
The spacing is bad because the evenly notes of the bottom staff do not stretch uniformly. Classical engraving includes very few complex triplets and so classical engraving rules can generate this type of result. Setting `proportionalNotationDuration` remedies this situation considerably.

```
\new Score \with {
  proportionalNotationDuration = #(ly:make-moment 1 20)
} <<
  \new RhythmicStaff {
    c'2
    c'16 c'16 c'16 c'16
    \times 4/5 {
      c'16 c'16 c'16 c'16 c'16
    }
  }
  \new RhythmicStaff {
    \times 8/9 {
      c'8 c'8 c'8 c'8 c'8 c'8 c'8 c'8 c'8
    }
  }
>>
```



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 do 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`.

```
\new Score \with {
  proportionalNotationDuration = #(ly:make-moment 1 20)
  \override SpacingSpanner #'uniform-stretching = ##t
} <<
  \new RhythmicStaff {
    c'2
    c'16 c'16 c'16 c'16
    \times 4/5 {
      c'16 c'16 c'16 c'16 c'16
    }
  }
  \new RhythmicStaff {
    \times 8/9 {
      c'8 c'8 c'8 c'8 c'8 c'8 c'8 c'8 c'8
    }
  }
>>
```



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 proportionalNotationDuration without also setting the SpacingSpanner's 'uniform-stretching attribute to ##t will, for example, cause Skips to consume an incorrect amount of horizontal space.

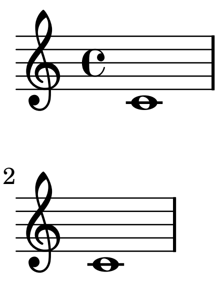
The SpacingSpanner is an abstract grob that lives in the Score context. As with our settings of proportionalNotationDuration, overrides to the SpacingSpanner can occur in any of three different places in our input file – in the Score \with block, in a Score \context block, or in note entry directly.

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 area], page 362, 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 "preferatory" space just before the first note in each system.

```
\paper {
  indent = #0
}

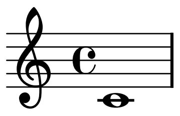
\new Staff {
  c'1
  \break
  c'1
}
```

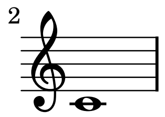


The amount of this preferatory space is the same whether after a time signature, a key signature or a clef. `Separating_line_group_engraver` is responsible for this space. Removing `Separating_line_group_engraver` reduces this space to zero.

```
\paper {
  indent = #0
}

\new Staff \with {
  \remove Separating_line_group_engraver
} {
  c'1
  \break
  c'1
}
```





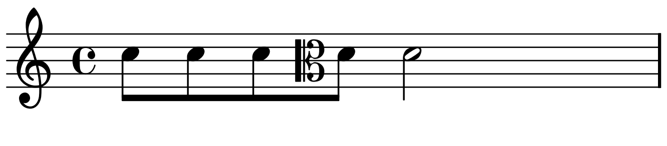
Nonmusical elements like time signatures, key signatures, clefs and accidentals are problematic in proportional notation. None of these elements has rhythmic duration. But all of these elements consume horizontal space. Different proportional scores approach these problems differently.

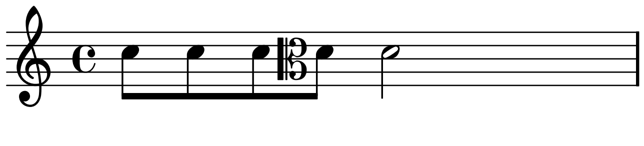
It may be possible to avoid spacing problems with key signatures simply by not having any. This is a valid option since most proportional scores are contemporary music. The same may be true of time signatures, especially for those scores that include a measured timeline or other graphic. But these scores 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 nonmusical 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 = #(ly:make-moment 1 16)
  c''8
  c''8
  c''8
  \clef alto
  d'8
  d'2
}

\new Staff {
  \set Score.proportionalNotationDuration = #(ly:make-moment 1 16)
  \override Score.SpacingSpanner #'strict-note-spacing = ##t
  c''8
  c''8
  c''8
  \clef alto
  d'8
  d'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`
- `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 area], page 362.

Snippets: Section "Spacing" in *Snippets*.

4.6 Fitting music onto fewer pages

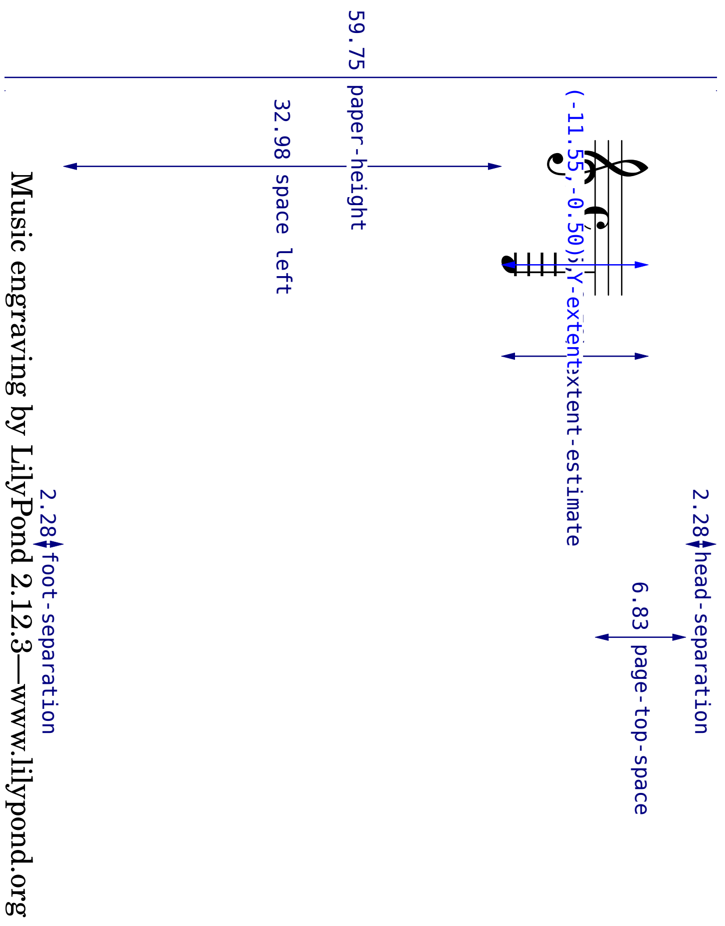
Sometimes you can end up with one or two staves on a second (or third, or fourth...) page. This is annoying, especially if you look at previous pages and it looks like there is plenty of room left on those.

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 371.

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:

```
#(set-default-paper-size "a6" 'landscape)
\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 1.757mm. 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

Section 4.2.1 [Setting the staff size], page 338 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 4.1.2 [Page formatting], page 334.

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.

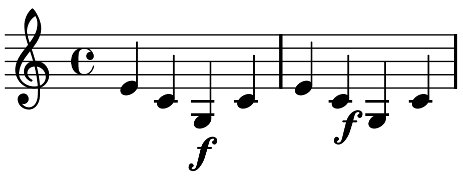
```
\paper {
  between-system-padding = #0.1
  between-system-space = #0.1
  ragged-last-bottom = ##f
  ragged-bottom = ##f
}
```

- 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
}
```

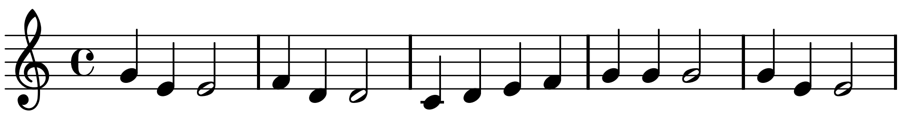
- Avoid (or reduce) objects that increase the vertical size of a system. For example, volta repeats (or alternate repeats) require extra space. If these repeats are spread over two systems, they will take up more space than one system with the volta repeats and another system without. For example, dynamics that 'stick out' of a system can be moved closer to the staff:

```
e4 c g\f c
\override DynamicText #'extra-offset = #'( -2.2 . 2.0)
e4 c g\f c
```



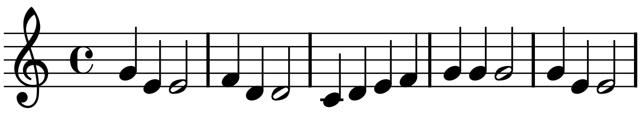
- Alter the horizontal spacing via `SpacingSpanner`. For more details, see Section 4.5.3 [Changing horizontal spacing], page 362. The following example illustrates the default spacing:

```
\score {
  \relative c'' {
    g4 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 c'' {
    g4 e e2 |
    f4 d d2 |
    c4 d e f |
    g4 g g2 |
    g4 e e2 |
  }
  \layout {
    \context {
      \Score
      \override SpacingSpanner
        #'common-shortest-duration = #(ly:make-moment 1 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 4.1.2 [Page formatting], page 334, Section 4.5.3 [Changing horizontal spacing], page 362.

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, 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:

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 {...}` or `\layout {...}` block is processed, or explicitly when a `\new Score` command is executed.

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

[1] Section "Scheme tutorial" in *Learning Manual*, contains a short tutorial on entering numbers, lists, strings, and symbols in Scheme.

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; the notes are printed on one line.

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 initialise certain properties and start appropriate engravers. Being bottom-level contexts, they cannot contain other contexts.

Voice

Corresponds to a voice on a staff. This context handles the conversion of dynamic signs, stems, beams, super- and sub-scripts, 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.

ChordNames

Typesets chord names.

5.1.2 Creating contexts

For scores with only one voice and one staff, contexts are created automatically. For more complex scores, it is necessary to create them by hand. There are three commands that do this.

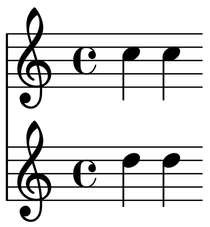
- The easiest command is `\new`, and it also the quickest to type. It is prepended to a music expression, for example

  `\new` *`type music expression`*

  where *type* is a context name (like `Staff` or `Voice`). This command creates a new context, and starts interpreting the *music expression* with that.

  A practical application of `\new` is a score with many staves. Each part that should be on its own staff, is preceded with `\new Staff`.

  ```
  <<
    \new Staff { c4 c }
    \new Staff { d4 d }
  >>
  ```

  The `\new` command may also give a name to the context,

  `\new` *`type = id music`*

  However, this user specified name is only used if there is no other context already earlier with the same name.

- Like `\new`, the `\context` command also directs a music expression to a context object, but gives the context an explicit name. The syntax is

  `\context` *`type = id music`*

  This form will search for an existing context of type *type* called *id*. If that context does not exist yet, a new context with the specified name is created. This is useful if the context is referred to later on. For example, when setting lyrics the melody is in a named context

  `\context Voice = "`**`tenor`**`"` *`music`*

  so the texts can be properly aligned to its notes,

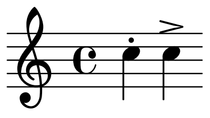
  `\new Lyrics \lyricsto "`**`tenor`**`"` *`lyrics`*

  Another possible use of named contexts is funneling two different music expressions into one context. In the following example, articulations and notes are entered separately,

  ```
  music = { c4 c4 }
  arts = { s4-. s4-> }
  ```

  They are combined by sending both to the same `Voice` context,

  ```
  <<
    \new Staff \context Voice = "A" \music
    \context Voice = "A" \arts
  >>
  ```

With this mechanism, it is possible to define an Urtext (original edition), with the option to put several distinct articulations on the same notes.

- The third command for creating contexts is

  `\context` *`type music`*

  This is similar to `\context` with `= ` *`id`*, but matches any context of type *type*, regardless of its given name.

  This variant is used with music expressions that can be interpreted at several levels. For example, the `\applyOutput` command (see Section 6.5.2 [Running a function on all layout objects], page 432). Without an explicit `\context`, it is usually applied to `Voice`

  ```
  \applyOutput #'context #function   % apply to Voice
  ```

  To have it interpreted at the `Score` or `Staff` level use these forms

  ```
  \applyOutput #'Score #function
  \applyOutput #'Staff #function
  ```

5.1.3 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_head_engraver` and the `Staff` context contains a `Key_signature_engraver`.

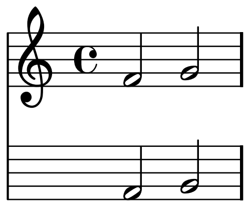
For a full a description of each plug-in, see Internals Reference ↦ Translation ↦ Engravers. Every context described in Internals Reference ↦ Translation ↦ Context. lists the engravers used for that context.

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 the ... should be the name of an engraver. Here is a simple example which removes `Time_signature_engraver` and `Clef_engraver` from a `Staff` context,

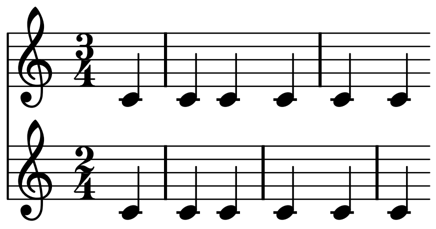
```
<<
  \new Staff {
    f2 g
  }
  \new Staff \with {
     \remove "Time_signature_engraver"
     \remove "Clef_engraver"
  } {
    f2 g2
  }
>>
```



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*.

The next example shows a practical application. Bar lines and time signatures are normally synchronized across the score. This is done by the `Timing_translator` and `Default_bar_line_engraver`. This plug-in keeps an administration of time signature, location within the measure, etc. By moving these engraver from `Score` to `Staff` context, we can have a score where each staff has its own time signature.

```
\new Score \with {
  \remove "Timing_translator"
  \remove "Default_bar_line_engraver"
} <<
  \new Staff \with {
    \consists "Timing_translator"
    \consists "Default_bar_line_engraver"
  } {
      \time 3/4
      c4 c c c c c
  }
  \new Staff \with {
    \consists "Timing_translator"
    \consists "Default_bar_line_engraver"
  } {
       \time 2/4
       c4 c c c c c
  }
>>
```



Known issues and warnings

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 order in which the engravers are specified is the order in which they are called to carry out their processing.

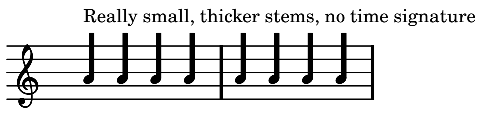
The following orderings are important: the `Bar_engraver` must normally be first, and the `New_fingering_engraver` must come before the `Script_column_engraver`. There may be others with ordering dependencies.

5.1.4 Changing context default settings

The context settings which are to be used by default in `Score`, `Staff` and `Voice` contexts may be specified in a `\layout` block, as illustrated in the following example. The `\layout` block should be placed within the `\score` block to which it is to apply, but outside any music.

Note that the `\set` command itself and the context must be omitted when the context default values are specified in this way:

```
\score {
  \relative c'' {
    a4^"Really small, thicker stems, no time signature" a a a
    a a a a
  }
  \layout {
    \context {
      \Staff
      fontSize = #-4
      \override Stem #'thickness = #4.0
      \remove "Time_signature_engraver"
    }
  }
}
```



In this example, the `\Staff` command specifies that the subsequent specifications are to be applied to all staves within this score block.

Modifications can be made to the `Score` context or all `Voice` contexts in a similar way.

Known issues and warnings

It is not possible to collect context changes in a variable and apply them to a `\context` definition by referring to that variable.

The `\RemoveEmptyStaffContext` will overwrite your current `\Staff` settings. If you wish to change the defaults for a staff which uses `\RemoveEmptyStaffContext`, you must do so after calling `\RemoveEmptyStaffContext`, ie

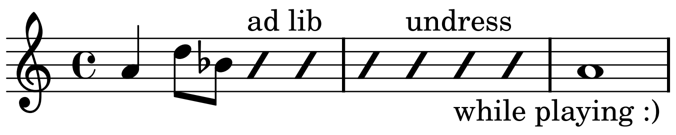
```
\layout {
  \context {
    \RemoveEmptyStaffContext

    \override Stem #'thickness = #4.0
  }
}
```

5.1.5 Defining new contexts

Specific contexts, like `Staff` and `Voice`, are made of 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`, we want commands that work on (existing) `Voice`s to remain working. This is achieved by giving the new context an alias `Voice`,

```
\alias Voice
```

The context will print notes and instructive texts, so we need to add the engravers which provide this functionality,

```
\consists Note_heads_engraver
\consists Text_engraver
```

but we only need this on the center line,

```
\consists Pitch_squash_engraver
squashedPosition = #0
```

The Section "Pitch_squash_engraver" in *Internals Reference* modifies note heads (created by Section "Note_heads_engraver" in *Internals Reference*) 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
\override Stem #'transparent = ##t
```

All these plug-ins have to cooperate, and this is achieved with a special plug-in, which must be marked with the keyword `\type`. This should always be `Engraver_group`.

```
\type "Engraver_group"
```

Put together, we get

```
\context {
  \name ImproVoice
  \type "Engraver_group"
  \consists "Note_heads_engraver"
  \consists "Text_engraver"
  \consists Pitch_squash_engraver
  squashedPosition = #0
  \override NoteHead #'style = #'slash
  \override Stem #'transparent = ##t
  \alias Voice
}
```

Contexts form hierarchies. We want to hang the `ImproVoice` under `Staff`, just like normal `Voice`s. Therefore, we modify the `Staff` definition with the `\accepts` command,

```
\context {
  \Staff
  \accepts ImproVoice
}
```

The opposite of `\accepts` is `\denies`, which is sometimes needed when reusing existing context definitions.

Putting both into a `\layout` block, like

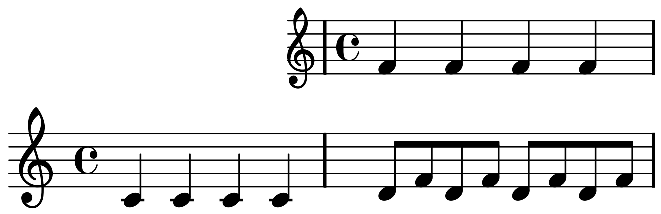
```
\layout {
  \context {
    \name ImproVoice
    ...
  }
  \context {
    \Staff
    \accepts "ImproVoice"
  }
}
```

Then the output at the start of this subsection can be entered as

```
\relative c'' {
  a4 d8 bes8
  \new ImproVoice {
    c4^"ad lib" c
    c4 c^"undress"
    c c_"while playing :)"
  }
  a1
}
```

5.1.6 Aligning contexts

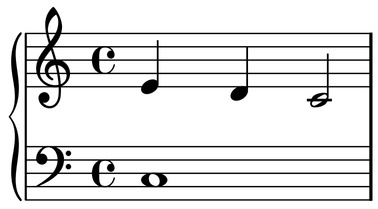
New contexts may be aligned above or below existing contexts. This could be useful in setting up a vocal staff (Section "Vocal ensembles" in *Learning Manual*) and in ossia,



Contexts like `PianoStaff` can contain other contexts nested within them. Contexts which are acceptable for nesting are defined by the "accepts" list of a context. Contexts which are not in this list are placed below the outer context in the printed score. For example, the `PianoStaff` context is defined by default to accept `Staff` and `FiguredBass` contexts within it, but not (for example) a `Lyrics` context. So in the following structure the lyrics are placed below the piano staff rather than between the two staves:

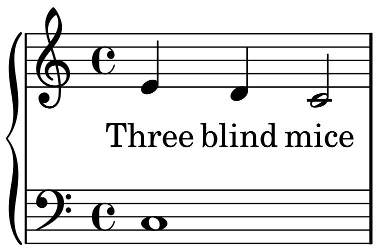
```
\new PianoStaff
<<
  \new Staff { e4 d c2 }
  \addlyrics { Three blind mice }
  \new Staff {
    \clef "bass"
    { c,1 }
  }
```

```
>>
```



The “accepts” list of a context can be modified to include additional nested contexts, so if we wanted the lyrics to appear between the two staves we could use:

```
\new PianoStaff \with { \accepts Lyrics }
<<
  \new Staff { e4 d c2 }
  \addlyrics { Three blind mice }
  \new Staff {
    \clef "bass"
    { c,1 }
  }
>>
```



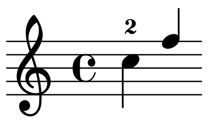
The opposite of `\accepts` is `\denies`; this removes a context from the “accepts” list.

5.2 Explaining the Internals Reference

5.2.1 Navigating the program reference

Suppose we want to move the fingering indication in the fragment below:

```
c-2
\stemUp
f
```



If you visit the documentation on fingering instructions (in [Fingering instructions], page 150), 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',

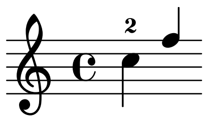
```
(Fingering
  . ((padding . 0.5)
     (avoid-slur . around)
     (slur-padding . 0.2)
     (staff-padding . 0.5)
     (self-alignment-X . 0)
     (self-alignment-Y . 0)
     (script-priority . 100)
     (stencil . ,ly:text-interface::print)
     (direction . ,ly:script-interface::calc-direction)
     (font-encoding . fetaNumber)
     (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 webpage 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
\stemUp
f
```



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

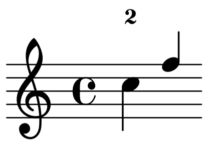
`padding`	(dimension, in staff space) Add this much extra space between objects that are next to each other.

By increasing the value of `padding`, we can move the fingering away from the note head. The following command inserts 3 staff spaces of white between the note and the fingering:

```
\once \override Voice.Fingering #'padding = #3
```

Inserting this command before the Fingering object is created, i.e., before `c2`, yields the following result:

```
\once \override Voice.Fingering #'padding = #3
c-2
\stemUp
f
```



In this case, the context for this tweak is `Voice`. This fact can also be deduced from the program reference, for the page for the Section "Fingering_engraver" in *Internals Reference* plug-in says

Fingering_engraver is part of contexts: . . . Section "Voice" in *Internals Reference*

5.2.4 Naming conventions

Another thing that is needed, is an overview of the various naming conventions:

scheme functions: lowercase-with-hyphens (incl. one-word names) scheme functions: ly:plus-scheme-style music events, music classes and music properties: as-scheme-functions Grob interfaces: scheme-style backend properties: scheme-style (but X and Y!) contexts (and MusicExpressions and grobs): Capitalized or CamelCase context properties: lowercaseFollowedByCamelCase engravers: Capitalized_followed_by_lowercase_and_with_underscores

Which of these are conventions and which are rules? Which are rules of the underlying language, and which are LP-specific?

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.

The syntax for this is

```
\override context.name #'property = #value
```

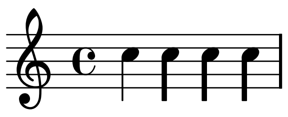
Here *name* is the name of a graphical object, like `Stem` or `NoteHead`, and *property* is an internal variable of the formatting system ('grob property' or 'layout property'). The latter is a symbol, so it must be quoted. The subsection Section 5.3 [Modifying properties], page 386, explains what to fill in for *name*, *property*, and *value*. Here we only discuss the functionality of this command.

The command

```
\override Staff.Stem #'thickness = #4.0
```

makes stems thicker (the default is 1.3, with staff line thickness as a unit). Since the command specifies `Staff` as context, it only applies to the current staff. Other staves will keep their normal appearance. Here we see the command in action:

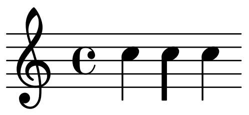
```
c4
\override Staff.Stem #'thickness = #4.0
c4
c4
c4
```



The `\override` command changes the definition of the `Stem` within the current `Staff`. After the command is interpreted all stems are thickened.

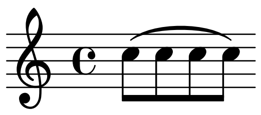
Analogous to `\set`, the *context* argument may be left out, causing the default context `Voice` to be used. Adding `\once` applies the change during one timestep only.

```
c4
\once \override Stem #'thickness = #4.0
c4
c4
```



The `\override` must be done before the object is started. Therefore, when altering *Spanner* objects such as slurs or beams, the `\override` command must be executed at the moment when the object is created. In this example,

```
\override Slur #'thickness = #3.0
c8[( c
\override Beam #'thickness = #0.6
c8 c])
```



the slur is fatter but the beam is not. This is because the command for `Beam` comes after the Beam is started, so it has no effect.

Analogous to `\unset`, the `\revert` command for a context undoes an `\override` command; like with `\unset`, it only affects settings that were made in the same context. In other words, the `\revert` in the next example does not do anything.

```
\override Voice.Stem #'thickness = #4.0
\revert Staff.Stem #'thickness
```

Some tweakable options are called 'subproperties' and reside inside properties. To tweak those, use commands of the form

`\override` *`context.name`* `#'`*`property`* `#'`*`subproperty`* `= #`*`value`*

such as

```
\override Stem #'(details beamed-lengths) = #'(4 4 3)
```

See also

Internals: Section "OverrideProperty" in *Internals Reference*, Section "RevertProperty" in *Internals Reference*, Section "PropertySet" in *Internals Reference*, Section "Backend" in *Internals Reference*, and Section "All layout objects" in *Internals Reference*.

Known issues and warnings

The back-end is not very strict in type-checking object properties. Cyclic references in Scheme values for properties can cause hangs or crashes, or both.

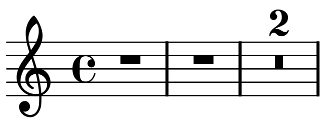
5.3.2 The \set command

Each context can have different *properties*, variables contained in that context. They can be changed during the interpretation step. This is achieved by inserting the `\set` command in the music,

```
\set context.prop = #value
```

For example,

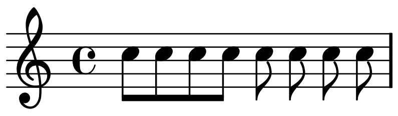
```
R1*2
\set Score.skipBars = ##t
R1*2
```



This command skips measures that have no notes. The result is that multi-rests are condensed. The value assigned is a Scheme object. In this case, it is `#t`, the boolean True value.

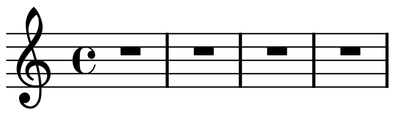
If the *context* argument is left out, then the current bottom-most context (typically `ChordNames`, `Voice`, or `Lyrics`) is used. In this example,

```
c8 c c c
\set autoBeaming = ##f
c8 c c c
```



the *context* argument to `\set` is left out, so automatic beaming is switched off in the current Section "Voice" in *Internals Reference*. Note that the bottom-most context does not always contain the property that you wish to change – for example, attempting to set the `skipBars` property (of the bottom-most context, in this case `Voice`) will have no effect.

```
R1*2
\set skipBars = ##t
R1*2
```



Contexts are hierarchical, so if a bigger context was specified, for example `Staff`, then the change would also apply to all `Voices` in the current stave. The change is applied 'on-the-fly', during the music, so that the setting only affects the second group of eighth notes.

There is also an `\unset` command,

```
\unset context.prop
```

which removes the definition of *prop*. This command removes the definition only if it is set in *context*, so

```
\set Staff.autoBeaming = ##f
```

introduces a property setting at `Staff` level. The setting also applies to the current `Voice`. However,

```
\unset Voice.autoBeaming
```

does not have any effect. To cancel this setting, the `\unset` must be specified on the same level as the original `\set`. In other words, undoing the effect of `Staff.autoBeaming = ##f` requires

```
\unset Staff.autoBeaming
```

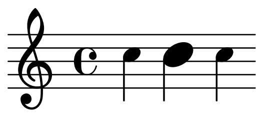
Like `\set`, the *context* argument does not have to be specified for a bottom context, so the two statements

```
\set Voice.autoBeaming = ##t
\set autoBeaming = ##t
```

are equivalent.

Settings that should only apply to a single time-step can be entered with `\once`, for example in

```
c4
\once \set fontSize = #4.7
c4
c4
```



the property `fontSize` is unset automatically after the second note.

A full description of all available context properties is in the program reference, see Translation ↦ Tunable context properties.

5.3.3 The `\override` command

Commands which change output generally look like

```
\override Voice.Stem #'thickness = #3.0
```

To construct this tweak we must determine these bits of information:

- the context: here `Voice`.
- the layout object: here `Stem`.
- the layout property: here `thickness`.
- a sensible value: here `3.0`.

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)
```

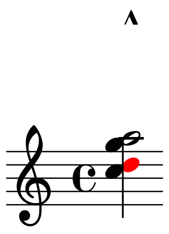
For many properties, regardless of the data type of the property, setting the property to false (`##f`) will result in turning it off, causing LilyPond to ignore that property entirely. This is particularly useful for turning off grob properties which may otherwise be causing problems.

We demonstrate how to glean this information from the notation manual and the program reference.

5.3.4 The `\tweak` command

In some cases, it is possible to take a short-cut for tuning graphical objects. For objects that are created directly from an item in the input file, you can use the `\tweak` command. For example:

```
< c
  \tweak #'color #red
  d
  g
  \tweak #'duration-log #1
  a
> 4
-\tweak #'padding #8
-^
```



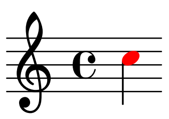
But the main use of the `\tweak` command is to modify just one of a number of notation elements which start at the same musical moment, like the notes of a chord, or tuplet brackets which start at the same time.

For an introduction to the syntax and uses of the tweak command see Section "Tweaking methods" in *Learning Manual*.

The `\tweak` command sets a property in the following object directly, without requiring the grob name or context to be specified. For this to work, it is necessary for the `\tweak` command to remain immediately adjacent to the object to which it is to apply after the input file has been converted to a music stream. This is often not the case, as many additional elements are inserted into the music stream implicitly. For example, when a note which is not part of a chord is processed, Lilypond implicitly inserts a `ChordEvent` event before the note, so separating the tweak from the note. However, if chord symbols are placed round the tweak and the note, the `\tweak` command comes after the `ChordEvent` in the music stream, so remaining adjacent to the note, and able to modify it.

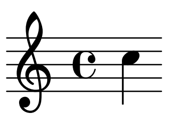
So, this works:

```
<\tweak #'color #red c>4
```



but this does not:

```
\tweak #'color #red c4
```



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:

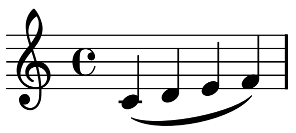
- note heads of notes inside a chord
- articulation signs on a single note
- ties between notes in a chord
- tuplet brackets starting at the same time

and `\tweak` may be used to modify any single occurrence of these items.

Notably the `\tweak` command cannot be used to modify stems, beams or accidentals directly, since these are generated later by note heads, rather than by music elements in the input stream. Nor can a `\tweak` command 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.

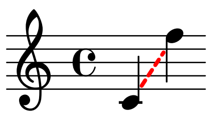
But the `\tweak` command can be used as an alternative to the `\override` command to modify those notational elements that do not cause any additional implicit elements to be added before them in the music stream. For example, slurs may be modified in this way:

```
c-\tweak #'thickness #5 ( d e f)
```



Also 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 6.3.1 [Displaying music expressions], page 423. This may be helpful in determining what may be modified by a `\tweak` command.

See also

Learning Manual: Section "Tweaking methods" in *Learning Manual*.

Notation Reference: Section 6.3.1 [Displaying music expressions], page 423.

Known issues and warnings

The `\tweak` command cannot be used inside a variable.

The `\tweak` commands cannot be used in `\lyricmode`.

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

We have seen two methods of changing properties: `\set` and `\override`. There are actually two different kinds of properties.

Contexts can have properties, which are usually named in `studlyCaps`. They mostly control the translation from music to notation, eg. `localKeySignature` (for determining whether to print accidentals), `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`.

There is a special type of context property: the element description. These properties are named in `StudlyCaps` (starting with capital letters). They contain the 'default settings' for said graphical object as an association list. See '`scm/define-grobs.scm`' to see what kind of settings there are. Element descriptions may be modified with `\override`.

`\override` is actually a shorthand;

```
\override context.name #'property = #value
```

is more or less equivalent to

```
\set context.name #'property = #(cons (cons 'property value) <previous value of con-
text)
```

The value of `context` (the alist) is used to initialize the properties of individual grobs. Grobs also have properties, named in Scheme style, with `dashed-words`. The values of grob properties change during the formatting process: formatting basically amounts to computing properties using callback functions.

`fontSize` is a special property: it is equivalent to entering `\override ... #'font-size` for all pertinent objects. Since this is a common change, the special property (modified with `\set`) was created.

5.4 Useful concepts and properties

5.4.1 Input modes

The way in which the notation contained within an input file is interpreted is determined by the current input mode.

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 255. Chords are rendered as notes on a staff.

Chord mode is also activated with the `\chords` command. This also creates a new `ChordNames` context and causes the following input to be interpreted with the syntax of chord notation and rendered as chord names in the `ChordNames` context, see [Printing chord names], page 260.

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 243.

Drum mode is also activated with the `\drums` command. This also creates a new `DrumStaff` context and causes the following input to be interpreted with the syntax of drum notation and rendered as drum symbols on a drum staff, see [Basic percussion notation], page 243.

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 267.

Figure mode is also activated with the `\figures` command. This also creates a new `FiguredBass` context and causes the following input to be interpreted with the figured bass syntax and rendered as figured bass symbols in the `FiguredBass` context, see [Introduction to figured bass], page 267.

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 217.

To create fret diagrams above a staff, you have two choices. You can either use the `FretBoards` context (see [Automatic fret diagrams], page 237 or you can enter them as a markup above the notes using the `\fret-diagram` command (see [Fret diagram markups], page 221).

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 183.

Lyric mode is also activated with the `\addlyrics` command. This also creates a new `Lyrics` context and an implicit `\lyricsto` command which associates the following lyrics with the preceding music.

Markup mode

This is activated with the `\markup` command, and causes input to be interpreted with the syntax of markup, see Section B.8 [Text markup commands], page 463.

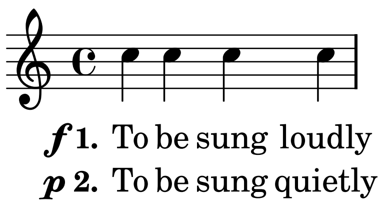
Note mode

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.

For example, to indicate dynamic markings for the verses of a choral pieces it is necessary to enter note mode to interpret the markings:

```
{ c4 c4 c4 c4 }
\addlyrics {
  \notemode{\set stanza = \markup{ \dynamic f 1. } }
  To be sung loudly
}
\addlyrics {
  \notemode{\set stanza = \markup{ \dynamic p 2. } }
  To be sung quietly
}
```



5.4.2 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.

Default actions

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).

Context layout order

Contexts are normally positioned in a system from top to bottom in the order in which they are encountered. Note, however, that a context will be created implicitly if a command is encountered when there is no suitable context available to contain it. When contexts are nested, the outer context will exclude inner contexts which are not included in its "accepts" list; excluded contexts will be repositioned below the outer context.

The default order in which contexts are laid out and the "accepts" list can be changed, see Section 5.1.6 [Aligning contexts], page 382.

Articulation direction indicators

When adding articulations to notes the direction indicator, `^` (meaning "up"), `_` (meaning "down") or `-` (meaning "use default direction"), 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. `-.`, `->`, `--`

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 all of the form

`\xxxUp`, `xxxDown`, `xxxNeutral`

where `xxxNeutral` means "use the default direction". See Section "Within-staff objects" in *Learning Manual*.

In a few cases, arpeggio being the only common example, the value of the `direction` property specifies whether the object is to be placed to the right or left of the parent object. 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, as before.

5.4.3 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. Distances may be specified in other units by following the quantity by `\mm`, `\cm`, `\in` (inches), or `\pt` (points, 1/72.27 of an inch). Page layout distances can also be specified in scalable units (see the following paragraph) by appending `\staff-space` to the quantity. Page layout is described in detail in Section 4.1.2 [Page formatting], page 334.

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 4.2.1 [Setting the staff size], page 338.

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*.

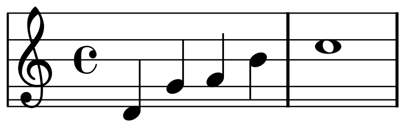
Notation Reference: Section 4.1.2 [Page formatting], page 334, Section 4.2.1 [Setting the staff size], page 338.

5.4.4 Staff symbol properties

The vertical position of staff lines and the number of staff lines can be defined at the same time. As the following example shows, note positions are not influenced by the staff line positions.

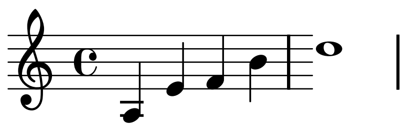
Note: The `'line-positions` property overrides the `'line-count` property. The number of staff lines is implicitly defined by the number of elements in the list of values for `'line-positions`.

```
\new Staff \with {
  \override StaffSymbol #'line-positions = #'(7 3 0 -4 -6 -7)
}
{ a4 e' f b | d1 }
```



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
}
{ a4 e' f b | d1 }
```



5.4.5 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 behaviour. Some of these properties are common to all spanners; others are restricted to a sub-set of the spanners.

All spanners support the `spanner-interface`. A few, esentially those that draw a straight line between the two objects, support in addition the `line-spanner-interface`.

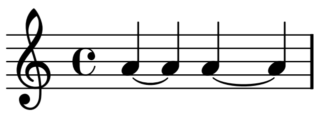
Using the `spanner-interface`

This interface provides two properties that apply to several spanners.

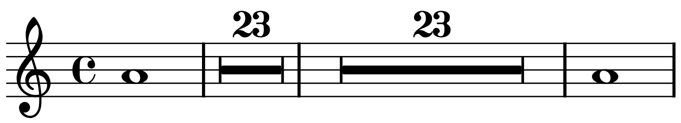
The `minimum-length` *property*

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.

