LilyPond

The music typesetter

Notation Reference

The LilyPond development team

This manual provides a reference for all notation that can be produced with LilyPond version 2.18.2. It assumes that the reader is familiar with the material in the Section "Learning Manual" in *Learning Manual*.

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

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

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For LilyPond version 2.18.2

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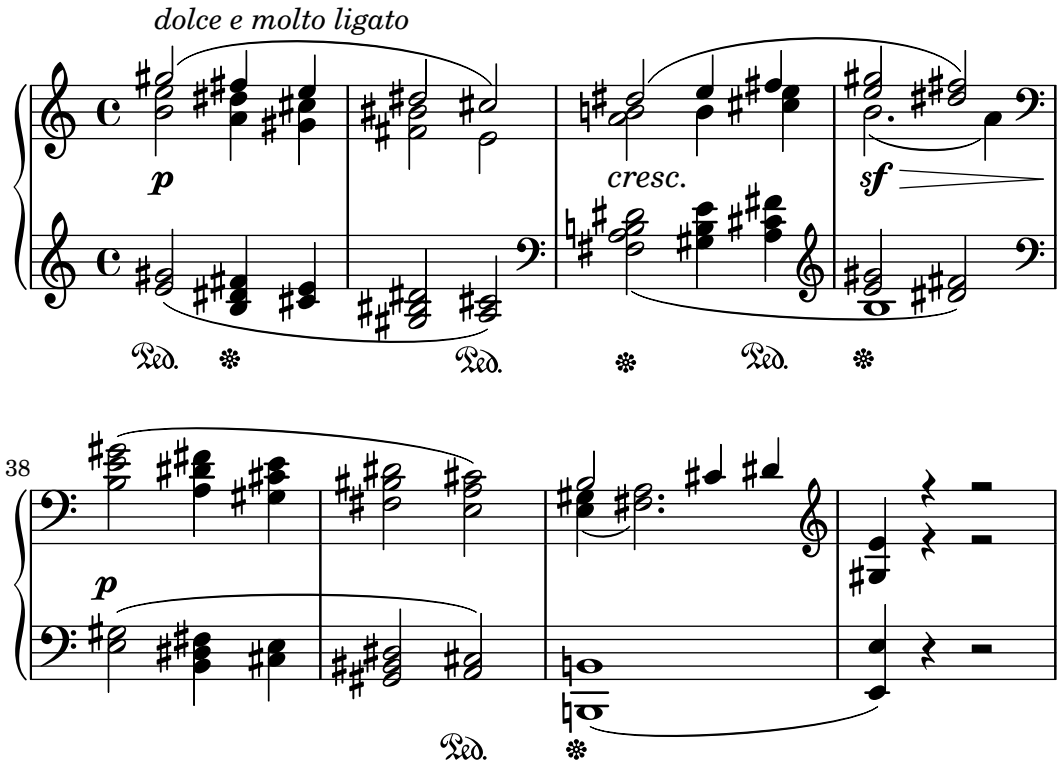
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1 Musical notation

This chapter explains how to create musical notation.

1.1 Pitches



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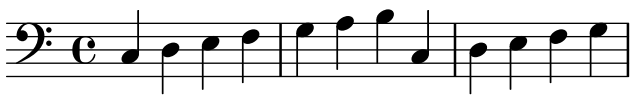
1.1.1 Writing pitches

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

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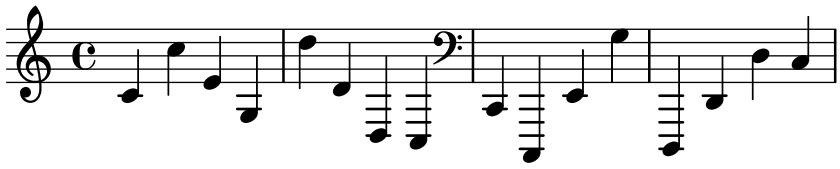
A pitch name is specified using lowercase letters `a` through `g`. The note names `c` to `b` are engraved in the octave below middle C.

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



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

```
{
  \clef treble
  c'4 c'' e' g
  d''4 d' d c
  \clef bass
  c,4 c,, e, g
  d,,4 d, d c
}
```



Music can be marked explicitly as being in absolute octave notation by preceding it with `\absolute`:

`\absolute` *musicexpr*

will be interpreted in absolute octave entry mode regardless of the context it appears in.

See also

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

Snippets: Section "Pitches" in *Snippets*.

Relative octave entry

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

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

`\relative` *startpitch musicexpr*

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

- If no octave changing mark is used on a pitch, its octave is calculated so that the interval with the previous note is less than a fifth. This interval is determined without considering accidentals.
- An octave changing mark `'` or `,` can be added to respectively raise or lower a pitch by an extra octave, relative to the pitch calculated without an octave mark.
- Multiple octave changing marks can be used. For example, `''` and `,,` will alter the pitch by two octaves.
- The pitch of the first note is relative to *startpitch*. *startpitch* is specified in absolute octave mode. Which choices are meaningful?

  an octave of `c`
  : Identifying middle C with `c'` is quite basic, so finding octaves of `c` tends to be straightforward. If your music starts with `gis` above `c'''`, you'd write something like `\relative c''' { gis' ... }`
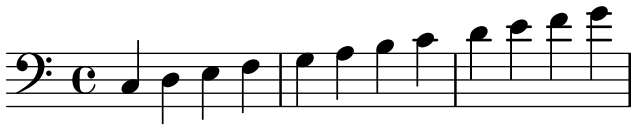
  an octave of the first note inside
  : Writing `\relative gis''' { gis ... }` makes it easy to determine the absolute pitch of the first note inside.

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

The documentation will usually employ the first option.
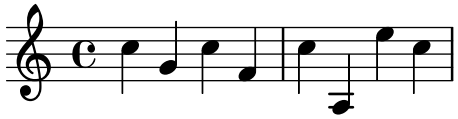
Here is the relative mode shown in action:

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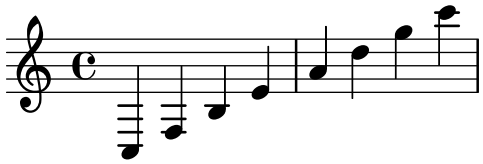


Octave changing marks are used for intervals greater than a fourth:

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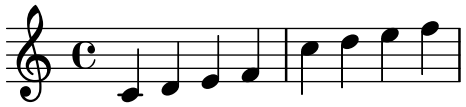


A note sequence without a single octave mark can nevertheless span large intervals:

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



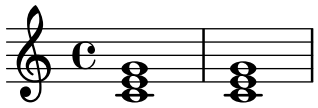
When `\relative` blocks are nested, the innermost `\relative` block applies.

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



`\relative` has no effect on `\chordmode` blocks.
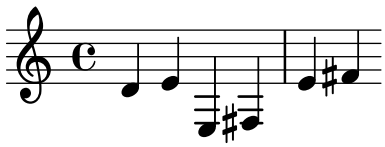
```
\new Staff {
  \relative c''' {
    \chordmode { c1 }
  }
  \chordmode { c1 }
}
```



`\relative` is not allowed inside of `\chordmode` blocks.

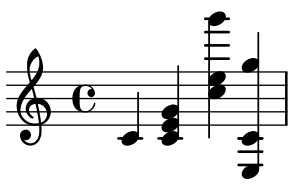
Music inside a `\transpose` block is absolute unless a `\relative` is included.

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



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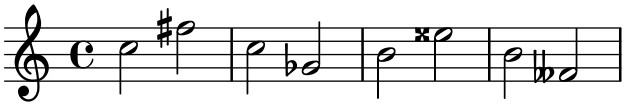
```
\relative c' {
  c
  <c e g>
  <c' e g'>
  <c, e, g''>
}
```



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
}
```



One consequence of these rules is that the first note inside `\relative f` music is interpreted just the same as if it was written in absolute pitch mode.

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 9.

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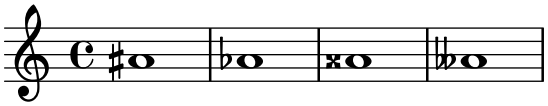
Internals Reference: Section “RelativeOctaveMusic” in *Internals Reference*.

Accidentals

> **Note:** New users are sometimes confused about accidentals and key signatures. In LilyPond, note names 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*.
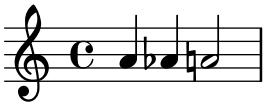
A *sharp* pitch is made by adding `is` to the note name, and a *flat* pitch by adding `es`. As you might expect, a *double sharp* or *double flat* is made by adding `isis` or `eses`. This syntax is derived from Dutch note naming conventions. To use other names for accidentals, see [Note names in other languages], page 7.

```
ais1 aes aisis aeses
```



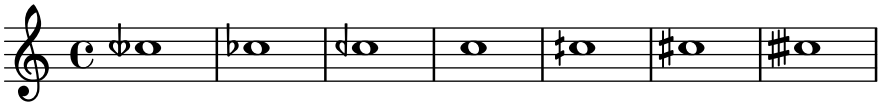
A natural will cancel the effect of an accidental or key signature. However, naturals are not encoded into the note name syntax with a suffix; a natural pitch is shown as a simple note name:

```
a4 aes a2
```
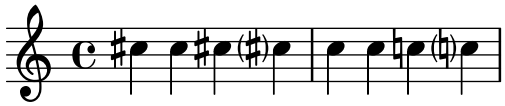


Quarter tones may be added; the following is a series of Cs with increasing pitches:

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



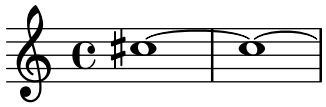
Normally accidentals are printed automatically, but you may also print them manually. A reminder accidental can be forced by adding an exclamation mark `!` after the pitch. A cautionary accidental (i.e., an accidental within parentheses) can be obtained by adding the question mark `?` after the pitch.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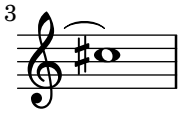
```
cis cis cis! cis? c c c! c?
```



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

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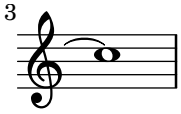




Selected Snippets

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

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

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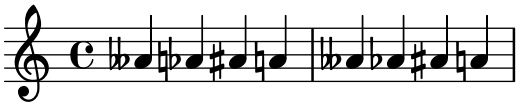




Preventing extra naturals from being automatically added

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

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

```
}
```



See also

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

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

Notation Reference: [Automatic accidentals], page 25, [Annotational accidentals (musica ficta)], page 414, [Note names in other languages], page 7.

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
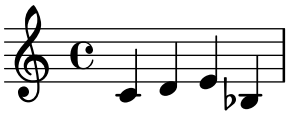
There are no generally accepted standards for denoting quarter-tone accidentals, so LilyPond’s symbol does not conform to any standard.

Note names in other languages

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

```
\language "italiano"

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



The available languages and the note names they define are:

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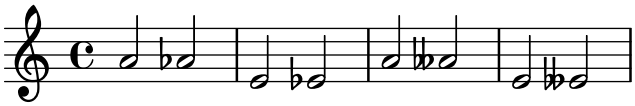
suomi	c d e f g a b h
svenska	c d e f g a b h
vlaams	do re mi fa sol la sib si

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

Language	sharp	flat	double sharp	double flat
nederlands	-is	-es	-isis	-eses
catalan	-d/-s	-b	-dd/-ss	-bb
deutsch	-is	-es	-isis	-eses
english	-s/-sharp	-f/-flat	-ss/-x/-sharpsharp	-ff/-flatflat
espanol or español	-s	-b	-ss/-x	-bb
italiano or français	-d	-b	-dd	-bb
norsk	-iss/-is	-ess/-es	-ississ/-isis	-essess/-eses
portugues	-s	-b	-ss	-bb
suomi	-is	-es	-isis	-eses
svenska	-iss	-ess	-ississ	-essess
vlaams	-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 following table lists note names for quarter-tone accidentals in various languages; here the prefixes *semi-* and *sesqui-* respectively mean 'half' and 'one and a half'. Languages that do not appear in this table do not provide special note names yet.

Language	semi-sharp	semi-flat	sesqui-sharp	sesqui-flat
nederlands	-ih	-eh	-isih	-eseh
deutsch	-ih	-eh	-isih	-eseh
english	-qs	-qf	-tqs	-tqf
espanol or español	-cs	-cb	-tcs	-tcb
italiano or français	-sd	-sb	-dsd	-bsb
portugues	-sqt	-bqt	-stqt	-btqt

Most languages presented here are commonly associated with Western classical music, also referred to as *Common Practice Period*. However, alternate pitches and tuning systems are also supported: see Section 2.10.1 [Common notation for non-Western music], page 434.

See also

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

Notation Reference: Section 2.10.1 [Common notation for non-Western music], page 434.

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

Snippets: Section “Pitches” in *Snippets*.

1.1.2 Changing multiple pitches
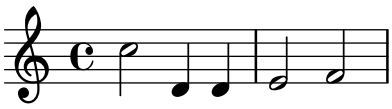
This section discusses how to modify pitches.

Octave checks

In relative mode, it is easy to forget an octave changing mark. Octave checks make such errors easier to find by displaying a warning and correcting the octave if a note is found in an unexpected octave.
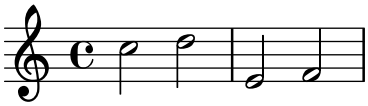
To check the octave of a note, specify the absolute octave after the `=` symbol. This example will generate a warning (and change the pitch) because the second note is the absolute octave `d''` instead of `d'` as indicated by the octave correction.

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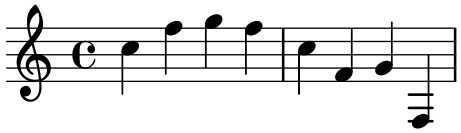
```
\relative c'' {
  c2 d
  \octaveCheck c'
  e2 f
}
```



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
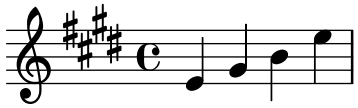
```
\transpose frompitch topitch musicexpr
```

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.

> **Note:** Music inside a `\transpose` block is absolute unless a `\relative` is included in the block.
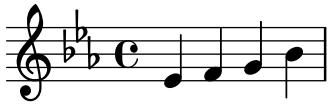
Consider a piece written in the key of D-major. It can be transposed up to E-major; note that the key signature is automatically transposed as well.

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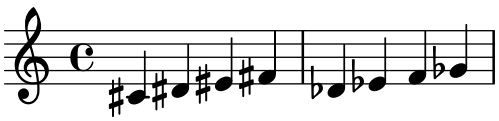
```
\transpose a c' {
  \relative c' {
    \key c \major
    c4 d e g
  }
}
```



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 24.

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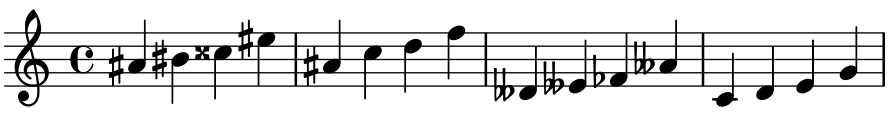
```
      (if (< n 0) (begin (set! o (- o 1)) (set! n (+ n 7))))
      (if (> n 6) (begin (set! o (+ o 1)) (set! n (- n 7))))
      (ly:make-pitch o n (/ a 4))))

#(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 24, [Inversion], page 13, [Modal transformations], page 14, [Relative octave entry], page 2, [Retrograde], page 13.

Snippets: Section “Pitches” in *Snippets*.

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

Known issues and warnings

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

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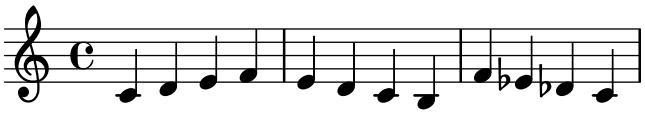
Inversion

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

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

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

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



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

See also
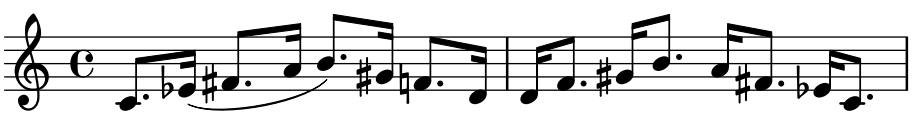
Notation Reference: [Modal transformations], page 14, [Retrograde], page 13, [Transpose], page 10.

Retrograde

A music expression can be reversed to produce its retrograde:

```
music = \relative c' { c8. ees16( fis8. a16 b8.) gis16 f8. d16 }

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



Known issues and warnings

Manual ties inside `\retrograde` will be broken and generate warnings. Some ties can be generated automatically by enabling [Automatic note splitting], page 72.

See also

Notation Reference: [Inversion], page 13, [Modal transformations], page 14, [Transpose], page 10.

Modal transformations

In a musical composition that is based on a scale, a motif is frequently transformed in various ways. It may be *transposed* to start at different places in the scale or it may be *inverted* around a pivot point in the scale. It may also be reversed to produce its *retrograde*, see [Retrograde], page 13.

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

Modal transposition
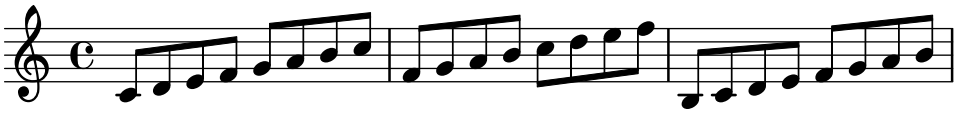
A motif can be transposed within a given scale with:

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

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

```
diatonicScale = \relative c' { c d e f g a b }
motif = \relative c' { c8 d e f g a b c }
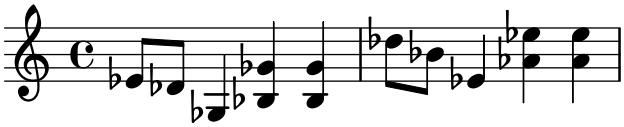
\new Staff {
  \motif
  \modalTranspose c f \diatonicScale \motif
  \modalTranspose c b, \diatonicScale \motif
}
```



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

```
pentatonicScale = \relative c' { ges aes bes des ees }
motif = \relative c' { ees8 des ges,4 <ges' bes,> <ges bes,> }
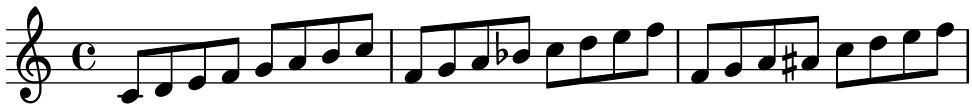
\new Staff {
  \motif
  \modalTranspose ges ees' \pentatonicScale \motif
}
```



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

```
chromaticScale = \relative c' { c cis d dis e f fis g gis a ais b }
motif = \relative c' { c8 d e f g a b c }
```

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



Modal inversion

A motif can be inverted within a given scale around a given pivot note and transposed in a single operation with:
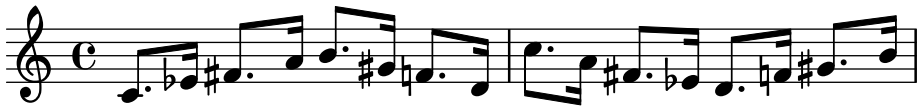
`\modalInversion` *around-pitch to-pitch scale motif*

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

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

```
octatonicScale = \relative c' { ees f fis gis a b c d }
motif = \relative c' { c8. ees16 fis8. a16 b8. gis16 f8. d16 }
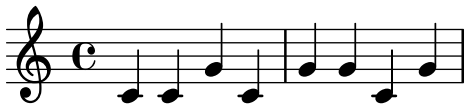
\new Staff {
  \motif
  \modalInversion fis' fis' \octatonicScale \motif
}
```



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

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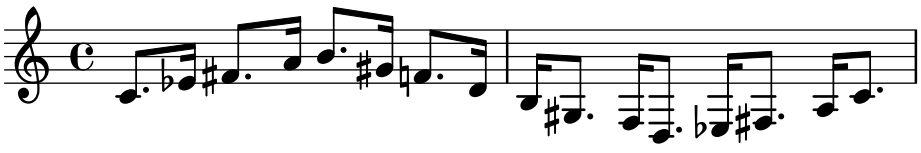
\new Staff {
  \motive
  \modalInversion c' g' \scale \motive
}
```



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

```
octatonicScale = \relative c' { ees f fis gis a b c d }
motif = \relative c' { c8. ees16 fis8. a16 b8. gis16 f8. d16 }
```

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



See also

Notation Reference: [Inversion], page 13, [Retrograde], page 13, [Transpose], page 10.
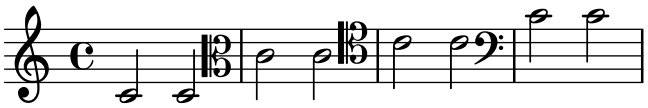
1.1.3 Displaying pitches

This section discusses how to alter the output of pitches.

Clef

The clef may be altered. Middle C is shown in every example. The following clef names can (but do not need to) be enclosed in quotes.

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



Other clefs include:

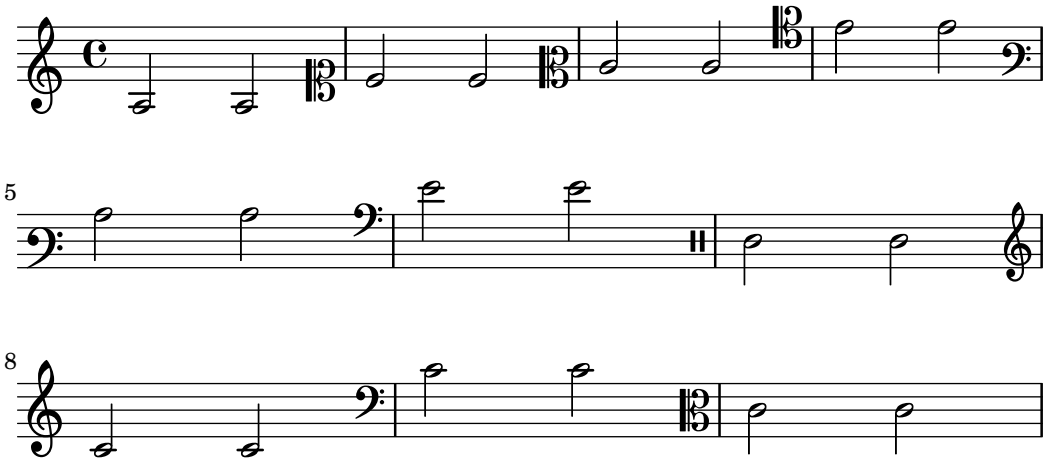
```
\clef french
c2 c
\clef soprano
c2 c
\clef mezzosoprano
c2 c
\clef baritone
c2 c