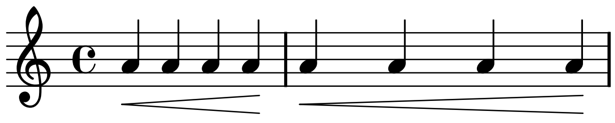
```
a~a
a
% increase the length of the tie
-\tweak #'minimum-length #5
~a
```



```
a1
\compressFullBarRests
R1*23
% increase the length of the rest bar
\once \override MultiMeasureRest #'minimum-length = #20
R1*23
a1
```



```
a \< a a a \!
% increase the length of the hairpin
\override Hairpin #'minimum-length = #20
a \< a a a \!
```

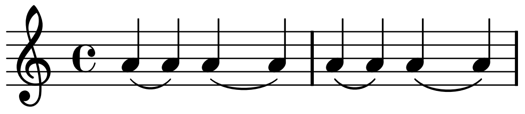


This override can also be used to increase the length of slurs and phrasing slurs:

```
a( a)
a
```

```
-\tweak #'minimum-length #5
( a)

a\( a\)
a
-\tweak #'minimum-length #5
\( a\)
```

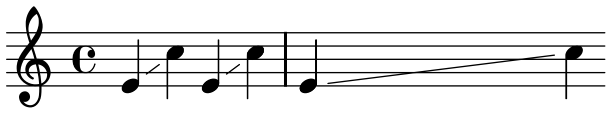


For some layout objects, the `minimum-length` property becomes effective only if the `set-spacing-rods` procedure is called explicitly. To do this, the `springs-and-rods` property should be set to `ly:spanner::set-spacing-rods`. For example, the minimum length of a glissando has no effect unless the `springs-and-rods` property is set:

```
% default
e \glissando c'

% not effective alone
\once \override Glissando #'minimum-length = #20
e, \glissando c'

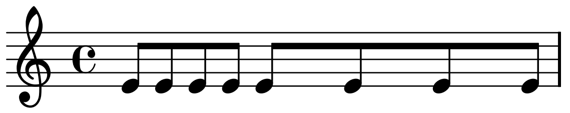
% effective only when both overrides are present
\once \override Glissando #'minimum-length = #20
\once \override Glissando #'springs-and-rods = #ly:spanner::set-spacing-rods
e, \glissando c'
```



The same is true of the `Beam` object:

```
% not effective alone
\once \override Beam #'minimum-length = #20
e8 e e e

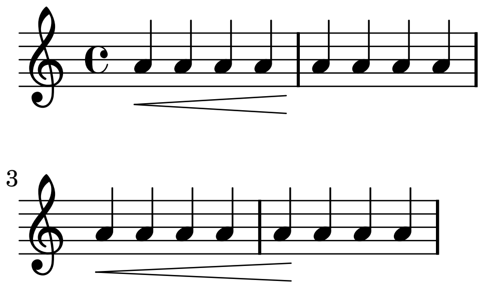
% effective only when both overrides are present
\once \override Beam #'minimum-length = #20
\once \override Beam #'springs-and-rods = #ly:spanner::set-spacing-rods
e8 e e e
```



The `to-barline` *property*

The second useful property of the `spanner-interface` is `to-barline`. By default this is true, causing hairpins and other spanners which are terminated on the first note of a measure to end instead on the immediately preceding bar line. If set to false, the spanner will extend beyond the bar line and end on the note itself:

```
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, seting 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.

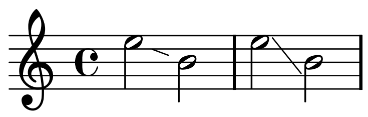
Using the `line-spanner-interface`

Objects which support the `line-spanner-interface` include

- `DynamicTextSpanner`
- `Glissando`
- `TextSpanner`
- `TrillSpanner`
- `VoiceFollower`

The routine responsible for drawing the stencils for these spanners is `ly:line-interface::print`. This routine determines the exact location of the two end points and draws a line between them, in the style requested. 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 which need to be specified are nested two levels down within the property hierarchy, but the syntax of the `\override` command is quite simple:

```
e2 \glissando b
\once \override Glissando #'(bound-details left Y) = #3
\once \override Glissando #'(bound-details right Y) = #-2
e2 \glissando b
```



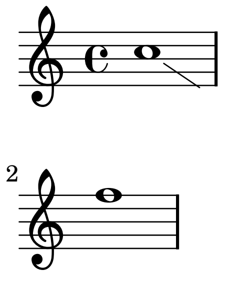
The units for the `Y` property are `staff-space`s, with the center line of the staff being the zero point. For the glissando, this is the value for `Y` at the X-coordinate corresponding to the center point of each note head, if the line is imagined to be extended to there.

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` sub-lists of `bound-details`. For example:

```
\override Glissando #'breakable = ##t
\override Glissando #'(bound-details right-broken Y) = #-3
c1 \glissando \break
```

```
f1
```



A number of further properties of the `left` and `right` sub-lists of the `bound-details` property may be modified in the same way as `Y`:

`Y` This sets the Y-coordinate of the end point, in `staff-space`s offset 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 hardcoded to 0.

`attach-dir`

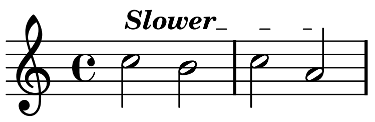
This determines where the line starts and ends in the X-direction, relative to the bound object. So, a value of `-1` (or `LEFT`) makes the line start/end at the left side of the note head it is attached to.

`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 sub-property. 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 }
c2\startTextSpan b c a\stopTextSpan
```



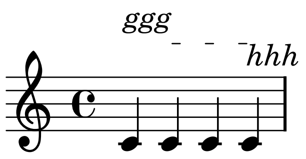
`stencil-align-dir-y`
`stencil-offset`

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` sub-properties. 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"
c4^\startTextSpan c c c \stopTextSpan
```



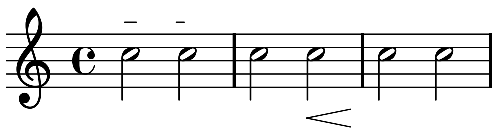
Note that negative values move the text *up*, contrary to the effect that might be expected, as a value of `-1` or `DOWN` means align the *bottom* edge of the text with the spanner line. A value of `1` or `UP` aligns the top edge of the text with the spanner line.

`arrow` Setting this sub-property to `#t` produces an arrowhead at the end of the line.

`padding` This sub-property 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.

```
\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*.

5.4.6 Visibility of objects

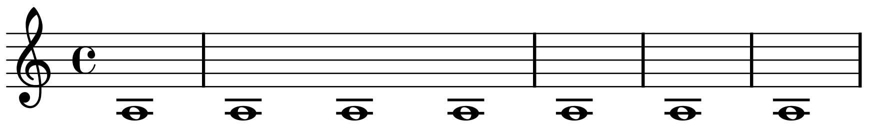
There are four main ways in which the visibility of layout objects can be controlled: their stencil can be removed, they can be made transparent, they can be colored white, or their `break-visibility` property can be overridden. The first three apply to all layout objects; the last to just a few – the *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`.

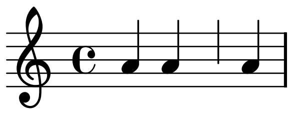
```
a1 a
\override Score.BarLine #'stencil = ##f
a a
\revert Score.BarLine #'stencil
a a a
```



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.

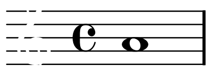
```
a4 a
\once \override NoteHead #'transparent = ##t
a a
```



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:

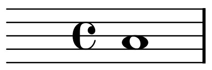
```
\override Staff.Clef #'color = #white
a1
```



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
a1
```



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 behaviour 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 pre-defined 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

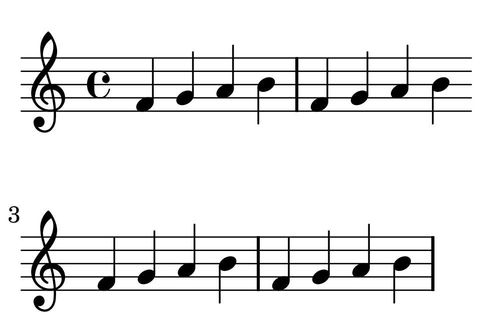
The default settings of `break-visibility` depend on the layout object. The following table shows all the layout objects of interest which are affected by `break-visibility` and the default setting of this property:

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`
`DoublePercentRepeat`	`Voice`	`begin-of-line-invisible`
`KeySignature`	`Staff`	`begin-of-line-visible`
`OctavateEight`	`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 barlines:

```
f4 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:

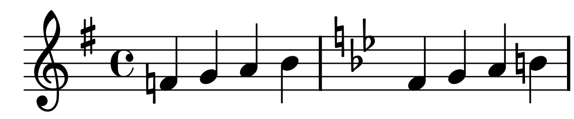
- Bar lines cannot be printed at start of line.
- A bar number cannot be printed at the start of the first line unless it is set to be different from 1.
- Clef – see below
- Double percent repeats are either all printed or all suppressed. Use begin-of line-invisible to print and all-invisible to suppress.
- Key signature – see below
- OctavateEight – see below

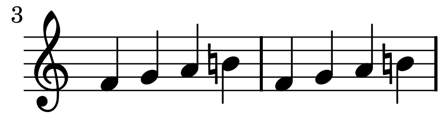
Special considerations

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.

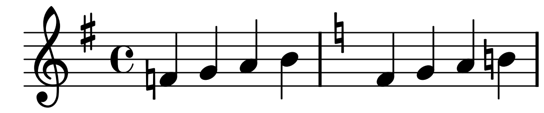
```
\key g \major
f4 g a b
% Try to remove all key signatures
\override Staff.KeySignature #'break-visibility = #all-invisible
\key bes \major
f4 g a b
\break
f4 g a b
f4 g a b
```

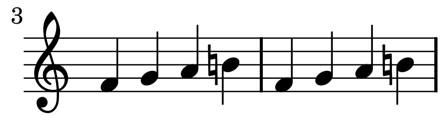




The visibility of such explicit key signature and clef changes is controlled by the `explicitKeySignatureVisibility` and `explicitClefVisibility` properties. These are the equivalent of the `break-visibility` property and both take a vector of three booleans or the predefined functions listed above, 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.

```
\key g \major
f4 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
```

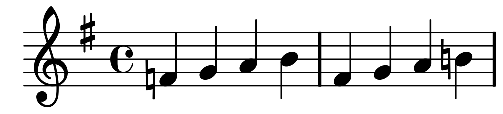


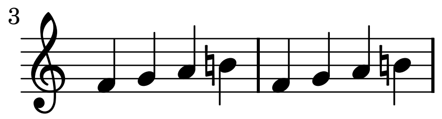


Visibility of cautionary accidentals

To remove the cautionary accidentals printed at an explicit key change, set the Staff context property `printKeyCancellation` to `#f`:

```
\key g \major
f4 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.

Automatic bars

As a special case, the printing of bar lines can also be turned off by setting the `automaticBars` property in the Score context. If set to `#f`, bar lines will not be printed automatically; they must be explicitly created with a `\bar` command. Unlike the `\cadenzaOn` predefined command, measures are still counted. Bar generation will resume according to that count if this property is later set to `#t`. When set to `#f`, line breaks can occur only at explicit `\bar` commands.

Octavated clefs

The small octavation symbol on octavated clefs is produced by the `OctavateEight` layout object. Its visibility is controlled independently from that of the `Clef` object, so it is necessary to apply any required `break-visibility` overrides to both the `Clef` and the `OctavateEight` layout objects to fully suppress such clef symbols at the start of each line.

For explicit clef changes, the `explicitClefVisibility` property controls both the clef symbol and any octavation symbol associated with it.

See also

Learning Manual: Section "Visibility and color of objects" in *Learning Manual*

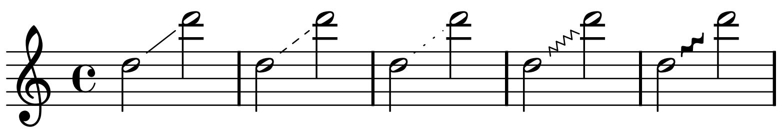
5.4.7 Line styles

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.

These all use the same routines as the glissando for drawing the texts and the lines, and tuning their behavior is therefore also done in the same way. It is done with a spanner, and the routine responsible for drawing the spanners is `ly:line-interface::print`. This routine determines the exact location of the two *span points* and draws a line between them, in the style requested.

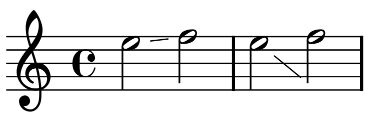
Here is an example showing the different line styles available, and how to tune them.

```
d2 \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
```



The locations of the end-points of the spanner are computed on-the-fly for every graphic object, but it is possible to override these:

```
e2 \glissando f
\once \override Glissando #'(bound-details right Y) = #-2
e2 \glissando f
```



The value for `Y` is set to `-2` for the right end point. The left side may be similarly adjusted by specifying `left` instead of `right`.

If `Y` is not set, the value is computed from the vertical position of the left and right attachment points of the spanner.

Other adjustments of spanners are possible, for details, see Section 5.4.5 [Spanners], page 396.

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.

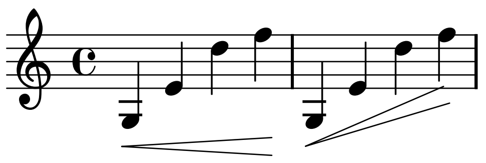
Rotating layout objects

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:

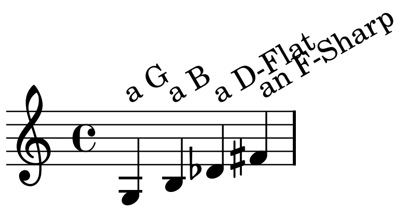
```
g4\< e' d' f\!
\override Hairpin #'rotation = #'(20 -1 0)
g,,4\< e' d' f\!
```



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" }
```



5.5 Advanced tweaks

This section discusses various approaches to fine tuning the appearance of the printed score.

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 383, Section 5.3 [Modifying properties], page 386, Chapter 6 [Interfaces for programmers], page 414.

Installed Files: ‘`scm/define-grobs.scm`’.

Snippets: Section “Tweaks and overrides” in *Snippets*.

Internals Reference: Section “All layout objects” in *Internals Reference*.

5.5.1 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 in several ways.

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`.

For example, an accidental can be repositioned vertically by setting `Y-offset` but any changes to `X-offset` have no effect.

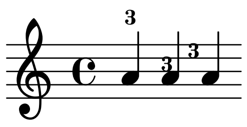
Rehearsal marks may be aligned with breakable objects such as bar lines, clef symbols, time signature symbols and key signatures. There are special properties to be found in the `break-aligned-interface` for positioning rehearsal marks on such objects.

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`

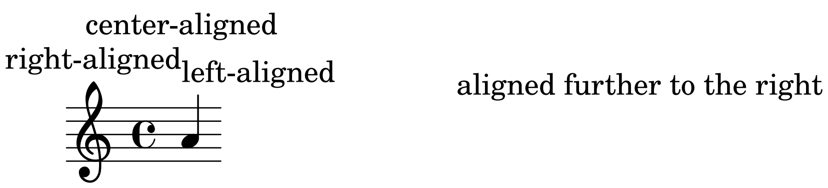
Self-aligning objects horizontally

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, 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

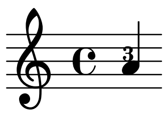
Objects may be aligned vertically in an analogous way to aligning them horizontally if the `Y-offset` property is set to `ly:self-alignment-interface::y-aligned-on-self`. However, other mechanisms are often involved in vertical alignment: the value of `Y-offset` is just one variable taken into account. 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`, `UP` may be substituted for `-1, 0, 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
```



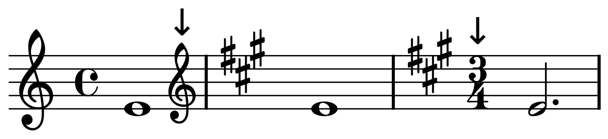
Using the `break-alignable-interface`

Rehearsal marks and bar numbers may be aligned with notation objects other than bar lines. These objects include `ambitus`, `breathing-sign`, `clef`, `custos`, `staff-bar`, `left-edge`, `key-cancellation`, `key-signature`, and `time-signature`.

By default, rehearsal marks and bar numbers will be horizontally centered above the object:

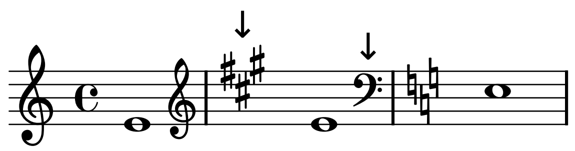
```
e1
% the RehearsalMark will be centered above the Clef
\override Score.RehearsalMark #'break-align-symbols = #'(clef)
\key a \major
\clef treble
\mark ""
e
% the RehearsalMark will be centered above the TimeSignature
\override Score.RehearsalMark #'break-align-symbols = #'(time-signature)
\key a \major
```

```
\clef treble
\time 3/4
\mark ""
e2.
```



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.

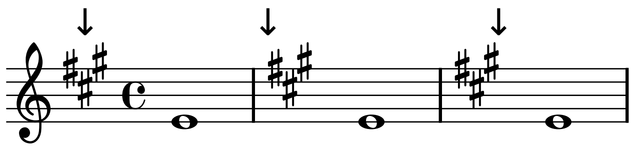
```
e1
% the RehearsalMark will be centered above the Key Signature
\override Score.RehearsalMark #'break-align-symbols = #'(key-signature clef)
\key a \major
\clef treble
\mark ""
e
% the RehearsalMark will be centered above the Clef
\set Staff.explicitKeySignatureVisibility = #all-invisible
\override Score.RehearsalMark #'break-align-symbols = #'(key-signature clef)
\key a \minor
\clef bass
\mark ""
e,
```



The alignment of the rehearsal mark 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.

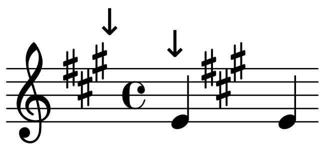
```
% The RehearsalMark will be centered above the KeySignature
\override Score.RehearsalMark #'break-align-symbols = #'(key-signature)
\key a \major
\clef treble
\time 4/4
\mark ""
e1
% The RehearsalMark will be aligned with the left edge of the KeySignature
\once \override Score.KeySignature #'break-align-anchor-alignment = #LEFT
\mark ""
\key a \major
e
% The RehearsalMark will be aligned with the right edge of the KeySignature
\once \override Score.KeySignature #'break-align-anchor-alignment = #RIGHT
```

```
\key a \major
\mark ""
e
```



The rehearsal mark can also be offset to the right or left of the left edge by an arbitrary amount. The units are staff-spaces:

```
% The RehearsalMark will be aligned with the left edge of the KeySignature
% and then shifted right by 3.5 staff-spaces
\override Score.RehearsalMark #'break-align-symbols = #'(key-signature)
\once \override Score.KeySignature #'break-align-anchor = #3.5
\key a \major
\mark ""
e
% The RehearsalMark will be aligned with the left edge of the KeySignature
% and then shifted left by 2 staff-spaces
\once \override Score.KeySignature #'break-align-anchor = #-2
\key a \major
\mark ""
e
```



5.5.2 Vertical grouping of grobs

The VerticalAlignment and VerticalAxisGroup grobs work together. VerticalAxisGroup groups together different grobs like Staff, Lyrics, etc. VerticalAlignment then vertically aligns the different grobs grouped together by VerticalAxisGroup. There is usually only one VerticalAlignment per score but every Staff, Lyrics, etc. has its own VerticalAxisGroup.

5.5.3 Modifying stencils

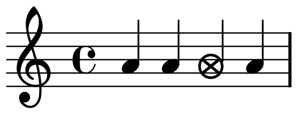
All layout objects have a `stencil` property which is part of the `grob-interface`. By default, this property is usually set to a function specific to the object that is tailor-made to render the symbol which represents it in the output. For example, the standard setting for the `stencil` property of 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 174.

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 c'' {
  a a \XinO a a
}
```



Any of the glyphs in the feta Font can be supplied to the `\musicglyph` markup command – see Section B.6 [The Feta font], page 446.

See also

Notation Reference: [Graphic notation inside markup], page 174, Section 1.8.2 [Formatting text], page 167, Section B.8 [Text markup commands], page 463, Section B.6 [The Feta font], page 446.

5.5.4 Modifying shapes

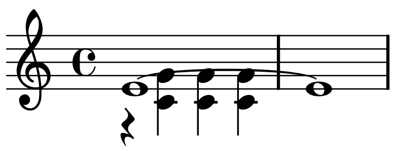
Modifying ties and slurs

Ties, slurs and phrasing slurs are 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 by explicitly specifying the four control points required to define a third-order Bézier curve.

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 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 travelling directly from the third control point. The curve is entirely contained in the quadrilateral defined by the four control points.

Here is an example of a case where the tie is not optimum, and where `\tieDown` would not help.

```
<<
  { e1 ~ e }
\\
  { r4 <g c,> <g c,> <g c,> }
>>
```



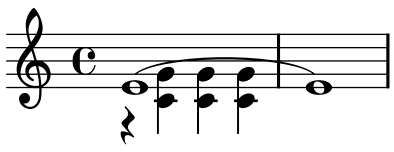
One way of improving this tie is to manually modify its control points, as follows.

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 entered 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.

It is useful to remember that a symmetric curve requires symmetric control points, and that Bézier curves have the useful property that transformations of the curve such as translation, rotation and scaling can be achieved by applying the same transformation to the curve's control points.

For the example above the following override gives a satisfactory tie:

```
<<
  \once \override Tie
    #'control-points = #'((1 . -1) (3 . 0.6) (12.5 . 0.6) (14.5 . -1))
  { e1 ~ e1 }
\\
  { r4 <g c,> <g c,> <g c,>4  }
>>
```



Known issues and warnings

It is not possible to modify shapes of ties or slurs by changing the `control-points` property if there are more than one at the same musical moment, not even by using the `\tweak` command.

6 Interfaces for programmers

Advanced tweaks may be performed by using Scheme. If you are not familiar with Scheme, you may wish to read our Section "Scheme tutorial" in *Learning Manual*.

6.1 Music functions

This section discusses how to create music functions within LilyPond.

6.1.1 Overview of music functions

Making a function which substitutes a variable into LilyPond code is easy. The general form of these functions is

```
function =
#(define-music-function (parser location var1 var2...vari... )
                        (var1-type? var2-type?...vari-type?...)
  #{
    ...music...
  #})
```

where

vari	ith variable
vari-type?	type of ith variable
...music...	normal LilyPond input, using variables as `#$var1`, etc.

There following input types may be used as variables in a music function. This list is not exhaustive; see other documentation specifically about Scheme for more variable types.

Input type	*vari-type?* **notation**
Integer	`integer?`
Float (decimal number)	`number?`
Text string	`string?`
Markup	`markup?`
Music expression	`ly:music?`
A pair of variables	`pair?`

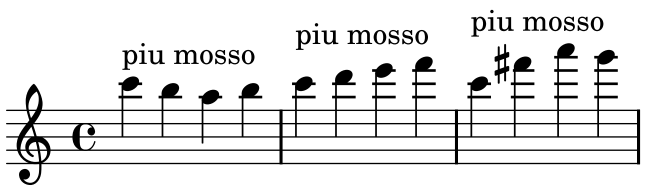
The `parser` and `location` arguments are mandatory, and are used in some advanced situations. The `parser` argument is used to gain access to the value of another LilyPond variable. The `location` argument is used to set the 'origin' of the music expression that is built by the music function, so that in case of a syntax error LilyPond can tell the user an appropriate place to look in the input file.

6.1.2 Simple substitution functions

Here is a simple example,

```
padText = #(define-music-function (parser location padding) (number?)
  #{
    \once \override TextScript #'padding = #$padding
  #})

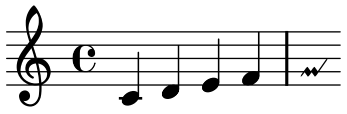
\relative c''' {
  c4^"piu mosso" b a b
  \padText #1.8
  c4^"piu mosso" d e f
  \padText #2.6
  c4^"piu mosso" fis a g
}
```



Music expressions may be substituted as well,

```
custosNote = #(define-music-function (parser location note)
                                     (ly:music?)
  #{
    \once \override Voice.NoteHead #'stencil =
      #ly:text-interface::print
    \once \override Voice.NoteHead #'text =
      \markup \musicglyph #"custodes.mensural.u0"
    \once \override Voice.Stem #'stencil = ##f
    $note
  #})

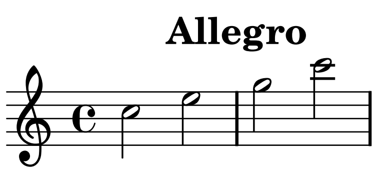
{ c' d' e' f' \custosNote g' }
```



Multiple variables may be used,

```
tempoMark = #(define-music-function (parser location padding marktext)
                                    (number? string?)
#{
  \once \override Score . RehearsalMark #'padding = $padding
  \once \override Score . RehearsalMark #'extra-spacing-width = #'(+inf.0 . -inf.0)
  \mark \markup { \bold $marktext }
#})

\relative c'' {
c2 e
\tempoMark #3.0 #"Allegro"
g c
}
```



6.1.3 Paired substitution functions

Some `\override` commands require a pair of numbers (called a `cons cell` in Scheme). To pass these numbers into a function, either use a `pair?` variable, or insert the `cons` into the music function.

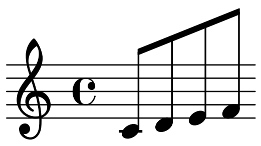
```
manualBeam =
#(define-music-function (parser location beg-end)
                        (pair?)
#{
  \once \override Beam #'positions = #$beg-end
#})

\relative {
  \manualBeam #'(3 . 6) c8 d e f
}
```

or

```
manualBeam =
#(define-music-function (parser location beg end)
                        (number? number?)
#{
  \once \override Beam #'positions = #(cons $beg $end)
#})

\relative {
  \manualBeam #3 #6 c8 d e f
}
```



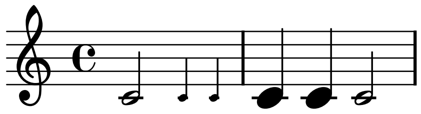
6.1.4 Mathematics in functions

Music functions can involve Scheme programming in addition to simple substitution,

```
AltOn = #(define-music-function (parser location mag) (number?)
  #{ \override Stem #'length = #$(* 7.0 mag)
     \override NoteHead #'font-size =
       #$(inexact->exact (* (/ 6.0 (log 2.0)) (log mag))) #})

AltOff = {
  \revert Stem #'length
  \revert NoteHead #'font-size
}

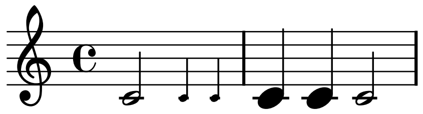
{ c'2 \AltOn #0.5 c'4 c'
  \AltOn #1.5 c' c' \AltOff c'2 }
```



This example may be rewritten to pass in music expressions,

```
withAlt = #(define-music-function (parser location mag music) (number? ly:music?)
  #{ \override Stem #'length = #$(* 7.0 mag)
     \override NoteHead #'font-size =
       #$(inexact->exact (* (/ 6.0 (log 2.0)) (log mag)))
     $music
     \revert Stem #'length
     \revert NoteHead #'font-size #})

{ c'2 \withAlt #0.5 {c'4 c'}
  \withAlt #1.5 {c' c'} c'2 }
```



6.1.5 Void functions

A music function must return a music expression, but sometimes we may want to have a function which does not involve music (such as turning off Point and Click). To do this, we return a `void` music expression.

That is why the form that is returned is the `(make-music ...)`. With the `'void` property set to `#t`, the parser is told to actually disregard this returned music expression. Thus the important part of the void music function is the processing done by the function, not the music expression that is returned.

```
noPointAndClick =
#(define-music-function (parser location) ()
   (ly:set-option 'point-and-click #f)
   (make-music 'SequentialMusic 'void #t))
...
\noPointAndClick   % disable point and click
```

6.1.6 Functions without arguments

In most cases a function without arguments should be written with an variable,

```
dolce = \markup{ \italic \bold dolce }
```

However, in rare cases it may be useful to create a music function without arguments,

```
displayBarNum =
#(define-music-function (parser location) ()
   (if (eq? #t (ly:get-option 'display-bar-numbers))
       #{ \once \override Score.BarNumber #'break-visibility = ##f #}
       #{#}))
```

To actually display bar numbers where this function is called, invoke `lilypond` with

```
lilypond -d display-bar-numbers FILENAME.ly
```

6.1.7 Overview of available music functions

The following commands are music functions

`acciaccatura` - *music* (music)
: Create an acciaccatura from the following music expression

`addChordShape` - *key-symbol* (symbol) *tuning* (pair) *shape-definition* (unknown)
: Add chord shape *shape-definition* to the *chord-shape-table* hash with the key *(cons key-symbol tuning)*.

`addInstrumentDefinition` - *name* (string) *lst* (list)
: Create instrument *name* with properties *list*.

`addQuote` - *name* (string) *music* (music)
: Define *music* as a quotable music expression named *name*

`afterGrace` - *main* (music) *grace* (music)
: Create *grace* note(s) after a *main* music expression.

`allowPageTurn`
: Allow a page turn. May be used at toplevel (ie between scores or markups), or inside a score.

`applyContext` - *proc* (procedure)
: Modify context properties with Scheme procedure *proc*.

`applyMusic` - *func* (procedure) *music* (music)
: Apply procedure *func* to *music*.

`applyOutput` - *ctx* (symbol) *proc* (procedure)
: Apply function `proc` to every layout object in context `ctx`

`appoggiatura` - *music* (music)
: Create an appoggiatura from *music*

`assertBeamQuant` - *l* (pair) *r* (pair)
: Testing function: check whether the beam quants *l* and *r* are correct

`assertBeamSlope` - *comp* (procedure)
: Testing function: check whether the slope of the beam is the same as `comp`

`autochange` - *music* (music)
: Make voices that switch between staves automatically

`balloonGrobText` - *grob-name* (symbol) *offset* (pair of numbers) *text* (markup)
: Attach *text* to *grob-name* at offset *offset* (use like `\once`)

`balloonText` - *offset* (pair of numbers) *text* (markup)
: Attach *text* at *offset* (use like `\tweak`)

`bar` - *type* (string)
: Insert a bar line of type *type*

`barNumberCheck` - *n* (integer)
: Print a warning if the current bar number is not *n*.

`bendAfter` - *delta* (unknown)
: Create a fall or doit of pitch interval *delta*.

`breathe`
: Insert a breath mark.

`clef` - *type* (string)
: Set the current clef to *type*.

`cueDuring` - *what* (string) *dir* (direction) *main-music* (music)
: Insert contents of quote *what* corresponding to *main-music*, in a CueVoice oriented by *dir*.

`displayLilyMusic` - *music* (music)
: Display the LilyPond input representation of *music* to the console.

`displayMusic` - *music* (music)
: Display the internal representation of *music* to the console.

`endSpanners` - *music* (music)
: Terminate the next spanner prematurely after exactly one note without the need of a specific end spanner.

`featherDurations` - *factor* (moment) *argument* (music)
: Adjust durations of music in *argument* by rational *factor*.

`grace` - *music* (music)
: Insert *music* as grace notes.

`includePageLayoutFile`
: Include the file <*basename*>*-page-layout.ly*. Deprecated as part of two-pass spacing.

`instrumentSwitch` - *name* (string)
: Switch instrument to *name*, which must be predefined with `\addInstrumentDefinition`.

`keepWithTag` - *tag* (symbol) *music* (music)
: Include only elements of *music* that are tagged with *tag*.

`killCues` - *music* (music)
: Remove cue notes from *music*.

`label` - *label* (symbol)
: Create *label* as a bookmarking label

`makeClusters` - *arg* (music)
: Display chords in *arg* as clusters

`musicMap` - *proc* (procedure) *mus* (music)
: (undocumented; fixme)

`noPageBreak`
: Forbid a page break. May be used at toplevel (ie between scores or markups), or inside a score.

`noPageTurn`
: Forbid a page turn. May be used at toplevel (ie between scores or markups), or inside a score.

`octaveCheck` - *pitch-note* (music)
: octave check

`ottava` - *octave* (number)
: set the octavation

`overrideProperty` - *name* (string) *property* (symbol) *value* (any type)
: Set *property* to *value* in all grobs named *name*. The *name* argument is a string of the form `"Context.GrobName"` or `"GrobName"`

`pageBreak`
: Force a page break. May be used at toplevel (ie between scores or markups), or inside a score.

`pageTurn` Force a page turn between two scores or top-level markups.

`parallelMusic` - *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 | }
```

`parenthesize` - *arg* (music)
: Tag *arg* to be parenthesized.

`partcombine` - *part1* (music) *part2* (music)
: (undocumented; fixme)

`pitchedTrill` - *main-note* (music) *secondary-note* (music)
: (undocumented; fixme)

`pointAndClickOff`
: (undocumented; fixme)

`pointAndClickOn`
: (undocumented; fixme)

`quoteDuring` - *what* (string) *main-music* (music)
: (undocumented; fixme)

`removeWithTag` - *tag* (symbol) *music* (music)
: Remove elements of *music* that are tagged with *tag*.

`resetRelativeOctave` - *reference-note* (music)
: Set the octave inside a \relative section.

`rightHandFinger` - *finger* (number or string)
: Apply *finger* as a fingering indication.

`scaleDurations` - *fraction* (pair of numbers) *music* (music)
: Multiply the duration of events in *music* by *fraction*.

`scoreTweak` - *name* (string)
: Include the score tweak, if exists.

`shiftDurations` - *dur* (integer) *dots* (integer) *arg* (music)
: Scale *arg* up by a factor of *2^dur*(2-(1/2)^dots)*.

`spacingTweaks` - *parameters* (list)
: Set the system stretch, by reading the 'system-stretch property of the 'parameters' assoc list.

`storePredefinedDiagram` - *chord* (music) *tuning* (pair) *diagram-definition* (unknown)
: Add predefined fret diagram defined by *diagram-definition* for the chord pitches *chord* and the stringTuning *tuning*.

`tag` - *tag* (symbol) *arg* (music)
: Add *tag* to the `tags` property of *arg*.

`tocItem` - *text* (markup)
: Add a line to the table of content, using the `tocItemMarkup` paper variable markup

`transposedCueDuring` - *what* (string) *dir* (direction) *pitch-note* (music) *main-music* (music)
: Insert notes from the part *what* into a voice called `cue`, using the transposition defined by *pitch-note*. 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` - *pitch-note* (music)
: Set instrument transposition

`tweak` - *sym* (symbol) *val* (any type) *arg* (music)
: Add `sym . val` to the `tweaks` property of *arg*.

`unfoldRepeats` - *music* (music)
: (undocumented; fixme)

`withMusicProperty` - *sym* (symbol) *val* (any type) *music* (music)
: Set *sym* to *val* in *music*.

6.2 Programmer interfaces

This section contains information about mixing LilyPond and Scheme.

6.2.1 Input variables and Scheme

The input format supports the notion of variables: in the following example, a music expression is assigned to a variable with the name `traLaLa`.

```
traLaLa = { c'4 d'4 }
```

There is also a form of scoping: in the following example, the `\layout` block also contains a `traLaLa` variable, which is independent of the outer `\traLaLa`.

```
traLaLa = { c'4 d'4 }
\layout { traLaLa = 1.0 }
```

In effect, each input file is a scope, and all `\header`, `\midi`, and `\layout` blocks are scopes nested inside that toplevel scope.

Both variables and scoping are implemented in the GUILE module system. An anonymous Scheme module is attached to each scope. An assignment of the form

```
traLaLa = { c'4 d'4 }
```

is internally converted to a Scheme definition

```
(define traLaLa Scheme value of `... ')
```

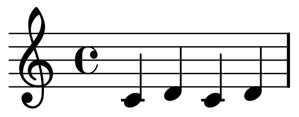
This means that input variables and Scheme variables may be freely mixed. In the following example, a music fragment is stored in the variable `traLaLa`, and duplicated using Scheme. The result is imported in a `\score` block by means of a second variable `twice`:

```
traLaLa = { c'4 d'4 }

%% dummy action to deal with parser lookahead
#(display "this needs to be here, sorry!")