\break

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

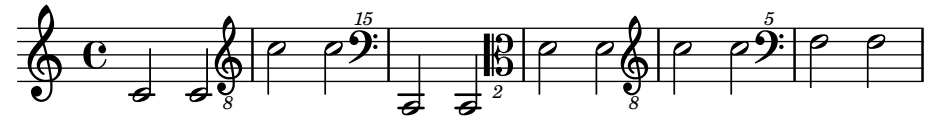
```
\break

\clef G   % synonym for treble
c2 c
\clef F   % synonym for bass
c2 c
\clef C   % synonym for alto
c2 c
```
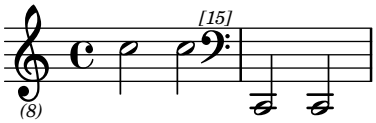


By adding `_8` or `^8` to the clef name, the clef is transposed one octave down or up respectively, and `_15` and `^15` transpose by two octaves. Other integers can be used if required. Clef names containing non-alphabetic characters must be enclosed in quotes

```
\clef treble
c2 c
\clef "treble_8"
c2 c
\clef "bass^15"
c2 c
\clef "alto_2"
c2 c
\clef "G_8"
c2 c
\clef "F^5"
c2 c
```



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

```
\clef "treble_(8)"
c2 c
\clef "bass^[15]"
c2 c
```



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

Some special purpose clefs are described in [Mensural clefs], page 409, [Gregorian clefs], page 417, [Default tablatures], page 318, and [Custom tablatures], page 331. For mixing different clefs when using cue notes within a score, see the `\cueClef` and `\cueDuringWithClef` functions in [Formatting cue notes], page 198.

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 `clefTransposition`. 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. In order to get key signatures on the correct staff lines, `middleCClefPosition` must also be set. The positional parameters are relative to the staff center line, positive numbers displacing upwards, counting one for each line and space. The `clefTransposition` 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
  \key f \major
  c'1
  % The standard bass clef
  \set Staff.clefGlyph = #"clefs.F"
  \set Staff.clefPosition = #2
  \set Staff.middleCPosition = #6
  \set Staff.middleCClefPosition = #6
  \key g \major
  c'1
  % The baritone clef
  \set Staff.clefGlyph = #"clefs.C"
  \set Staff.clefPosition = #4
  \set Staff.middleCPosition = #4
  \set Staff.middleCClefPosition = #4
  \key f \major
  c'1
  % The standard choral tenor clef
  \set Staff.clefGlyph = #"clefs.G"
  \set Staff.clefPosition = #-2
  \set Staff.clefTransposition = #-7
```

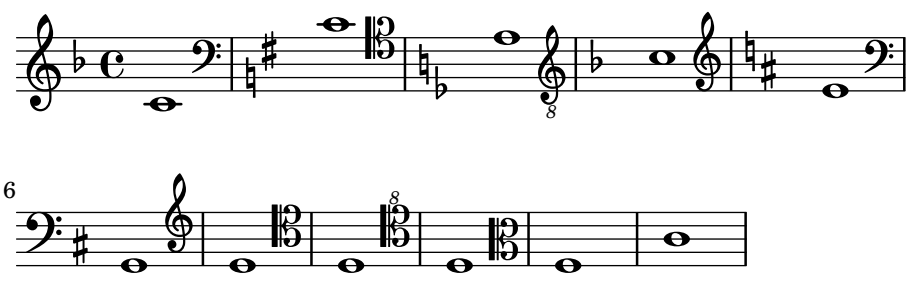
```
  \set Staff.middleCPosition = #1
  \set Staff.middleCClefPosition = #1
  \key f \major
  c'1
  % A non-standard clef
  \set Staff.clefPosition = #0
  \set Staff.clefTransposition = #0
  \set Staff.middleCPosition = #-4
  \set Staff.middleCClefPosition = #-4
  \key g \major
  c'1 \break

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

  \set Staff.clefGlyph = #"clefs.F"
  \set Staff.clefPosition = #2
  c'1
  \set Staff.clefGlyph = #"clefs.G"
  c'1
  \set Staff.clefGlyph = #"clefs.C"
  c'1
  \set Staff.clefTransposition = #7
  c'1
  \set Staff.clefTransposition = #0
  \set Staff.clefPosition = #0
  c'1

  % Return to the normal clef:

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



See also

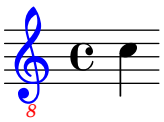
Notation Reference: [Mensural clefs], page 409, [Gregorian clefs], page 417, [Default tablatures], page 318, [Custom tablatures], page 331, [Formatting cue notes], page 198.

Snippets: Section “Pitches” in *Snippets*.

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

Known issues and warnings

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



Key signature
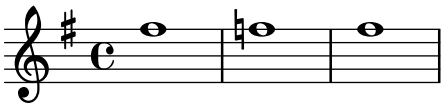
> **Note:** New users are sometimes confused about accidentals and key signatures. In LilyPond, note names are the raw input; key signatures and clefs determine how this raw input is displayed. An unaltered note like `c` means 'C natural', regardless of the key signature or clef. For more information, 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`.
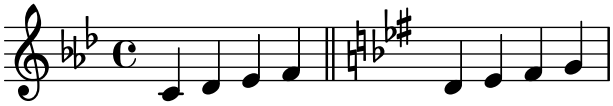
```
\key g \major
fis1
f
fis
```



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

```
freygish = #`((0 . ,NATURAL) (1 . ,FLAT) (2 . ,NATURAL)
    (3 . ,NATURAL) (4 . ,NATURAL) (5 . ,FLAT) (6 . ,FLAT))
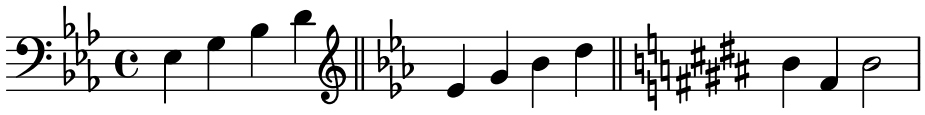
\relative c' {
  \key c \freygish c4 des e f
  \bar "||" \key d \freygish d es fis g
}
```



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

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

\override Staff.KeySignature.sharp-positions = #'(2)
\bar "||" \key b \major b fis b2
```
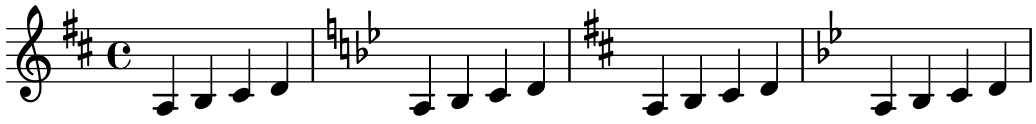


Selected Snippets

Preventing natural signs from being printed when the key signature changes

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

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



Non-traditional key signatures

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

To create non-standard key signatures, set this property directly. The format of this command is a list:
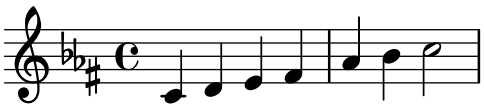
`\set Staff.keySignature = #`(((octave . step) . alter) ((octave . step) . alter) ...)` where, for each element in the list, `octave` specifies the octave (0 being the octave from middle C to the B above), `step` specifies the note within the octave (0 means C and 6 means B), and `alter` is `,SHARP` `,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 . 6) . ,FLAT)
                              ((0 . 5) . ,FLAT)
                              ((0 . 3) . ,SHARP))
  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*.

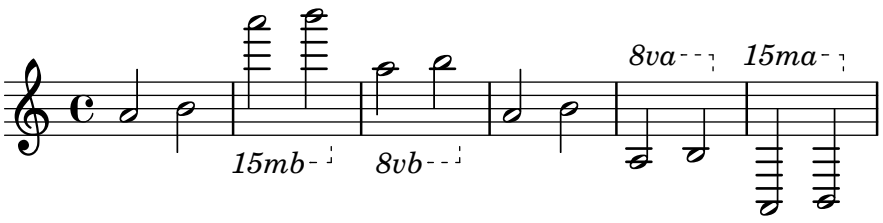
Snippets: Section “Pitches” in *Snippets*.

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-signature-interface” in *Internals Reference*.

Ottava brackets

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

```
a2 b
\ottava #-2
a2 b
\ottava #-1
a2 b
\ottava #0
a2 b
\ottava #1
a2 b
\ottava #2
a2 b
```



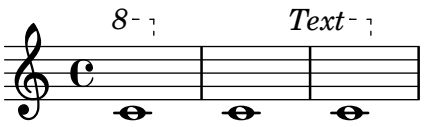
Selected Snippets

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
```

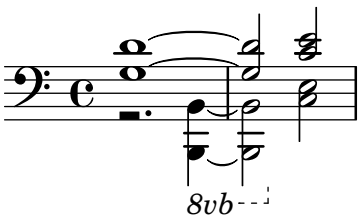
```
  \set Staff.ottavation = #"8"
  c''1
  \ottava #0
  c'1
  \ottava #1
  \set Staff.ottavation = #"Text"
  c''1
}
```



Adding an ottava marking to a single voice

If you have more than one voice on the staff, setting octavation in one voice will transpose the position of notes in all voices for the duration of the ottava bracket. If the ottavation is only intended to apply to one voice, the middleCPosition and ottava bracket may be set explicitly. In this snippet, the bass clef usually has middleCPosition set to 6, six positions above the center line, so in the 8va portion middleCPosition is 7 positions (one octave) higher still.

```
{
  \clef bass
  << { <g d'>1~ q2 <c' e'> }
  \\
    {
      r2.
      \set Staff.ottavation = #"8vb"
      \once \override Staff.OttavaBracket.direction = #DOWN
      \set Voice.middleCPosition = #(+ 6 7)
      <b,,, b,,>4 ~ |
      q2
      \unset Staff.ottavation
      \unset Voice.middleCPosition
      <c e>2
    }
  >>
}
```



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 195.

`\transposition` *pitch*
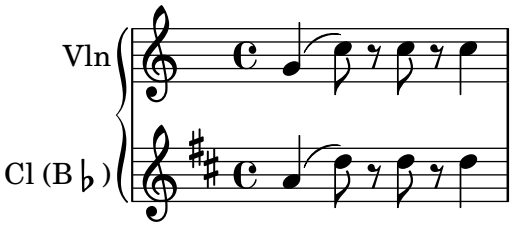
The pitch to use for `\transposition` should correspond to the real sound heard when a `c'` written on the staff is played by the transposing instrument. This pitch is entered in absolute mode, so an instrument that produces a real sound which is one tone higher than the printed music should use `\transposition 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

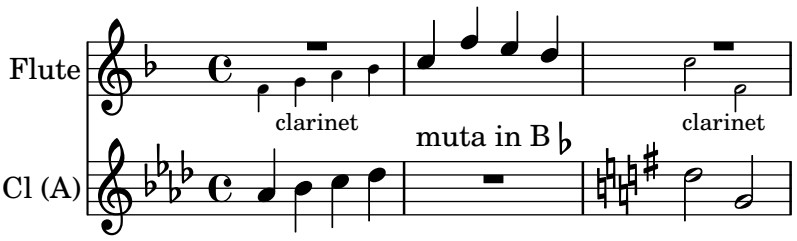
      \key d \major
      a4( d8) r d r d4
    }
  }
>>
```



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

```
flute = \relative c'' {
  \key f \major
  \cueDuring #"clarinet" #DOWN {
```

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



See also

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

Notation Reference: [Quoting other voices], page 195, [Transpose], page 10.

Snippets: Section “Pitches” in *Snippets*.

Automatic accidentals

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

```
\new Staff <<
  \accidentalStyle voice
  { ... }
>>
```

The accidental style 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:

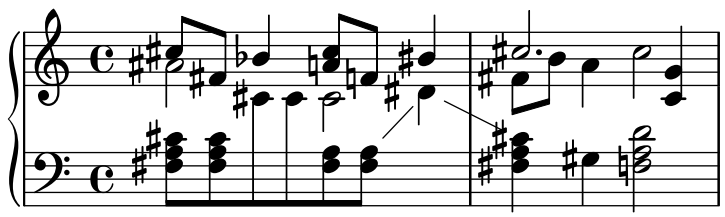
```
\accidentalStyle StaffGroup.voice
```

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

```
musicA = {
  <<
    \relative c' {
      cis'8 fis, bes4 <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>8[ <fis a cis>
      \change Staff = up
      cis' cis
      \change Staff = down
      <fis, a> <fis a>]
      \showStaffSwitch
      \change Staff = up
      dis'4 |
      \change Staff = down
      <fis, a cis>4 gis <f a d>2 |
    }
  }
}

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

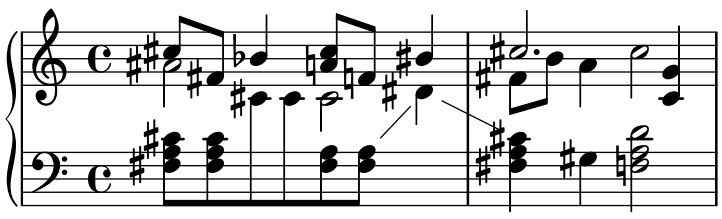


Note that the last lines of this example can be replaced by the following, as long as the same accidental style should be used in both staves.

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

`default`

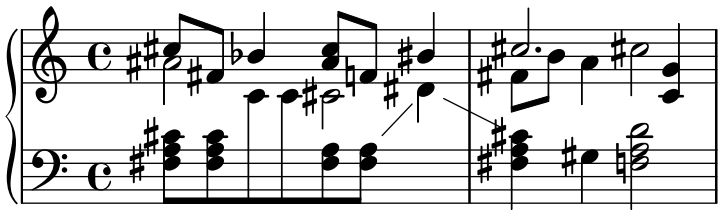
This is the default typesetting behavior. It corresponds to eighteenth-century common practice: accidentals are remembered to the end of the measure in which they occur and only in their own octave. Thus, in the example below, no natural signs are printed before the `b` in the second measure or the last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

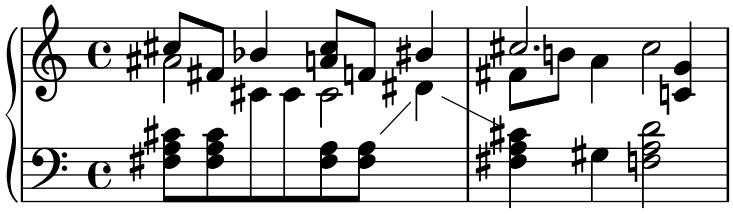
As a result, accidentals from one voice do not get canceled in other voices, which is often an unwanted result: in the following example, it is hard to determine whether the second `a` should be played natural or sharp. The `voice` option should therefore be used only if the voices are to be read solely 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`

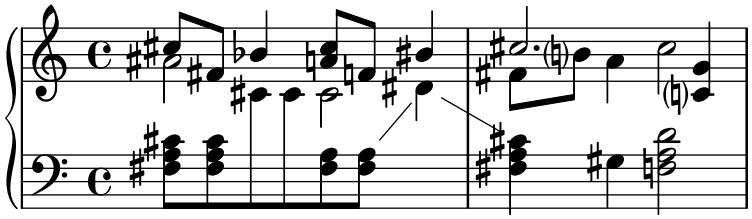
This rule corresponds to the common practice in the twentieth century. It omits some extra natural signs, which were traditionally prefixed to a sharp following a double sharp, or a flat following a double flat. The `modern` rule prints the same accidentals as `default`, with two additions that serve to avoid ambiguity: after

temporary accidentals, cancellation marks are printed also in the following measure (for notes in the same octave) and, in the same measure, for notes in other octaves. Hence the naturals before the `b` and the `c` in the second measure of the upper staff:



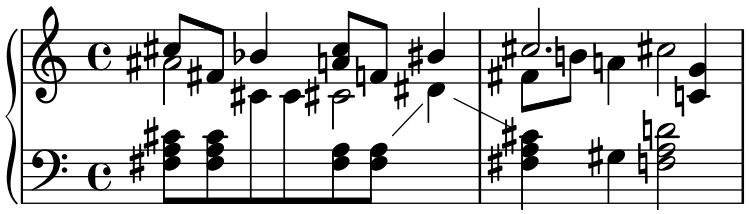
`modern-cautionary`

This rule is similar to `modern`, but the 'extra' accidentals (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`.



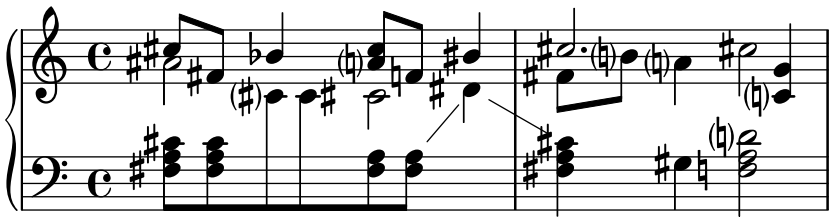
`modern-voice`

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`

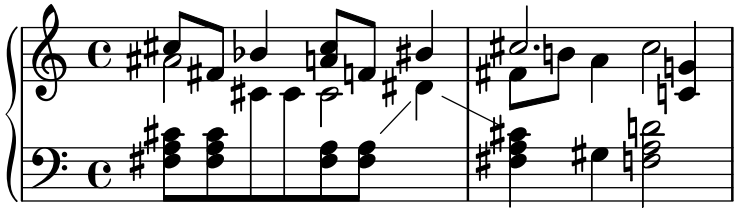
This rule is the same as `modern-voice`, but with the extra accidentals (the ones not typeset by `voice`) typeset as cautionaries. Even though all accidentals typeset by `default` *are* typeset with this rule, some of them are typeset as cautionaries.



`piano`

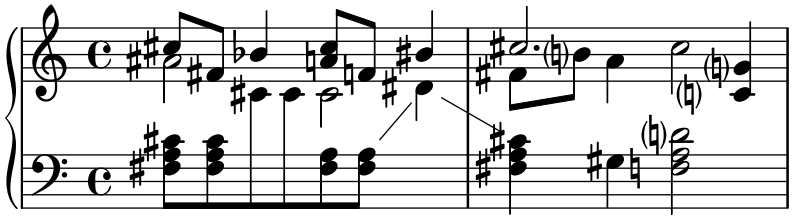
This rule reflects twentieth-century practice for piano notation. Its behavior is very similar to `modern` style, but here accidentals also get canceled across the staves in the same `GrandStaff` or `PianoStaff`, hence all the cancellations of the final notes.

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



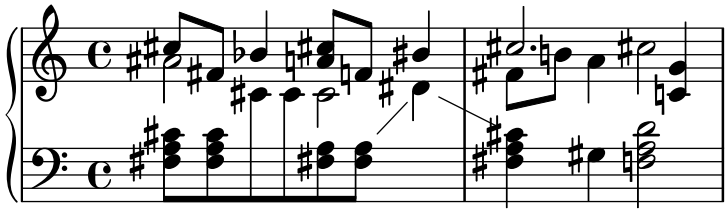
`piano-cautionary`

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



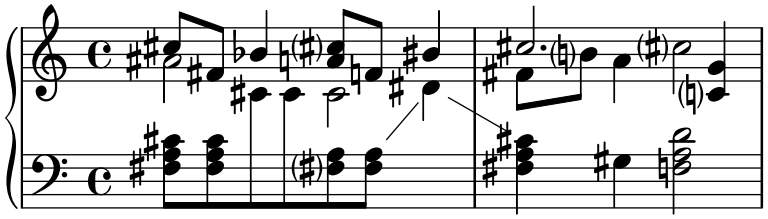
`neo-modern`

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.



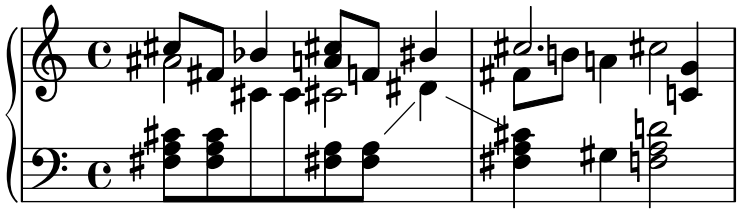
`neo-modern-cautionary`

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



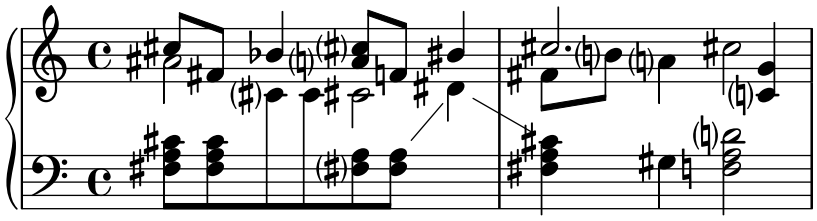
`neo-modern-voice`

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 as with `neo-modern`, but they are canceled across voices in the same `Staff`.