#(define newLa (map ly:music-deep-copy
  (list traLaLa traLaLa)))
#(define twice
  (make-sequential-music newLa))

{ \twice }
```



In this example, the assignment happens after parser has verified that nothing interesting happens after `traLaLa = { ... }`. Without the dummy statement in the above example, the `newLa` definition is executed before `traLaLa` is defined, leading to a syntax error.

The above example shows how to 'export' music expressions from the input to the Scheme interpreter. The opposite is also possible. By wrapping a Scheme value in the function `ly:export`, a Scheme value is interpreted as if it were entered in LilyPond syntax. Instead of defining `\twice`, the example above could also have been written as

```
...
{ #(ly:export (make-sequential-music (list newLa))) }
```

Scheme code is evaluated as soon as the parser encounters it. To define some Scheme code in a macro (to be called later), use Section 6.1.5 [Void functions], page 417, or

```
#(define (nopc)
  (ly:set-option 'point-and-click #f))

...
#(nopc)
{ c'4 }
```

Known issues and warnings

Mixing Scheme and LilyPond variables is not possible with the `--safe` option.

6.2.2 Internal music representation

When a music expression is parsed, it is converted into a set of Scheme music objects. The defining property of a music object is that it takes up time. Time is a rational number that measures the length of a piece of music in whole notes.

A music object has three kinds of types:

- music name: Each music expression has a name. For example, a note leads to a Section "NoteEvent" in *Internals Reference*, and `\simultaneous` leads to a Section "SimultaneousMusic" in *Internals Reference*. A list of all expressions available is in the Internals Reference manual, under Section "Music expressions" in *Internals Reference*.
- 'type' or interface: Each music name has several 'types' or interfaces, for example, a note is an `event`, but it is also a `note-event`, a `rhythmic-event`, and a `melodic-event`. All classes of music are listed in the Internals Reference, under Section "Music classes" in *Internals Reference*.
- C++ object: Each music object is represented by an object of the C++ class `Music`.

The actual information of a music expression is stored in properties. For example, a Section "NoteEvent" in *Internals Reference* has `pitch` and `duration` properties that store the pitch and duration of that note. A list of all properties available is in the internals manual, under Section "Music properties" in *Internals Reference*.

A compound music expression is a music object that contains other music objects in its properties. A list of objects can be stored in the `elements` property of a music object, or a single 'child' music object in the `element` property. For example, Section "SequentialMusic" in *Internals Reference* has its children in `elements`, and Section "GraceMusic" in *Internals Reference* has its single argument in `element`. The body of a repeat is stored in the `element` property of Section "RepeatedMusic" in *Internals Reference*, and the alternatives in `elements`.

6.3 Building complicated functions

This section explains how to gather the information necessary to create complicated music functions.

6.3.1 Displaying music expressions

When writing a music function it is often instructive to inspect how a music expression is stored internally. This can be done with the music function `\displayMusic`

```
{
  \displayMusic { c'4\f }
}
```

will display

```
(make-music
  'SequentialMusic
  'elements
  (list (make-music
          'EventChord
          'elements
          (list (make-music
                  'NoteEvent
                  'duration
                  (ly:make-duration 2 0 1 1)
                  'pitch
                  (ly:make-pitch 0 0 0))
                (make-music
                  'AbsoluteDynamicEvent
                  'text
                  "f")))))
```

By default, LilyPond will print these messages to the console along with all the other messages. To split up these messages and save the results of `\display{STUFF}`, redirect the output to a file.

```
lilypond file.ly >display.txt
```

With a bit of reformatting, the above information is easier to read,

```
(make-music 'SequentialMusic
  'elements (list (make-music 'EventChord
                    'elements (list (make-music 'NoteEvent
                                      'duration (ly:make-duration 2 0 1 1)
                                      'pitch (ly:make-pitch 0 0 0))
                                    (make-music 'AbsoluteDynamicEvent
                                      'text "f")))))
```

A `{ ... }` music sequence has the name `SequentialMusic`, and its inner expressions are stored as a list in its `'elements` property. A note is represented as an `EventChord` expression, containing a `NoteEvent` object (storing the duration and pitch properties) and any extra information (in this case, an `AbsoluteDynamicEvent` with a `"f"` text property.

6.3.2 Music properties

The `NoteEvent` object is the first object of the `'elements` property of `someNote`.

```
someNote = c'
\displayMusic \someNote
===>
(make-music
  'EventChord
  'elements
  (list (make-music
          'NoteEvent
          'duration
          (ly:make-duration 2 0 1 1)
          'pitch
          (ly:make-pitch 0 0 0))))
```

The `display-scheme-music` function is the function used by `\displayMusic` to display the Scheme representation of a music expression.

```
#(display-scheme-music (first (ly:music-property someNote 'elements)))
===>
(make-music
  'NoteEvent
  'duration
  (ly:make-duration 2 0 1 1)
  'pitch
  (ly:make-pitch 0 0 0))
```

Then the note pitch is accessed through the `'pitch` property of the `NoteEvent` object,

```
#(display-scheme-music
   (ly:music-property (first (ly:music-property someNote 'elements))
                      'pitch))
===>
(ly:make-pitch 0 0 0)
```

The note pitch can be changed by setting this ’pitch property,

```
#(set! (ly:music-property (first (ly:music-property someNote 'elements))
                          'pitch)
       (ly:make-pitch 0 1 0)) ;; set the pitch to d'.
\displayLilyMusic \someNote
===>
d'
```

6.3.3 Doubling a note with slurs (example)

Suppose we want to create a function which translates input like `a` into `a( a)`. We begin by examining the internal representation of the music we want to end up with.

```
\displayMusic{ a'( a') }
===>
(make-music
  'SequentialMusic
  'elements
  (list (make-music
          'EventChord
          'elements
          (list (make-music
                  'NoteEvent
                  'duration
                  (ly:make-duration 2 0 1 1)
                  'pitch
                  (ly:make-pitch 0 5 0))
                (make-music
                  'SlurEvent
                  'span-direction
                  -1)))
```

```
        (make-music
          'EventChord
          'elements
          (list (make-music
                  'NoteEvent
                  'duration
                  (ly:make-duration 2 0 1 1)
                  'pitch
                  (ly:make-pitch 0 5 0))
                (make-music
                  'SlurEvent
                  'span-direction
                  1)))))
```

The bad news is that the `SlurEvent` expressions must be added 'inside' the note (or more precisely, inside the `EventChord` expression).

Now we examine the input,

```
(make-music
  'SequentialMusic
  'elements
  (list (make-music
          'EventChord
          'elements
          (list (make-music
                  'NoteEvent
                  'duration
                  (ly:make-duration 2 0 1 1)
                  'pitch
                  (ly:make-pitch 0 5 0))))))
```

So in our function, we need to clone this expression (so that we have two notes to build the sequence), add `SlurEvents` to the `'elements` property of each one, and finally make a `SequentialMusic` with the two `EventChords`.

```
doubleSlur = #(define-music-function (parser location note) (ly:music?)
         "Return: { note ( note ) }.
         `note' is supposed to be an EventChord."
         (let ((note2 (ly:music-deep-copy note)))
           (set! (ly:music-property note 'elements)
                 (cons (make-music 'SlurEvent 'span-direction -1)
                       (ly:music-property note 'elements)))
           (set! (ly:music-property note2 'elements)
                 (cons (make-music 'SlurEvent 'span-direction 1)
                       (ly:music-property note2 'elements)))
           (make-music 'SequentialMusic 'elements (list note note2))))
```

6.3.4 Adding articulation to notes (example)

The easy way to add articulation to notes is to merge two music expressions into one context, as explained in Section 5.1.2 [Creating contexts], page 377. However, suppose that we want to write a music function which does this.

A `$variable` inside the `#{...#}` notation is like using a regular `\variable` in classical LilyPond notation. We know that

```
{ \music -. -> }
```

will not work in LilyPond. We could avoid this problem by attaching the articulation to a fake note,

```
{ << \music s1*0-.-> }
```

but for the sake of this example, we will learn how to do this in Scheme. We begin by examining our input and desired output,

```
%  input
\displayMusic c4
===>
(make-music
  'EventChord
  'elements
  (list (make-music
          'NoteEvent
          'duration
          (ly:make-duration 2 0 1 1)
          'pitch
          (ly:make-pitch -1 0 0))))
=====
%  desired output
\displayMusic c4->
===>
(make-music
  'EventChord
  'elements
  (list (make-music
          'NoteEvent
          'duration
          (ly:make-duration 2 0 1 1)
          'pitch
          (ly:make-pitch -1 0 0))
        (make-music
          'ArticulationEvent
          'articulation-type
          "marcato")))
```

We see that a note (`c4`) is represented as an `EventChord` expression, with a `NoteEvent` expression in its elements list. To add a marcato articulation, an `ArticulationEvent` expression must be added to the elements property of the `EventChord` expression.

To build this function, we begin with

```
(define (add-marcato event-chord)
  "Add a marcato ArticulationEvent to the elements of `event-chord',
  which is supposed to be an EventChord expression."
  (let ((result-event-chord (ly:music-deep-copy event-chord)))
    (set! (ly:music-property result-event-chord 'elements)
          (cons (make-music 'ArticulationEvent
                  'articulation-type "marcato")
                (ly:music-property result-event-chord 'elements)))
    result-event-chord))
```

The first line is the way to define a function in Scheme: the function name is `add-marcato`, and has one variable called `event-chord`. In Scheme, the type of variable is often clear from its name. (this is good practice in other programming languages, too!)

```
"Add a marcato..."
```

is a description of what the function does. This is not strictly necessary, but just like clear variable names, it is good practice.

```
(let ((result-event-chord (ly:music-deep-copy event-chord)))
```

`let` is used to declare local variables. Here we use one local variable, named `result-event-chord`, to which we give the value `(ly:music-deep-copy event-chord)`. `ly:music-deep-copy` is a function specific to LilyPond, like all functions prefixed by `ly:`. It is use to make a copy of a music expression. Here we copy `event-chord` (the parameter of the function). Recall that our purpose is to add a marcato to an `EventChord` expression. It is better to not modify the `EventChord` which was given as an argument, because it may be used elsewhere.

Now we have a `result-event-chord`, which is a `NoteEventChord` expression and is a copy of `event-chord`. We add the marcato to its elements list property.

```
(set! place new-value)
```

Here, what we want to set (the 'place') is the 'elements' property of `result-event-chord` expression.

```
(ly:music-property result-event-chord 'elements)
```

`ly:music-property` is the function used to access music properties (the `'elements`, `'duration`, `'pitch`, etc, that we see in the `\displayMusic` output above). The new value is the former elements property, with an extra item: the `ArticulationEvent` expression, which we copy from the `\displayMusic` output,

```
(cons (make-music 'ArticulationEvent
        'articulation-type "marcato")
      (ly:music-property result-event-chord 'elements))
```

`cons` is used to add an element to a list without modifying the original list. This is what we want: the same list as before, plus the new `ArticulationEvent` expression. The order inside the elements property is not important here.

Finally, once we have added the marcato articulation to its `elements` property, we can return `result-event-chord`, hence the last line of the function.

Now we transform the `add-marcato` function into a music function,

```
addMarcato = #(define-music-function (parser location event-chord)
                                     (ly:music?)
    "Add a marcato ArticulationEvent to the elements of `event-chord',
    which is supposed to be an EventChord expression."
    (let ((result-event-chord (ly:music-deep-copy event-chord)))
      (set! (ly:music-property result-event-chord 'elements)
            (cons (make-music 'ArticulationEvent
                    'articulation-type "marcato")
                  (ly:music-property result-event-chord 'elements)))
      result-event-chord))
```

We may verify that this music function works correctly,

```
\displayMusic \addMarcato c4
```

6.4 Markup programmer interface

Markups are implemented as special Scheme functions which produce a Stencil object given a number of arguments.

6.4.1 Markup construction in Scheme

The `markup` macro builds markup expressions in Scheme while providing a LilyPond-like syntax. For example,

```
(markup #:column (#:line (#:bold #:italic "hello" #:raise 0.4 "world")
                  #:larger #:line ("foo" "bar" "baz")))
```

is equivalent to:

```
\markup \column { \line { \bold \italic "hello" \raise #0.4 "world" }
                  \larger \line { foo bar baz } }
```

This example demonstrates the main translation rules between regular LilyPond markup syntax and Scheme markup syntax.

LilyPond	**Scheme**
`\markup markup1`	`(markup markup1)`
`\markup { markup1 markup2 ... }`	`(markup markup1 markup2 ... )`
`\command`	`#:command`
`\variable`	`variable`
`\center-column { ... }`	`#:center-column ( ... )`
`string`	`"string"`
`#scheme-arg`	`scheme-arg`

The whole Scheme language is accessible inside the `markup` macro. For example, You may use function calls inside `markup` in order to manipulate character strings. This is useful when defining new markup commands (see Section 6.4.3 [New markup command definition], page 429).

Known issues and warnings

The markup-list argument of commands such as `#:line`, `#:center`, and `#:column` cannot be a variable or the result of a function call.

```
(markup #:line (function-that-returns-markups))
```

is invalid. One should use the `make-line-markup`, `make-center-markup`, or `make-column-markup` functions instead,

```
(markup (make-line-markup (function-that-returns-markups)))
```

6.4.2 How markups work internally

In a markup like

```
\raise #0.5 "text example"
```

`\raise` is actually represented by the `raise-markup` function. The markup expression is stored as

```
(list raise-markup 0.5 (list simple-markup "text example"))
```

When the markup is converted to printable objects (Stencils), the `raise-markup` function is called as

```
(apply raise-markup
       \layout object
       list of property alists
       0.5
       the "text example" markup)
```

The `raise-markup` function first creates the stencil for the `text example` string, and then it raises that Stencil by 0.5 staff space. This is a rather simple example; more complex examples are in the rest of this section, and in ‘`scm/define-markup-commands.scm`’.

6.4.3 New markup command definition

New markup commands can be defined with the `define-markup-command` Scheme macro.

```
(define-markup-command (command-name layout props arg1 arg2 ...)
            (arg1-type? arg2-type? ...)
  ..command body..)
```

The arguments are

argi	*i*th command argument
argi-type?	a type predicate for the *ith* argument
layout	the 'layout' definition
props	a list of alists, containing all active properties.

As a simple example, we show how to add a `\smallcaps` command, which selects a small caps font. Normally we could select the small caps font,

```
\markup { \override #'(font-shape . caps) Text-in-caps }
```

This selects the caps font by setting the `font-shape` property to `#'caps` for interpreting `Text-in-caps`.

To make the above available as `\smallcaps` command, we must define a function using `define-markup-command`. The command should take a single argument of type `markup`. Therefore the start of the definition should read

```
(define-markup-command (smallcaps layout props argument) (markup?)
```

What follows is the content of the command: we should interpret the `argument` as a markup, i.e.,

```
(interpret-markup layout ... argument)
```

This interpretation should add `'(font-shape . caps)` to the active properties, so we substitute the following for the ... in the above example:

```
(cons (list '(font-shape . caps) ) props)
```

The variable `props` is a list of alists, and we prepend to it by cons'ing a list with the extra setting.

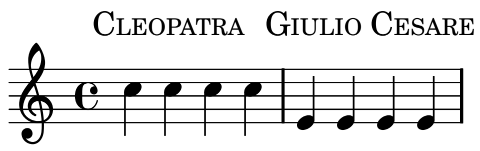
Suppose that we are typesetting a recitative in an opera and we would like to define a command that will show character names in a custom manner. Names should be printed with small caps and moved a bit to the left and top. We will define a `\character` command which takes into account the necessary translation and uses the newly defined `\smallcaps` command:

```
#(define-markup-command (character layout props name) (string?)
  "Print the character name in small caps, translated to the left and
  top.  Syntax: \\character #\"name\""
  (interpret-markup layout props
   (markup #:hspace 0 #:translate (cons -3 1) #:smallcaps name)))
```

There is one complication that needs explanation: texts above and below the staff are moved vertically to be at a certain distance (the `padding` property) from the staff and the notes. To make sure that this mechanism does not annihilate the vertical effect of our `#:translate`, we add an empty string (`#:hspace 0`) before the translated text. Now the `#:hspace 0` will be put above the notes, and the `name` is moved in relation to that empty string. The net effect is that the text is moved to the upper left.

The final result is as follows:

```
{
  c''^\markup \character #"Cleopatra"
  e'^\markup \character #"Giulio Cesare"
}
```



We have used the `caps` font shape, but suppose that our font does not have a small-caps variant. In that case we have to fake the small caps font by setting a string in upcase with the first letter a little larger:

```
#(define-markup-command (smallcaps layout props str) (string?)
  "Print the string argument in small caps."
  (interpret-markup layout props
   (make-line-markup
    (map (lambda (s)
          (if (= (string-length s) 0)
              s
              (markup #:large (string-upcase (substring s 0 1))
                      #:translate (cons -0.6 0)
                      #:tiny (string-upcase (substring s 1)))))
         (string-split str #\Space)))))
```

The `smallcaps` command first splits its string argument into tokens separated by spaces (`(string-split str #\Space)`); for each token, a markup is built with the first letter made large and upcased (`#:large (string-upcase (substring s 0 1))`), and a second markup built with the following letters made tiny and upcased (`#:tiny (string-upcase (substring s 1))`). As LilyPond introduces a space between markups on a line, the second markup is translated to the left (`#:translate (cons -0.6 0) ...`). Then, the markups built for each token are put in a line by `(make-line-markup ...)`. Finally, the resulting markup is passed to the `interpret-markup` function, with the `layout` and `props` arguments.

Note: there is now an internal command `\smallCaps` which can be used to set text in small caps. See Section B.8 [Text markup commands], page 463, for details.

Known issues and warnings

Currently, the available combinations of arguments (after the standard *layout* and *props* arguments) to a markup command defined with `define-markup-command` are limited as follows.

(no argument)
list
markup
markup markup
scm
scm markup
scm scm
scm scm markup
scm scm markup markup
scm markup markup
scm scm scm

In the above table, *scm* represents native Scheme data types like ‘number’ or ‘string’.

As an example, it is not possible to use a markup command `foo` with four arguments defined as

```
#(define-markup-command (foo layout props
                          num1    str1    num2    str2)
                         (number? string? number? string?)
  ...)
```

If you apply it as, say,

```
\markup \foo #1 #"bar" #2 #"baz"
```

`lilypond` complains that it cannot parse `foo` due to its unknown Scheme signature.

6.4.4 New markup list command definition

Markup list commands are defined with the `define-markup-list-command` Scheme macro, which is similar to the `define-markup-command` macro described in Section 6.4.3 [New markup command definition], page 429, except that where the latter returns a single stencil, the former returns a list stencils.

In the following example, a `\paragraph` markup list command is defined, which returns a list of justified lines, the first one being indented. The indent width is taken from the `props` argument.

```
#(define-markup-list-command (paragraph layout props args) (markup-list?)
   (let ((indent (chain-assoc-get 'par-indent props 2)))
     (interpret-markup-list layout props
       (make-justified-lines-markup-list (cons (make-hspace-markup indent)
                                               args)))))
```

Besides the usual `layout` and `props` arguments, the `paragraph` markup list command takes a markup list argument, named `args`. The predicate for markup lists is `markup-list?`.

First, the function gets the indent width, a property here named `par-indent`, from the property list `props` If the property is not found, the default value is `2`. Then, a list of justified lines is made using the `make-justified-lines-markup-list` function, which is related to the `\justified-lines` built-in markup list command. An horizontal space is added at the beginning using the `make-hspace-markup` function. Finally, the markup list is interpreted using the `interpret-markup-list` function.

This new markup list command can be used as follows:

```
\markuplines {
  \paragraph {
    The art of music typography is called \italic {(plate) engraving.}
    The term derives from the traditional process of music printing.
    Just a few decades ago, sheet music was made by cutting and stamping
    the music into a zinc or pewter plate in mirror image.
  }
  \override-lines #'(par-indent . 4) \paragraph {
    The plate would be inked, the depressions caused by the cutting
    and stamping would hold ink.  An image was formed by pressing paper
    to the plate.  The stamping and cutting was completely done by
    hand.
  }
}
```

6.5 Contexts for programmers

6.5.1 Context evaluation

Contexts can be modified during interpretation with Scheme code. The syntax for this is

`\applyContext` *function*

function should be a Scheme function taking a single argument, being the context to apply it to. The following code will print the current bar number on the standard output during the compile:

```
\applyContext
  #(lambda (x)
    (format #t "\nWe were called in barnumber ~a.\n"
     (ly:context-property x 'currentBarNumber)))
```

6.5.2 Running a function on all layout objects

The most versatile way of tuning an object is `\applyOutput`. Its syntax is

`\applyOutput` *context proc*

where *proc* is a Scheme function, taking three arguments.

When interpreted, the function *proc* is called for every layout object found in the context *context*, with the following arguments:

- the layout object itself,
- the context where the layout object was created, and
- the context where `\applyOutput` is processed.

In addition, the cause of the layout object, i.e., the music expression or object that was responsible for creating it, is in the object property `cause`. For example, for a note head, this is a Section "NoteHead" in *Internals Reference* event, and for a Section "Stem" in *Internals Reference* object, this is a Section "NoteHead" in *Internals Reference* object.

Here is a function to use for `\applyOutput`; it blanks note-heads on the center-line:

```
(define (blanker grob grob-origin context)
 (if (and (memq (ly:grob-property grob 'interfaces)
                note-head-interface)
          (eq? (ly:grob-property grob 'staff-position) 0))
     (set! (ly:grob-property grob 'transparent) #t)))
```

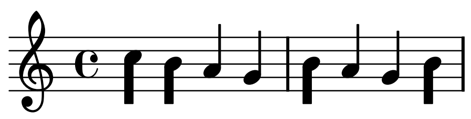
6.6 Scheme procedures as properties

Properties (like thickness, direction, etc.) can be set at fixed values with \override, e.g.

```
\override Stem #'thickness = #2.0
```

Properties can also be set to a Scheme procedure,

```
\override Stem #'thickness = #(lambda (grob)
    (if (= UP (ly:grob-property grob 'direction))
        2.0
        7.0))
c b a g b a g b
```



In this case, the procedure is executed as soon as the value of the property is requested during the formatting process.

Most of the typesetting engine is driven by such callbacks. Properties that typically use callbacks include

`stencil`	The printing routine, that constructs a drawing for the symbol
`X-offset`	The routine that sets the horizontal position
`X-extent`	The routine that computes the width of an object

The procedure always takes a single argument, being the grob.

If routines with multiple arguments must be called, the current grob can be inserted with a grob closure. Here is a setting from `AccidentalSuggestion`,

```
(X-offset .
  ,(ly:make-simple-closure
    `(,+
        ,(ly:make-simple-closure
           (list ly:self-alignment-interface::centered-on-x-parent))
      ,(ly:make-simple-closure
           (list ly:self-alignment-interface::x-aligned-on-self)))))
```

In this example, both `ly:self-alignment-interface::x-aligned-on-self` and `ly:self-alignment-interface::centered-on-x-parent` are called with the grob as argument. The results are added with the `+` function. To ensure that this addition is properly executed, the whole thing is enclosed in `ly:make-simple-closure`.

In fact, using a single procedure as property value is equivalent to

```
(ly:make-simple-closure (ly:make-simple-closure (list proc)))
```

The inner `ly:make-simple-closure` supplies the grob as argument to *proc*, the outer ensures that result of the function is returned, rather than the `simple-closure` object.

6.7 Using Scheme code instead of \tweak

The main disadvantage of `\tweak` is its syntactical inflexibility. For example, the following produces a syntax error.

```
F = \tweak #'font-size #-3 -\flageolet

\relative c'' {
  c4^\F c4_\F
}
```

With other words, `\tweak` doesn't behave like an articulation regarding the syntax; in particular, it can't be attached with `^` and `_`.

Using Scheme, this problem can be circumvented. The route to the result is given in Section 6.3.4 [Adding articulation to notes (example)], page 425, especially how to use `\displayMusic` as a helping guide.

```
F = #(let ((m (make-music 'ArticulationEvent
                          'articulation-type "flageolet")))
       (set! (ly:music-property m 'tweaks)
             (acons 'font-size -3
                    (ly:music-property m 'tweaks)))
       m)

\relative c'' {
  c4^\F c4_\F
}
```

Here, the `tweaks` properties of the flageolet object `m` (created with `make-music`) are extracted with `ly:music-property`, a new key-value pair to change the font size is prepended to the property list with the `acons` Scheme function, and the result is finally written back with `set!`. The last element of the `let` block is the return value, `m` itself.

6.8 Difficult tweaks

There are a few classes of difficult adjustments.

- One type of difficult adjustment is the appearance of spanner objects, such as slur and tie. Initially, only one of these objects is created, and they can be adjusted with the normal mechanism. However, in some cases the spanners cross line breaks. If this happens, these objects are cloned. A separate object is created for every system that it is in. These are clones of the original object and inherit all properties, including `\override`s.

  In other words, an `\override` always affects all pieces of a broken spanner. To change only one part of a spanner at a line break, it is necessary to hook into the formatting process. The `after-line-breaking` callback contains the Scheme procedure that is called after the line breaks have been determined, and layout objects have been split over different systems.

  In the following example, we define a procedure `my-callback`. This procedure

  - determines if we have been split across line breaks
  - if yes, retrieves all the split objects
  - checks if we are the last of the split objects
  - if yes, it sets `extra-offset`.

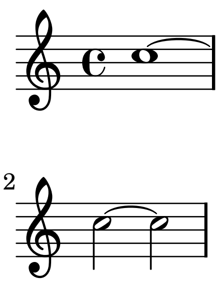
  This procedure is installed into Section "Tie" in *Internals Reference*, so the last part of the broken tie is translated up.

```
#(define (my-callback grob)
  (let* (
         ; have we been split?
         (orig (ly:grob-original grob))

         ; if yes, get the split pieces (our siblings)
         (siblings (if (ly:grob? orig)
                     (ly:spanner-broken-into orig) '() )))

   (if (and (>= (length siblings) 2)
             (eq? (car (last-pair siblings)) grob))
     (ly:grob-set-property! grob 'extra-offset '(-2 . 5)))))

\relative c'' {
  \override Tie #'after-line-breaking =
  #my-callback
  c1 ~ \break c2 ~ c
}
```



  When applying this trick, the new `after-line-breaking` callback should also call the old one `after-line-breaking`, if there is one. For example, if using this with `Hairpin`, `ly:hairpin::after-line-breaking` should also be called.

- Some objects cannot be changed with `\override` for technical reasons. Examples of those are `NonMusicalPaperColumn` and `PaperColumn`. They can be changed with the `\overrideProperty` function, which works similar to `\once \override`, but uses a different syntax.