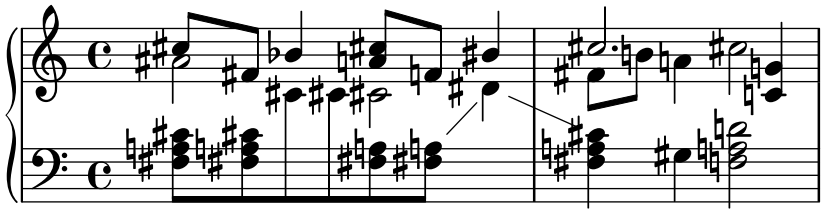
`neo-modern-voice-cautionary`

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



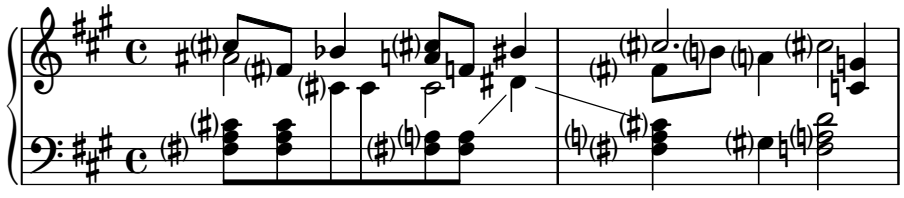
`dodecaphonic`

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



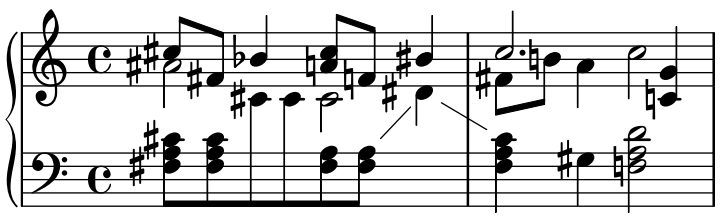
`teaching`

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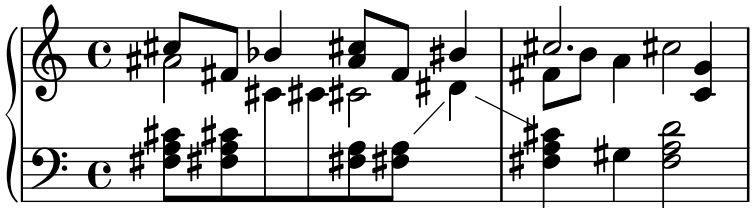


`no-reset`

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



`forget`

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



See also

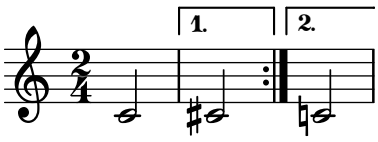
Snippets: Section "Pitches" in *Snippets*.

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

Known issues and warnings

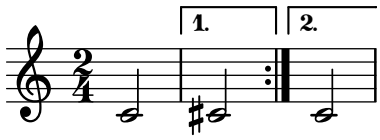
Simultaneous notes are not considered in the automatic determination of accidentals; only previous notes and the key signature are considered. Forcing accidentals with `!` or `?` may be required when the same note name occurs simultaneously with different alterations, as in '`<f! fis!>`'.

Cautionary cancellation of accidentals is done by looking at previous measure. However, in the `\alternative` block following a `\repeat volta N` section, one would expect the cancellation being calculated using the previous *played* measure, not previous *printed* measure. In the following example, the natural `c` in the second alternative does not need a natural sign:



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

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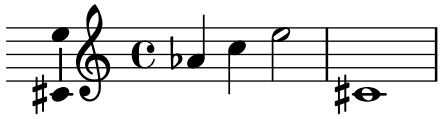


Ambitus

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
}
```
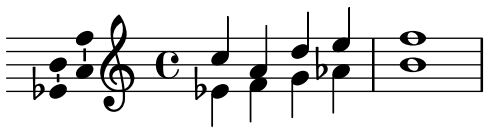


Selected Snippets

Adding ambitus per voice

Ambitus can be added per voice. In this case, the ambitus must be moved manually to prevent collisions.
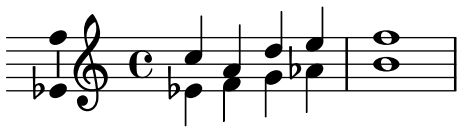
```
\new Staff <<
  \new Voice \with {
    \consists "Ambitus_engraver"
  } \relative c'' {
    \override Ambitus.X-offset = #2.0
    \voiceOne
    c4 a d e
    f1
  }
  \new Voice \with {
    \consists "Ambitus_engraver"
  } \relative c' {
    \voiceTwo
    es4 f g as
    b1
  }
>>
```



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
  }
>>
```



Changing the ambitus gap

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

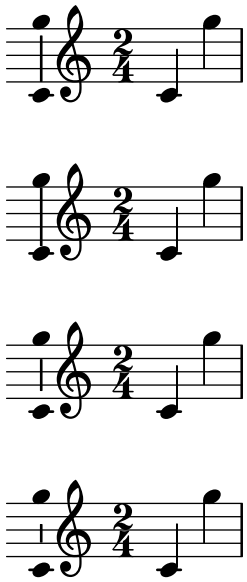
```
\layout {
  \context {
    \Voice
    \consists "Ambitus_engraver"
  }
}

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

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

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

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



See also

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

Snippets: Section “Pitches” in *Snippets*.

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

Known issues and warnings

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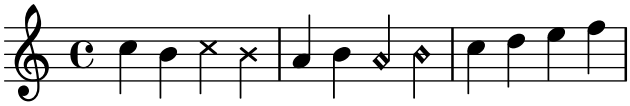
1.1.4 Note heads

This section suggests ways of altering note heads.

Special note heads

The appearance of note heads may be altered:

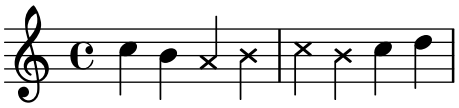
```
c4 b
\override NoteHead.style = #'cross
c4 b
\revert NoteHead.style
a b
\override NoteHead.style = #'harmonic
a b
\revert NoteHead.style
c4 d e f
```



To see all note head styles, see Section A.9 [Note head styles], page 645.

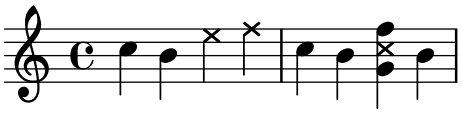
The `cross` style is used to represent a variety of musical intentions. The following generic predefined commands modify the note head in both staff and tablature contexts and can be used to represent any musical meaning:

```
c4 b
\xNotesOn
 a b c4 b
\xNotesOff
c4 d
```



The music function form of this predefined command may be used inside and outside chords to generate crossed note heads in both staff and tablature contexts:
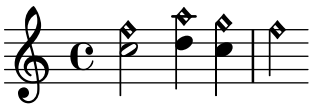
```
c4 b
\xNote { e f }
c b < g \xNote c f > b
```



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

There is also a similar shorthand for diamond shapes:

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



Predefined commands

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

See also

Snippets: Section “Pitches” in *Snippets*.

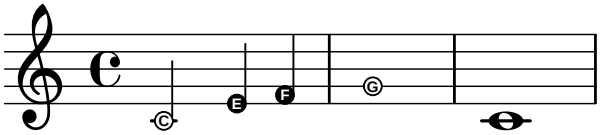
Notation Reference: Section A.9 [Note head styles], page 645, [Chorded notes], page 154, [Indicating harmonics and dampened notes], page 358.

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

Easy notation note heads

The 'easy play' note head includes a note name inside the head. It is used in music for beginners. To make the letters readable, it should be printed in a large font size. To print with a larger font, see Section 4.2.2 [Setting the staff size], page 506.

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



Predefined commands

`\easyHeadsOn`, `\easyHeadsOff`.

Selected Snippets

Numbers as easy note heads

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

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

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

#(set-global-staff-size 26)

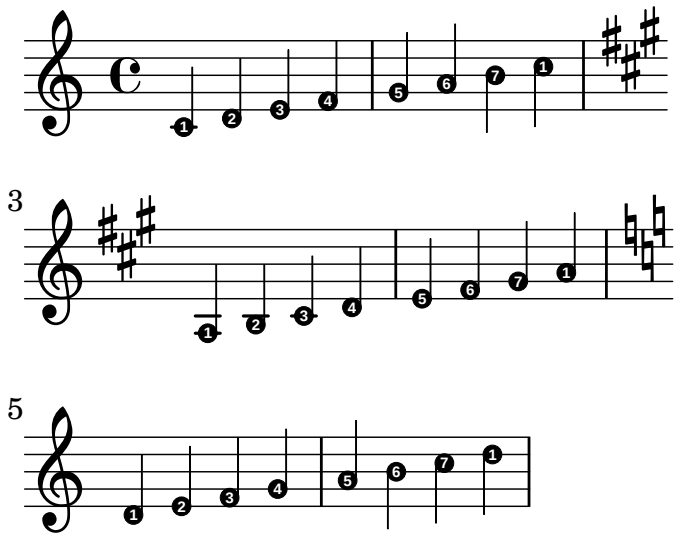
\layout {
  ragged-right = ##t
  \context {
    \Voice
    \consists \Ez_numbers_engraver
  }
```

```
}

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

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

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



See also

Notation Reference: Section 4.2.2 [Setting the staff size], page 506.

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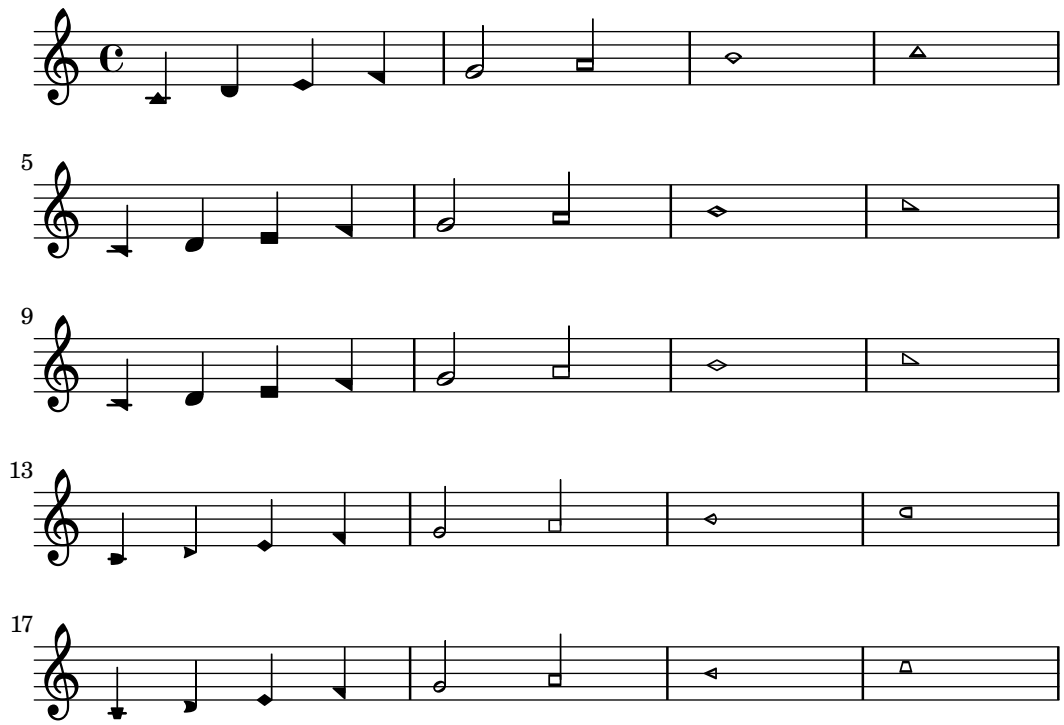
Internals Reference: Section “note-event” in *Internals Reference*, Section “Note_heads_engraver” in *Internals Reference*, Section “NoteHead” in *Internals Reference*, Section “note-head-interface” in *Internals Reference*.

Shape note heads

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

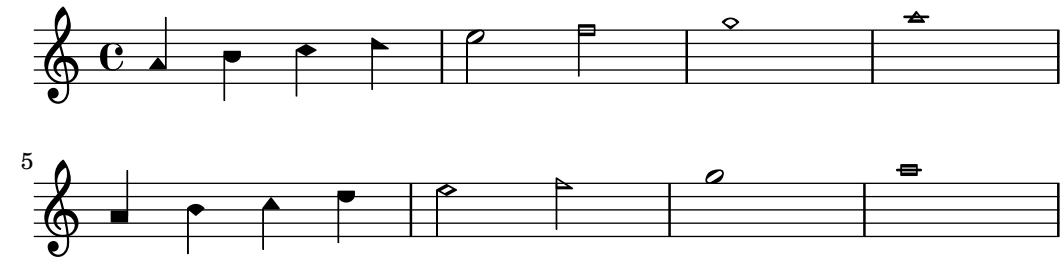
```
\aikenHeads
c, d e f g2 a b1 c \break
\sacredHarpHeads
c,4 d e f g2 a b1 c \break
\southernHarmonyHeads
c,4 d e f g2 a b1 c \break
```

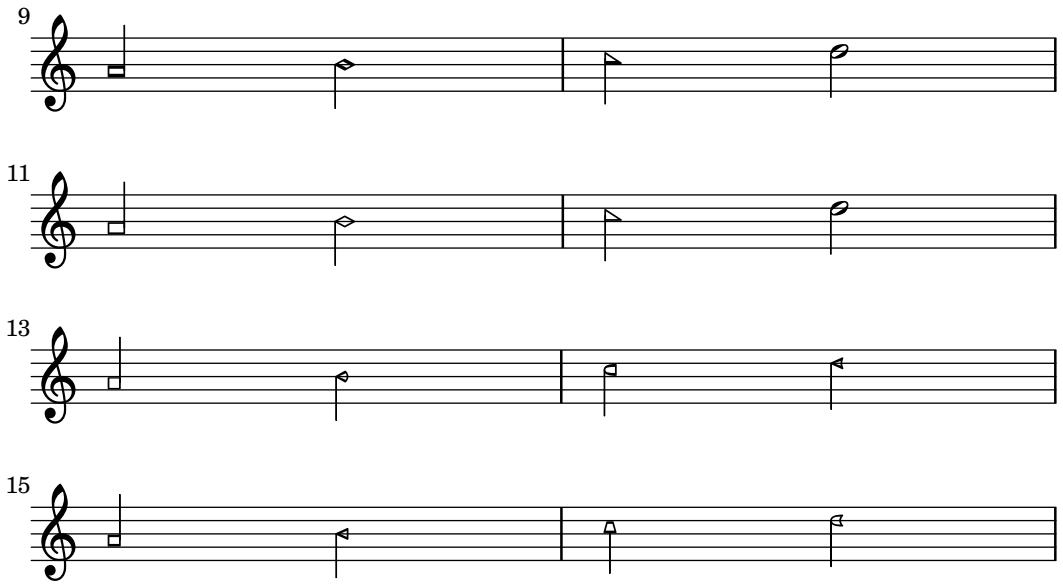
```
\funkHeads
c,4 d e f g2 a b1 c \break
\walkerHeads
c,4 d e f g2 a b1 c \break
```



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

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





Predefined commands

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

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`.

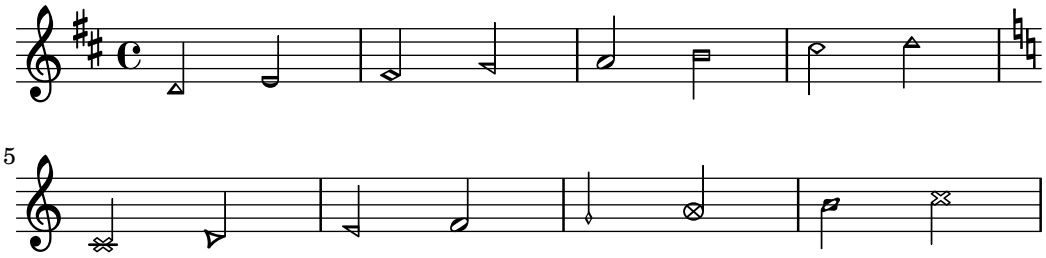
This example shows different ways to obtain shape note heads, and demonstrates the ability to transpose a melody without losing the correspondence between harmonic functions and note head styles.

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

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

  \break
```

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



To see all note head styles, see Section A.9 [Note head styles], page 645.

See also

Snippets: Section “Pitches” in *Snippets*.

Notation Reference: Section A.9 [Note head styles], page 645.

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

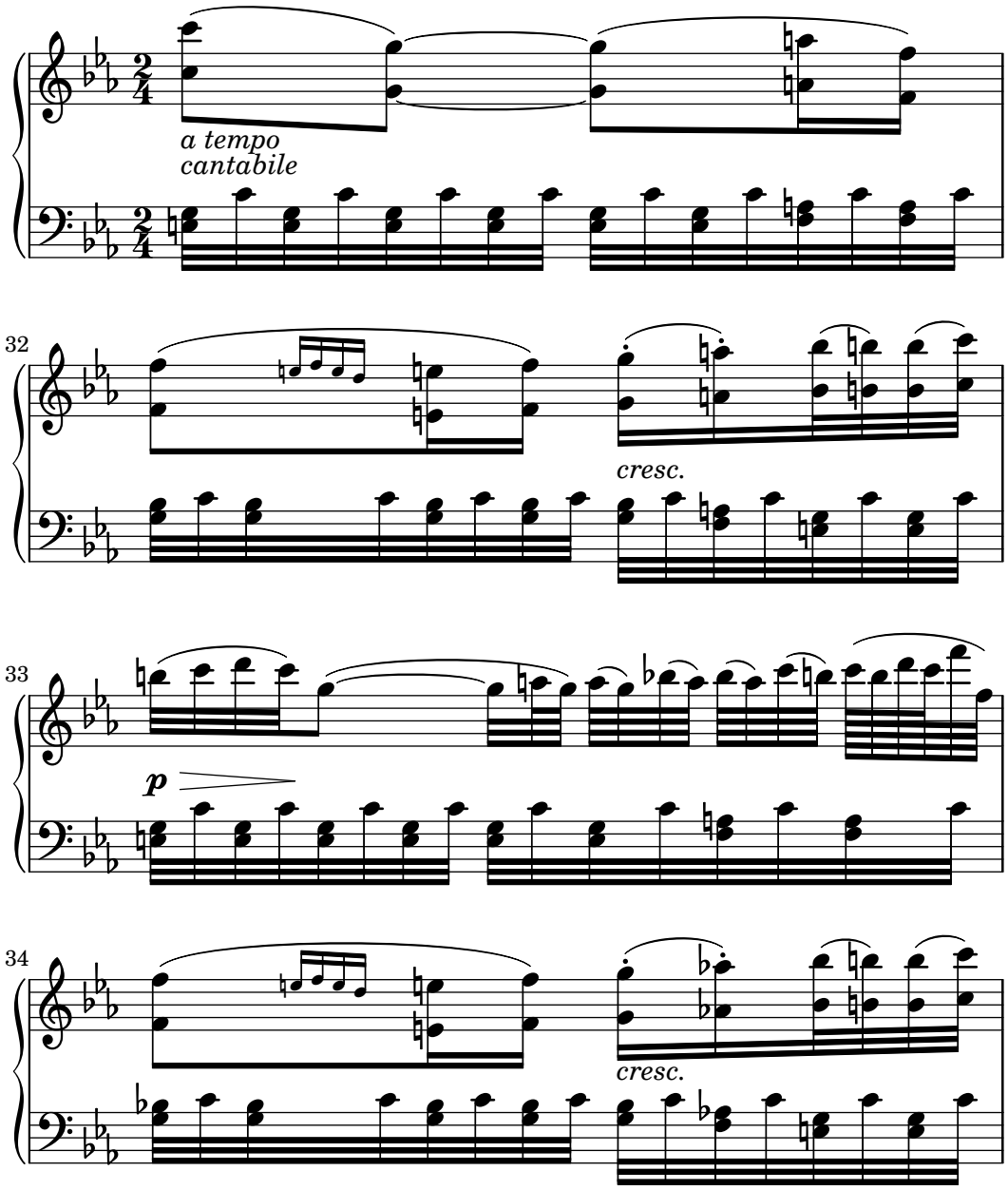
`\improvisationOn`, `\improvisationOff`.

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
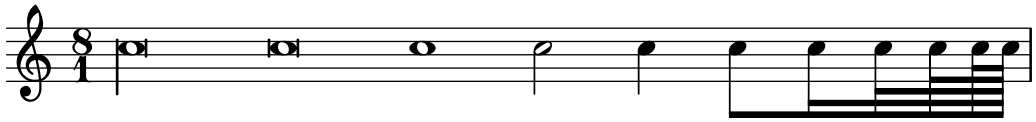


This section discusses rhythms, rests, durations, beaming and bars.

1.2.1 Writing rhythms

Durations
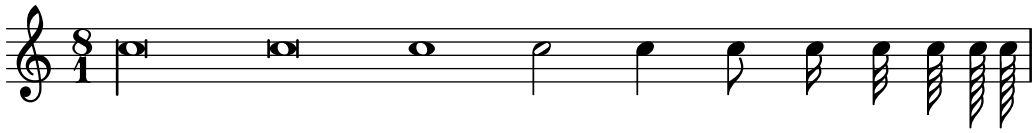
Durations are designated by numbers and dots. Durations are entered as their reciprocal values. For example, a quarter note is entered using a `4` (since it is a 1/4 note), and a half note is entered using a `2` (since it is a 1/2 note). For notes longer than a whole you must use the `\longa` (a double 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.
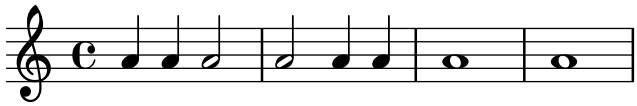
```
\time 8/1
\autoBeamOff
c\longa c\breve c1 c2
c4 c8 c16 c32 c64 c128 c128
```



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 2.9 [Ancient notation], page 404.
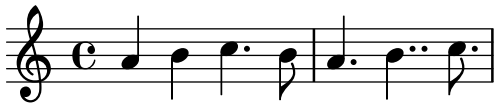
If the duration is omitted, it is set to the previously entered duration. The default for the first note is a quarter note.

```
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 49.

For ways of specifying durations for the syllables of lyrics and ways of aligning lyrics to notes, see Section 2.1 [Vocal music], page 239.

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 535.

Dots are normally moved up to avoid staff lines, except in polyphonic situations. Dots may be manually placed above or below the staff; see Section 5.4.2 [Direction and placement], page 577.

Predefined commands

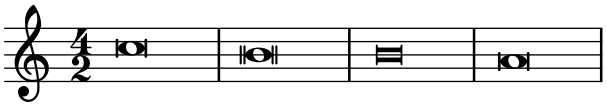
`\autoBeamOn`, `\autoBeamOff`, `\dotsUp`, `\dotsDown`, `\dotsNeutral`.

Selected Snippets

Alternative breve notes

Breve notes are also available with two vertical lines on each side of the notehead instead of one line and in baroque style.
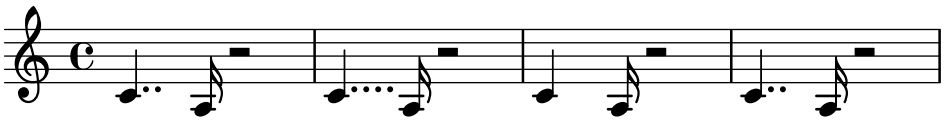
```
\relative c'' {
  \time 4/2
  c\breve |
  \override Staff.NoteHead.style = #'altdefault
  b\breve
  \override Staff.NoteHead.style = #'baroque
  b\breve
  \revert Staff.NoteHead.style
  a\breve
}
```



Changing the number of augmentation dots per note

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

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



See also

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

Notation Reference: [Automatic beams], page 76, [Ties], page 49, [Stems], page 210, Section 1.2.1 [Writing rhythms], page 41, Section 1.2.2 [Writing rests], page 52, Section 2.1 [Vocal music], page 239, Section 2.9 [Ancient notation], page 404, Section 4.5.5 [Proportional notation], page 535.

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.

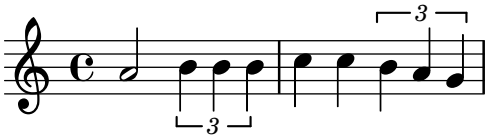
Tuplets

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