  ```
  \overrideProperty
  #"Score.NonMusicalPaperColumn"  % Grob name
  #'line-break-system-details     % Property name
  #'((next-padding . 20))         % Value
  ```

  Note, however, that `\override`, applied to `NonMusicalPaperColumn` and `PaperColumn`, still works as expected within `\context` blocks.

Appendix A Literature list

If you need to know more about music notation, here are some interesting titles to read.

Ignatzek 1995

Klaus Ignatzek, Die Jazzmethode für Klavier. Schott's Söhne 1995. Mainz, Germany ISBN 3-7957-5140-3.

A tutorial introduction to playing Jazz on the piano. One of the first chapters contains an overview of chords in common use for Jazz music.

Gerou 1996

Tom Gerou and Linda Lusk, Essential Dictionary of Music Notation. Alfred Publishing, Van Nuys CA ISBN 0-88284-768-6.

A concise, alphabetically ordered list of typesetting and music (notation) issues, covering most of the normal cases.

Read 1968

Gardner Read, Music Notation: A Manual of Modern Practice. Taplinger Publishing, New York (2nd edition).

A standard work on music notation.

Ross 1987 Ted Ross, Teach yourself the art of music engraving and processing. Hansen House, Miami, Florida 1987.

This book is about music engraving, i.e., professional typesetting. It contains directions on stamping, use of pens and notational conventions. The sections on reproduction technicalities and history are also interesting.

Schirmer 2001

The G.Schirmer/AMP Manual of Style and Usage. G.Schirmer/AMP, NY, 2001. (This book can be ordered from the rental department.)

This manual specifically focuses on preparing print for publication by Schirmer. It discusses many details that are not in other, normal notation books. It also gives a good idea of what is necessary to bring printouts to publication quality.

Stone 1980

Kurt Stone, Music Notation in the Twentieth Century. Norton, New York 1980.

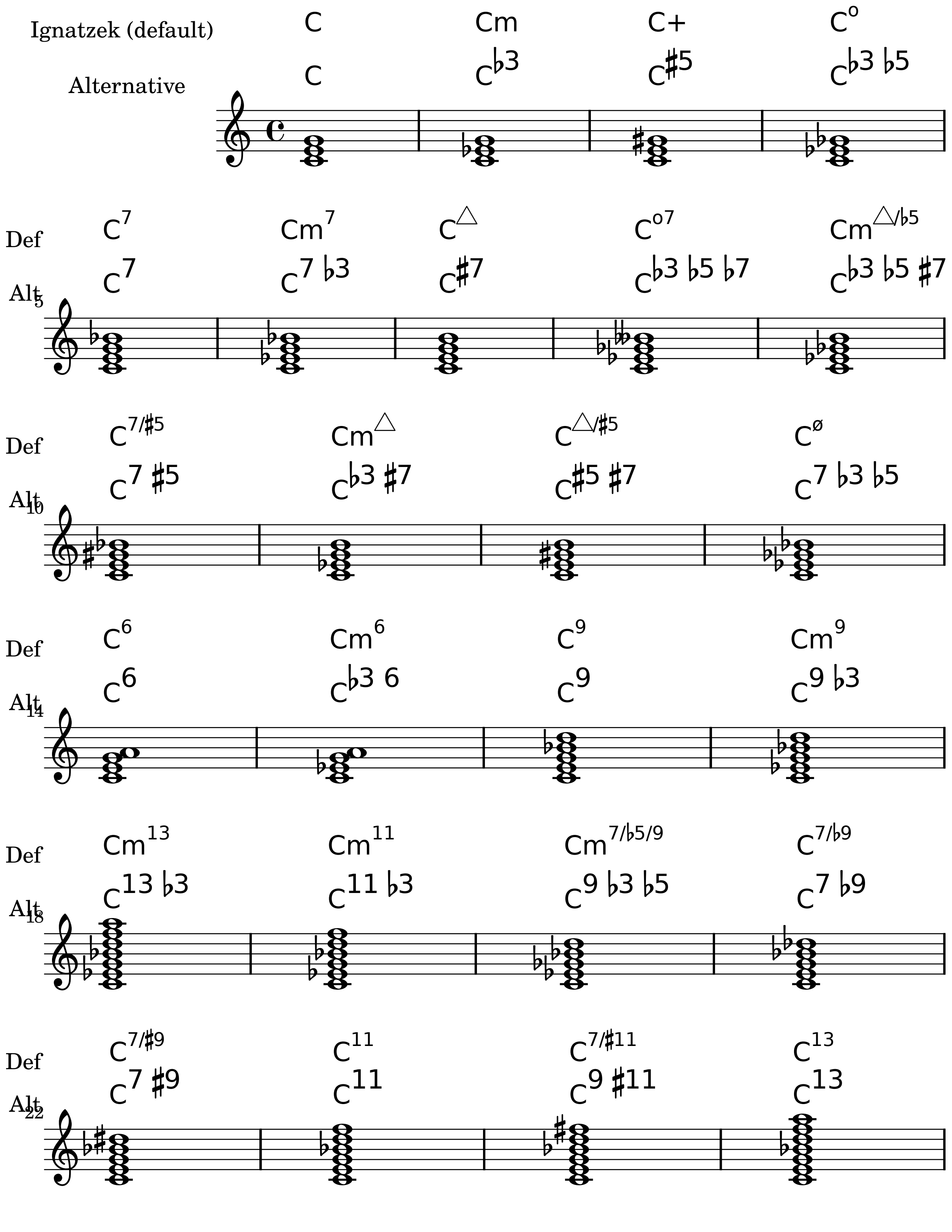
This book describes music notation for modern serious music, but starts out with a thorough overview of existing traditional notation practices.

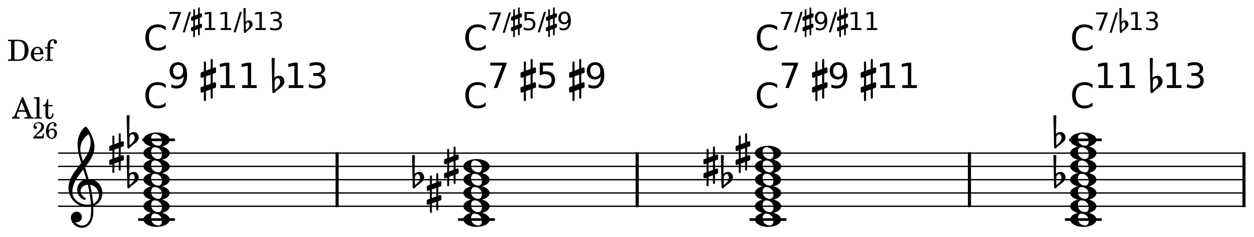
The source archive includes a more elaborate BibTEX bibliography of over 100 entries in '`Documentation/bibliography/`'.

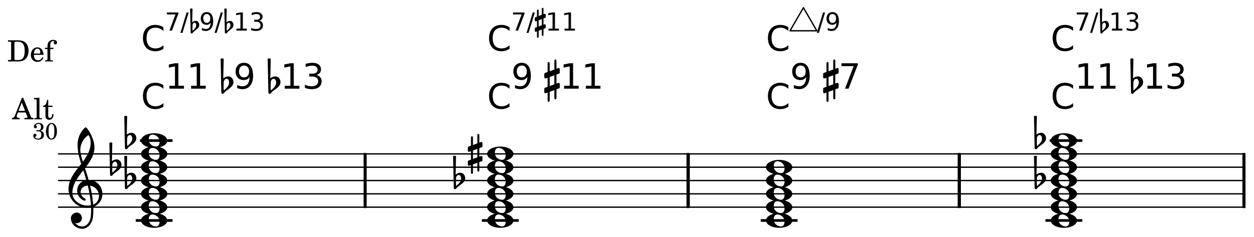
Appendix B Notation manual tables

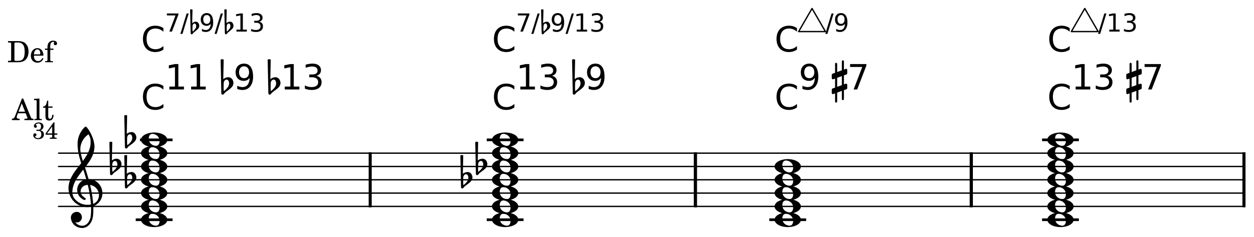
B.1 Chord name chart

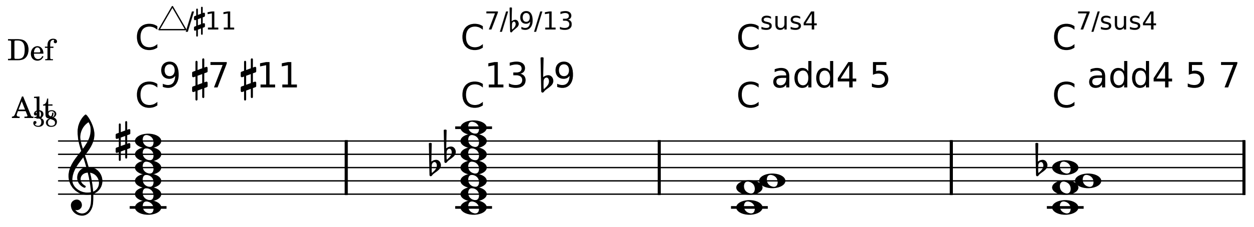
The following charts shows two standard systems for printing chord names, along with the pitches they represent.

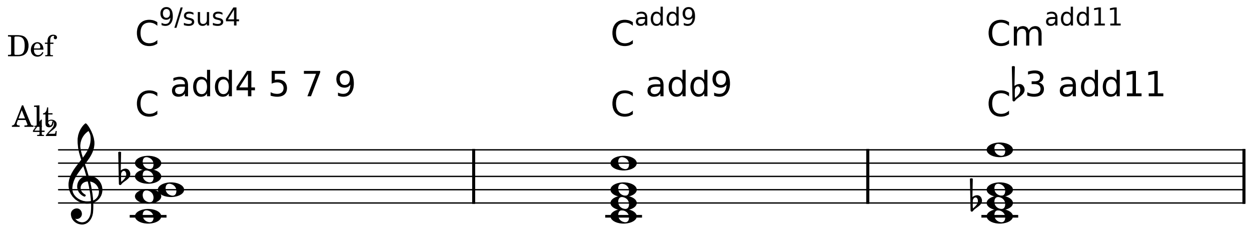






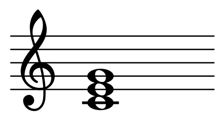
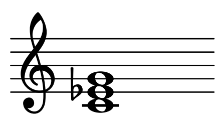


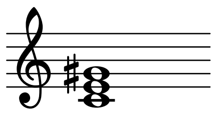
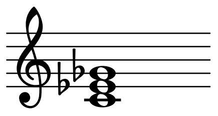
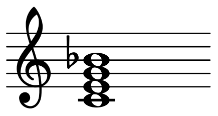
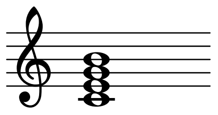
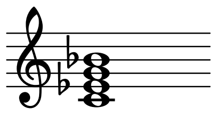
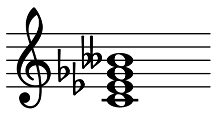
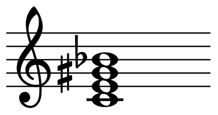
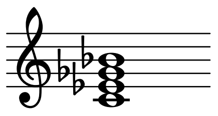
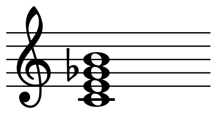


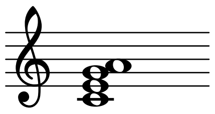
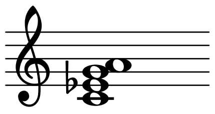
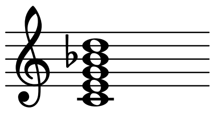
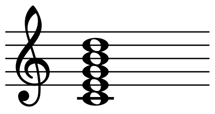
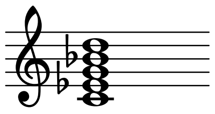
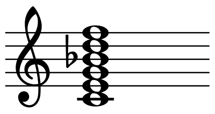
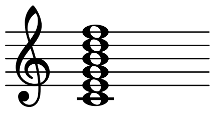
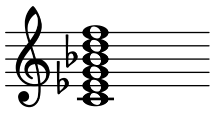
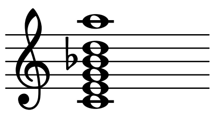


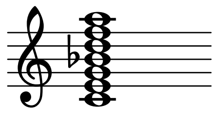
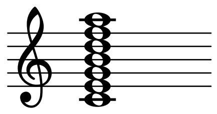
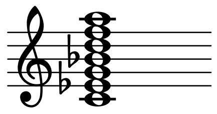
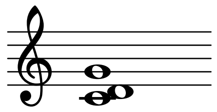
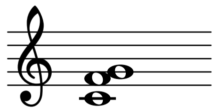
B.2 Common chord modifiers

The following table shows chord modifiers that can be used in `\chordmode` to generate standard chord structures.

Chord type	Intervals	Modifier(s)	Example
Major	Major third, perfect fifth	`5` or nothing	
Minor	Minor third, perfect fifth	`m` or `m5`	

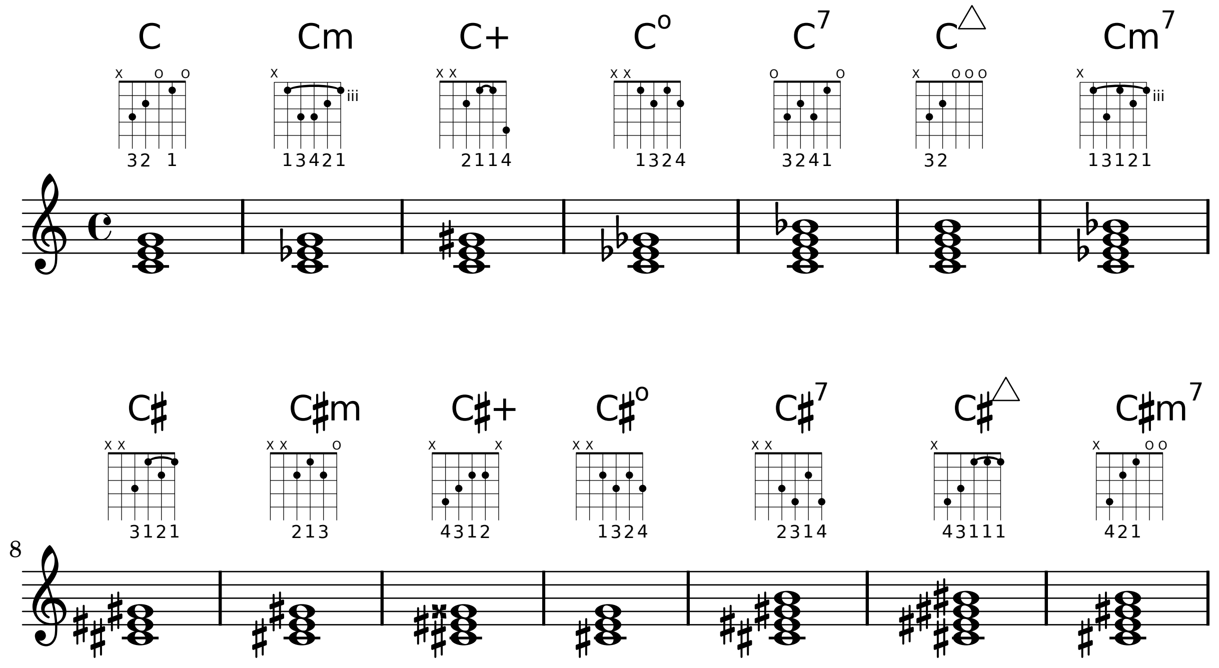
Augmented	Major third, augmented fifth	`aug`	
Diminished	Minor third, diminished fifth	`dim`	
Dominant seventh	Major triad, minor seventh	`7`	
Major seventh	Major triad, major seventh	`maj7` or `maj`	
Minor seventh	Minor triad, minor seventh	`m7`	
Diminished seventh	Diminished triad, diminished seventh	`dim7`	
Augmented seventh	Augmented triad, minor seventh	`aug7`	
Half-diminished seventh	Diminished triad, minor seventh	`m7.5-`	
Minor-major seventh	Minor triad, major seventh	`maj7.5-`	

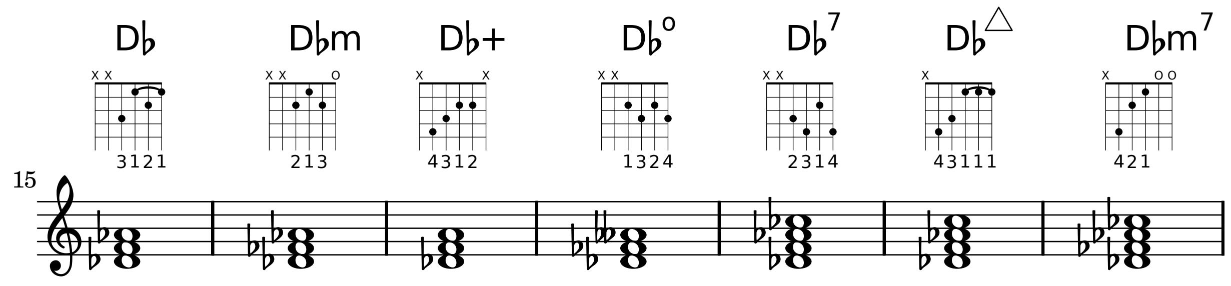
Major sixth	Major triad, sixth	`6`	
Minor sixth	Minor triad, sixth	`m6`	
Dominant ninth	Dominant seventh, major ninth	`9`	
Major ninth	Major seventh, major ninth	`maj9`	
Minor ninth	Minor seventh, major ninth	`m9`	
Dominant eleventh	Dominant ninth, perfect eleventh	`11`	
Major eleventh	Major ninth, perfect eleventh	`maj11`	
Minor eleventh	Minor ninth, perfect eleventh	`m11`	
Dominant thirteenth	Dominant ninth, major thirteenth	`13`	

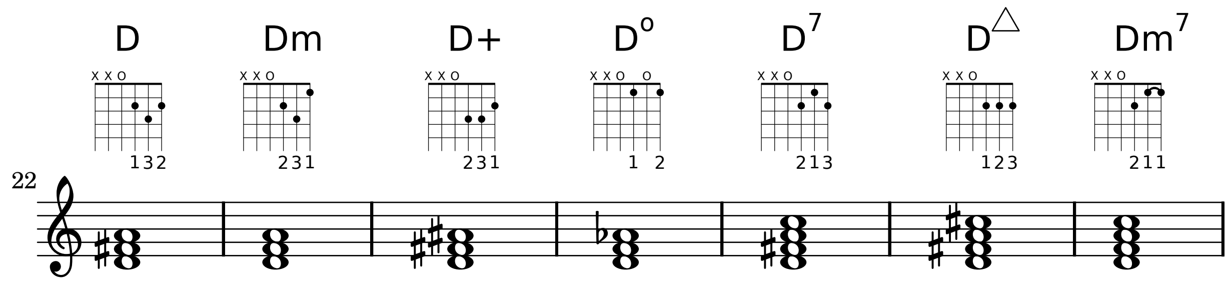
Dominant thirteenth	Dominant eleventh, major thirteenth	`13.11`	
Major thirteenth	Major eleventh, major thirteenth	`maj13.11`	
Minor thirteenth	Minor eleventh, major thirteenth	`m13.11`	
Suspended second	Major second, perfect fifth	`sus2`	
Suspended fourth	Perfect fourth, perfect fifth	`sus4`	

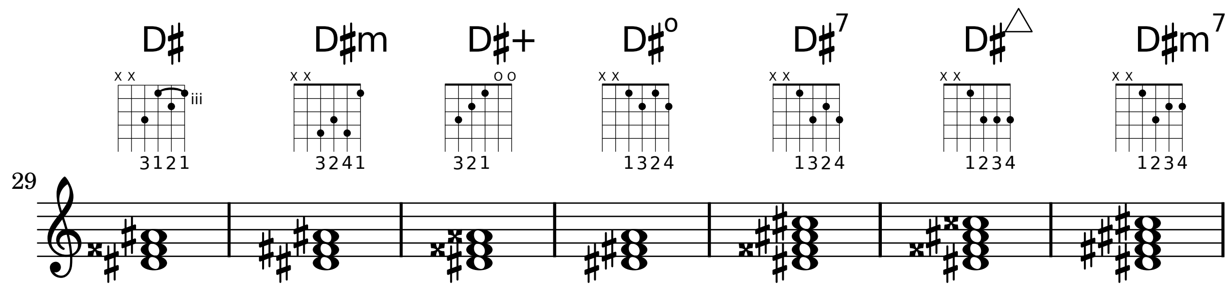
B.3 Predefined fretboard diagrams

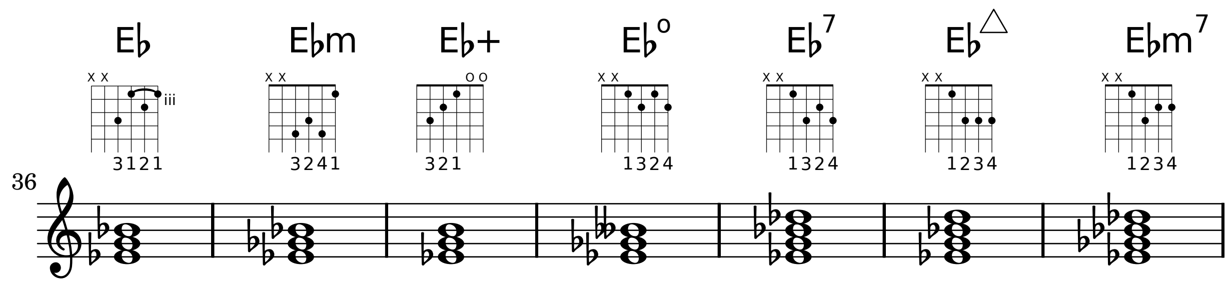
The chart below shows the predefined fretboard diagrams.

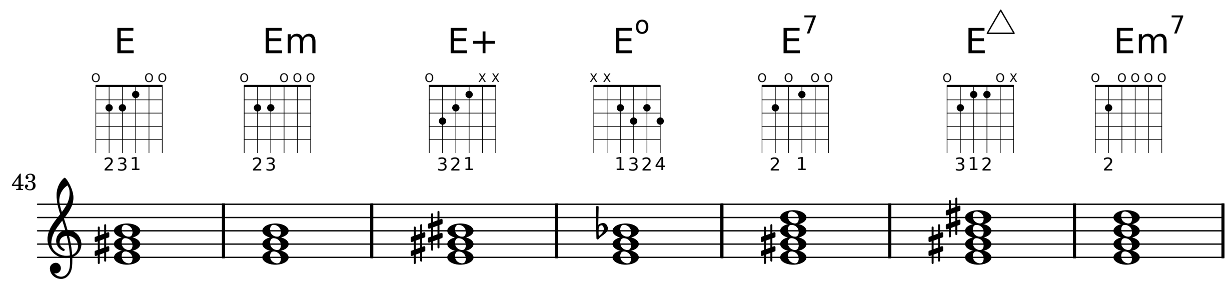


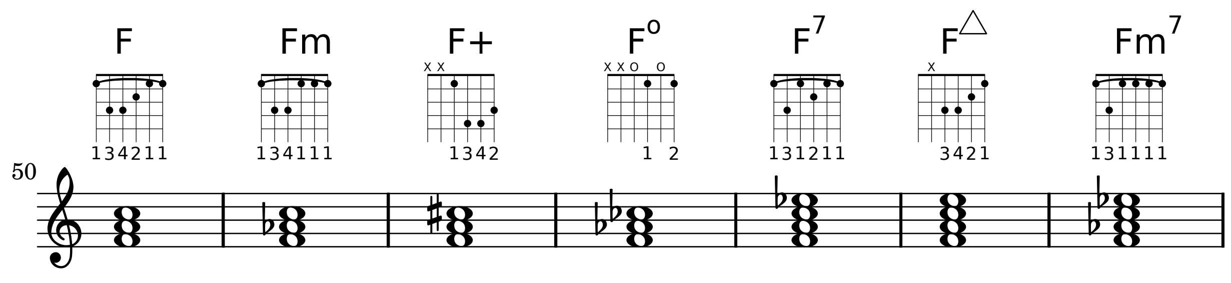

D♭
D♭m
D♭+
D♭o
D♭7
D♭△
D♭m7
3121
213
4312
1324
2314
43111
421
15

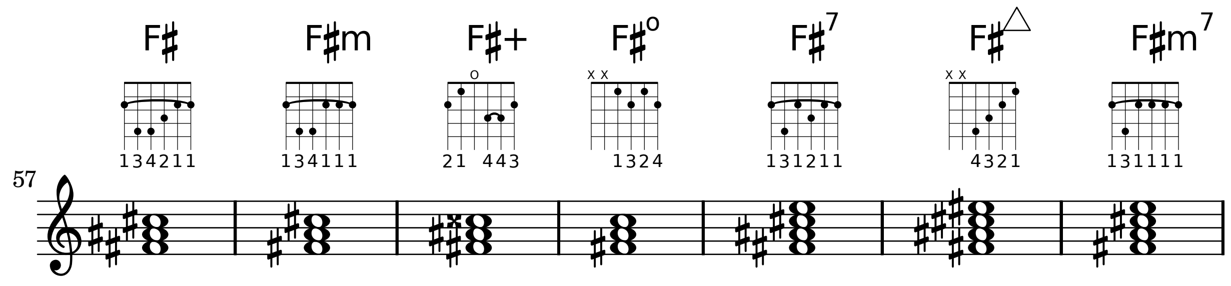

D
Dm
D+
Do
D7
D△
Dm7
132
231
231
1 2
213
123
211
22

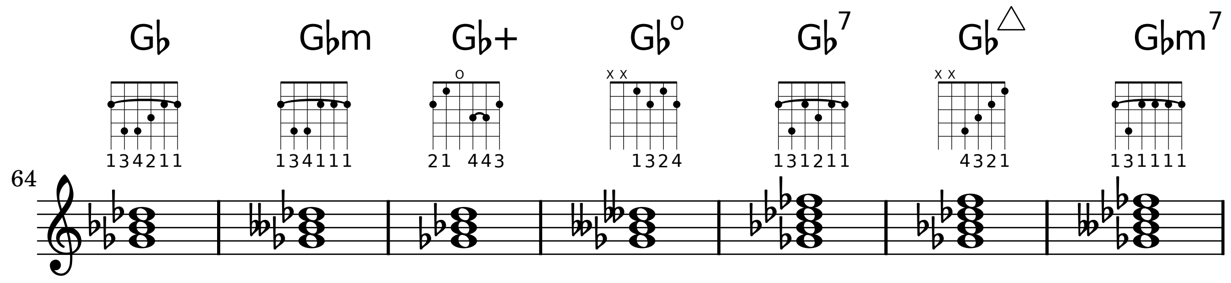

D♯
D♯m
D♯+
D♯o
D♯7
D♯△
D♯m7
iii
3121
3241
321
1324
1324
1234
1234
29

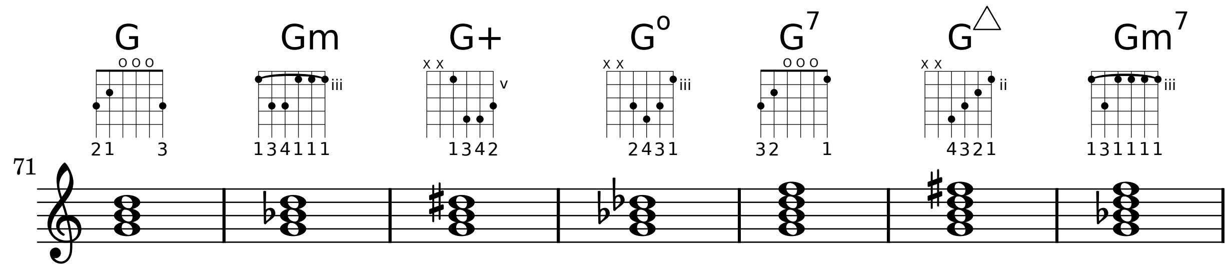

E♭
E♭m
E♭+
E♭o
E♭7
E♭△
E♭m7
iii
3121
3241
321
1324
1324
1234
1234
36

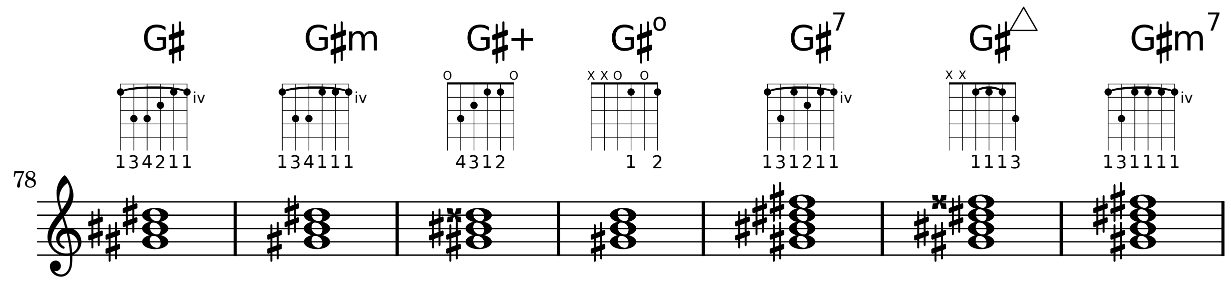

E
Em
E+
Eo
E7
E△
Em7
231
23
321
1324
2 1
312
2
43


F
Fm
F+
Fo
F7
F△
Fm7
134211
134111
1342
1 2
131211
3421
131111
50


F♯
F♯m
F♯+
F♯o
F♯7
F♯△
F♯m7
134211
134111
21 443
1324
131211
4321
131111
57


G♭
G♭m
G♭+
G♭o
G♭7
G♭△
G♭m7
134211
134111
21 443
1324
131211
4321
131111
64


G
Gm
G+
Go
G7
G△
Gm7
21 3
134111
1342
2431
32 1
4321
131111
iii
v
iii
ii
iii
71


G♯
G♯m
G♯+
G♯o
G♯7
G♯△
G♯m7
134211
134111
4312
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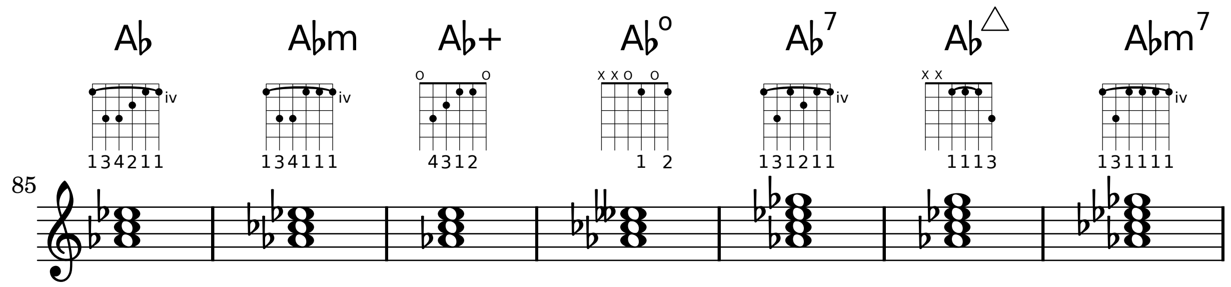
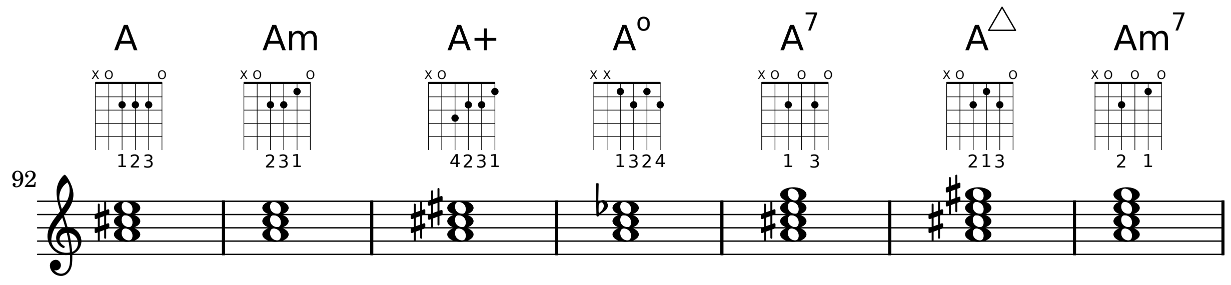
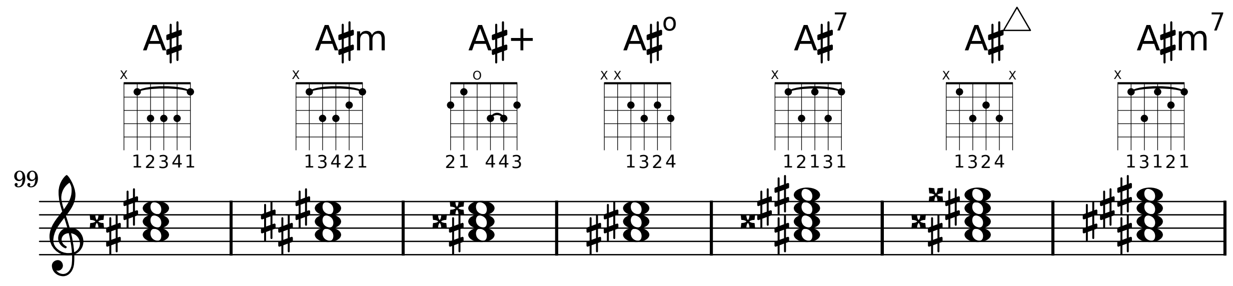
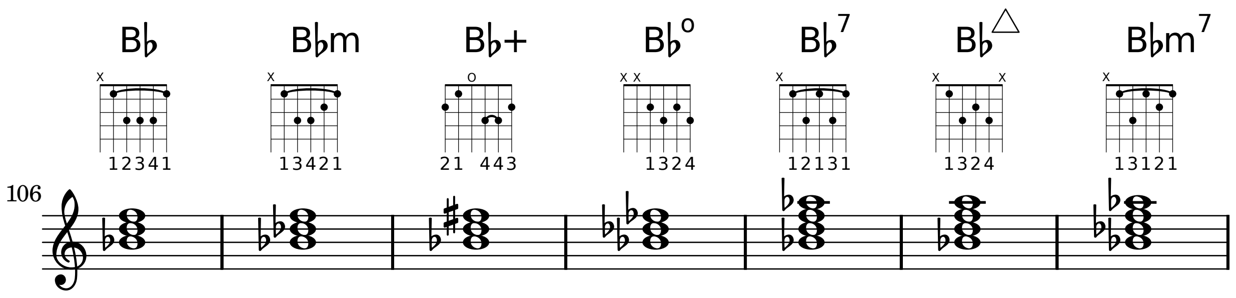
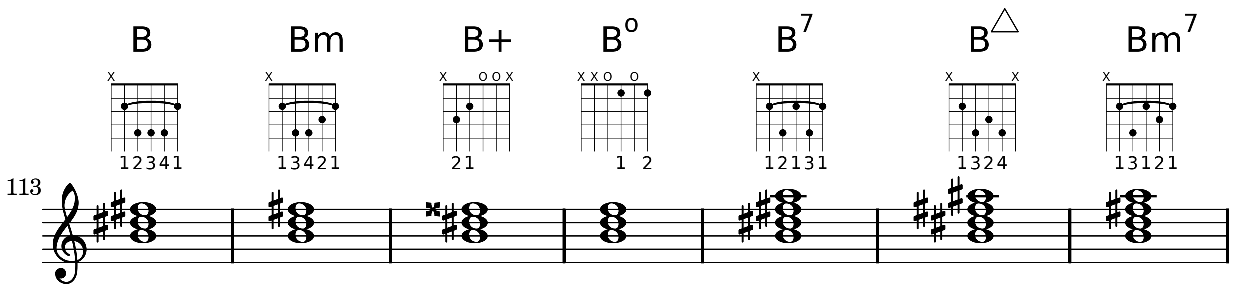
131211
1113
131111
iv
iv
iv
iv
78


A♭
A♭m
A♭+
A♭o
A♭7
A♭△
A♭m7
134211
134111
4312
1 2
131211
1113
131111
iv
iv
iv
iv
85


A
Am
A+
Ao
A7
A△
Am7
123
231
4231
1324
1 3
213
2 1
92







B.4 MIDI instruments

The following is a list of names that can be used for the `midiInstrument` property.

```
acoustic grand
bright acoustic
electric grand
honky-tonk
electric piano 1
electric piano 2
harpsichord
clav
celesta
glockenspiel
music box
vibraphone
marimba
xylophone
tubular bells
dulcimer
drawbar organ
percussive organ
rock organ
church organ
reed organ
accordion
harmonica
contrabass
tremolo strings
pizzicato strings
orchestral strings
timpani
string ensemble 1
string ensemble 2
synthstrings 1
synthstrings 2
choir aahs
voice oohs
synth voice
orchestra hit
trumpet
trombone
tuba
muted trumpet
french horn
brass section
synthbrass 1
synthbrass 2
soprano sax
alto sax
lead 7 (fifths)
lead 8 (bass+lead)
pad 1 (new age)
pad 2 (warm)
pad 3 (polysynth)
pad 4 (choir)
pad 5 (bowed)
pad 6 (metallic)
pad 7 (halo)
pad 8 (sweep)
fx 1 (rain)
fx 2 (soundtrack)
fx 3 (crystal)
fx 4 (atmosphere)
fx 5 (brightness)
fx 6 (goblins)
fx 7 (echoes)
fx 8 (sci-fi)
sitar
banjo
shamisen
koto
kalimba
```

`concertina`	`tenor sax`	`bagpipe`
`acoustic guitar (nylon)`	`baritone sax`	`fiddle`
`acoustic guitar (steel)`	`oboe`	`shanai`
`electric guitar (jazz)`	`english horn`	`tinkle bell`
`electric guitar (clean)`	`bassoon`	`agogo`
`electric guitar (muted)`	`clarinet`	`steel drums`
`overdriven guitar`	`piccolo`	`woodblock`
`distorted guitar`	`flute`	`taiko drum`
`guitar harmonics`	`recorder`	`melodic tom`
`acoustic bass`	`pan flute`	`synth drum`
`electric bass (finger)`	`blown bottle`	`reverse cymbal`
`electric bass (pick)`	`shakuhachi`	`guitar fret noise`
`fretless bass`	`whistle`	`breath noise`
`slap bass 1`	`ocarina`	`seashore`
`slap bass 2`	`lead 1 (square)`	`bird tweet`
`synth bass 1`	`lead 2 (sawtooth)`	`telephone ring`
`synth bass 2`	`lead 3 (calliope)`	`helicopter`
`violin`	`lead 4 (chiff)`	`applause`
`viola`	`lead 5 (charang)`	`gunshot`
`cello`	`lead 6 (voice)`	

B.5 List of colors

Normal colors

Usage syntax is detailed in [Coloring objects], page 153.

`black`	`white`	`red`	`green`
`blue`	`cyan`	`magenta`	`yellow`
`grey`	`darkred`	`darkgreen`	`darkblue`
`darkcyan`	`darkmagenta`	`darkyellow`	

X color names

X color names come several variants:

Any name that is spelled as a single word with capitalization (e.g. 'LightSlateBlue') can also be spelled as space separated words without capitalization (e.g. 'light slate blue').

The word 'grey' can always be spelled 'gray' (e.g. 'DarkSlateGray').

Some names can take a numerical suffix (e.g. 'LightSalmon4').

Color Names without a numerical suffix:

`snow`	`GhostWhite`	`WhiteSmoke`	`gainsboro`	`FloralWhite`
`OldLace`	`linen`	`AntiqueWhite`	`PapayaWhip`	`BlanchedAlmond`
`bisque`	`PeachPuff`	`NavajoWhite`	`moccasin`	`cornsilk`
`ivory`	`LemonChiffon`	`seashell`	`honeydew`	`MintCream`
`azure`	`AliceBlue`	`lavender`	`LavenderBlush`	`MistyRose`
`white`	`black`	`DarkSlateGrey`	`DimGrey`	`SlateGrey`
`LightSlateGrey`	`grey`	`LightGrey`	`MidnightBlue`	`navy`
`NavyBlue`	`CornflowerBlue`	`DarkSlateBlue`	`SlateBlue`	`MediumSlateBlue`
`LightSlateBlue`	`MediumBlue`	`RoyalBlue`	`blue`	`DodgerBlue`
`DeepSkyBlue`	`SkyBlue`	`LightSkyBlue`	`SteelBlue`	`LightSteelBlue`
`LightBlue`	`PowderBlue`	`PaleTurquoise`	`DarkTurquoise`	`MediumTurquoise`
`turquoise`	`cyan`	`LightCyan`	`CadetBlue`	`MediumAquamarine`

`aquamarine`	`DarkGreen`	`DarkOliveGreen`	`DarkSeaGreen`	`SeaGreen`
`MediumSeaGreen`	`LightSeaGreen`	`PaleGreen`	`SpringGreen`	`LawnGreen`
`green`	`chartreuse`	`MediumSpringGreen`	`GreenYellow`	`LimeGreen`
`YellowGreen`	`ForestGreen`	`OliveDrab`	`DarkKhaki`	`khaki`
`PaleGoldenrod`	`LightGoldenrodYellow`	`LightYellow`	`yellow`	`gold`
`LightGoldenrod`	`goldenrod`	`DarkGoldenrod`	`RosyBrown`	`IndianRed`
`SaddleBrown`	`sienna`	`peru`	`burlywood`	`beige`
`wheat`	`SandyBrown`	`tan`	`chocolate`	`firebrick`
`brown`	`DarkSalmon`	`salmon`	`LightSalmon`	`orange`
`DarkOrange`	`coral`	`LightCoral`	`tomato`	`OrangeRed`
`red`	`HotPink`	`DeepPink`	`pink`	`LightPink`
`PaleVioletRed`	`maroon`	`MediumVioletRed`	`VioletRed`	`magenta`
`violet`	`plum`	`orchid`	`MediumOrchid`	`DarkOrchid`
`DarkViolet`	`BlueViolet`	`purple`	`MediumPurple`	`thistle`
`DarkGrey`	`DarkBlue`	`DarkCyan`	`DarkMagenta`	`DarkRed`
`LightGreen`				

Color names with a numerical suffix

In the following names the suffix N can be a number in the range 1-4:

`snowN`	`seashellN`	`AntiqueWhiteN`	`bisqueN`	`PeachPuffN`
`NavajoWhiteN`	`LemonChiffonN`	`cornsilkN`	`ivoryN`	`honeydewN`
`LavenderBlushN`	`MistyRoseN`	`azureN`	`SlateBlueN`	`RoyalBlueN`
`blueN`	`DodgerBlueN`	`SteelBlueN`	`DeepSkyBlueN`	`SkyBlueN`
`LightSkyBlueN`	`LightSteelBlueN`	`LightBlueN`	`LightCyanN`	`PaleTurquoiseN`
`CadetBlueN`	`turquoiseN`	`cyanN`	`aquamarineN`	`DarkSeaGreenN`
`SeaGreenN`	`PaleGreenN`	`SpringGreenN`	`greenN`	`chartreuseN`
`OliveDrabN`	`DarkOliveGreenN`	`khakiN`	`LightGoldenrodN`	`LightYellowN`
`yellowN`	`goldN`	`goldenrodN`	`DarkGoldenrodN`	`RosyBrownN`
`IndianRedN`	`siennaN`	`burlywoodN`	`wheatN`	`tanN`
`chocolateN`	`firebrickN`	`brownN`	`salmonN`	`LightSalmonN`
`orangeN`	`DarkOrangeN`	`coralN`	`tomatoN`	`OrangeRedN`
`redN`	`DeepPinkN`	`HotPinkN`	`pinkN`	`LightPinkN`
`PaleVioletRedN`	`maroonN`	`VioletRedN`	`magentaN`	`orchidN`
`plumN`	`MediumOrchidN`	`DarkOrchidN`	`purpleN`	`MediumPurpleN`
`thistleN`				

Grey Scale

A grey scale can be obtained using:

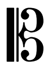
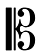
`greyN`

Where N is in the range 0-100.

B.6 The Feta font

The following symbols are available in the Emmentaler font and may be accessed directly using text markup such as `g^\markup { \musicglyph #"scripts.segno" }`, see Section 1.8.2 [Formatting text], page 167.

Clef glyphs

`clefs.C`		`clefs.C_change`	

`clefs.F`	𝄢	`clefs.F_change`	𝄢
`clefs.G`	𝄞	`clefs.G_change`	𝄞
`clefs.percussion`	𝄥	`clefs.percussion_change`	𝄥
`clefs.tab`	TAB	`clefs.tab_change`	TAB

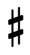
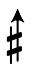
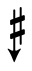
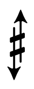
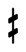
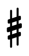
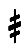
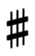
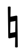
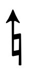
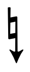
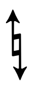
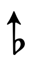
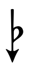
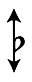
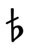
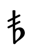
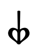
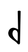
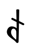
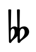
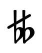
Time Signature glyphs

`timesig.C44`	𝄴	`timesig.C22`	𝄵

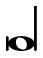
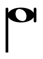
Number glyphs

`plus`	+	`comma`	,
`hyphen`	-	`period`	.
`zero`	0	`one`	1
`two`	2	`three`	3
`four`	4	`five`	5
`six`	6	`seven`	7
`eight`	8	`nine`	9

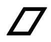
Accidental glyphs

accidentals.sharp		accidentals.sharp.arrowup	
accidentals.sharp.arrowdown		accidentals.sharp.arrowboth	
accidentals.sharp.slashslash.stem		accidentals.sharp.slashslashslash.stemstem	
accidentals.sharp.slashslashslash.stem		accidentals.sharp.slashslash.stemstemstem	
accidentals.natural		accidentals.natural.arrowup	
accidentals.natural.arrowdown		accidentals.natural.arrowboth	
accidentals.flat		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.slash		accidentals.doublesharp	
accidentals.rightparen	)	accidentals.leftparen	(

Default Notehead glyphs

`noteheads.uM2`		`noteheads.dM2`	
`noteheads.sM1`		`noteheads.s0`	
`noteheads.s1`		`noteheads.s2`	

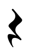
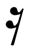
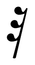
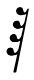
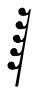
Special Notehead glyphs

`noteheads.s0cross`		`noteheads.s1cross`	
`noteheads.s2cross`		`noteheads.s0diamond`	
`noteheads.s1diamond`		`noteheads.s2diamond`	
`noteheads.s0harmonic`		`noteheads.s2harmonic`	
`noteheads.s0slash`		`noteheads.s1slash`	
`noteheads.s2slash`		`noteheads.s0triangle`	
`noteheads.d1triangle`		`noteheads.u1triangle`	
`noteheads.u2triangle`		`noteheads.d2triangle`	
`noteheads.s2xcircle`			

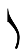
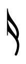
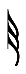
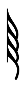
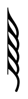
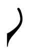
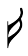
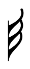
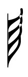
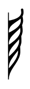
Shape-note Notehead glyphs

`noteheads.s0do`		`noteheads.d1do`	
`noteheads.u1do`		`noteheads.d2do`	
`noteheads.u2do`		`noteheads.s0re`	
`noteheads.u1re`		`noteheads.d1re`	
`noteheads.u2re`		`noteheads.d2re`	
`noteheads.s0mi`		`noteheads.s1mi`	
`noteheads.s2mi`		`noteheads.u0fa`	
`noteheads.d0fa`		`noteheads.u1fa`	
`noteheads.d1fa`		`noteheads.u2fa`	
`noteheads.d2fa`		`noteheads.s0la`	
`noteheads.s1la`		`noteheads.s2la`	
`noteheads.s0ti`		`noteheads.u1ti`	
`noteheads.d1ti`		`noteheads.u2ti`	
`noteheads.d2ti`			

Rest glyphs

rests.0		rests.1	
rests.0o		rests.1o	
rests.M3		rests.M2	
rests.M1		rests.2	
rests.2classical		rests.3	
rests.4		rests.5	
rests.6		rests.7	

Flag glyphs

flags.u3		flags.u4	
flags.u5		flags.u6	
flags.u7		flags.d3	
flags.ugrace		flags.dgrace	
flags.d4		flags.d5	
flags.d6		flags.d7	

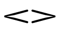
Dot glyphs

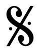
`dots.dot`	•

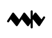
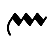
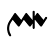
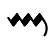
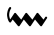
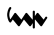
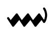
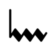
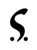
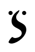
Dynamic glyphs

`space`		`f`	***f***
`m`	***m***	`p`	***p***
`r`	***r***	`s`	***s***
`z`	***z***		

Script glyphs

`scripts.ufermata`		`scripts.dfermata`	
`scripts.ushortfermata`		`scripts.dshortfermata`	
`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.stopped		scripts.upbow	
scripts.downbow		scripts.reverseturn	
scripts.turn		scripts.trill	
scripts.upedalheel		scripts.dpedalheel	
scripts.upedaltoe		scripts.dpedaltoe	
scripts.flageolet		scripts.segno	
scripts.coda		scripts.varcoda	
scripts.rcomma		scripts.lcomma	
scripts.rvarcomma		scripts.lvarcomma	
scripts.arpeggio		scripts.trill_element	
scripts.arpeggio .arrow.M1		scripts.arpeggio.arrow.1	
scripts.trilelement		scripts.prall	
scripts.mordent		scripts.prallprall	

`scripts.prallmordent`		`scripts.upprall`	
`scripts.upmordent`		`scripts.pralldown`	
`scripts.downprall`		`scripts.downmordent`	
`scripts.prallup`		`scripts.lineprall`	
`scripts.caesura.curved`		`scripts.caesura.straight`	
`scripts.ictus`		`scripts.uaccentus`	
`scripts.daccentus`		`scripts.usemicirculus`	
`scripts.dsemicirculus`		`scripts.circulus`	
`scripts.augmentum`		`scripts .usignumcongruentiae`	
`scripts .dsignumcongruentiae`			

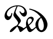
Arrowhead glyphs

`arrowheads.open.01`		`arrowheads.open.0M1`	
`arrowheads.open.11`		`arrowheads.open.1M1`	
`arrowheads.close.01`		`arrowheads.close.0M1`	
`arrowheads.close.11`		`arrowheads.close.1M1`	

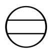
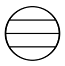
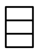
Bracket-tip glyphs

`brackettips.up`		`brackettips.down`	

Pedal glyphs

`pedal.*`		`pedal.M`	
`pedal..`		`pedal.P`	
`pedal.d`		`pedal.e`	
`pedal.Ped`			

Accordion glyphs

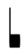
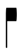
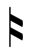
`accordion.accDiscant`		`accordion.accDot`	
`accordion.accFreebase`		`accordion.accStdbase`	
`accordion.accBayanbase`		`accordion.accOldEE`	

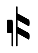
Vaticana glyphs

`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`	

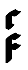
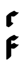
noteheads.svaticana.vupes		noteheads.svaticana.plica	
noteheads.svaticana.vplica		noteheads.svaticana.epiphonus	
noteheads.svaticana.vepiphonus		noteheads.svaticana.reverse.plica	
noteheads.svaticana.reverse.vplica		noteheads.svaticana.inner.cephalicus	
noteheads.svaticana.cephalicus		noteheads.svaticana.quilisma	
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			

Medicaea glyphs

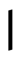
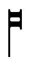
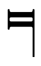
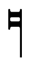
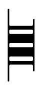
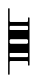
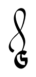
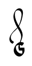
noteheads.smedicaea.inclinatum		noteheads.smedicaea.punctum	
noteheads.smedicaea.rvirga		noteheads.smedicaea.virga	
clefs.medicaea.do		clefs.medicaea.do_change	

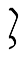
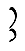
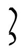
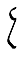
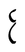
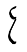
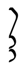
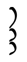
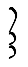
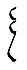
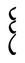
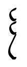
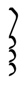
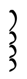
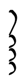
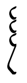
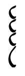
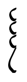
clefs.medicaea.fa		clefs.medicaea.fa_change	
custodes.medicaea.u0		custodes.medicaea.u1	
custodes.medicaea.u2		custodes.medicaea.d0	
custodes.medicaea.d1		custodes.medicaea.d2	
accidentals.medicaeaM1			

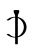
Hufnagel glyphs

noteheads .shufnagel.punctum		noteheads .shufnagel.virga	
noteheads.shufnagel.lpes		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	

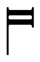
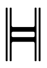
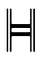
Mensural glyphs

rests.M3mensural		rests.M2mensural	
rests.M1mensural		rests.0mensural	
rests.1mensural		rests.2mensural	
rests.3mensural		rests.4mensural	
noteheads.slmensural		noteheads.sM3mensural	
noteheads.sM2mensural		noteheads.sM1mensural	
noteheads.s0mensural		noteheads.s1mensural	
noteheads.s2mensural		clefs.mensural.c	
clefs.mensural.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	C
timesig.mensural22	₵	timesig.mensural32	O

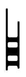
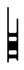
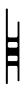
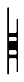
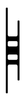
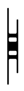
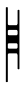
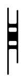
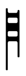
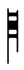
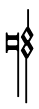
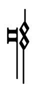
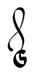
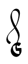
`timesig.mensural64`		`timesig.mensural94`	
`timesig.mensural34`		`timesig.mensural68`	
`timesig.mensural98`		`timesig.mensural48`	
`timesig.mensural68alt`		`timesig.mensural24`	

Neomensural glyphs

`rests.M3neomensural`		`rests.M2neomensural`	
`rests.M1neomensural`		`rests.0neomensural`	
`rests.1neomensural`		`rests.2neomensural`	
`rests.3neomensural`		`rests.4neomensural`	
`noteheads.slneomensural`		`noteheads.sM3neomensural`	
`noteheads.sM2neomensural`		`noteheads.sM1neomensural`	
`noteheads.s0neomensural`		`noteheads.s1neomensural`	
`noteheads.s2neomensural`		`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	

Petrucci glyphs

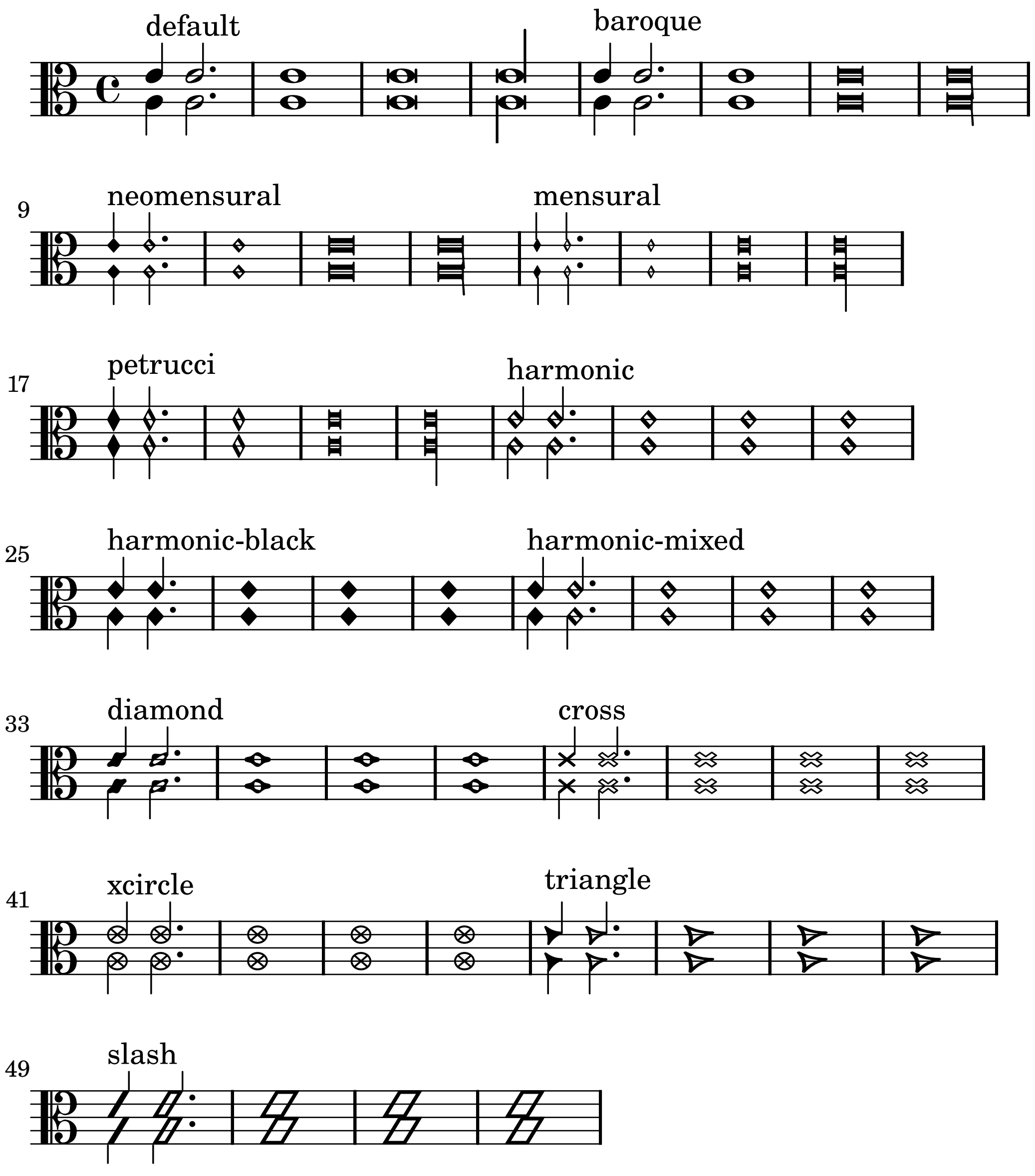
noteheads.s0petrucci		noteheads.s1petrucci	
noteheads.s2petrucci		clefs.petrucci.c1	
clefs.petrucci.c1_change		clefs.petrucci.c2	
clefs.petrucci.c2_change		clefs.petrucci.c3	
clefs.petrucci.c3_change		clefs.petrucci.c4	
clefs.petrucci.c4_change		clefs.petrucci.c5	
clefs.petrucci.c5_change		clefs.petrucci.f	
clefs.petrucci.f_change		clefs.petrucci.g	
clefs.petrucci.g_change			

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`			

B.7 Note head styles

The following styles may be used for note heads.



B.8 Text markup commands

The following commands can all be used inside `\markup { }`.

B.8.1 Font

`\abs-fontsize` *size* (number) *arg* (markup)

Use *size* as the absolute font size 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 }
}
```

default text font size   text font size 16   text font size 12

`\bold` *arg* (markup)

Switch to bold font-series.

```
\markup {
  default
  \hspace #2
  \bold
  bold
}
```

default   **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. }
}
```

$\boxed{\text{V. S.}}$

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

`\finger` *arg* (markup)

Set *arg* as small numbers.

```
\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
  \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
  }
}
```

default   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
  }
}
```

some bold text   medium font series   **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
  }
}
```

default subscript in standard size

Used properties:

- `baseline-skip`

`\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:

- `baseline-skip`

`\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 {
    Some text with font overrides
    \hspace #2
    \normal-text {
      Default text, same font-size
    }
    \hspace #2
    More text as before
  }
}
```

SOME TEXT WITH FONT OVERRIDES Default text, same font-size **MOR**

`\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 time signatures and fingerings. This font contains numbers and some punctuation; it has no letters.

```
\markup {
  \number {
    0 1 2 3 4 5 6 7 8 9 . ,
  }
}
```

0123456789.,

`\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 serif, bold **text in roman font family** **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)

A simple text string; `\markup { foo }` is equivalent with `\markup { \simple #"foo" }`.

Note: for creating standard text markup or defining new markup commands, the use of `\simple` is unnecessary.

```
\markup {
  \simple #"simple"
  \simple #"text"
  \simple #"strings"
}
```

simple text strings

`\small` *arg* (markup)

Set font size to -1.

```
\markup {
  default
  \hspace #2
  \small
  small
}
```

default small

`\smallCaps` *arg* (markup)

Emit *arg* as small caps.

Note: `\smallCaps` does not support accented characters.

```
\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 {
    some large text
    \hspace #2
    \smaller {
      a bit smaller
    }
    \hspace #2
    more large text
  }
}
```

some large text a bit smaller more large text

`\sub` *arg* (markup)

Set *arg* in subscript.

```
\markup {
  \concat {
    H
    \sub {
      2
    }
    O
  }
}
```

H_2O

Used properties:

- `baseline-skip`
- `font-size` (0)

`\super` *arg* (markup)

Set *arg* in superscript.

```
\markup {
  E =
  \concat {
    mc
    \super
    2
  }
}
```

$E = mc^2$

Used properties:

- `baseline-skip`
- `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**

`\tiny` *arg* (markup)

Set font size to -2.

```
\markup {
  default
  \hspace #2
  \tiny
  tiny
}
```

default tiny

`\typewriter` *arg* (markup)

Use `font-family` typewriter for *arg*.

```
\markup {
  default
  \hspace #2
  \typewriter
  typewriter
}
```

default `typewriter`

`\underline` *arg* (markup)

Underline *arg*. Looks at `thickness` to determine line thickness and y-offset.

```
\markup {
  default
  \hspace #2
  \override #'(thickness . 2)
  \underline {
    underline
  }
}
```

default underline

Used properties:

- `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*

B.8.2 Align

`\center-align` *arg* (markup)

Align `arg` to its X center.

```
\markup {
  \column {
    one
    \center-align
    two
    three
  }
}
```

one
two
three

`\center-column` *args* (list of markups)

Put `args` in a centered column.

```
\markup {
  \center-column {
    one
    two
    three
  }
}
```

one
two
three

Used properties:

- `baseline-skip`

`\column` *args* (list of markups)

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; the follow example will not compile:

```
\combine { a list }
```

```
\markup {
  \fontsize #5
  \override #'(thickness . 2)
  \combine
    \draw-line #'(0 . 4)
    \arrow-head #Y #DOWN ##f
}
```

`\concat` *args* (list of markups)

Concatenate *args* in a horizontal line, without spaces in between. Strings and simple markups are concatenated on the input level, allowing ligatures. For example, `\concat { "f" \simple #"i" }` is equivalent to `"fi"`.

```
\markup {
  \concat {
    one
    two
    three
  }
}
```

```
onetwothree
```

`\dir-column` *args* (list of markups)

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
    }
  }
}
```

```
up             up
going   going  going
        down
```

Used properties:

- `baseline-skip`
- `direction`

`\fill-line` *args* (list of markups)

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 }
    }
  }
}
```

Words evenly spaced across the page

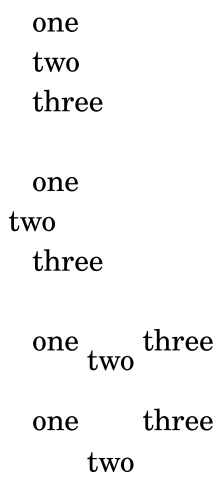
Text markups *evenly spaced* across the page

Used properties:

- `line-width` (#f)
- `word-space` (1)
- `text-direction` (1)

`\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
    }
  }
}
```



`\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

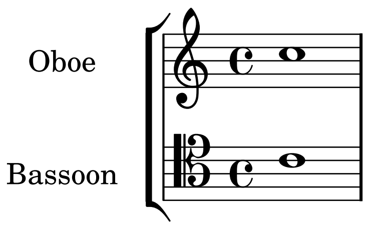
   one
two
   three

   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-field` *symbol* (symbol)

Justify the data which has been assigned to *symbol*.

```
\header {
  title = "My title"
  description = "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:description
    }
  }
}

\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` *args* (list of markups)

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-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* (list of markups)

Put `args` in a left-aligned column.

```
\markup {
  \left-column {
    one
    two
    three
  }
}
```

one
two
three

Used properties:

- `baseline-skip`

`\line` *args* (list of markups)

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`.

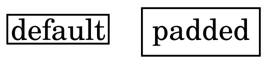
```
\markup {
  one
  \lower #3
  two
  three
}
```

one   three
    two

`\pad-around` *amount* (number) *arg* (markup)

Add padding *amount* all around *arg*.

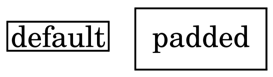
```
\markup {
  \box {
    default
  }
  \hspace #2
  \box {
    \pad-around #0.5 {
      padded
    }
  }
}
```



`\pad-markup` *amount* (number) *arg* (markup)

Add space around a markup object.

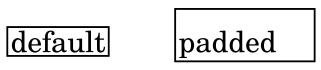
```
\markup {
  \box {
    default
  }
  \hspace #2
  \box {
    \pad-markup #1 {
      padded
    }
  }
}
```



`\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.

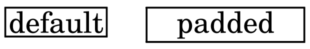
```
\markup {
  \box {
    default
  }
  \hspace #4
  \box {
    \pad-to-box #'(0 . 10) #'(0 . 3) {
      padded
    }
  }
}
```



`\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*.

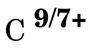
`\raise` *amount* (number) *arg* (markup)

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.

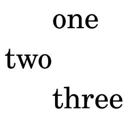
```
\markup {
  C
  \small
  \bold
  \raise #1.0
  9/7+
}
```



`\right-align` *arg* (markup)

Align *arg* on its right edge.

```
\markup {
  \column {
    one
    \right-align
    two
    three
  }
}
```



`\right-column` *args* (list of markups)

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.

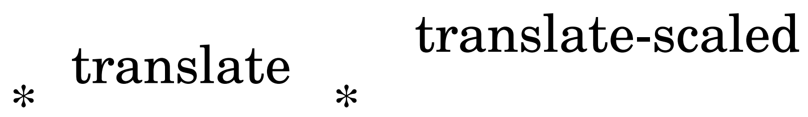
```
\markup {
  *
  \translate #'(2 . 3)
  \line { translated two spaces right, three up }
}
```

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
  }
}
```



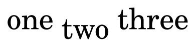
Used properties:

- `font-size` (0)

`\vcenter` *arg* (markup)

Align `arg` to its Y center.

```
\markup {
  one
  \vcenter
  two
  three
}
```



`\wordwrap-field` *symbol* (symbol)

Wordwrap the data which has been assigned to *symbol*.

```
\header {
  title = "My title"
  description = "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:descr
    }
  }
}

\markup {
  \null
}
```

`\wordwrap` *args* (list of markups)

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.
    }
  }
```

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-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:

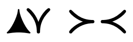
- `text-direction` (1)
- `word-space`
- `line-width`
- `baseline-skip`

B.8.3 Graphic

`\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.

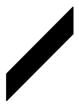
```
\markup {
  \fontsize #5 {
    \general-align #Y #DOWN {
      \arrow-head #Y #UP ##t
      \arrow-head #Y #DOWN ##f
      \hspace #2
      \arrow-head #X #RIGHT ##f
      \arrow-head #X #LEFT ##f
    }
  }
}
```



`\beam` *width* (number) *slope* (number) *thickness* (number)

Create a beam with the specified parameters.

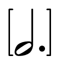
```
\markup {
  \beam #5 #1 #2
}
```



`\bracket` *arg* (markup)

Draw vertical brackets around *arg*.

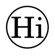
```
\markup {
  \bracket {
    \note #"2." #UP
  }
}
```



`\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
  }
}
```



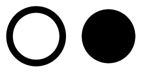
Used properties:

- `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.

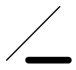
```
\markup {
  \draw-circle #2 #0.5 ##f
  \hspace #2
  \draw-circle #2 #0 ##t
}
```



`\draw-line` *dest* (pair of numbers)

A simple line.

```
\markup {
  \draw-line #'(4 . 4)
  \override #'(thickness . 5)
  \draw-line #'(-3 . 0)
}
```



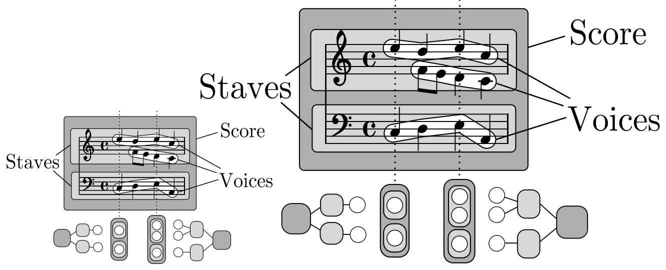
Used properties:

- `thickness` (1)

`\epsfile` *axis* (number) *size* (number) *file-name* (string)

Inline an EPS image. The image is scaled along *axis* to *size*.

```
\markup {
  \general-align #Y #DOWN {
    \epsfile #X #20 #"context-example.eps"
    \epsfile #Y #20 #"context-example.eps"
  }
}
```



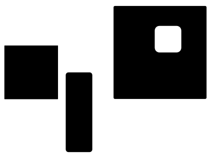
`\filled-box` *xext* (pair of numbers) *yext* (pair of numbers) *blot* (number)

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
  \filled-box #'(1 . 8) #'(0 . 7) #0.2
  \with-color #white
  \filled-box #'(-4.5 . -2.5) #'(3.5 . 5.5) #0.7
}
```



`\hbracket` *arg* (markup)

Draw horizontal brackets around *arg*.

```
\markup {
  \hbracket {
    \line {
      one two three
    }
  }
}
```

one two three

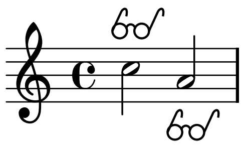
`\postscript` *str* (string)

This inserts *str* directly into the output as a PostScript command string.

```
eyeglassesps = #"
  0.15 setlinewidth
  -0.9 0 translate
  1.1 1.1 scale
  1.2 0.7 moveto
  0.7 0.7 0.5 0 361 arc
  stroke
  2.20 0.70 0.50 0 361 arc
  stroke
  1.45 0.85 0.30 0 180 arc
  stroke
  0.20 0.70 moveto
  0.80 2.00 lineto
  0.92 2.26 1.30 2.40 1.15 1.70 curveto
  stroke
  2.70 0.70 moveto
  3.30 2.00 lineto
  3.42 2.26 3.80 2.40 3.65 1.70 curveto
  stroke"

eyeglasses = \markup {
  \with-dimensions #'(0 . 4.4) #'(0 . 2.5)
  \postscript #eyeglassesps
}
```

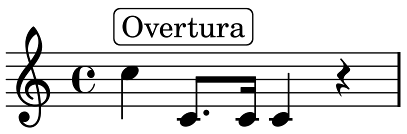
```
\relative c'' {
  c2^\eyeglasses
  a2_\eyeglasses
}
```



`\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
```



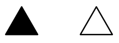
Used properties:

- `box-padding` (0.5)
- `font-size` (0)
- `corner-radius` (1)
- `thickness` (1)

`\triangle` *filled* (boolean)

A triangle, either filled or empty.

```
\markup {
  \triangle ##t
  \hspace #2
  \triangle ##f
}
```



Used properties:

- `baseline-skip` (2)
- `font-size` (0)
- `thickness` (0.1)

`\with-url` *url* (string) *arg* (markup)

Add a link to URL *url* around *arg*. This only works in the PDF backend.

```
\markup {
  \with-url #"http://lilypond.org/web/" {
    LilyPond ... \italic {
      music notation for everyone
    }
  }
}
```

LilyPond ... *music notation for everyone*

B.8.4 Music

`\doubleflat`

Draw a double flat symbol.

```
\markup {
  \doubleflat
}
```

`\doublesharp`

Draw a double sharp symbol.

```
\markup {
  \doublesharp
}
```

`\flat`

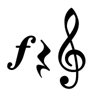
Draw a flat symbol.

```
\markup {
  \flat
}
```

`\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 Feta font" in *Notation Reference* for a complete listing of the possible glyphs.

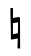
```
\markup {
  \musicglyph #"f"
  \musicglyph #"rests.2"
  \musicglyph #"clefs.G_change"
}
```



`\natural`

Draw a natural symbol.

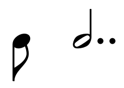
```
\markup {
  \natural
}
```



`\note-by-number` *log* (number) *dot-count* (number) *dir* (number)

Construct a note symbol, with stem. By using fractional values for *dir*, longer or shorter stems can be obtained.

```
\markup {
  \note-by-number #3 #0 #DOWN
  \hspace #2
  \note-by-number #1 #2 #0.8
}
```



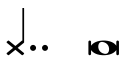
Used properties:

- `style` ('())
- `font-size` (0)

`\note` *duration* (string) *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
}
```



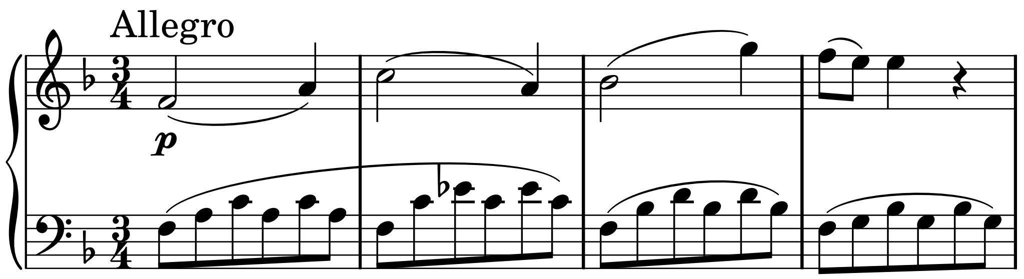
Used properties:

- `style` ('())
- `font-size` (0)

`\score` *score* (unknown)

Inline an image of music.

```
\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
      }
    }
  }
}
```



`\semiflat`

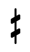
Draw a semiflat symbol.

```
\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)

Like simple-markup, but use tie characters for '~' tilde symbols.

```
\markup {
  \tied-lyric #"Lasciate~i monti"
}
```

Lasciate‿i monti

B.8.5 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 (in staff spaces). Default: 0.05.
  - `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`*** `)`
: Place a fret playing indication on string *string-number* at fret *fret-number* with an optional fingering label *finger-value*. By default, the fret playing indicator is a solid dot. This can be changed by setting the value of the variable *dot-color*. 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.

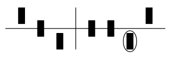
Possible elements in *definition-string*:

`^`	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:

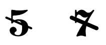
- `thickness` (0.5)
- `harp-pedal-details`
- `size` (1.0)

B.8.6 Other

`\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
}
```

A ©

`\fraction` *arg1* (markup) *arg2* (markup)

Make a fraction of two markups.

```
\markup {

  \fraction 355 113
}
```

$$\pi \approx \frac{355}{113}$$

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.

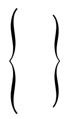
```
\header {
  myTitle = "myTitle"
  title = \markup {
    from
    \italic
    \fromproperty #'header:myTitle
  }
}
\markup {
  \null
}
```

from *myTitle*

`\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
}
```

I AA

`\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
}
```

`\null`

An empty markup with extents of a single point.

```
\markup {
  \null
}
```

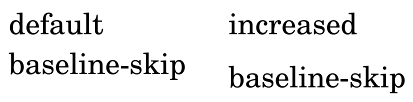
`\on-the-fly` *procedure* (symbol) *arg* (markup)

Apply the *procedure* markup command to *arg*. *procedure* should take a single argument.

`\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*.

```
\markup {
  \line {
    \column {
      default
      baseline-skip
    }
    \hspace #2
    \override #'(baseline-skip . 4) {
      \column {
        increased
        baseline-skip
      }
    }
  }
}
```



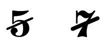
`\page-ref` *label* (symbol) *gauge* (markup) *default* (markup)

Reference to a page number. *label* is the label set on the referenced page (using the `\label` command), *gauge* a markup used to estimate the maximum width of the page number, and *default* the value to display when *label* is not found.

`\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
}
```

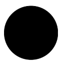


Used properties:

- `thickness` (1.6)
- `font-size` (0)

`\stencil` *stil* (unknown)
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
  }
}
```

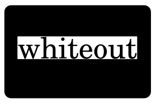
`\verbatim-file` *name* (string)
Read the contents of file *name*, and include it verbatim.

```
\markup {
  \verbatim-file #"simple.ly"
}
```

```
%% A simple piece in LilyPond, a scale.
\relative c' {
  c d e f g a b c
}
%% Optional helper for automatic updating by convert-ly.  May be omit
\version "2.12.0"
```

`\whiteout` *arg* (markup)
Provide a white background for *arg*.

```
\markup {
  \combine
    \filled-box #'(-1 . 10) #'(-3 . 4) #1
    \whiteout whiteout
}
```



`\with-color` *color* (list) *arg* (markup)
Draw *arg* in color specified by *color*.

```
\markup {
  \with-color #red
  red
  \hspace #2
  \with-color #green
  green
  \hspace #2
  \with-color #blue
  blue
}
```

red green blue

`\with-dimensions` *x* (pair of numbers) *y* (pair of numbers) *arg* (markup)
: Set the dimensions of *arg* to *x* and *y*.

B.9 Text markup list commands

The following commands can all be used with `\markuplines`.

`\column-lines` *args* (list of markups)
: 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* (list of markups)
: 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`

`\override-lines` *new-prop* (pair) *args* (list of markups)
: Like `\override`, for markup lists.

`\wordwrap-internal` *justify* (boolean) *args* (list of markups)
: Internal markup list command used to define `\justify` and `\wordwrap`.

  Used properties:

  - `text-direction` (1)
  - `word-space`
  - `line-width` (#f)

`\wordwrap-lines` *args* (list of markups)
: 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`

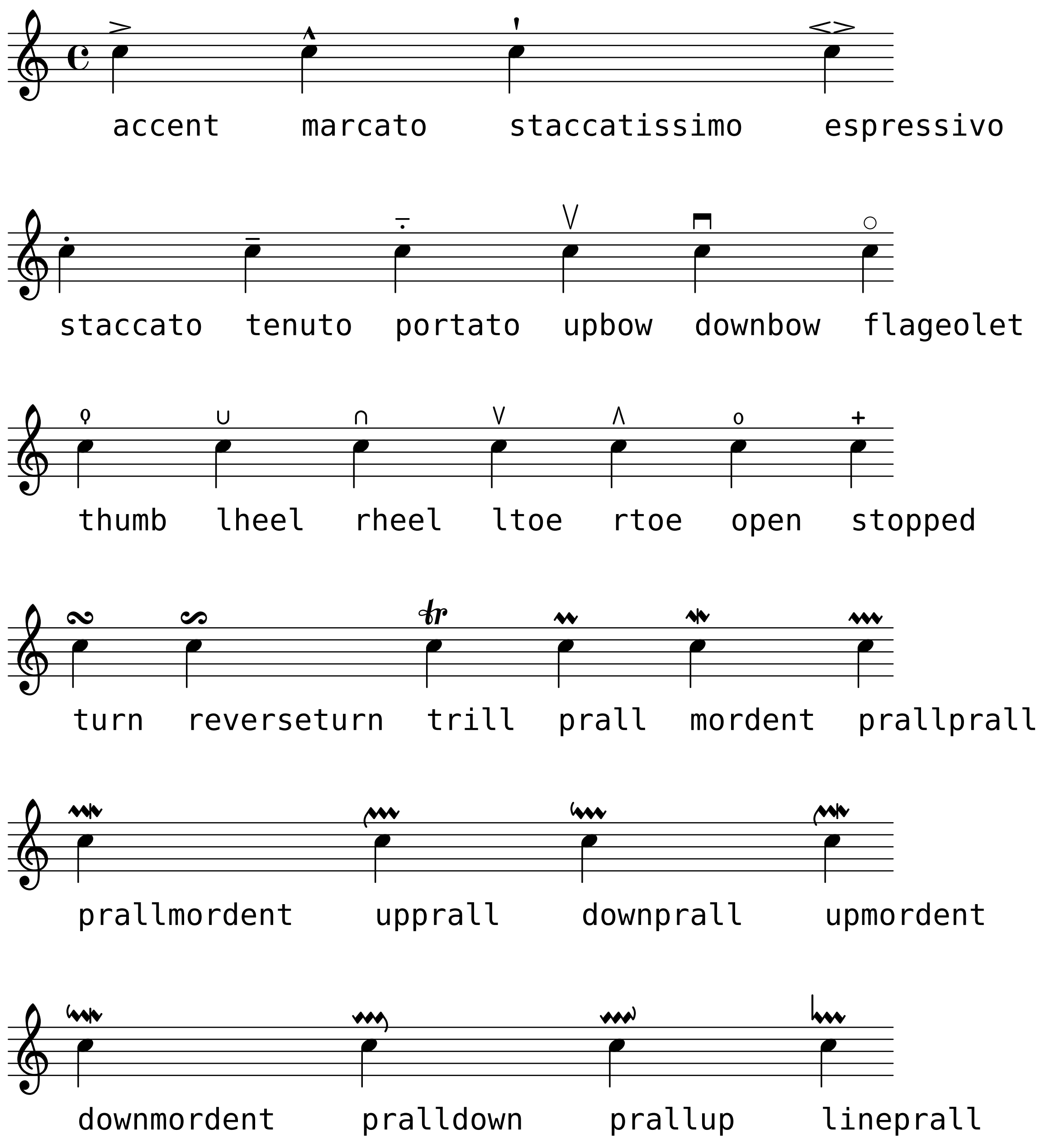
`\wordwrap-string-internal` *justify* (boolean) *arg* (string)
: Internal markup list command used to define `\justify-string` and `\wordwrap-string`.

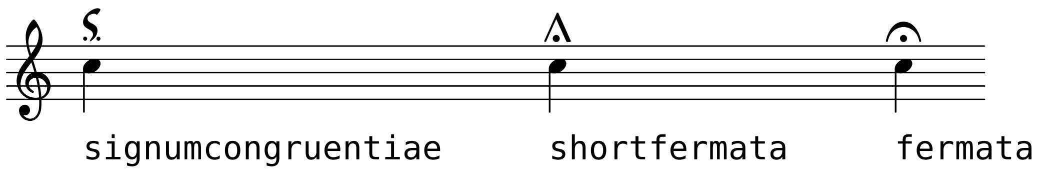
  Used properties:

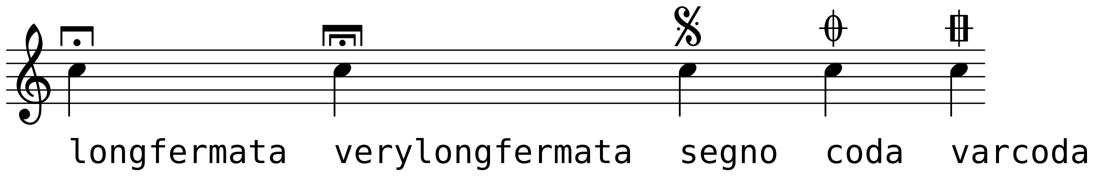
  - `text-direction` (1)
  - `word-space`
  - `line-width`

B.10 List of articulations

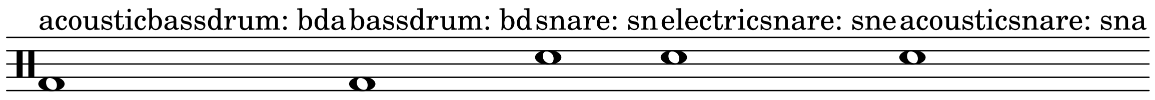
Here is a chart showing all scripts available,

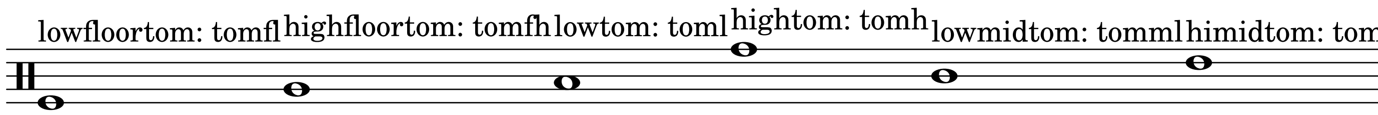


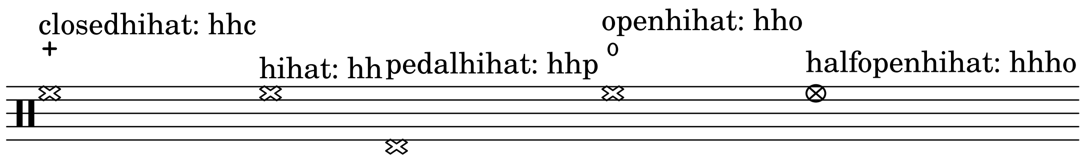


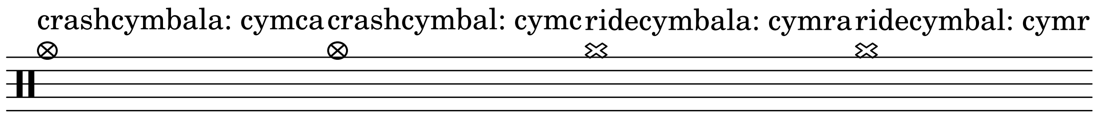


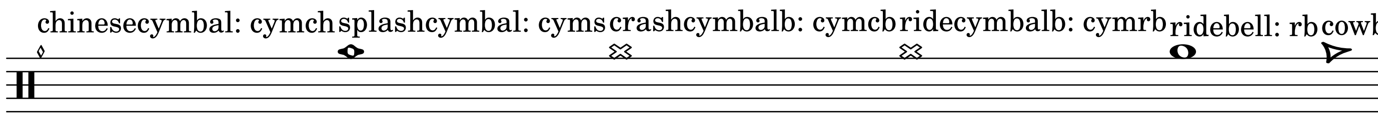
B.11 Percussion notes

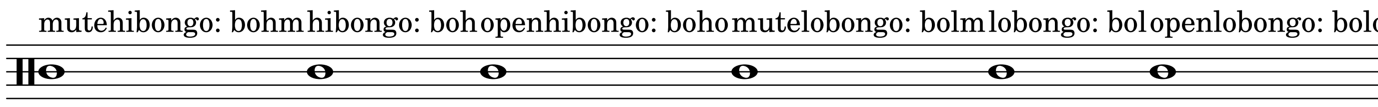


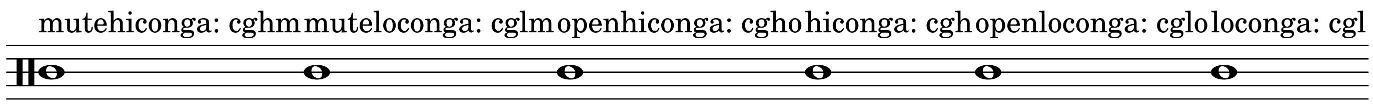


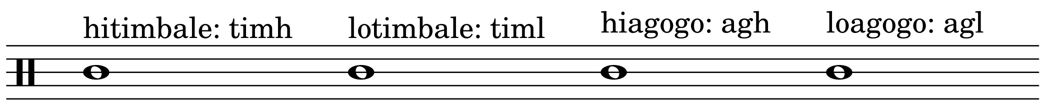


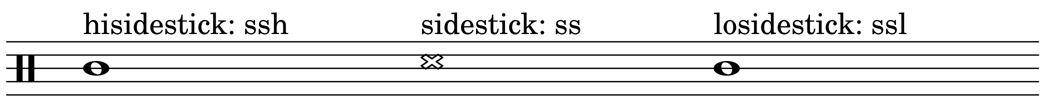


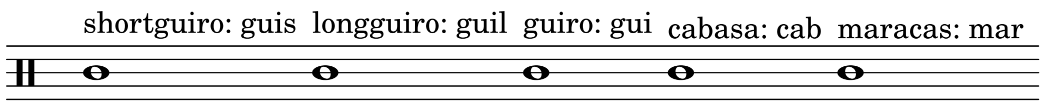


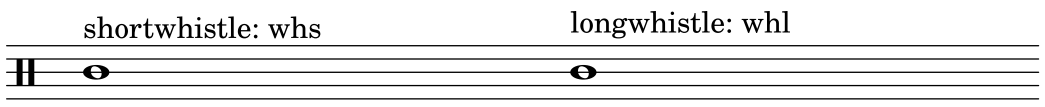


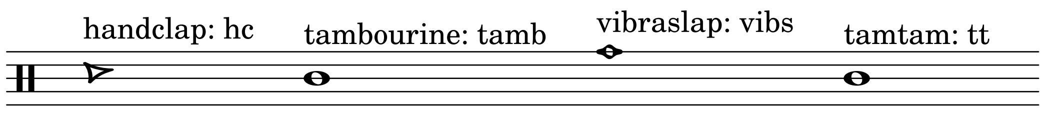


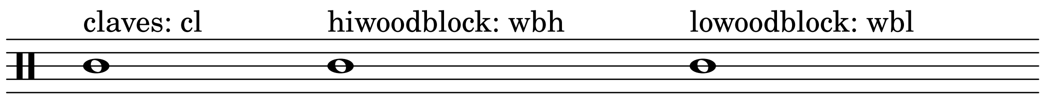


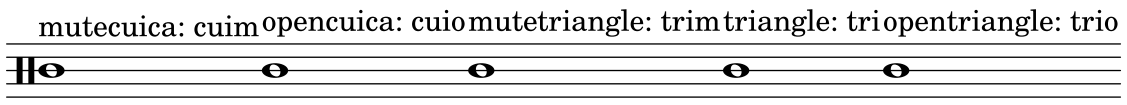


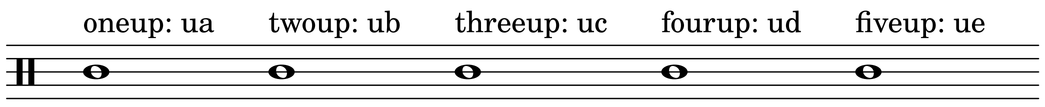


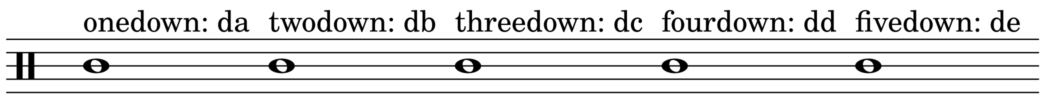












B.12 All context properties

`aDueText` (markup)
: Text to print at a unisono passage.