```
\tuplet fraction { music }
```
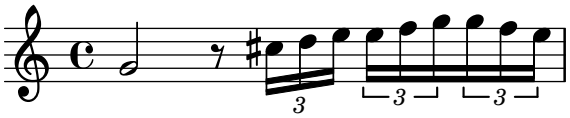
The fraction's numerator will be printed over or under the notes, optionally with a bracket. The most common tuplets are triplets: 3 notes sound within the duration normally allowed for 2:

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



When entering long passages of tuplets, having to write a separate `\tuplet` command for each group is inconvenient. It is possible to specify the duration of one tuplet group directly before the music in order to have the tuplets grouped automatically:
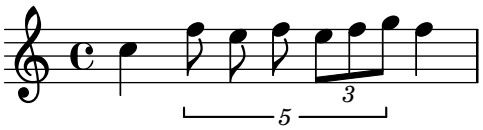
```
g2 r8 \tuplet 3/2 8 { cis16 d e e f g g f e }
```



Tuplet brackets may be manually placed above or below the staff; see Section 5.4.2 [Direction and placement], page 577.

Tuplets may be nested:

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



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

To modify the duration of notes without printing a tuplet bracket, see [Scaling durations], page 48.

Predefined commands

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

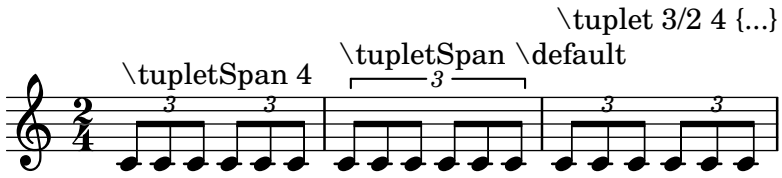
Selected Snippets

Entering several tuplets using only one \tuplet command

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

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

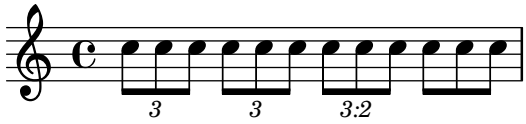
```
\relative c' {
  \time 2/4
  \tupletSpan 4
  \tuplet 3/2 { c8^"\\tupletSpan 4" c c c c c }
  \tupletSpan \default
  \tuplet 3/2 { c8^"\\tupletSpan \\default" c c c c c }
  \tuplet 3/2 4 { c8^"\\tuplet 3/2 4 {...}" c c c c c }
}
```



Changing the tuplet number

By default, only the numerator of the tuplet number is printed over the tuplet bracket. Alternatively, num:den of the tuplet number may be printed, or the tuplet number may be suppressed altogether.

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



Non-default tuplet numbers

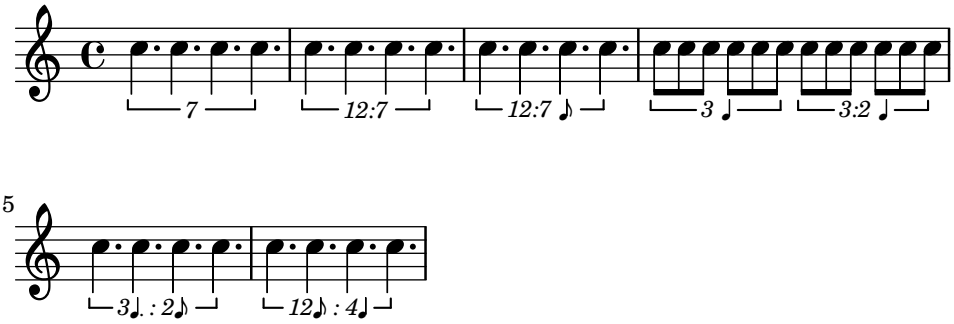
LilyPond also provides formatting functions to print tuplet numbers different than the actual fraction, as well as to append a note value to the tuplet number or tuplet fraction.

```
\relative c'' {
  \once \override TupletNumber.text =
    #(tuplet-number::non-default-tuplet-denominator-text 7)
  \tuplet 3/2  { c4. c4. c4. c4. }
  \once \override TupletNumber.text =
    #(tuplet-number::non-default-tuplet-fraction-text 12 7)
  \tuplet 3/2  { c4. c4. c4. c4. }
  \once \override TupletNumber.text =
    #(tuplet-number::append-note-wrapper
      (tuplet-number::non-default-tuplet-fraction-text 12 7) "8")
  \tuplet 3/2  { c4. c4. c4. c4. }

  \once \override TupletNumber.text =
    #(tuplet-number::append-note-wrapper
      tuplet-number::calc-denominator-text "4")
  \tuplet 3/2  { c8 c8 c8 c8 c8 c8 }
```

```
  \once \override TupletNumber.text =
    #(tuplet-number::append-note-wrapper
      tuplet-number::calc-fraction-text "4")
  \tuplet 3/2  { c8 c8 c8 c8 c8 c8 }

  \once \override TupletNumber.text =
    #(tuplet-number::fraction-with-notes "4." "8")
  \tuplet 3/2  { c4. c4. c4. c4. }
  \once \override TupletNumber.text =
    #(tuplet-number::non-default-fraction-with-notes 12 "8" 4 "4")
  \tuplet 3/2  { c4. c4. c4. c4. }
}
```

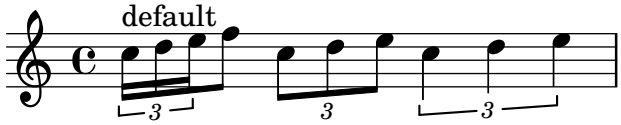


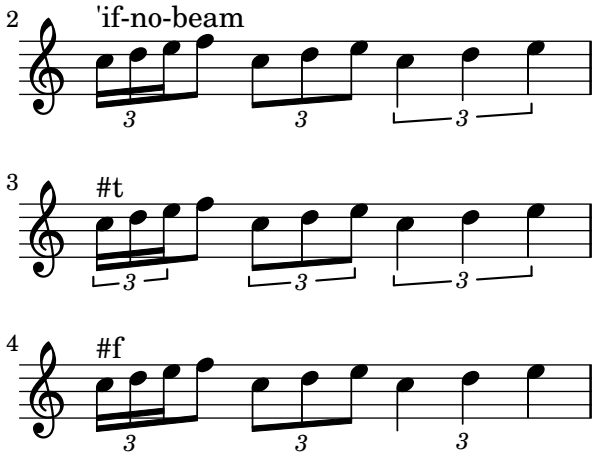
Controlling tuplet bracket visibility

The default behavior of tuplet-bracket visibility is to print a bracket unless there is a beam of the same length as the tuplet. To control the visibility of tuplet brackets, set the property `'bracket-visibility` to either `#t` (always print a bracket), `#f` (never print a bracket) or `#'if-no-beam` (only print a bracket if there is no beam).

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

\new Voice {
  \relative c' {
    << \music s4^"default" >>
    \override TupletBracket.bracket-visibility = #'if-no-beam
    << \music s4^"'if-no-beam" >>
    \override TupletBracket.bracket-visibility = ##t
    << \music s4^"#t" >>
    \override TupletBracket.bracket-visibility = ##f
    << \music s4^"#f" >>
  }
}
```

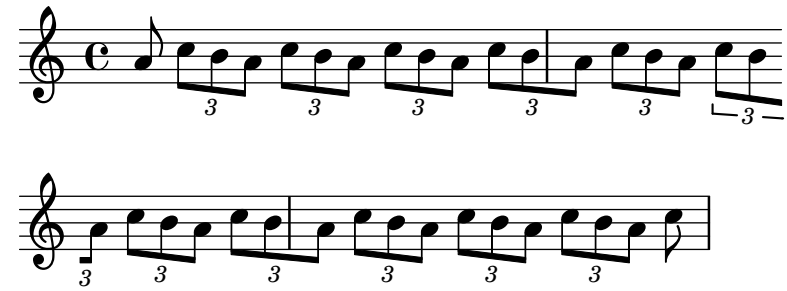




Permitting line breaks within beamed tuplets

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

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



See also

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

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

Notation Reference: [Time administration], page 110, [Scaling durations], page 48, Section 5.3.4 [The tweak command], page 571, [Polymetric notation], page 69.

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

Grace notes may be placed within tuplet brackets, *except* when a staff begins with a grace note followed by a tuplet. In this particular case, the grace note must be placed before the `\tuplet` command to avoid errors.

When using a tuplet at the beginning of a piece with a `\tempo` mark, the music must be explicitly entered in a `\new Voice` block, as discussed in Section "Voices contain music" in *Learning Manual*.

Scaling durations

The duration of single notes, rests or chords may be multiplied by a fraction `N/M` by appending `*N/M` (or `*N` if `M` is 1) to the duration. 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 like `*L*M/N`. Factors are part of the duration: if a duration is not specified for subsequent notes, the default duration taken from the preceding note will include any scaling factor.

In the following example, the first three notes take up exactly two beats, but no triplet bracket is printed.
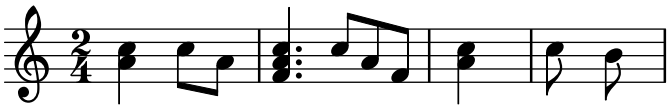
```
\time 2/4
% Alter durations to triplets
a4*2/3 gis a
% Normal durations
a4 a
% Double the duration of chord
<a d>4*2
% Duration of quarter, appears like sixteenth
b16*4 c4
```



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

Longer stretches of music may be compressed by a fraction in the same way, as if every note, chord or rest had the fraction as a multiplier. This leaves the appearance of the music unchanged but the internal duration of the notes will be multiplied by the fraction *num*/*den*. 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 69.

See also

Notation Reference: [Tuplets], page 44, [Invisible rests], page 54, [Polymetric notation], page 69.

Snippets: Section “Rhythms” in *Snippets*.