`alignAboveContext` (string)
: Where to insert newly created context in vertical alignment.

`alignBassFigureAccidentals` (boolean)
: If true, then the accidentals are aligned in bass figure context.

`alignBelowContext` (string)
: Where to insert newly created context in vertical alignment.

`associatedVoice` (string)
: Name of the `Voice` that has the melody for this `Lyrics` line.

`autoAccidentals` (list)
: List of different ways to typeset an accidental.

  For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used.

  Each entry in the list is either a symbol or a procedure.

  symbol The symbol is the name of the context in which the following rules are to be applied. For example, if *context* is Section "Score" in *Internals Reference* then all staves share accidentals, and if *context* is Section "Staff" in *Internals Reference* then all voices in the same staff share accidentals, but staves do not.

  procedure The procedure represents an accidental rule to be applied to the previously specified context.

  The procedure takes the following arguments:

  `context` The current context to which the rule should be applied.

  `pitch` The pitch of the note to be evaluated.

  `barnum` The current bar number.

  `measurepos`
  The current measure position.

  The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. `(#t . #f)` does not make sense.

`autoBeamCheck` (procedure)
: A procedure taking three arguments, *context*, *dir* [start/stop (-1 or 1)], and *test* [shortest note in the beam]. A non-`#f` return value starts or stops the auto beam.

`autoBeamSettings` (list)
: Specifies when automatically generated beams should begin and end. See Section "Setting automatic beam behavior" in *Notation Reference* for more information.

`autoBeaming` (boolean)
: If set to true then beams are generated automatically.

`autoCautionaries` (list)
: List similar to `autoAccidentals`, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

`automaticBars` (boolean)
: If set to false then bar lines will not be printed automatically; they must be explicitly created with a `\bar` command. Unlike the `\cadenzaOn` keyword, measures are still counted. Bar line generation will resume according to that count if this property is unset.

`barAlways` (boolean)
: If set to true a bar line is drawn after each note.

`barCheckSynchronize` (boolean)
: If true then reset `measurePosition` when finding a bar check.

`barNumberVisibility` (procedure)
: A Procedure that takes an integer and returns whether the corresponding bar number should be printed.

`bassFigureFormatFunction` (procedure)
: A procedure that is called to produce the formatting for a `BassFigure` grob. It takes a list of `BassFigureEvent`s, a context, and the grob to format.

`bassStaffProperties` (list)
: An alist of property settings to apply for the down staff of `PianoStaff`. Used by `\autochange`.

`beatGrouping` (list)
: A list of beatgroups, e.g., in 5/8 time `'(2 3)`.

`beatLength` (moment)
: The length of one beat in this time signature.

`chordChanges` (boolean)
: Only show changes in chords scheme?

`chordNameExceptions` (list)
: An alist of chord exceptions. Contains `(`*`chord`*` . `*`markup`*`)` entries.

`chordNameExceptionsFull` (list)
: An alist of full chord exceptions. Contains `(`*`chord`*` . `*`markup`*`)` entries.

`chordNameExceptionsPartial` (list)
: An alist of partial chord exceptions. Contains `(`*`chord`*` . (`*`prefix-markup suffix-markup`*`))` entries.

`chordNameFunction` (procedure)
: The function that converts lists of pitches to chord names.

`chordNameSeparator` (markup)
: The markup object used to separate parts of a chord name.

`chordNoteNamer` (procedure)
: A function that converts from a pitch object to a text markup. Used for single pitches.

`chordPrefixSpacer` (number)
: The space added between the root symbol and the prefix of a chord name.

`chordRootNamer` (procedure)
: A function that converts from a pitch object to a text markup. Used for chords.

`clefGlyph` (string)
: Name of the symbol within the music font.

`clefOctavation` (integer)
: Add this much extra octavation. Values of 7 and -7 are common.

`clefPosition` (number)
: Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

`completionBusy` (boolean)
: Whether a completion-note head is playing.

`connectArpeggios` (boolean)
: If set, connect arpeggios across piano staff.

`countPercentRepeats` (boolean)
: If set, produce counters for percent repeats.

`createKeyOnClefChange` (boolean)
: Print a key signature whenever the clef is changed.

`createSpacing` (boolean)
: Create `StaffSpacing` objects? Should be set for staves.

`crescendoSpanner` (symbol)
: The type of spanner to be used for crescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin crescendo is used.

`crescendoText` (markup)
: The text to print at start of non-hairpin crescendo, i.e., '`cresc.`'.

`currentBarNumber` (integer)
: Contains the current barnumber. This property is incremented at every bar line.

`decrescendoSpanner` (symbol)
: The type of spanner to be used for decrescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin decrescendo is used.

`decrescendoText` (markup)
: The text to print at start of non-hairpin decrescendo, i.e., '`dim.`'.

`defaultBarType` (string)
: Set the default type of bar line. See `whichBar` for information on available bar types.

  This variable is read by Section "Timing_translator" in *Internals Reference* at Section "Score" in *Internals Reference* level.

`doubleRepeatType` (string)
: Set the default bar line for double repeats.

`doubleSlurs` (boolean)
: If set, two slurs are created for every slurred note, one above and one below the chord.

`drumPitchTable` (hash table)
: A table mapping percussion instruments (symbols) to pitches.

`drumStyleTable` (hash table)
: A hash table which maps drums to layout settings. Predefined values: '`drums-style`', '`timbales-style`', '`congas-style`', '`bongos-style`', and '`percussion-style`'.

  The layout style is a hash table, containing the drum-pitches (e.g., the symbol '`hihat`') as keys, and a list `(`*`notehead-style script vertical-position`*`)` as values.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`explicitKeySignatureVisibility` (vector)
: '`break-visibility`' function for explicit key changes. '`\override`' of the `break-visibility` property will set the visibility for normal (i.e., at the start of the line) key signatures.

`extendersOverRests` (boolean)
: Whether to continue extenders as they cross a rest.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals changing from a non-natural to another non-natural.

`figuredBassAlterationDirection` (direction)
: Where to put alterations relative to the main figure.

`figuredBassCenterContinuations` (boolean)
: Whether to vertically center pairs of extender lines. This does not work with three or more lines.

`figuredBassFormatter` (procedure)
: A routine generating a markup for a bass figure.

`figuredBassPlusDirection` (direction)
: Where to put plus signs relative to the main figure.

`fingeringOrientations` (list)
: A list of symbols, containing '`left`', '`right`', '`up`' and/or '`down`'. This list determines where fingerings are put relative to the chord being fingered.

`firstClef` (boolean)
: If true, create a new clef when starting a staff.

`followVoice` (boolean)
: If set, note heads are tracked across staff switches by a thin line.

`fontSize` (number)
: The relative size of all grobs in a context.

`forbidBreak` (boolean)
: If set to `##t`, prevent a line break at this point.

`forceClef` (boolean)
: Show clef symbol, even if it has not changed. Only active for the first clef after the property is set, not for the full staff.

`gridInterval` (moment)
: Interval for which to generate `GridPoints`.

`harmonicAccidentals` (boolean)
: If set, harmonic notes in chords get accidentals.

`harmonicDots` (boolean)
: If set, harmonic notes in dotted chords get dots.

`highStringOne` (boolean)
: Whether the first string is the string with highest pitch on the instrument. This used by the automatic string selector for tablature notation.

`ignoreBarChecks` (boolean)
: Ignore bar checks.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`ignoreMelismata` (boolean)
: Ignore melismata for this Section "Lyrics" in *Internals Reference* line.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`implicitTimeSignatureVisibility` (vector)
: break visibility for the default time signature.

`instrumentCueName` (markup)
: The name to print if another instrument is to be taken.

`instrumentEqualizer` (procedure)
: A function taking a string (instrument name), and returning a `(`*`min`*` . `*`max`*`)` pair of numbers for the loudness range of the instrument.

`instrumentName` (markup)
: The name to print left of a staff. The `instrument` property labels the staff in the first system, and the `instr` property labels following lines.

`instrumentTransposition` (pitch)
: Define the transposition of the instrument. Its value is the pitch that sounds like middle C. This is used to transpose the MIDI output, and `\quote`s.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

`keyAlterationOrder` (list)
: An alist that defines in what order alterations should be printed. The format is `(`*`step`*` . `*`alter`*`)`, where *step* is a number from 0 to 6 and *alter* from -2 (sharp) to 2 (flat).

`keySignature` (list)
: The current key signature. This is an alist containing `(`*`step`*` . `*`alter`*`)` or `((`*`octave`*` . `*`step`*`) . `*`alter`*`)`, where *step* is a number in the range 0 to 6 and *alter* a fraction, denoting alteration. For alterations, use symbols, e.g. `keySignature = #`((6 . ,FLAT))`.

`lyricMelismaAlignment` (direction)
: Alignment to use for a melisma syllable.

`majorSevenSymbol` (markup)
: How should the major 7th be formatted in a chord name?

`markFormatter` (procedure)
: A procedure taking as arguments the context and the rehearsal mark. It should return the formatted mark as a markup object.

`maximumFretStretch` (number)
: Don't allocate frets further than this from specified frets.

`measureLength` (moment)
: Length of one measure in the current time signature.

`measurePosition` (moment)
: How much of the current measure have we had. This can be set manually to create incomplete measures.

`melismaBusyProperties` (list)
: A list of properties (symbols) to determine whether a melisma is playing. Setting this property will influence how lyrics are aligned to notes. For example, if set to `#'(melismaBusy beamMelismaBusy)`, only manual melismata and manual beams are considered. Possible values include `melismaBusy`, `slurMelismaBusy`, `tieMelismaBusy`, and `beamMelismaBusy`.

`metronomeMarkFormatter` (procedure)
: How to produce a metronome markup. Called with four arguments: text, duration, count and context.

`middleCClefPosition` (number)
: The position of the middle C, as determined only by the clef. This can be calculated by looking at `clefPosition` and `clefGlyph`.

`middleCOffset` (number)
: The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

`middleCPosition` (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

`midiInstrument` (string)
: Name of the MIDI instrument to use.

`midiMaximumVolume` (number)
: Analogous to `midiMinimumVolume`.

`midiMinimumVolume` (number)
: Set the minimum loudness for MIDI. Ranges from 0 to 1.

`minimumFret` (number)
: The tablature auto string-selecting mechanism selects the highest string with a fret at least `minimumFret`.

`minimumPageTurnLength` (moment)
: Minimum length of a rest for a page turn to be allowed.

`minimumRepeatLengthForPageTurn` (moment)
: Minimum length of a repeated section for a page turn to be allowed within that section.

`noteToFretFunction` (procedure)
: How to produce a fret diagram. Parameters: A list of note events and a list of tabstring events.

`ottavation` (markup)
: If set, the text for an ottava spanner. Changing this creates a new text spanner.

`output` (unknown)
: The output produced by a score-level translator during music interpretation.

`pedalSostenutoStrings` (list)
: See `pedalSustainStrings`.

`pedalSostenutoStyle` (symbol)
: See `pedalSustainStyle`.

`pedalSustainStrings` (list)
: A list of strings to print for sustain-pedal. Format is `(`*`up updown down`*`)`, where each of the three is the string to print when this is done with the pedal.

`pedalSustainStyle` (symbol)
: A symbol that indicates how to print sustain pedals: `text`, `bracket` or `mixed` (both).

`pedalUnaCordaStrings` (list)
: See `pedalSustainStrings`.

`pedalUnaCordaStyle` (symbol)
: See `pedalSustainStyle`.

`predefinedDiagramTable` (hash table)
: The hash table of predefined fret diagrams to use in FretBoards.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

`printOctaveNames` (boolean)
: Print octave marks for the `NoteNames` context.

`printPartCombineTexts` (boolean)
: Set 'Solo' and 'A due' texts in the part combiner?

`proportionalNotationDuration` (moment)
: Global override for shortest-playing duration. This is used for switching on proportional notation.

`recordEventSequence` (procedure)
: When `Recording_group_engraver` is in this context, then upon termination of the context, this function is called with current context and a list of music objects. The list of contains entries with start times, music objects and whether they are processed in this context.

`rehearsalMark` (integer)
: The last rehearsal mark printed.

`repeatCommands` (list)
: This property is a list of commands of the form `(list 'volta x)`, where *x* is a string or `#f`. `'end-repeat` is also accepted as a command.

`repeatCountVisibility` (procedure)
: A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when `countPercentRepeats` is set.

`restNumberThreshold` (number)
: If a multimeasure rest has more measures than this, a number is printed.

`shapeNoteStyles` (vector)
: Vector of symbols, listing style for each note head relative to the tonic (qv.) of the scale.

`shortInstrumentName` (markup)
: See `instrument`.

`shortVocalName` (markup)
: Name of a vocal line, short version.

`skipBars` (boolean)
: If set to true, then skip the empty bars that are produced by multimeasure notes and rests. These bars will not appear on the printed output. If not set (the default), multimeasure notes and rests expand into their full length, printing the appropriate number of empty bars so that synchronization with other voices is preserved.

```
{
  r1 r1*3 R1*3
  \set Score.skipBars= ##t
  r1*3 R1*3
}
```

`skipTypesetting` (boolean)
: If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

`soloIIText` (markup)
: The text for the start of a solo for voice 'two' when part-combining.

`soloText` (markup)
: The text for the start of a solo when part-combining.

`squashedPosition` (integer)
: Vertical position of squashing for Section "Pitch_squash_engraver" in *Internals Reference*.

`staffLineLayoutFunction` (procedure)
: Layout of staff lines, `traditional`, or `semitone`.

`stanza` (markup)
: Stanza 'number' to print before the start of a verse. Use in `Lyrics` context.

`stemLeftBeamCount` (integer)
: Specify the number of beams to draw on the left side of the next note. Overrides automatic beaming. The value is only used once, and then it is erased.

`stemRightBeamCount` (integer)
: See `stemLeftBeamCount`.

`stringNumberOrientations` (list)
: See `fingeringOrientations`.

`stringOneTopmost` (boolean)
: Whether the first string is printed on the top line of the tablature.

`stringTunings` (list)
: The tablature strings tuning. It is a list of the pitch (in semitones) of each string (starting with the lower one).

`strokeFingerOrientations` (list)
: See `fingeringOrientations`.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at beat positions by only drawing one beam over the beat.

`suggestAccidentals` (boolean)
: If set, accidentals are typeset as cautionary suggestions over the note.

`systemStartDelimiter` (symbol)
: Which grob to make for the start of the system/staff? Set to `SystemStartBrace`, `SystemStartBracket` or `SystemStartBar`.

`systemStartDelimiterHierarchy` (pair)
: A nested list, indicating the nesting of a start delimiters.

`tablatureFormat` (procedure)
: A function formatting a tablature note head. Called with three arguments: string number, context and event. It returns the text as a string.

`tempoHideNote` (boolean)
: Hide the note=count in tempo marks.

`tempoText` (markup)
: Text for tempo marks.

`tempoUnitCount` (number)
: Count for specifying tempo.

`tempoUnitDuration` (duration)
: Unit for specifying tempo.

`tempoWholesPerMinute` (moment)
: The tempo in whole notes per minute.

`tieWaitForNote` (boolean)
: If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

`timeSignatureFraction` (pair of numbers)
: A pair of numbers, signifying the time signature. For example, `#'(4 . 4)` is a 4/4 time signature.

`timing` (boolean)
: Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

`tonic` (pitch)
: The tonic of the current scale.

`trebleStaffProperties` (list)
: An alist of property settings to apply for the up staff of `PianoStaff`. Used by `\autochange`.

`tremoloFlags` (integer)
: The number of tremolo flags to add if no number is specified.

`tupletFullLength` (boolean)
: If set, the tuplet is printed up to the start of the next note.

`tupletFullLengthNote` (boolean)
: If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

`tupletSpannerDuration` (moment)
: Normally, a tuplet bracket is as wide as the `\times` expression that gave rise to it. By setting this property, you can make brackets last shorter.

```
{
  \set tupletSpannerDuration = #(ly:make-moment 1 4)
  \times 2/3 { c8 c c c c c }
}
```

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

`verticallySpacedContexts` (list)
: List of symbols, containing context names whose vertical axis groups should be taken into account for vertical spacing of systems.

`vocalName` (markup)
: Name of a vocal line.

`voltaSpannerDuration` (moment)
: This specifies the maximum duration to use for the brackets printed for `\alternative`. This can be used to shrink the length of brackets in the situation where one alternative is very large.

`whichBar` (string)
: This property is read to determine what type of bar line to create.

  Example:

`\set Staff.whichBar = "|:"`

This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

B.13 Layout properties

`X-extent` (pair of numbers)
: Hard coded extent in X direction.

`X-offset` (number)
: The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers)
: Hard coded extent in Y direction.

`Y-offset` (number)
: The vertical amount that this object is moved relative to its Y-parent.

`add-stem-support` (boolean)
: If set, the `Stem` object is included in this script's support.

`after-line-breaking` (boolean)
: Dummy property, used to trigger callback for `after-line-breaking`.

`align-dir` (direction)
: Which side to align? `-1`: left side, `0`: around center of width, `1`: right side.

`allow-loose-spacing` (boolean)
: If set, column can be detached from main spacing.

`allow-span-bar` (boolean)
: If false, no inter-staff bar line will be created below this bar line.

`alteration` (number)
: Alteration numbers for accidental.

`alteration-alist` (list)
: List of `(`*`pitch . accidental`*`)` pairs for key signature.

`annotation` (string)
: Annotate a grob for debug purposes.

`arpeggio-direction` (direction)
: If set, put an arrow on the arpeggio squiggly line.

`arrow-length` (number)
: Arrow length.

`arrow-width` (number)
: Arrow width.

`auto-knee-gap` (dimension, in staff space)
: If a gap is found between note heads where a horizontal beam fits that is larger than this number, make a kneed beam.

`average-spacing-wishes` (boolean)
: If set, the spacing wishes are averaged over staves.

`avoid-note-head` (boolean)
: If set, the stem of a chord does not pass through all note heads, but starts at the last note head.

`avoid-slur` (symbol)
: Method of handling slur collisions. Choices are `around`, `inside`, `outside`. If unset, scripts and slurs ignore each other. `around` only moves the script if there is a collision; `outside` always moves the script.

`axes` (list)
: List of axis numbers. In the case of alignment grobs, this should contain only one number.

`bar-size` (dimension, in staff space)
: The size of a bar line.

`base-shortest-duration` (moment)
: Spacing is based on the shortest notes in a piece. Normally, pieces are spaced as if notes at least as short as this are present.

`baseline-skip` (dimension, in staff space)
: Distance between base lines of multiple lines of text.

`beam-thickness` (dimension, in staff space)
: Beam thickness, measured in `staff-space` units.

`beam-width` (dimension, in staff space)
: Width of the tremolo sign.

`beamed-stem-shorten` (list)
: How much to shorten beamed stems, when their direction is forced. It is a list, since the value is different depending on the number of flags and beams.

`beaming` (pair)
: Pair of number lists. Each number list specifies which beams to make. `0` is the central beam, `1` is the next beam toward the note, etc. This information is used to determine how to connect the beaming patterns from stem to stem inside a beam.

`beamlet-default-length` (pair)
: A pair of numbers. The first number specifies the default length of a beamlet that sticks out of the left hand side of this stem; the second number specifies the default length of the beamlet to the right. The actual length of a beamlet is determined by taking either the default length or the length specified by `beamlet-max-length-proportion`, whichever is smaller.

`beamlet-max-length-proportion` (pair)
: The maximum length of a beamlet, as a proportion of the distance between two adjacent stems.

`before-line-breaking` (boolean)
: Dummy property, used to trigger a callback function.

`between-cols` (pair)
: Where to attach a loose column to.

`bound-details` (list)
: An alist of properties for determining attachments of spanners to edges.

`bound-padding` (number)
: The amount of padding to insert around spanner bounds.

`bracket-flare` (pair of numbers)
: A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

`bracket-visibility` (boolean or symbol)
: This controls the visibility of the tuplet bracket. Setting it to false prevents printing of the bracket. Setting the property to `if-no-beam` makes it print only if there is no beam associated with this tuplet bracket.

`break-align-anchor` (number)
: Grobs aligned to this break-align grob will have their X-offsets shifted by this number. In bar lines, for example, this is used to position grobs relative to the (visual) center of the bar line.

`break-align-anchor-alignment` (number)
: Read by `ly:break-aligned-interface::calc-extent-aligned-anchor` for aligning an anchor to a grob's extent

`break-align-orders` (vector)
: Defines the order in which prefatory matter (clefs, key signatures) appears. The format is a vector of length 3, where each element is one order for end-of-line, middle of line, and start-of-line, respectively. An order is a list of symbols.

  For example, clefs are put after key signatures by setting

```
\override Score.BreakAlignment #'break-align-orders =
  #(make-vector 3 '(span-bar
                    breathing-sign
                    staff-bar
                    key
                    clef
                    time-signature))
```

`break-align-symbol` (symbol)
: This key is used for aligning and spacing breakable items.

`break-align-symbols` (list)
: A list of symbols that determine which break-aligned grobs to align this to. If the grob selected by the first symbol in the list is invisible due to break-visibility, we will align to the next grob (and so on).

`break-overshoot` (pair of numbers)
: How much does a broken spanner stick out of its bounds?

`break-visibility` (vector)
: A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`breakable` (boolean)
: Allow breaks here.

`c0-position` (integer)
: An integer indicating the position of middle C.

`circled-tip` (boolean)
: Put a circle at start/end of hairpins (al/del niente).

`clip-edges` (boolean)
: Allow outward pointing beamlets at the edges of beams?

`collapse-height` (dimension, in staff space)
: Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.

`color` (list)
: The color of this grob.

`common-shortest-duration` (moment)
: The most common shortest note length. This is used in spacing. Enlarging this sets the score tighter.

`concaveness` (number)
: A beam is concave if its inner stems are closer to the beam than the two outside stems. This number is a measure of the closeness of the inner stems. It is used for damping the slope of the beam.

`connect-to-neighbor` (pair)
: Pair of booleans, indicating whether this grob looks as a continued break.

`control-points` (list)
: List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

`damping` (number)
: Amount of beam slope damping.

`dash-fraction` (number)
: Size of the dashes, relative to `dash-period`. Should be between `0.0` (no line) and `1.0` (continuous line).

`dash-period` (number)
: The length of one dash together with whitespace. If negative, no line is drawn at all.

`default-direction` (direction)
: Direction determined by note head positions.

`digit-names` (unknown)
: Names for string finger digits.

`direction` (direction)
: If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`dot-count` (integer)
: The number of dots.

`dot-negative-kern` (number)
: The space to remove between a dot and a slash in percent repeat glyphs. Larger values bring the two elements closer together.

`dot-placement-list` (list)
: List consisting of `(`*`description string-number fret-number finger-number`*`)` entries used to define fret diagrams.

`duration-log` (integer)
: The 2-log of the note head duration, i.e., `0` = whole note, `1` = half note, etc.

`eccentricity` (number)
: How asymmetrical to make a slur. Positive means move the center to the right.

`edge-height` (pair)
: A pair of numbers specifying the heights of the vertical edges: `(`*`left-height`*` . `*`right-height`*`)`.

`edge-text` (pair)
: A pair specifying the texts to be set at the edges: `(`*`left-text`*` . `*`right-text`*`)`.

`expand-limit` (integer)
: Maximum number of measures expanded in church rests.

`extra-X-extent` (pair of numbers)
: A grob is enlarged in X dimension by this much.

`extra-Y-extent` (pair of numbers)
: A grob is enlarged in Y dimension by this much.

`extra-dy` (number)
: Slope glissandi this much extra.

`extra-offset` (pair of numbers)
: A pair representing an offset. This offset is added just before outputting the symbol, so the typesetting engine is completely oblivious to it. The values are measured in `staff-space` units of the staff's `StaffSymbol`.

`extra-spacing-height` (pair of numbers)
: In the horizontal spacing problem, we increase the height of each item by this amount (by adding the 'car' to the bottom of the item and adding the 'cdr' to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to `(-inf.0 . +inf.0)`.

`extra-spacing-width` (pair of numbers)
: In the horizontal spacing problem, we pad each item by this amount (by adding the 'car' on the left side of the item and adding the 'cdr' on the right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

`flag` (unknown)
: A function returning the full flag stencil for the `Stem`, which is passed to the function as the only argument. The default ly:stem::calc-stencil function uses the `flag-style` property to determine the correct glyph for the flag. By providing your own function, you can create arbitrary flags.

`flag-count` (number)
: The number of tremolo beams.

`flag-style` (symbol)
: A symbol determining what style of flag glyph is typeset on a `Stem`. Valid options include `'()` for standard flags, `'mensural` and `'no-flag`, which switches off the flag.

`font-encoding` (symbol)
: The font encoding is the broadest category for selecting a font. Currently, only lilypond's system fonts (Emmentaler and Aybabtu) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces` (Aybabtu), `fetaNumber` (Emmentaler), and `fetaDynamic` (Emmentaler).

`font-family` (symbol)
: The font family is the broadest category for selecting text fonts. Options include: `sans`, `roman`.

`font-name` (string)
: Specifies a file name (without extension) of the font to load. This setting overrides selection using `font-family`, `font-series` and `font-shape`.

`font-series` (symbol)
: Select the series of a font. Choices include `medium`, `bold`, `bold-narrow`, etc.

`font-shape` (symbol)
: Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`font-size` (number)
: The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. Fractional values are allowed.

`force-hshift` (number)
: This specifies a manual shift for notes in collisions. The unit is the note head width of the first voice note. This is used by Section "note-collision-interface" in *Internals Reference*.

`fraction` (pair of numbers)
: Numerator and denominator of a time signature object.

`french-beaming` (boolean)
: Use French beaming style for this stem. The stem stops at the innermost beams.

`fret-diagram-details` (list)
: An alist of detailed grob properties for fret diagrams. Each alist entry consists of a `(`*`property . value`*`)` pair. The properties which can be included in `fret-diagram-details` include the following:

- `barre-type` – Type of barre indication used. Choices include `curved`, `straight`, and `none`. Default `curved`.
- `capo-thickness` – Thickness of capo indicator, in multiples of fret-space. Default value 0.5.
- `dot-color` – Color of dots. Options include `black` and `white`. Default `black`.
- `dot-label-font-mag` – Magnification for font used to label fret dots. Default value 1.
- `dot-position` – Location of dot in fret space. Default 0.6 for dots without labels, 0.95-`dot-radius` for dots with labels.
- `dot-radius` – Radius of dots, in terms of fret spaces. Default value 0.425 for labeled dots, 0.25 for unlabeled dots.
- `finger-code` – Code for the type of fingering indication used. Options include `none`, `in-dot`, and `below-string`. Default `none` for markup fret diagrams, `below-string` for `FretBoards` fret diagrams.
- `fret-count` – The number of frets. Default 4.
- `fret-label-font-mag` – The magnification of the font used to label the lowest fret number. Default 0.5.
- `fret-label-vertical-offset` – The offset of the fret label from the center of the fret in direction parallel to strings. Default 0.
- `label-dir` – Side to which the fret label is attached. `-1`, `#LEFT`, or `#DOWN` for left or down; `1`, `#RIGHT`, or `#UP` for right or up. Default `#RIGHT`.
- `mute-string` – Character string to be used to indicate muted string. Default `"x"`.
- `number-type` – Type of numbers to use in fret label. Choices include `roman-lower`, `roman-upper`, and `arabic`. Default `roman-lower`.
- `open-string` – Character string to be used to indicate open string. Default `"o"`.

- `orientation` – Orientation of fret-diagram. Options include `normal`, `landscape`, and `opposing-landscape`. Default `normal`.
- `string-count` – The number of strings. Default 6.
- `string-label-font-mag` – The magnification of the font used to label fingerings at the string, rather than in the dot. Default value 0.6 for `normal` orientation, 0.5 for `landscape` and `opposing-landscape`.
- `string-thickness-factor` – Factor for changing thickness of each string in the fret diagram. Thickness of string *k* is given by `thickness` * (1+`string-thickness-factor`) ^ (*k*-1). Default 0.
- `top-fret-thickness` – The thickness of the top fret line, as a multiple of the standard thickness. Default value 3.
- `xo-font-magnification` – Magnification used for mute and open string indicators. Default value 0.5.
- `xo-padding` – Padding for open and mute indicators from top fret. Default value 0.25.

`full-length-padding` (number)
: How much padding to use at the right side of a full-length tuplet bracket.

`full-length-to-extent` (boolean)
: Run to the extent of the column for a full-length tuplet bracket.

`full-measure-extra-space` (number)
: Extra space that is allocated at the beginning of a measure with only one note. This property is read from the NonMusicalPaperColumn that begins the measure.

`full-size-change` (boolean)
: Don't make a change clef smaller.

`gap` (dimension, in staff space)
: Size of a gap in a variable symbol.

`gap-count` (integer)
: Number of gapped beams for tremolo.

`glyph` (string)
: A string determining what 'style' of glyph is typeset. Valid choices depend on the function that is reading this property.

`glyph-name-alist` (list)
: An alist of key-string pairs.

`grow-direction` (direction)
: Crescendo or decrescendo?

`hair-thickness` (number)
: Thickness of the thin line in a bar line.

`harp-pedal-details` (list)
: An alist of detailed grob properties for harp pedal diagrams. Each alist entry consists of a `(`*`property . value`*`)` pair. The properties which can be included in harp-pedal-details include the following:

- `box-offset` – Vertical shift of the center of flat/sharp pedal boxes above/below the horizontal line. Default value 0.8.
- `box-width` – Width of each pedal box. Default value 0.4.
- `box-height` – Height of each pedal box. Default value 1.0.

- `space-before-divider` – Space between boxes before the first divider (so that the diagram can be made symmetric). Default value 0.8.
- `space-after-divider` – Space between boxes after the first divider. Default value 0.8.
- `circle-thickness` – Thickness (in unit of the line-thickness) of the ellipse around circled pedals. Default value 0.5.
- `circle-x-padding` – Padding in X direction of the ellipse around circled pedals. Default value 0.15.
- `circle-y-padding` – Padding in Y direction of the ellipse around circled pedals. Default value 0.2.

`head-direction` (direction)
: Are the note heads left or right in a semitie?

`height` (dimension, in staff space)
: Height of an object in `staff-space` units.

`height-limit` (dimension, in staff space)
: Maximum slur height: The longer the slur, the closer it is to this height.

`horizontal-shift` (integer)
: An integer that identifies ranking of `NoteColumns` for horizontal shifting. This is used by Section "note-collision-interface" in *Internals Reference*.

`horizontal-skylines` (unknown)
: Two skylines, one to the left and one to the right of this grob.

`ignore-collision` (boolean)
: If set, don't do note collision resolution on this `NoteColumn`.

`implicit` (boolean)
: Is this an implicit bass figure?

`inspect-index` (integer)
: If debugging is set, set beam and slur configuration to this index, and print the respective scores.

`inspect-quants` (pair of numbers)
: If debugging is set, set beam and slur quants to this position, and print the respective scores.

`keep-fixed-while-stretching` (boolean)
: A grob with this property set to true is fixed relative to the staff above it when systems are stretched.

`keep-inside-line` (boolean)
: If set, this column cannot have objects sticking into the margin.

`kern` (dimension, in staff space)
: Amount of extra white space to add. For bar lines, this is the amount of space after a thick line.

`knee` (boolean)
: Is this beam kneed?

`knee-spacing-correction` (number)
: Factor for the optical correction amount for kneed beams. Set between `0` for no correction and `1` for full correction.

`labels` (list)
: List of labels (symbols) placed on a column

`layer` (integer)
: The output layer (a value between 0 and 2): Layers define the order of printing objects. Objects in lower layers are overprinted by objects in higher layers.

`ledger-line-thickness` (pair of numbers)
: The thickness of ledger lines. It is the sum of 2 numbers: The first is the factor for line thickness, and the second for staff space. Both contributions are added.

`left-bound-info` (list)
: An alist of properties for determining attachments of spanners to edges.

`left-padding` (dimension, in staff space)
: The amount of space that is put left to an object (e.g., a group of accidentals).

`length` (dimension, in staff space)
: User override for the stem length of unbeamed stems.

`length-fraction` (number)
: Multiplier for lengths. Used for determining ledger lines and stem lengths.

`line-break-penalty` (number)
: Penalty for a line break at this column. This affects the choices of the line breaker; it avoids a line break at a column with a positive penalty and prefers a line break at a column with a negative penalty.

`line-break-permission` (symbol)
: Instructs the line breaker on whether to put a line break at this column. Can be `force` or `allow`.

`line-break-system-details` (list)
: An alist of properties to use if this column is the start of a system.

`line-count` (integer)
: The number of staff lines.

`line-positions` (list)
: Vertical positions of staff lines.

`line-thickness` (number)
: The thickness of the tie or slur contour.

`long-text` (markup)
: Text markup. See Section “Formatting text” in *Notation Reference*.

`max-beam-connect` (integer)
: Maximum number of beams to connect to beams from this stem. Further beams are typeset as beamlets.

`max-stretch` (number)
: The maximum amount that this `VerticalAxisGroup` can be vertically stretched (for example, in order to better fill a page).

`measure-count` (integer)
: The number of measures for a multi-measure rest.

`measure-length` (moment)
: Length of a measure. Used in some spacing situations.

`merge-differently-dotted` (boolean)
: Merge note heads in collisions, even if they have a different number of dots. This is normal notation for some types of polyphonic music.

  `merge-differently-dotted` only applies to opposing stem directions (i.e., voice 1 & 2).

`merge-differently-headed` (boolean)
: Merge note heads in collisions, even if they have different note heads. The smaller of the two heads is rendered invisible. This is used in polyphonic guitar notation. The value of this setting is used by Section "note-collision-interface" in *Internals Reference*.

  `merge-differently-headed` only applies to opposing stem directions (i.e., voice 1 & 2).

`minimum-X-extent` (pair of numbers)
: Minimum size of an object in X dimension, measured in `staff-space` units.

`minimum-Y-extent` (pair of numbers)
: Minimum size of an object in Y dimension, measured in `staff-space` units.

`minimum-distance` (dimension, in staff space)
: Minimum distance between rest and notes or beam.

`minimum-length` (dimension, in staff space)
: Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

`minimum-length-fraction` (number)
: Minimum length of ledger line as fraction of note head size.

`minimum-space` (dimension, in staff space)
: Minimum distance that the victim should move (after padding).

`neutral-direction` (direction)
: Which direction to take in the center of the staff.

`neutral-position` (number)
: Position (in half staff spaces) where to flip the direction of custos stem.

`next` (layout object)
: Object that is next relation (e.g., the lyric syllable following an extender).

`no-alignment` (boolean)
: If set, don't place this grob in a `VerticalAlignment`; rather, place it using its own `Y-offset` callback.

`no-ledgers` (boolean)
: If set, don't draw ledger lines on this object.

`no-stem-extend` (boolean)
: If set, notes with ledger lines do not get stems extending to the middle staff line.

`non-default` (boolean)
: Set for manually specified clefs.

`non-musical` (boolean)
: True if the grob belongs to a `NonMusicalPaperColumn`.

`note-names` (vector)
: Vector of strings containing names for easy-notation note heads.

`outside-staff-horizontal-padding` (number)
: By default, an outside-staff-object can be placed so that is it very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

`outside-staff-padding` (number)
: The padding to place between this grob and the staff when spacing according to `outside-staff-priority`.

`outside-staff-priority` (number)
: If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`packed-spacing` (boolean)
: If set, the notes are spaced as tightly as possible.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`padding-pairs` (list)
: An alist mapping `(`*`name`*` . `*`name`*`)` to distances.

`page-break-penalty` (number)
: Penalty for page break at this column. This affects the choices of the page breaker; it avoids a page break at a column with a positive penalty and prefers a page break at a column with a negative penalty.

`page-break-permission` (symbol)
: Instructs the page breaker on whether to put a page break at this column. Can be `force` or `allow`.

`page-turn-penalty` (number)
: Penalty for a page turn at this column. This affects the choices of the page breaker; it avoids a page turn at a column with a positive penalty and prefers a page turn at a column with a negative penalty.

`page-turn-permission` (symbol)
: Instructs the page breaker on whether to put a page turn at this column. Can be `force` or `allow`.

`parenthesized` (boolean)
: Parenthesize this grob.

`positions` (pair of numbers)
: Pair of staff coordinates `(`*`left`*` . `*`right`*`)`, where both *left* and *right* are in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

`prefer-dotted-right` (boolean)
: For note collisions, prefer to shift dotted up-note to the right, rather than shifting just the dot.

`ratio` (number)
: Parameter for slur shape. The higher this number, the quicker the slur attains its `height-limit`.

`remove-empty` (boolean)
: If set, remove group if it contains no interesting items.

`remove-first` (boolean)
: Remove the first staff of an orchestral score?

`restore-first` (boolean)
: Print a natural before the accidental.

`rhythmic-location` (rhythmic location)
: Where (bar number, measure position) in the score.

`right-bound-info` (list)
: An alist of properties for determining attachments of spanners to edges.

`right-padding` (dimension, in staff space)
: Space to insert on the right side of an object (e.g., between note and its accidentals).

`rotation` (list)
: Number of degrees to rotate this object, and what point to rotate around. For example, `#'(45 0 0)` rotates by 45 degrees around the center of this object.

`same-direction-correction` (number)
: Optical correction amount for stems that are placed in tight configurations. This amount is used for stems with the same direction to compensate for note head to stem distance.

`script-priority` (number)
: A sorting key that determines in what order a script is within a stack of scripts.

`self-alignment-X` (number)
: Specify alignment of an object. The value `-1` means left aligned, `0` centered, and `1` right-aligned in X direction. Other numerical values may also be specified.

`self-alignment-Y` (number)
: Like `self-alignment-X` but for the Y axis.

`shorten-pair` (pair of numbers)
: The lengths to shorten a text-spanner on both sides, for example a pedal bracket. Positive values shorten the text-spanner, while negative values lengthen it.

`shortest-duration-space` (dimension, in staff space)
: Start with this much space for the shortest duration. This is expressed in `spacing-increment` as unit. See also Section “spacing-spanner-interface” in *Internals Reference*.

`shortest-playing-duration` (moment)
: The duration of the shortest note playing here.

`shortest-starter-duration` (moment)
: The duration of the shortest note that starts here.

`side-axis` (number)
: If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`side-relative-direction` (direction)
: Multiply direction of `direction-source` with this to get the direction of this object.

`size` (number)
: Size of object, relative to standard size.

`skyline-horizontal-padding` (number)
: For determining the vertical distance between two staves, it is possible to have a configuration which would result in a tight interleaving of grobs from the top staff

and the bottom staff. The larger this parameter is, the farther apart the staves are placed in such a configuration.

`slash-negative-kern` (number)
: The space to remove between slashes in percent repeat glyphs. Larger values bring the two elements closer together.

`slope` (number)
: The slope of this object.

`slur-padding` (number)
: Extra distance between slur and script.

`space-alist` (list)
: A table that specifies distances between prefatory items, like clef and time-signature. The format is an alist of spacing tuples: `(`*`break-align-symbol type . distance`*`)`, where *type* can be the symbols `minimum-space` or `extra-space`.

`space-to-barline` (boolean)
: If set, the distance between a note and the following non-musical column will be measured to the bar line instead of to the beginning of the non-musical column. If there is a clef change followed by a bar line, for example, this means that we will try to space the non-musical column as though the clef is not there.

`spacing-increment` (number)
: Add this much space for a doubled duration. Typically, the width of a note head. See also Section "spacing-spanner-interface" in *Internals Reference*.

`springs-and-rods` (boolean)
: Dummy variable for triggering spacing routines.

`stacking-dir` (direction)
: Stack objects in which direction?

`staff-padding` (dimension, in staff space)
: Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics **p** and **f**) on their baselines.

`staff-position` (number)
: Vertical position, measured in half staff spaces, counted from the middle line.

`staff-space` (dimension, in staff space)
: Amount of space between staff lines, expressed in global `staff-space`.

`stem-attachment` (pair of numbers)
: An `(`*`x`*` . `*`y`*`)` pair where the stem attaches to the notehead.

`stem-end-position` (number)
: Where does the stem end (the end is opposite to the support-head)?

`stem-spacing-correction` (number)
: Optical correction amount for stems that are placed in tight configurations. For opposite directions, this amount is the correction for two normal sized stems that overlap completely.

`stemlet-length` (number)
: How long should be a stem over a rest?

`stencil` (unknown)
: The symbol to print.

`stencils` (list)
: Multiple stencils, used as intermediate value.

`strict-grace-spacing` (boolean)
: If set, main notes are spaced normally, then grace notes are put left of the musical columns fot the main notes.

`strict-note-spacing` (boolean)
: If set, unbroken columns with non-musical material (clefs, bar lines, etc.) are not spaced separately, but put before musical columns.

`stroke-style` (string)
: Set to `"grace"` to turn stroke through flag on.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`text` (markup)
: Text markup. See Section "Formatting text" in *Notation Reference*.

`text-direction` (direction)
: This controls the ordering of the words. The default `RIGHT` is for roman text. Arabic or Hebrew should use `LEFT`.

`thick-thickness` (number)
: Bar line thickness, measured in `line-thickness`.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

`thin-kern` (number)
: The space after a hair-line in a bar line.

`threshold` (pair of numbers)
: `(`*`min`*` . `*`max`*`)`, where *min* and *max* are dimensions in staff space.

`tie-configuration` (list)
: List of `(`*`position`*` . `*`dir`*`)` pairs, indicating the desired tie configuration, where *position* is the offset from the center of the staff in staff space and *dir* indicates the direction of the tie (`1`=>up, `-1`=>down, `0`=>center). A non-pair entry in the list causes the corresponding tie to be formatted automatically.

`to-barline` (boolean)
: If true, the spanner will stop at the bar line just before it would otherwise stop.

`toward-stem-shift` (number)
: Amount by which scripts are shifted toward the stem if their direction coincides with the stem direction. `0.0` means keep the default position (centered on the note head), `1.0` means centered on the stem. Interpolated values are possible.

`transparent` (boolean)
: This makes the grob invisible.

`uniform-stretching` (boolean)
: If set, items stretch proportionally to their durations. This looks better in complex polyphonic patterns.

`used` (boolean)
: If set, this spacing column is kept in the spacing problem.

`vertical-skylines` (unknown)
: Two skylines, one above and one below this grob.

`when` (moment)
: Global time step associated with this column happen?

`width` (dimension, in staff space)
: The width of a grob measured in staff space.

`word-space` (dimension, in staff space)
: Space to insert between words in texts.

`zigzag-length` (dimension, in staff space)
: The length of the lines of a zigzag, relative to `zigzag-width`. A value of `1` gives 60-degree zigzags.

`zigzag-width` (dimension, in staff space)
: The width of one zigzag squiggle. This number is adjusted slightly so that the glissando line can be constructed from a whole number of squiggles.

B.14 Identifiers

`acciaccatura` - *music* (music)
: Create an acciaccatura from the following music expression

`addChordShape` - *key-symbol* (symbol) *tuning* (pair) *shape-definition* (unknown)
: Add chord shape *shape-definition* to the *chord-shape-table* hash with the key *(cons key-symbol tuning)*.

`addInstrumentDefinition` - *name* (string) *lst* (list)
: Create instrument *name* with properties *list*.

`addQuote` - *name* (string) *music* (music)
: Define *music* as a quotable music expression named *name*

`afterGrace` - *main* (music) *grace* (music)
: Create *grace* note(s) after a *main* music expression.

`allowPageTurn`
: Allow a page turn. May be used at toplevel (ie between scores or markups), or inside a score.

`applyContext` - *proc* (procedure)
: Modify context properties with Scheme procedure *proc*.

`applyMusic` - *func* (procedure) *music* (music)
: Apply procedure *func* to *music*.

`applyOutput` - *ctx* (symbol) *proc* (procedure)
: Apply function `proc` to every layout object in context `ctx`

`appoggiatura` - *music* (music)
: Create an appoggiatura from *music*

`assertBeamQuant` - *l* (pair) *r* (pair)
: Testing function: check whether the beam quants *l* and *r* are correct

`assertBeamSlope` - *comp* (procedure)
: Testing function: check whether the slope of the beam is the same as `comp`

`autochange` - *music* (music)
: Make voices that switch between staves automatically

`balloonGrobText` - *grob-name* (symbol) *offset* (pair of numbers) *text* (markup)
: Attach *text* to *grob-name* at offset *offset* (use like `\once`)

`balloonText` - *offset* (pair of numbers) *text* (markup)
: Attach *text* at *offset* (use like `\tweak`)

`bar` - *type* (string)
: Insert a bar line of type *type*

`barNumberCheck` - *n* (integer)
: Print a warning if the current bar number is not *n*.

`bendAfter` - *delta* (unknown)
: Create a fall or doit of pitch interval *delta*.

`breathe` Insert a breath mark.

`clef` - *type* (string)
: Set the current clef to *type*.

`cueDuring` - *what* (string) *dir* (direction) *main-music* (music)
: Insert contents of quote *what* corresponding to *main-music*, in a CueVoice oriented by *dir*.

`displayLilyMusic` - *music* (music)
: Display the LilyPond input representation of *music* to the console.

`displayMusic` - *music* (music)
: Display the internal representation of *music* to the console.

`endSpanners` - *music* (music)
: Terminate the next spanner prematurely after exactly one note without the need of a specific end spanner.

`featherDurations` - *factor* (moment) *argument* (music)
: Adjust durations of music in *argument* by rational *factor*.

`grace` - *music* (music)
: Insert *music* as grace notes.

`includePageLayoutFile`
: Include the file <*basename*>*-page-layout.ly*. Deprecated as part of two-pass spacing.

`instrumentSwitch` - *name* (string)
: Switch instrument to *name*, which must be predefined with `\addInstrumentDefinition`.

`keepWithTag` - *tag* (symbol) *music* (music)
: Include only elements of *music* that are tagged with *tag*.

`killCues` - *music* (music)
: Remove cue notes from *music*.

`label` - *label* (symbol)
: Create *label* as a bookmarking label

`makeClusters` - *arg* (music)
: Display chords in *arg* as clusters

`musicMap` - *proc* (procedure) *mus* (music)
: (undocumented; fixme)

`noPageBreak`
: Forbid a page break. May be used at toplevel (ie between scores or markups), or inside a score.

`noPageTurn`
: Forbid a page turn. May be used at toplevel (ie between scores or markups), or inside a score.

`octaveCheck` - *pitch-note* (music)
: octave check

`ottava` - *octave* (number)
: set the octavation

`overrideProperty` - *name* (string) *property* (symbol) *value* (any type)
: Set *property* to *value* in all grobs named *name*. The *name* argument is a string of the form `"Context.GrobName"` or `"GrobName"`

`pageBreak`
: Force a page break. May be used at toplevel (ie between scores or markups), or inside a score.

`pageTurn` Force a page turn between two scores or top-level markups.

`parallelMusic` - *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 | }
```

`parenthesize` - *arg* (music)
: Tag *arg* to be parenthesized.

`partcombine` - *part1* (music) *part2* (music)
: (undocumented; fixme)

`pitchedTrill` - *main-note* (music) *secondary-note* (music)
: (undocumented; fixme)

`pointAndClickOff`
: (undocumented; fixme)

`pointAndClickOn`
: (undocumented; fixme)

`quoteDuring` - *what* (string) *main-music* (music)
: (undocumented; fixme)

`removeWithTag` - *tag* (symbol) *music* (music)
: Remove elements of *music* that are tagged with *tag*.

`resetRelativeOctave` - *reference-note* (music)
: Set the octave inside a \relative section.

`rightHandFinger` - *finger* (number or string)
: Apply *finger* as a fingering indication.

`scaleDurations` - *fraction* (pair of numbers) *music* (music)
: Multiply the duration of events in *music* by *fraction*.

`scoreTweak` - *name* (string)
: Include the score tweak, if exists.

`shiftDurations` - *dur* (integer) *dots* (integer) *arg* (music)
: Scale *arg* up by a factor of *2^dur*(2-(1/2)^dots)*.

`spacingTweaks` - *parameters* (list)
: Set the system stretch, by reading the 'system-stretch property of the 'parameters' assoc list.

`storePredefinedDiagram` - *chord* (music) *tuning* (pair) *diagram-definition* (unknown)
: Add predefined fret diagram defined by *diagram-definition* for the chord pitches *chord* and the stringTuning *tuning*.

`tag` - *tag* (symbol) *arg* (music)
: Add *tag* to the `tags` property of *arg*.

`tocItem` - *text* (markup)
: Add a line to the table of content, using the `tocItemMarkup` paper variable markup

`transposedCueDuring` - *what* (string) *dir* (direction) *pitch-note* (music) *main-music* (music)
: Insert notes from the part *what* into a voice called `cue`, using the transposition defined by *pitch-note*. 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` - *pitch-note* (music)
: Set instrument transposition

`tweak` - *sym* (symbol) *val* (any type) *arg* (music)
: Add `sym . val` to the `tweaks` property of *arg*.

`unfoldRepeats` - *music* (music)
: (undocumented; fixme)

`withMusicProperty` - *sym* (symbol) *val* (any type) *music* (music)
: Set *sym* to *val* in *music*.

B.15 Scheme functions

`dispatcher` *x* [Function]
Is *x* a `Dispatcher` object?

`listener` *x* [Function]
Is *x* a `Listener` object?

`ly:add-file-name-alist` *alist* [Function]
Add mappings for error messages from *alist*.

`ly:add-interface` *a b c* [Function]
Add an interface description.

`ly:add-listener` *list disp cl* [Function]
Add the listener *list* to the dispatcher *disp*. Whenever *disp* hears an event of class *cl*, it is forwarded to *list*.

`ly:add-option` *sym val description* [Function]
Add a program option *sym* with default *val*.

`ly:all-grob-interfaces` [Function]
Get a hash table with all interface descriptions.

`ly:all-options` [Function]
Get all option settings in an alist.

`ly:all-stencil-expressions` [Function]
Return all symbols recognized as stencil expressions.

`ly:assoc-get` *key alist default-value* [Function]
Return value if *key* in *alist*, else `default-value` (or `#f` if not specified).

`ly:book-add-bookpart!` *book-smob book-part* [Function]
Add *book_part* to *book-smob* book part list.

`ly:book-add-score!` *book-smob score* [Function]
Add *score* to *book-smob* score list.

`ly:book-process` *book-smob default-paper default-layout output* [Function]
Print book. *output* is passed to the backend unchanged. For example, it may be a string (for file based outputs) or a socket (for network based output).

`ly:book-process-to-systems` *book-smob default-paper default-layout output* [Function]
Print book. *output* is passed to the backend unchanged. For example, it may be a string (for file based outputs) or a socket (for network based output).

`ly:box?` *x* [Function]
Is *x* a `Box` object?

`ly:bp` *num* [Function]
num bigpoints (1/72th inch).

`ly:bracket` *a iv t p* [Function]
Make a bracket in direction *a*. The extent of the bracket is given by *iv*. The wings protrude by an amount of *p*, which may be negative. The thickness is given by *t*.

`ly:broadcast` *disp ev* [Function]
Send the stream event *ev* to the dispatcher *disp*.

`ly:camel-case->lisp-identifier` *name-sym* [Function]
Convert `FooBar_Bla` to `foo-bar-bla` style symbol.

`ly:chain-assoc-get` *key achain dfault* [Function]
Return value for *key* from a list of alists *achain*. If no entry is found, return *dfault* or `#f` if no *dfault* is specified.

`ly:clear-anonymous-modules` [Function]
Plug a GUILE 1.6 and 1.7 memory leak by breaking a weak reference pointer cycle explicitly.

`ly:cm` *num* [Function]
num cm.

`ly:command-line-code` [Function]
The Scheme code specified on command-line with '`-e`'.

`ly:command-line-options` [Function]
The Scheme options specified on command-line with '`-d`'.

`ly:command-line-verbose?` [Function]
Was `be_verbose_global` set?

`ly:connect-dispatchers` *to from* [Function]
Make the dispatcher *to* listen to events from *from*.

`ly:context-event-source` *context* [Function]
Return `event-source` of context *context*.

`ly:context-events-below` *context* [Function]
Return a `stream-distributor` that distributes all events from *context* and all its subcontexts.

`ly:context-find` *context name* [Function]
Find a parent of *context* that has name or alias *name*. Return `#f` if not found.

`ly:context-grob-definition` *context name* [Function]
Return the definition of *name* (a symbol) within *context* as an alist.

`ly:context-id` *context* [Function]
Return the ID string of *context*, i.e., for `\context Voice = one ...` return the string `one`.

`ly:context-name` *context* [Function]
Return the name of *context*, i.e., for `\context Voice = one ...` return the symbol `Voice`.

`ly:context-now` *context* [Function]
Return `now-moment` of context *context*.

`ly:context-parent` *context* [Function]
Return the parent of *context*, `#f` if none.

`ly:context-property` *c name* [Function]
Return the value of *name* from context *c*.

`ly:context-property-where-defined` *context name* [Function]
Return the context above *context* where *name* is defined.

`ly:context-pushpop-property` *context grob eltprop val* [Function]
Do a single `\override` or `\revert` operation in *context*. The grob definition *grob* is extended with *eltprop* (if *val* is specified) or reverted (if unspecified).

`ly:context-set-property!` *context name val* [Function]
Set value of property *name* in context *context* to *val*.

`ly:context-unset-property` *context name* [Function]
Unset value of property *name* in context *context*.

`ly:context?` *x* [Function]
Is *x* a `Context` object?

`ly:default-scale` [Function]
Get the global default scale.

`ly:dimension?` *d* [Function]
Return *d* as a number. Used to distinguish length variables from normal numbers.

`ly:dir?` *s* [Function]
A type predicate. The direction `s` is `-1`, `0` or `1`, where `-1` represents left or down and `1` represents right or up.

`ly:duration->string` *dur* [Function]
Convert *dur* to a string.

`ly:duration-dot-count` *dur* [Function]
Extract the dot count from *dur*.

`ly:duration-factor` *dur* [Function]
Extract the compression factor from *dur*. Return it as a pair.

`ly:duration-length` *dur* [Function]
The length of the duration as a `moment`.

`ly:duration-log` *dur* [Function]
Extract the duration log from *dur*.

`ly:duration<?` *p1 p2* [Function]
Is *p1* shorter than *p2*?

`ly:duration?` *x* [Function]
Is *x* a `Duration` object?

`ly:effective-prefix` [Function]
Return effective prefix.

`ly:error` *str rest* [Function]
A Scheme callable function to issue the error *str*. The error is formatted with `format` and *rest*.

`ly:eval-simple-closure` *delayed closure scm-start scm-end* [Function]
Evaluate a simple *closure* with the given *delayed* argument. If *scm-start* and *scm-end* are defined, evaluate it purely with those start and end points.

`ly:event-deep-copy` *m* [Function]
Copy *m* and all sub expressions of *m*.

`ly:event-property` *sev sym* [Function]
Get the property *sym* of stream event *mus*. If *sym* is undefined, return `'()`.

`ly:event-set-property!` *ev sym val* [Function]
Set property *sym* in event *ev* to *val*.

`ly:expand-environment` *str* [Function]
Expand `$VAR` and `${VAR}` in *str*.

`ly:export` *arg* [Function]
Export a Scheme object to the parser so it is treated as an identifier.

`ly:find-file` *name* [Function]
Return the absolute file name of *name*, or `#f` if not found.

`ly:font-config-add-directory` *dir* [Function]
Add directory *dir* to FontConfig.

`ly:font-config-add-font` *font* [Function]
Add font *font* to FontConfig.

`ly:font-config-display-fonts` [Function]
Dump a list of all fonts visible to FontConfig.

`ly:font-config-get-font-file` *name* [Function]
Get the file for font *name*.

`ly:font-design-size` *font* [Function]
Given the font metric *font*, return the design size, relative to the current output-scale.

`ly:font-file-name` *font* [Function]
Given the font metric *font*, return the corresponding file name.

`ly:font-get-glyph` *font name* [Function]
Return a stencil from *font* for the glyph named *name*. If the glyph is not available, return an empty stencil.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Aybabtu fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

`ly:font-glyph-name-to-charcode` *font name* [Function]
Return the character code for glyph *name* in *font*.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Aybabtu fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

`ly:font-glyph-name-to-index` *font name* [Function]
Return the index for *name* in *font*.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Aybabtu fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

`ly:font-index-to-charcode` *font index* [Function]
Return the character code for *index* in *font*.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Aybabtu fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

`ly:font-magnification` *font* [Function]
Given the font metric *font*, return the magnification, relative to the current output-scale.

`ly:font-metric?` *x* [Function]
Is *x* a `Font_metric` object?

`ly:font-name` *font* [Function]
Given the font metric *font*, return the corresponding name.

`ly:font-sub-fonts` *font* [Function]
Given the font metric *font* of an OpenType font, return the names of the subfonts within *font*.

`ly:format` *str rest* [Function]
LilyPond specific format, supporting `~a` and `~[0-9]f`.

`ly:format-output` *context* [Function]
Given a global context in its final state, process it and return the `Music_output` object in its final state.

`ly:get-all-function-documentation` [Function]
Get a hash table with all LilyPond Scheme extension functions.

`ly:get-all-translators` [Function]
Return a list of all translator objects that may be instantiated.

`ly:get-glyph` *font index* [Function]
Retrieve a stencil for the glyph numbered *index* in *font*.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Aybabtu fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

`ly:get-listened-event-classes` [Function]
Return a list of all event classes that some translator listens to.

`ly:get-option` *var* [Function]
Get a global option setting.

`ly:gettext` *original* [Function]
A Scheme wrapper function for `gettext`.

`ly:grob-alist-chain` *grob global* [Function]
Get an alist chain for grob *grob*, with *global* as the global default. If unspecified, `font-defaults` from the layout block is taken.

`ly:grob-array-length` *grob-arr* [Function]
Return the length of *grob-arr*.

`ly:grob-array-ref` *grob-arr index* [Function]
Retrieve the *index*th element of *grob-arr*.

`ly:grob-array?` *x* [Function]
Is *x* a `Grob_array` object?

`ly:grob-basic-properties` *grob* [Function]
Get the immutable properties of *grob*.

`ly:grob-common-refpoint` *grob other axis* [Function]
Find the common refpoint of *grob* and *other* for *axis*.

`ly:grob-common-refpoint-of-array` *grob others axis* [Function]
Find the common refpoint of *grob* and *others* (a grob-array) for *axis*.

`ly:grob-default-font` *grob* [Function]
Return the default font for grob *gr*.

`ly:grob-extent` *grob refp axis* [Function]
Get the extent in *axis* direction of *grob* relative to the grob *refp*.

`ly:grob-interfaces` *grob* [Function]
Return the interfaces list of grob *grob*.

`ly:grob-layout` *grob* [Function]
Get `\layout` definition from grob *grob*.

`ly:grob-object` *grob sym* [Function]
Return the value of a pointer in grob *g* of property *sym*. It returns `'()` (end-of-list) if *sym* is undefined in *g*.

`ly:grob-original` *grob* [Function]
Return the unbroken original grob of *grob*.

`ly:grob-parent` *grob axis* [Function]
Get the parent of *grob*. *axis* is 0 for the X-axis, 1 for the Y-axis.

`ly:grob-pq<?` *a b* [Function]
Compare two grob priority queue entries. This is an internal function.

`ly:grob-properties` *grob* [Function]
Get the mutable properties of *grob*.

`ly:grob-property` *grob sym deflt* [Function]
Return the value of a value in grob *g* of property *sym*. It returns `'()` (end-of-list) or *deflt* (if specified) if *sym* is undefined in *g*.

`ly:grob-property-data` *grob sym* [Function]
Retrieve *sym* for *grob* but don't process callbacks.

`ly:grob-relative-coordinate` *grob refp axis* [Function]
Get the coordinate in *axis* direction of *grob* relative to the grob *refp*.

`ly:grob-robust-relative-extent` *grob refp axis* [Function]
Get the extent in *axis* direction of *grob* relative to the grob *refp*, or `(0,0)` if empty.

`ly:grob-script-priority-less` *a b* [Function]
Compare two grobs by script priority. For internal use.

`ly:grob-set-property!` *grob sym val* [Function]
Set *sym* in grob *grob* to value *val*.

`ly:grob-staff-position` *sg* [Function]
Return the Y-position of *sg* relative to the staff.

`ly:grob-suicide!` *grob* [Function]
Kill *grob*.

`ly:grob-system` *grob* [Function]
Return the system grob of *grob*.

`ly:grob-translate-axis!` *grob d a* [Function]
Translate *g* on axis *a* over distance *d*.

`ly:grob?` *x* [Function]
Is *x* a `Grob` object?

`ly:gulp-file` *name size* [Function]
Read the file *name*, and return its contents in a string. The file is looked up using the search path.

`ly:hash-table-keys` *tab* [Function]
Return a list of keys in *tab*.

`ly:inch` *num* [Function]
num inches.

`ly:input-both-locations` *sip* [Function]
Return input location in *sip* as `(file-name first-line first-column last-line last-column)`.

`ly:input-file-line-char-column` *sip* [Function]
Return input location in *sip* as `(file-name line char column)`.

`ly:input-location?` *x* [Function]
Is *x* an `input-location`?

`ly:input-message` *sip msg rest* [Function]
Print *msg* as a GNU compliant error message, pointing to the location in *sip*. *msg* is interpreted similar to `format`'s argument, using *rest*.

`ly:interpret-music-expression` *mus ctx* [Function]
Interpret the music expression *mus* in the global context *ctx*. The context is returned in its final state.

`ly:interpret-stencil-expression` *expr func arg1 offset* [Function]
Parse *expr*, feed bits to *func* with first arg *arg1* having offset *offset*.

`ly:intlog2` *d* [Function]
The 2-logarithm of 1/*d*.

`ly:is-listened-event-class` *sym* [Function]
Is *sym* a listened event class?

`ly:item-break-dir` *it* [Function]
The break status direction of item *it*. `-1` means end of line, `0` unbroken, and `1` beginning of line.

`ly:item?` *g* [Function]
Is *g* an `Item` object?

`ly:iterator?` *x* [Function]
Is *x* a `Music_iterator` object?

`ly:lexer-keywords` *lexer* [Function]
Return a list of `(KEY . CODE)` pairs, signifying the LilyPond reserved words list.

`ly:lily-lexer?` *x* [Function]
Is *x* a `Lily_lexer` object?

`ly:lily-parser?` *x* [Function]
Is *x* a `Lily_parser` object?

`ly:make-book` *paper header scores* [Function]
Make a `\book` of *paper* and *header* (which may be `#f` as well) containing `\scores`.

`ly:make-book-part` *scores* [Function]
Make a `\bookpart` containing `\scores`.

`ly:make-dispatcher` [Function]
Return a newly created dispatcher.

`ly:make-duration` *length dotcount num den* [Function]
length is the negative logarithm (base 2) of the duration: 1 is a half note, 2 is a quarter note, 3 is an eighth note, etc. The number of dots after the note is given by the optional argument *dotcount*.

The duration factor is optionally given by *num* and *den*.

A duration is a musical duration, i.e., a length of time described by a power of two (whole, half, quarter, etc.) and a number of augmentation dots.

`ly:make-global-context` *output-def* [Function]
Set up a global interpretation context, using the output block *output_def*. The context is returned.

`ly:make-global-translator` *global* [Function]
Create a translator group and connect it to the global context *global*. The translator group is returned.

`ly:make-listener` *callback* [Function]
Create a listener. Any time the listener hears an object, it will call *callback* with that object.

callback should take exactly one argument.

`ly:make-moment` *n d gn gd* [Function]
Create the rational number with main timing *n*/*d*, and optional grace timing *gn*/*gd*.

A *moment* is a point in musical time. It consists of a pair of rationals (*m*, *g*), where *m* is the timing for the main notes, and *g* the timing for grace notes. In absence of grace notes, *g* is zero.

`ly:make-music` *props* [Function]
Make a C++ `Music` object and initialize it with *props*.

This function is for internal use and is only called by `make-music`, which is the preferred interface for creating music objects.

`ly:make-music-function` *signature func* [Function]
Make a function to process music, to be used for the parser. `func` is the function, and `signature` describes its arguments. `signature` is a list containing either `ly:music?` predicates or other type predicates.

`ly:make-output-def` [Function]
Make an output definition.

`ly:make-page-label-marker` *label* [Function]
Return page marker with label.

`ly:make-page-permission-marker` *symbol permission* [Function]
Return page marker with page breaking and turning permissions.

`ly:make-pango-description-string` *chain size* [Function]
Make a `PangoFontDescription` string for the property alist *chain* at size *size*.

`ly:make-paper-outputter` *port format* [Function]
Create an outputter that evaluates within `output-`*format*, writing to *port*.

`ly:make-pitch` *octave note alter* [Function]
octave is specified by an integer, zero for the octave containing middle C. *note* is a number indexing the global default scale, with 0 corresponding to pitch C and 6 usually corresponding to pitch B. *alter* is a rational number of 200-cent whole tones for alteration.

`ly:make-prob` *type init rest* [Function]
Create a `Prob` object.

`ly:make-scale` *steps* [Function]
Create a scale. The argument is a vector of rational numbers, each of which represents the number of 200 cent tones of a pitch above the tonic.

`ly:make-score` *music* [Function]
Return score with *music* encapsulated in *score*.

`ly:make-simple-closure` *expr* [Function]
Make a simple closure. *expr* should be form of `(`*`func a1 A2`*` ...)`, and will be invoked as `(`*`func delayed-arg a2 a2`*` ...)`.

`ly:make-stencil` *expr xext yext* [Function]
Stencils are device independent output expressions. They carry two pieces of information:

1. A specification of how to print this object. This specification is processed by the output backends, for example '`scm/output-ps.scm`'.
2. The vertical and horizontal extents of the object, given as pairs. If an extent is unspecified (or if you use `(1000 . -1000)` as its value), it is taken to be empty.

`ly:make-stream-event` *cl proplist* [Function]
Create a stream event of class *cl* with the given mutable property list.

`ly:message` *str rest* [Function]
A Scheme callable function to issue the message *str*. The message is formatted with `format` and *rest*.

`ly:minimal-breaking` *pb* [Function]
Break (pages and lines) the `Paper_book` object *pb* without looking for optimal spacing: stack as many lines on a page before moving to the next one.

`ly:mm` *num* [Function]
num mm.

`ly:module->alist` *mod* [Function]
Dump the contents of module *mod* as an alist.

`ly:module-copy` *dest src* [Function]
Copy all bindings from module *src* into *dest*.

`ly:modules-lookup` *modules sym def* [Function]
Look up *sym* in the list *modules*, returning the first occurence. If not found, return *def* or `#f` if *def* isn't specified.

`ly:moment-add` *a b* [Function]
Add two moments.

`ly:moment-div` *a b* [Function]
Divide two moments.

`ly:moment-grace-denominator` *mom* [Function]
Extract denominator from grace timing.

`ly:moment-grace-numerator` *mom* [Function]
Extract numerator from grace timing.

`ly:moment-main-denominator` *mom* [Function]
Extract denominator from main timing.

`ly:moment-main-numerator` *mom* [Function]
Extract numerator from main timing.

`ly:moment-mod` *a b* [Function]
Modulo of two moments.

`ly:moment-mul` *a b* [Function]
Multiply two moments.

`ly:moment-sub` *a b* [Function]
Subtract two moments.

`ly:moment<?` *a b* [Function]
Compare two moments.

`ly:moment?` *x* [Function]
Is *x* a `Moment` object?

`ly:music-compress` *m factor* [Function]
Compress music object *m* by moment *factor*.

`ly:music-deep-copy` *m* [Function]
Copy *m* and all sub expressions of *m*.

`ly:music-duration-compress` *mus fact* [Function]
Compress *mus* by factor *fact*, which is a `Moment`.

`ly:music-duration-length` *mus* [Function]
Extract the duration field from *mus* and return the length.

`ly:music-function-extract` *x* [Function]
Return the Scheme function inside *x*.

`ly:music-function?` *x* [Function]
Is *x* a `music-function`?

`ly:music-length` *mus* [Function]
Get the length of music expression *mus* and return it as a `Moment` object.

`ly:music-list?` *lst* [Function]
Type predicate: Return true if *lst* is a list of music objects.

`ly:music-mutable-properties` *mus* [Function]
Return an alist containing the mutable properties of *mus*. The immutable properties are not available, since they are constant and initialized by the `make-music` function.

`ly:music-output?` *x* [Function]
Is *x* a `Music_output` object?

`ly:music-property` *mus sym dfault* [Function]
Get the property *sym* of music expression *mus*. If *sym* is undefined, return `'()`.

`ly:music-set-property!` *mus sym val* [Function]
Set property *sym* in music expression *mus* to *val*.

`ly:music-transpose` *m p* [Function]
Transpose *m* such that central C is mapped to *p*. Return *m*.

`ly:music?` *obj* [Function]
Type predicate.

`ly:note-head::stem-attachment` *font-metric glyph-name* [Function]
Get attachment in *font-metric* for attaching a stem to notehead *glyph-name*.

`ly:number->string` *s* [Function]
Convert *num* to a string without generating many decimals.

`ly:optimal-breaking` *pb* [Function]
Optimally break (pages and lines) the `Paper_book` object *pb* to minimize badness in bother vertical and horizontal spacing.

`ly:option-usage` [Function]
Print `ly:set-option` usage.

`ly:otf->cff` *otf-file-name* [Function]
Convert the contents of an OTF file to a CFF file, returning it as a string.

`ly:otf-font-glyph-info` *font glyph* [Function]
Given the font metric *font* of an OpenType font, return the information about named glyph *glyph* (a string).

`ly:otf-font-table-data` *font tag* [Function]
Extract a table *tag* from *font*. Return empty string for non-existent *tag*.

`ly:otf-font?` *font* [Function]
Is *font* an OpenType font?

`ly:otf-glyph-list` *font* [Function]
Return a list of glyph names for *font*.

`ly:output-def-clone` *def* [Function]
Clone output definition *def*.

`ly:output-def-lookup` *pap sym def* [Function]
Look up *sym* in the *pap* output definition (e.g., `\paper`). Return the value or *def* (which defaults to `'()`) if undefined.

`ly:output-def-parent` *def* [Function]
Get the parent output definition of *def*.

`ly:output-def-scope` *def* [Function]
Get the variable scope inside *def*.

`ly:output-def-set-variable!` *def sym val* [Function]
Set an output definition *def* variable *sym* to *val*.

`ly:output-def?` *def* [Function]
Is *def* a layout definition?

`ly:output-description` *output-def* [Function]
Return the description of translators in *output-def*.

`ly:output-formats` [Function]
Formats passed to '`--format`' as a list of strings, used for the output.

`ly:outputter-close` *outputter* [Function]
Close port of *outputter*.

`ly:outputter-dump-stencil` *outputter stencil* [Function]
Dump stencil *expr* onto *outputter*.

`ly:outputter-dump-string` *outputter str* [Function]
Dump *str* onto *outputter*.

`ly:outputter-output-scheme` *outputter expr* [Function]
Eval *expr* in module of *outputter*.

`ly:outputter-port` *outputter* [Function]
Return output port for *outputter*.

`ly:page-marker?` *x* [Function]
Is *x* a `Page_marker` object?

`ly:page-turn-breaking` *pb* [Function]
Optimally break (pages and lines) the `Paper_book` object *pb* such that page turns only happen in specified places, returning its pages.

`ly:pango-font-physical-fonts` *f* [Function]
Return alist of `(ps-name file-name font-index)` lists for Pango font *f*.

`ly:pango-font?` *f* [Function]
Is *f* a pango font?

`ly:paper-book-pages` *pb* [Function]
Return pages in book *pb*.

`ly:paper-book-paper` *pb* [Function]
Return pages in book *pb*.

`ly:paper-book-performances` *paper-book* [Function]
Return performances in book *paper-book*.

`ly:paper-book-scopes` *book* [Function]
Return scopes in layout book *book*.

`ly:paper-book-systems` *pb* [Function]
Return systems in book *pb*.

`ly:paper-book?` *x* [Function]
Is *x* a `Paper_book` object?

`ly:paper-fonts` *bp* [Function]
Return fonts from the `\paper` block *bp*.

`ly:paper-get-font` *paper-smob chain* [Function]
Return a font metric satisfying the font-qualifiers in the alist chain *chain*. (An alist chain is a list of alists, containing grob properties.)

`ly:paper-get-number` *layout-smob name* [Function]
Return the layout variable *name*.

`ly:paper-outputscale` *bp* [Function]
Get output-scale for *bp*.

`ly:paper-score-paper-systems` *paper-score* [Function]
Return vector of `paper_system` objects from *paper-score*.

`ly:paper-system-minimum-distance` *sys1 sys2* [Function]
Measure the minimum distance between these two paper-systems, using their stored skylines if possible and falling back to their extents otherwise.

`ly:paper-system?` *obj* [Function]
Type predicate.

`ly:parse-file` *name* [Function]
Parse a single `.ly` file. Upon failure, throw `ly-file-failed` key.

`ly:parser-clear-error` *parser* [Function]
Clear the error flag for the parser.

`ly:parser-clone` *parser-smob* [Function]
Return a clone of *parser-smob*.

`ly:parser-define!` *parser-smob symbol val* [Function]
Bind *symbol* to *val* in *parser-smob*'s module.

`ly:parser-error` *parser msg input* [Function]
Display an error message and make the parser fail.

`ly:parser-has-error?` *parser* [Function]
Does *parser* have an error flag?

`ly:parser-lexer` *parser-smob* [Function]
Return the lexer for *parser-smob*.

`ly:parser-lookup` *parser-smob symbol* [Function]
Look up *symbol* in *parser-smob*'s module. Return `'()` if not defined.

`ly:parser-output-name` *parser* [Function]
Return the base name of the output file.

`ly:parser-parse-string` *parser-smob ly-code* [Function]
Parse the string *ly-code* with *parser-smob*. Upon failure, throw `ly-file-failed` key.

`ly:parser-set-note-names` *parser names* [Function]
Replace current note names in *parser*. *names* is an alist of symbols. This only has effect if the current mode is notes.

`ly:performance-write` *performance filename* [Function]
Write *performance* to *filename*.

`ly:pfb->pfa` *pfb-file-name* [Function]
Convert the contents of a PFB file to PFA.

`ly:pitch-alteration` *pp* [Function]
Extract the alteration from pitch *pp*.

`ly:pitch-diff` *pitch root* [Function]
Return pitch *delta* such that *pitch* transposed by *delta* equals *root*.

`ly:pitch-negate` *p* [Function]
Negate *p*.

`ly:pitch-notename` *pp* [Function]
Extract the note name from pitch *pp*.

`ly:pitch-octave` *pp* [Function]
Extract the octave from pitch *pp*.

`ly:pitch-quartertones` *pp* [Function]
Calculate the number of quarter tones of *pp* from middle C.

`ly:pitch-semitones` *pp* [Function]
Calculate the number of semitones of *pp* from middle C.

`ly:pitch-steps` *p* [Function]
Number of steps counted from middle C of the pitch *p*.

`ly:pitch-transpose` *p delta* [Function]
Transpose *p* by the amount *delta*, where *delta* is relative to middle C.

`ly:pitch<?` *p1 p2* [Function]
Is *p1* lexicographically smaller than *p2*?

`ly:pitch?` *x* [Function]
Is *x* a `Pitch` object?

`ly:position-on-line?` *sg spos* [Function]
Return whether *pos* is on a line of the staff associated with the the grob *sg* (even on an extender line).

`ly:prob-immutable-properties` *prob* [Function]
Retrieve an alist of mutable properties.

`ly:prob-mutable-properties` *prob* [Function]
Retrieve an alist of mutable properties.

`ly:prob-property` *obj sym dfault* [Function]
Return the value for *sym*.

`ly:prob-property?` *obj sym* [Function]
Is boolean prop *sym* set?

`ly:prob-set-property!` *obj sym value* [Function]
Set property *sym* of *obj* to *value*.

`ly:prob-type?` *obj type* [Function]
Is *obj* the specified prob-type?

`ly:prob?` *x* [Function]
Is *x* a `Prob` object?

`ly:programming-error` *str rest* [Function]
A Scheme callable function to issue the internal warning *str*. The message is formatted with `format` and *rest*.

`ly:progress` *str rest* [Function]
A Scheme callable function to print progress *str*. The message is formatted with `format` and *rest*.

`ly:property-lookup-stats` *sym* [Function]
Return hash table with a property access corresponding to *sym*. Choices are `prob`, `grob`, and `context`.

`ly:protects` [Function]
Return hash of protected objects.

`ly:pt` *num* [Function]
num printer points.

`ly:register-stencil-expression` *symbol* [Function]
Add *symbol* as head of a stencil expression.

`ly:relative-group-extent` *elements common axis* [Function]
Determine the extent of *elements* relative to *common* in the *axis* direction.

`ly:reset-all-fonts` [Function]
Forget all about previously loaded fonts.

`ly:round-filled-box` *xext yext blot* [Function]
Make a `Stencil` object that prints a black box of dimensions *xext*, *yext* and roundness *blot*.

`ly:round-filled-polygon` *points blot* [Function]
Make a `Stencil` object that prints a black polygon with corners at the points defined by *points* (list of coordinate pairs) and roundness *blot*.

`ly:run-translator` *mus output-def* [Function]
Process *mus* according to *output-def*. An interpretation context is set up, and *mus* is interpreted with it. The context is returned in its final state.

Optionally, this routine takes an object-key to to uniquely identify the score block containing it.

`ly:score-add-output-def!` *score def* [Function]
Add an output definition *def* to *score*.

`ly:score-embedded-format` *score layout* [Function]
Run *score* through *layout* (an output definition) scaled to correct output-scale already, returning a list of layout-lines. This function takes an optional `Object_key` argument.

`ly:score-error?` *score* [Function]
Was there an error in the score?

`ly:score-header` *score* [Function]
Return score header.

`ly:score-music` *score* [Function]
Return score music.

`ly:score-output-defs` *score* [Function]
All output definitions in a score.

`ly:score-set-header!` *score module* [Function]
Set the score header.

`ly:score?` *x* [Function]
Is *x* a `Score` object?

`ly:set-default-scale` *scale* [Function]
Set the global default scale. This determines the tuning of pitches with no accidentals or key signatures. The first pitch is C. Alterations are calculated relative to this scale. The number of pitches in this scale determines the number of scale steps that make up an octave. Usually the 7-note major scale.

`ly:set-grob-modification-callback` *cb* [Function]
Specify a procedure that will be called every time LilyPond modifies a grob property. The callback will receive as arguments the grob that is being modified, the name of the C++ file in which the modification was requested, the line number in the C++ file in which the modification was requested, the name of the function in which the modification was requested, the property to be changed, and the new value for the property.

`ly:set-middle-C!` *context* [Function]
Set the `middleCPosition` variable in *context* based on the variables `middleCClefPosition` and middleCOffset.

`ly:set-option` *var val* [Function]
Set a program option.

`ly:set-property-cache-callback` *cb* [Function]
Specify a procedure that will be called whenever lilypond calculates a callback function and caches the result. The callback will receive as arguments the grob whose property it is, the name of the property, the name of the callback that calculated the property, and the new (cached) value of the property.

`ly:simple-closure?` *clos* [Function]
Type predicate.

`ly:skyline-pair?` *x* [Function]
Is *x* a `Skyline_pair` object?

`ly:skyline?` *x* [Function]
Is *x* a `Skyline` object?

`ly:smob-protects` [Function]
Return LilyPond's internal smob protection list.

`ly:solve-spring-rod-problem` *springs rods length ragged* [Function]
Solve a spring and rod problem for *count* objects, that are connected by *count*-1 *springs*, and an arbitrary number of *rods*. *count* is implicitly given by *springs* and *rods*. The *springs* argument has the format `(ideal, inverse_hook)` and *rods* is of the form `(idx1, idx2, distance)`.

length is a number, *ragged* a boolean.

The function returns a list containing the force (positive for stretching, negative for compressing and `#f` for non-satisfied constraints) followed by *spring-count*+1 positions of the objects.

`ly:source-file?` *x* [Function]
Is *x* a `Source_file` object?

`ly:spanner-bound` *spanner dir* [Function]
Get one of the bounds of *spanner*. *dir* is `-1` for left, and `1` for right.

`ly:spanner-broken-into` *spanner* [Function]
Return broken-into list for *spanner*.

`ly:spanner?` *g* [Function]
Is *g* a spanner object?

`ly:staff-symbol-line-thickness` *grob* [Function]
Returns the line-thickness of the staff associated with *grob*.

`ly:start-environment` [Function]
Return the environment (a list of strings) that was in effect at program start.

`ly:stderr-redirect` *file-name mode* [Function]
Redirect stderr to *file-name*, opened with *mode*.

`ly:stencil-add` *args* [Function]
Combine stencils. Takes any number of arguments.

`ly:stencil-aligned-to` *stil axis dir* [Function]
Align *stil* using its own extents. *dir* is a number. `-1` and `1` are left and right, respectively. Other values are interpolated (so `0` means the center).

`ly:stencil-combine-at-edge` *first axis direction second padding minimum* [Function]
Construct a stencil by putting *second* next to *first*. *axis* can be 0 (x-axis) or 1 (y-axis). *direction* can be -1 (left or down) or 1 (right or up). The stencils are juxtaposed with *padding* as extra space. If this puts the reference points closer than *minimum*, they are moved by the latter amount. *first* and *second* may also be `'()` or `#f`.

`ly:stencil-empty?` *stil* [Function]
Return whether *stil* is empty.

`ly:stencil-expr` *stil* [Function]
Return the expression of *stil*.

`ly:stencil-extent` *stil axis* [Function]
Return a pair of numbers signifying the extent of *stil* in *axis* direction (`0` or `1` for x and y axis, respectively).

`ly:stencil-fonts` *s* [Function]
Analyze *s*, and return a list of fonts used in *s*.

`ly:stencil-in-color` *stc r g b* [Function]
Put *stc* in a different color.

`ly:stencil-rotate` *stil angle x y* [Function]
Return a stencil *stil* rotated *angle* degrees around the relative offset (*x*, *y*). E.g. an offset of (-1, 1) will rotate the stencil around the left upper corner.

`ly:stencil-rotate-absolute` *stil angle x y* [Function]
Return a stencil *stil* rotated *angle* degrees around point (*x*, *y*), given in absolute coordinates.

`ly:stencil-translate` *stil offset* [Function]
Return a *stil*, but translated by *offset* (a pair of numbers).

`ly:stencil-translate-axis` *stil amount axis* [Function]
Return a copy of *stil* but translated by *amount* in *axis* direction.

`ly:stencil?` *x* [Function]
Is *x* a `Stencil` object?

`ly:stream-event?` *x* [Function]
Is *x* a `Stream_event` object?

`ly:string-substitute` *a b s* [Function]
Replace string *a* by string *b* in string *s*.

`ly:system-font-load` *name* [Function]
Load the OpenType system font '`name.otf`'. Fonts loaded with this command must contain three additional SFNT font tables called `LILC`, `LILF`, and `LILY`, needed for typesetting musical elements. Currently, only the Emmentaler and the Aybabtu fonts fulfill these requirements.

Note that only `ly:font-get-glyph` and derived code (like `\lookup`) can access glyphs from the system fonts; text strings are handled exclusively via the Pango interface.

`ly:system-print` *system* [Function]
Draw the system and return the prob containing its stencil.

`ly:system-stretch` *system amount-scm* [Function]
Stretch the system vertically by the given amount. This must be called before the system is drawn (for example with `ly:system-print`).

`ly:text-dimension` *font text* [Function]
Given the font metric in *font* and the string *text*, compute the extents of that text in that font. The return value is a pair of number-pairs.

`ly:text-interface::interpret-markup` [Function]
Convert a text markup into a stencil. Takes three arguments, *layout*, *props*, and *markup*.

layout is a `\layout` block; it may be obtained from a grob with `ly:grob-layout`. *props* is an alist chain, i.e. a list of alists. This is typically obtained with `(ly:grob-alist-chain grob (ly:output-def-lookup layout 'text-font-defaults))`. *markup* is the markup text to be processed.

`ly:translator-description` *me* [Function]
Return an alist of properties of translator *me*.

`ly:translator-group?` *x* [Function]
Is *x* a `Translator_group` object?

`ly:translator-name` *trans* [Function]
Return the type name of the translator object *trans*. The name is a symbol.

`ly:translator?` *x* [Function]
Is *x* a `Translator` object?

`ly:transpose-key-alist` *l pit* [Function]
Make a new key alist of *l* transposed by pitch *pit*.

`ly:truncate-list!` *lst i* [Function]
Take at most the first *i* of list *lst*.

`ly:ttf->pfa` *ttf-file-name idx* [Function]
: Convert the contents of a TrueType font file to PostScript Type 42 font, returning it as a string. The optional *idx* argument is useful for TrueType collections (TTC) only; it specifies the font index within the TTC. The default value of *idx* is 0.

`ly:ttf-ps-name` *ttf-file-name idx* [Function]
: Extract the PostScript name from a TrueType font. The optional *idx* argument is useful for TrueType collections (TTC) only; it specifies the font index within the TTC. The default value of *idx* is 0.

`ly:unit` [Function]
: Return the unit used for lengths as a string.

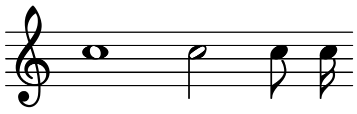
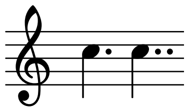
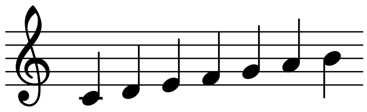
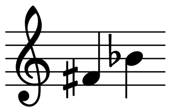
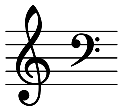
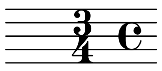
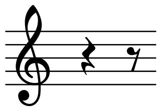
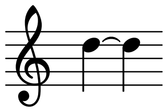
`ly:usage` [Function]
: Print usage message.

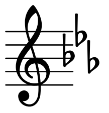
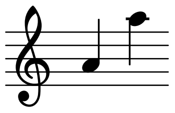
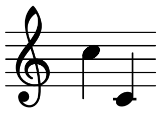
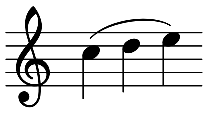
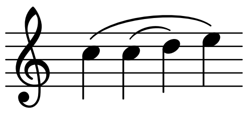
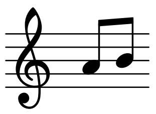
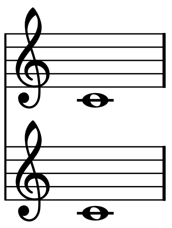
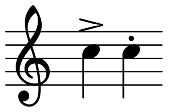
`ly:version` [Function]
: Return the current lilypond version as a list, e.g., `(1 3 127 uu1)`.

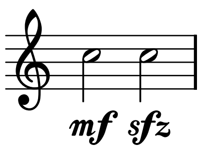
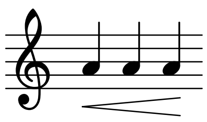
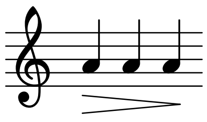
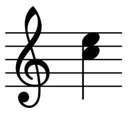
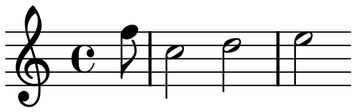
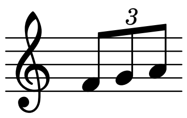
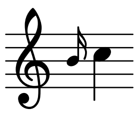
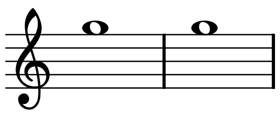
`ly:warning` *str rest* [Function]
: A Scheme callable function to issue the warning `str`. The message is formatted with `format` and `rest`.

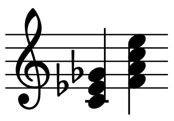
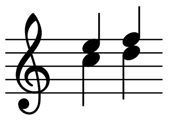
`ly:wide-char->utf-8` *wc* [Function]
: Encode the Unicode codepoint *wc*, an integer, as UTF-8.

Appendix C 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`	upstep	
`\times 2/3 {f g a}`	triplets	
`\grace`	grace notes	
`\lyricmode { twinkle }`	entering lyrics	twinkle
`\new Lyrics`	printing lyrics	twinkle
`twin -- kle`	lyric hyphen	 twin - kle

`\chordmode { c:dim f:maj7 }`	chords	
`\context ChordNames`	printing chord names	$\mathrm{C}^{o}\ \mathrm{F}^{\triangle}$
`<<{e f} \\ {c d}>>`	polyphony	
`s4 s8 s16`	spacer rests	

Appendix D LilyPond grammar

This appendix contains a description of the LilyPond grammar, as output from the parser.

`Grammar`

```
  1 lilypond:  /* empty */
  2         | lilypond toplevel_expression
  3         | lilypond assignment
  4         | lilypond error
  5         | lilypond "\\invalid"

  6 object_id_setting:  "\\objectid" STRING

  7 toplevel_expression:  lilypond_header
  8                    | book_block
  9                    | bookpart_block
 10                    | score_block
 11                    | composite_music
 12                    | full_markup
 13                    | full_markup_list
 14                    | output_def

 15 embedded_scm:  SCM_TOKEN
 16             | SCM_IDENTIFIER

 17 lilypond_header_body:  /* empty */
 18                     | lilypond_header_body assignment

 19 lilypond_header:  "\\header" '{' lilypond_header_body '}'

 20 assignment_id:  STRING
 21              | LYRICS_STRING

 22 assignment:  assignment_id '=' identifier_init
 23           | embedded_scm

 24 identifier_init:  score_block
 25                | book_block
 26                | bookpart_block
 27                | output_def
 28                | context_def_spec_block
 29                | music
 30                | post_event
 31                | number_expression
 32                | string
 33                | embedded_scm
 34                | full_markup
 35                | DIGIT

 36 context_def_spec_block:  "\\context" '{' context_def_spec_body '}'

 37 context_def_spec_body:  /* empty */
```

```
38                      | CONTEXT_DEF_IDENTIFIER
39                      | context_def_spec_body "\\grobdescriptions" embedded_scm
40                      | context_def_spec_body context_mod

41 book_block:  "\\book" '{' book_body '}'

42 book_body:  /* empty */
43          | BOOK_IDENTIFIER
44          | book_body paper_block
45          | book_body bookpart_block
46          | book_body score_block
47          | book_body composite_music
48          | book_body full_markup
49          | book_body full_markup_list
50          | book_body lilypond_header
51          | book_body error
52          | book_body object_id_setting

53 bookpart_block:  "\\bookpart" '{' bookpart_body '}'

54 bookpart_body:  /* empty */
55              | BOOK_IDENTIFIER
56              | bookpart_body paper_block
57              | bookpart_body score_block
58              | bookpart_body composite_music
59              | bookpart_body full_markup
60              | bookpart_body full_markup_list
61              | bookpart_body lilypond_header
62              | bookpart_body error
63              | bookpart_body object_id_setting

64 score_block:  "\\score" '{' score_body '}'

65 score_body:  music
66           | SCORE_IDENTIFIER
67           | score_body object_id_setting
68           | score_body lilypond_header
69           | score_body output_def
70           | score_body error

71 paper_block:  output_def

72 output_def:  output_def_body '}'

73 output_def_head:  "\\paper"
74                | "\\midi"
75                | "\\layout"

76 output_def_head_with_mode_switch:  output_def_head

77 output_def_body:  output_def_head_with_mode_switch '{'
78                | output_def_head_with_mode_switch '{' OUTPUT_DEF_IDENTIFIER
```

```
 79                | output_def_body assignment
 80                | output_def_body context_def_spec_block
 81                | output_def_body error

 82 tempo_event:  "\\tempo" steno_duration '=' bare_unsigned
 83            | "\\tempo" string steno_duration '=' bare_unsigned
 84            | "\\tempo" full_markup steno_duration '=' bare_unsigned
 85            | "\\tempo" string
 86            | "\\tempo" full_markup

 87 music_list:  /* empty */
 88           | music_list music
 89           | music_list embedded_scm
 90           | music_list error

 91 music:  simple_music
 92      | composite_music

 93 alternative_music:  /* empty */
 94                  | "\\alternative" '{' music_list '}'

 95 repeated_music:  "\\repeat" simple_string unsigned_number music alternative_music

 96 sequential_music:  "\\sequential" '{' music_list '}'
 97                 | '{' music_list '}'

 98 simultaneous_music:  "\\simultaneous" '{' music_list '}'
 99                   | "<<" music_list ">>"

100 simple_music:  event_chord
101             | MUSIC_IDENTIFIER
102             | music_property_def
103             | context_change

104 optional_context_mod:  /* empty */

106 optional_context_mod:  "\with"  '{' context_mod_list '}'

107 context_mod_list:  /* empty */
108                 | context_mod_list context_mod

109 composite_music:  prefix_composite_music
110                | grouped_music_list

111 grouped_music_list:  simultaneous_music
112                   | sequential_music

113 function_scm_argument:  embedded_scm
114                      | simple_string

115 function_arglist_music_last:  EXPECT_MUSIC function_arglist music
```

```
116 function_arglist_nonmusic_last:  EXPECT_MARKUP function_arglist full_markup
117                               | EXPECT_SCM function_arglist function_scm_argument

118 function_arglist_nonmusic:  EXPECT_NO_MORE_ARGS
119                          | EXPECT_MARKUP function_arglist_nonmusic full_markup
120                          | EXPECT_SCM function_arglist_nonmusic function_scm_argument

121 function_arglist:  EXPECT_NO_MORE_ARGS
122                 | function_arglist_music_last
123                 | function_arglist_nonmusic_last

124 generic_prefix_music_scm:  MUSIC_FUNCTION function_arglist

125 optional_id:  /* empty */
126            | '=' simple_string

127 prefix_composite_music:  generic_prefix_music_scm
128                       | "\context" simple_string optional_id optional_context_mod musi
129                       | "\new" simple_string optional_id optional_context_mod music
130                       | "\times" fraction music
131                       | repeated_music
132                       | "\transpose" pitch_also_in_chords pitch_also_in_chords music
133                       | mode_changing_head grouped_music_list
134                       | mode_changing_head_with_context optional_context_mod grouped_
135                       | relative_music
136                       | re_rhythmed_music

137 mode_changing_head:  "\notemode"
138                   | "\drummode"
139                   | "\figuremode"
140                   | "\chordmode"
141                   | "\lyricmode"

142 mode_changing_head_with_context:  "\drums"
143                                | "\figures"
144                                | "\chords"
145                                | "\lyrics"

146 relative_music:  "\relative" absolute_pitch music
147               | "\relative" composite_music

149 new_lyrics:  "\addlyrics"  grouped_music_list

151 new_lyrics:  new_lyrics "\addlyrics"  grouped_music_list

152 re_rhythmed_music:  grouped_music_list new_lyrics

154 re_rhythmed_music:  "\lyricsto" simple_string  music

155 context_change:  "\change" STRING '=' STRING

156 property_path_revved:  embedded_scm
```

```
157                    | property_path_revved embedded_scm

158 property_path:  property_path_revved

159 property_operation:  STRING '=' scalar
160                    | "\unset" simple_string
161                    | "\override" simple_string property_path '=' embedded_scm
162                    | "\revert" simple_string embedded_scm

163 context_def_mod:  "\consists"
164                 | "\remove"
165                 | "\accepts"
166                 | "\defaultchild"
167                 | "\denies"
168                 | "\alias"
169                 | "\type"
170                 | "\description"
171                 | "\name"

172 context_mod:  property_operation
173             | context_def_mod STRING

174 context_prop_spec:  simple_string
175                   | simple_string '.' simple_string

176 simple_music_property_def:  "\override" context_prop_spec property_path '=' scalar
177                           | "\revert" context_prop_spec embedded_scm
178                           | "\set" context_prop_spec '=' scalar
179                           | "\unset" context_prop_spec

180 music_property_def:  simple_music_property_def
181                    | "\once" simple_music_property_def

182 string:  STRING
183       | STRING_IDENTIFIER
184       | string '+' string

185 simple_string:  STRING
186               | LYRICS_STRING
187               | STRING_IDENTIFIER

188 scalar:  string
189       | LYRICS_STRING
190       | bare_number
191       | embedded_scm
192       | full_markup
193       | DIGIT

194 event_chord:  simple_chord_elements post_events
195             | MULTI_MEASURE_REST optional_notemode_duration post_events
196             | command_element
197             | note_chord_element
```

```
198 note_chord_element:  chord_body optional_notemode_duration post_events

199 chord_body:  "<" chord_body_elements ">"

200 chord_body_elements:  /* empty */
201                    | chord_body_elements chord_body_element

202 chord_body_element:  pitch exclamations questions octave_check post_events
203                   | DRUM_PITCH post_events
204                   | music_function_chord_body

205 music_function_identifier_musicless_prefix:  MUSIC_FUNCTION

206 music_function_chord_body:  music_function_identifier_musicless_prefix EXPECT_MUSIC fu
207                          | music_function_identifier_musicless_prefix function_arglist

208 music_function_event:  music_function_identifier_musicless_prefix EXPECT_MUSIC functio
209                     | music_function_identifier_musicless_prefix function_arglist_nonm

210 command_element:  command_event
211                 | "\skip" duration_length
212                 | "\["
213                 | "\]"
214                 | "\"
215                 | '|'
216                 | "\partial" duration_length
217                 | "\time" fraction
218                 | "\mark" scalar

219 command_event:  "\~"
220               | "\mark" "\default"
221               | tempo_event
222               | "\key" "\default"
223               | "\key" NOTENAME_PITCH SCM_IDENTIFIER

224 post_events:  /* empty */
225             | post_events post_event

226 post_event:  direction_less_event
227            | '-' music_function_event
228            | "--"
229            | "__"
230            | script_dir direction_reqd_event
231            | script_dir direction_less_event
232            | string_number_event

233 string_number_event:  E_UNSIGNED

234 direction_less_char:  '['
235                    | ']'
236                    | '~'
```

```
237                    | '('
238                    | ')'
239                    | "\!"
240                    | "\("
241                    | "\)"
242                    | "\>"
243                    | "\<"

244 direction_less_event:  direction_less_char
245                     | EVENT_IDENTIFIER
246                     | tremolo_type

247 direction_reqd_event:  gen_text_def
248                     | script_abbreviation

249 octave_check:  /* empty */
250             | '='
251             | '=' sub_quotes
252             | '=' sup_quotes

253 sup_quotes:  '''
254           | sup_quotes '''

255 sub_quotes:  ','
256           | sub_quotes ','

257 steno_pitch:  NOTENAME_PITCH
258            | NOTENAME_PITCH sup_quotes
259            | NOTENAME_PITCH sub_quotes

260 steno_tonic_pitch:  TONICNAME_PITCH
261                  | TONICNAME_PITCH sup_quotes
262                  | TONICNAME_PITCH sub_quotes

263 pitch:  steno_pitch

264 pitch_also_in_chords:  pitch
265                     | steno_tonic_pitch

266 gen_text_def:  full_markup
267             | string
268             | DIGIT

269 script_abbreviation:  '^'
270                    | '+'
271                    | '-'
272                    | '|'
273                    | ">"
274                    | '.'
275                    | '_'

276 script_dir:  '_'
```

```
277           | '^'
278           | '-'

279 absolute_pitch:  steno_pitch

280 duration_length:  multiplied_duration

281 optional_notemode_duration:  /* empty */
282                            | multiplied_duration

283 steno_duration:  bare_unsigned dots
284               | DURATION_IDENTIFIER dots

285 multiplied_duration:  steno_duration
286                    | multiplied_duration '*' bare_unsigned
287                    | multiplied_duration '*' FRACTION

288 fraction:  FRACTION
289         | UNSIGNED '/' UNSIGNED

290 dots:  /* empty */
291     | dots '.'

292 tremolo_type:  ':'
293             | ':' bare_unsigned

294 bass_number:  DIGIT
295            | UNSIGNED
296            | STRING
297            | full_markup

298 figured_bass_alteration:  '-'
299                        | '+'
300                        | '!'

301 bass_figure:  "_"
302            | bass_number
303            | bass_figure ']'
304            | bass_figure figured_bass_alteration
305            | bass_figure figured_bass_modification

306 figured_bass_modification:  "\+"
307                          | "\!"
308                          | '/'
309                          | "\"

310 br_bass_figure:  bass_figure
311               | '[' bass_figure

312 figure_list:  /* empty */
313            | figure_list br_bass_figure
```

```
314 figure_spec:  FIGURE_OPEN figure_list FIGURE_CLOSE

315 optional_rest:  /* empty */
316              | "\rest"

317 simple_element:  pitch exclamations questions octave_check optional_notemode_duration
318               | DRUM_PITCH optional_notemode_duration
319               | RESTNAME optional_notemode_duration
320               | lyric_element optional_notemode_duration

321 simple_chord_elements:  simple_element
322                      | new_chord
323                      | figure_spec optional_notemode_duration

324 lyric_element:  lyric_markup
325              | LYRICS_STRING

326 new_chord:  steno_tonic_pitch optional_notemode_duration
327          | steno_tonic_pitch optional_notemode_duration chord_separator chord_items

328 chord_items:  /* empty */
329            | chord_items chord_item

330 chord_separator:  ":"
331                | "^"
332                | "/" steno_tonic_pitch
333                | "/+" steno_tonic_pitch

334 chord_item:  chord_separator
335           | step_numbers
336           | CHORD_MODIFIER

337 step_numbers:  step_number
338             | step_numbers '.' step_number

339 step_number:  bare_unsigned
340            | bare_unsigned '+'
341            | bare_unsigned "-"

342 number_expression:  number_expression '+' number_term
343                  | number_expression '-' number_term
344                  | number_term

345 number_term:  number_factor
346            | number_factor '*' number_factor
347            | number_factor '/' number_factor

348 number_factor:  '-' number_factor
349              | bare_number

350 bare_number:  UNSIGNED
351            | REAL
```

```
352            | NUMBER_IDENTIFIER
353            | REAL NUMBER_IDENTIFIER
354            | UNSIGNED NUMBER_IDENTIFIER

355 bare_unsigned:  UNSIGNED
356              | DIGIT

357 unsigned_number:  bare_unsigned
358                | NUMBER_IDENTIFIER

359 exclamations:  /* empty */
360             | exclamations '!'

361 questions:  /* empty */
362          | questions '?'

363 lyric_markup:  LYRIC_MARKUP_IDENTIFIER

365 lyric_markup:  LYRIC_MARKUP  markup_top

367 full_markup_list:  "\markuplines"  markup_list

368 full_markup:  MARKUP_IDENTIFIER

370 full_markup:  "\markup"  markup_top

371 markup_top:  markup_list
372           | markup_head_1_list simple_markup
373           | simple_markup

374 markup_list:  markup_composed_list
375            | markup_braced_list
376            | markup_command_list

377 markup_composed_list:  markup_head_1_list markup_braced_list

378 markup_braced_list:  '{' markup_braced_list_body '}'

379 markup_braced_list_body:  /* empty */
380                        | markup_braced_list_body markup
381                        | markup_braced_list_body markup_list

382 markup_command_list:  MARKUP_LIST_HEAD_EMPTY
383                    | MARKUP_LIST_HEAD_LIST0 markup_list
384                    | MARKUP_LIST_HEAD_SCM0 embedded_scm
385                    | MARKUP_LIST_HEAD_SCM0_LIST1 embedded_scm markup_list
386                    | MARKUP_LIST_HEAD_SCM0_SCM1_LIST2 embedded_scm embedded_scm marku

387 markup_head_1_item:  MARKUP_HEAD_MARKUP0
388                   | MARKUP_HEAD_SCM0_MARKUP1 embedded_scm
389                   | MARKUP_HEAD_SCM0_SCM1_MARKUP2 embedded_scm embedded_scm
```

```
  390 markup_head_1_list:  markup_head_1_item
  391                    | markup_head_1_list markup_head_1_item

  392 simple_markup:  STRING
  393              | MARKUP_IDENTIFIER
  394              | LYRIC_MARKUP_IDENTIFIER
  395              | STRING_IDENTIFIER

  397 simple_markup:  "\score"  '{' score_body '}'
  398              | MARKUP_HEAD_SCM0 embedded_scm
  399              | MARKUP_HEAD_SCM0_SCM1_SCM2 embedded_scm embedded_scm embedded_scm
  400              | MARKUP_HEAD_SCM0_SCM1 embedded_scm embedded_scm
  401              | MARKUP_HEAD_SCM0_MARKUP1_MARKUP2 embedded_scm markup markup
  402              | MARKUP_HEAD_SCM0_SCM1_MARKUP2_MARKUP3 embedded_scm embedded_scm markup
  403              | MARKUP_HEAD_EMPTY
  404              | MARKUP_HEAD_LIST0 markup_list
  405              | MARKUP_HEAD_MARKUP0_MARKUP1 markup markup

  406 markup:  markup_head_1_list simple_markup
  407       | simple_markup


Terminals, with rules where they appear



"-" (320) 341
"--" (341) 228
"/" (321) 332
"/+" (317) 333
":" (319) 330
"<" (322) 199
"<<" (324) 99
">" (323) 199 273
">>" (325) 99
"\!" (330) 239 307
"\" (326) 214 309
"\(" (332) 240
"\)" (329) 241
"\+" (335) 306
"\<" (334) 243
"\>" (327) 242
"\[" (331) 212
"\]" (333) 213
"\accepts" (261) 165
"\addlyrics" (259) 149 151
"\alias" (262) 168
"\alternative" (263) 94
"\book" (264) 41
"\bookpart" (265) 53
"\C[haracter]" (328)
"\change" (266) 155
```

```
"_" (340) 301
"__" (337) 229
$end (0) 0
'!' (33) 300 360
''' (39) 253 254
'(' (40) 237
')' (41) 238
'*' (42) 286 287 346
'+' (43) 184 270 299 340 342
',' (44) 255 256
'-' (45) 227 271 278 298 343 348
'.' (46) 175 274 291 338
'/' (47) 289 308 347
':' (58) 292 293
'=' (61) 22 82 83 84 126 155 159 161 176 178 250 251 252
'?' (63) 362
'[' (91) 234 311
']' (93) 235 303
'^' (94) 269 277
'_' (95) 275 276
'{' (123) 19 36 41 53 64 77 78 94 96 97 98 106 378 397
'|' (124) 215 272
'}' (125) 19 36 41 53 64 72 94 96 97 98 106 378 397
'~' (126) 236
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EXPECT_MUSIC (349) 115 206 208
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```

```
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STRING (389) 6 20 155 159 173 182 185 296 392
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    on left:  22 23, on right:  3 18 79
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    on left:  20 21, on right:  22
bare_number (277)
    on left:  350 351 352 353 354, on right:  190 349
bare_unsigned (278)
    on left:  355 356, on right:  82 83 84 283 286 293 339 340 341 357
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    on left:  301 302 303 304 305, on right:  303 304 305 310 311
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    on left:  42 43 44 45 46 47 48 49 50 51 52, on right:  41 44 45 46
    47 48 49 50 51 52
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    on left:  53, on right:  9 26 45
bookpart_body (174)
    on left:  54 55 56 57 58 59 60 61 62 63, on right:  53 56 57 58 59
    60 61 62 63
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    on left:  310 311, on right:  313
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    on left:  202 203 204, on right:  201 206
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    on left:  200 201, on right:  199 201
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    on left:  334 335 336, on right:  329
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    on right:  244
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    on left:  244 245 246, on right:  226 231
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```

```
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    on left:  314, on right:  323
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```

```
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Appendix F LilyPond command index

This index lists all the LilyPond commands and keywords with links to those sections of the manual which describe or discuss their use. Each link is in two parts. The first part points to the exact location in the manual where the command or keyword appears; the second part points to the start of the section of the manual in which the command or keyword appears.

Appendix G LilyPond index

In addition to all the LilyPond commands and keywords, this index lists musical terms and words which relate to each of them, with links to those sections of the manual which describe or discuss that topic. Each link is in two parts. The first part points to the exact location in the manual where the topic appears; the second part points to the start of the section of the manual where that topic is discussed.