Known issues and warnings

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

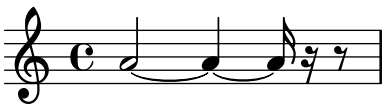
Ties

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

> **Note:** Ties should not be confused with *slurs*, which indicate articulation, or *phrasing slurs*, which indicate musical phrasing. A tie is just a way of extending a note duration, similar to the augmentation dot.
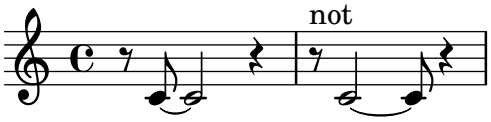
A tie is entered by appending a tilde symbol (~) to the first of each pair of notes being tied. This indicates that the note should be tied to the following note, which must be at the same pitch.

```
a2~ a4~ a16 r r8
```



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

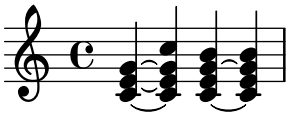
```
\relative c' {
  r8 c~ c2 r4 |
  r8^"not" c2~ c8 r4
}
```



If you need to tie many notes across bar lines, it may be easier to use automatic note splitting, see [Automatic note splitting], page 72. This mechanism automatically splits long notes, and ties them across bar lines.

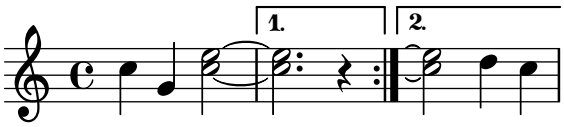
When a tie is applied to a chord, all note heads whose pitches match are connected. When no note heads match, no ties will be created. Chords may be partially tied by placing the ties inside the chord.
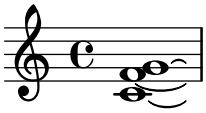
```
<c e g>~ <c e g c>
<c~ e g~ b> <c e g b>
```



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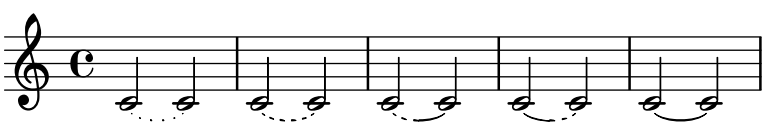
```
<c f g>1\laissezVibrer
```



Ties may be made to curve up or down manually; see Section 5.4.2 [Direction and placement], page 577.
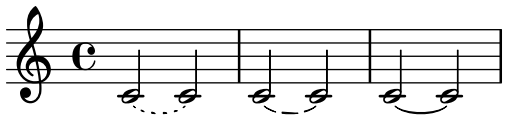
Ties may be made dashed, dotted, or a combination of solid and dashed.

```
\tieDotted
c2~ c
\tieDashed
c2~ c
\tieHalfDashed
c2~ c
\tieHalfSolid
c2~ c
\tieSolid
c2~ c
```



Custom dash patterns can be specified:
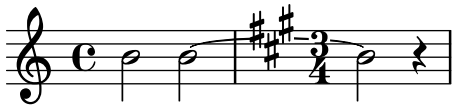
```
\tieDashPattern #0.3 #0.75
c2~ c
\tieDashPattern #0.7 #1.5
c2~ c
\tieSolid
c2~ c
```



Dash pattern definitions for ties have the same structure as dash pattern definitions for slurs. For more information about complex dash patterns, see [Slurs], page 122.

Override *whiteout* and *layer* layout properties for ties that collide with other objects in a staff.

```
\override Tie.layer = #-2
\override Staff.TimeSignature.layer = #-1
\override Staff.KeySignature.layer = #-1
\override Staff.TimeSignature.whiteout = ##t
\override Staff.KeySignature.whiteout = ##t
b2 b~
\time 3/4
\key a \major
b r4
```



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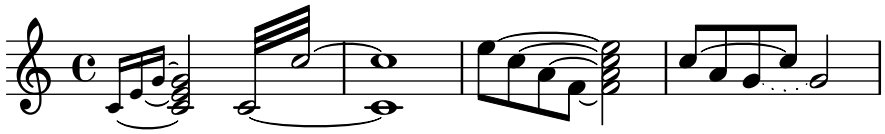
`\tieUp`, `\tieDown`, `\tieNeutral`, `\tieDotted`, `\tieDashed`, `\tieDashPattern`, `\tieHalfDashed`, `\tieHalfSolid`, `\tieSolid`.

Selected Snippets

Using ties with arpeggios

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

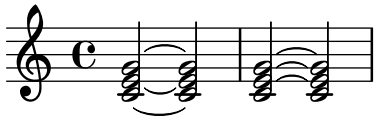
```
\relative c' {
  \set tieWaitForNote = ##t
  \grace { c16[ ~ e ~ g] ~ } <c, e g>2
  \repeat tremolo 8 { c32 ~ c' ~ } <c c,>1
  e8 ~ c ~ a ~ f ~ <e' c a f>2
  \tieUp
  c8 ~ a
  \tieDown
  \tieDotted
  g8 ~ c g2
}
```



Engraving ties manually

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

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



See also

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

Notation Reference: [Slurs], page 122, [Automatic note splitting], page 72.

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

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

Known issues and warnings

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

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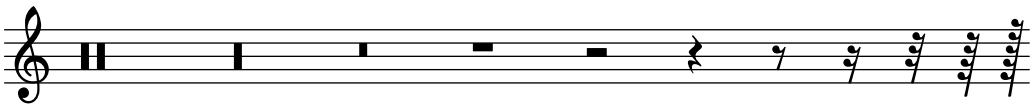
1.2.2 Writing rests

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

Rests

Rests are entered like notes with the note name `r`. Durations longer than a whole rest use the following predefined commands:
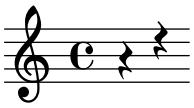
```
\new Staff {
  % These two lines are just to prettify this example
  \time 16/1
  \omit Staff.TimeSignature
  % Print a maxima rest, equal to four breves
  r\maxima
  % Print a longa rest, equal to two breves
  r\longa
  % Print a breve rest
  r\breve
  r1 r2 r4 r8 r16 r32 r64 r128
}
```



Whole measure rests, centered in the middle of the measure, must be entered as multi-measure rests. They can be used for a single measure as well as many measures and are discussed in [Full measure rests], page 55.

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
  \context {
    \Staff
    \remove "Time_signature_engraver"
  }
}

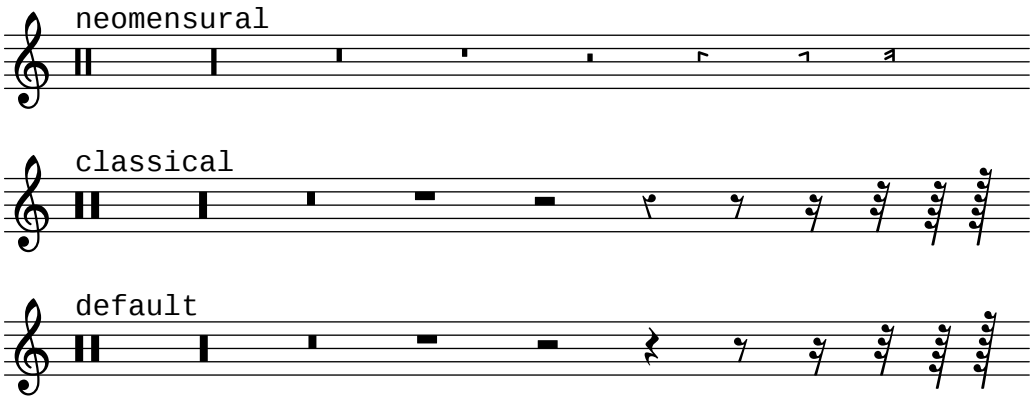
\new Staff \relative c {
  \cadenzaOn
  \override Staff.Rest.style = #'mensural
  r\maxima^\markup \typewriter { mensural }
  r\longa r\breve r1 r2 r4 r8 r16 s32 s64 s128 s128
  \bar ""

  \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 55.

Snippets: Section “Rhythms” in *Snippets*.

Internals Reference: Section “Rest” in *Internals Reference*.
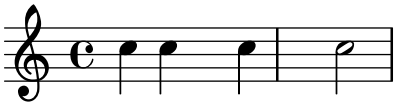
Known issues and warnings

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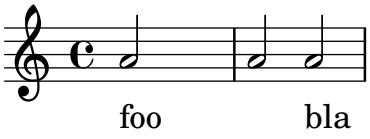
An invisible rest (also called a ‘spacer rest’) can be entered like a note with the note name `s`:

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



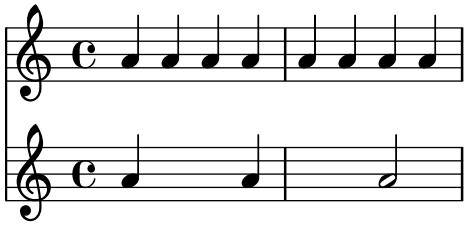
Spacer rests are available only in note mode and chord mode. In other situations, for example, when entering lyrics, the command `\skip` is used to skip a musical moment. `\skip` requires an explicit duration, but this is ignored if the lyrics derive their durations from the notes in an associated melody through `\addlyrics` or `\lyricsto`.

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



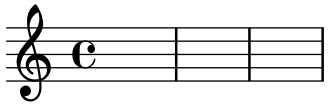
Because `\skip` is a command, it does not affect the default durations of following notes, unlike `s`.

```
<<
  {
    \repeat unfold 8 { a4 }
  }
  {
    a4 \skip 2 a |
    s2 a
  }
>>
```



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

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

Notation Reference: [Hidden notes], page 207, Section 5.4.6 [Visibility of objects], page 584.

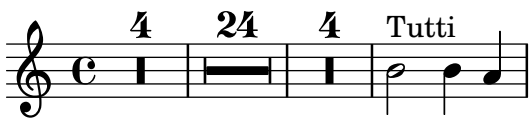
Snippets: Section "Rhythms" in *Snippets*.

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

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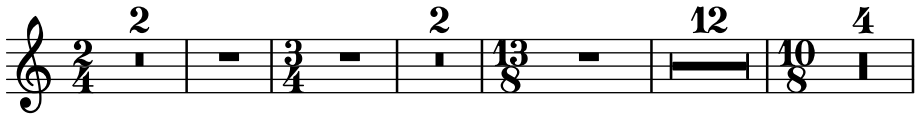
Rests for one or more full measures are entered like notes with the note name uppercase `R`:

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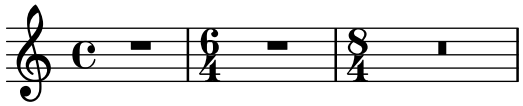


The duration of full-measure rests is identical to the duration notation used for notes. The duration in a multi-measure rest must always be an integral number of measure-lengths, so augmentation dots or fractions must often be used:

```
\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 |
```



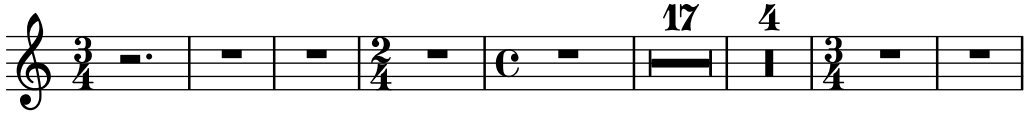
A full-measure rest is printed as either a whole or breve rest, centered in the measure, depending on the time signature.

```
\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:

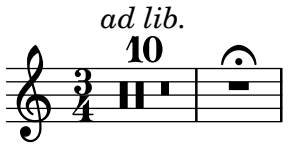
```
% Default behavior
\time 3/4 r2. | R2.*2 |
\time 2/4 R2 |
\time 4/4
% Rest measures contracted to single measure
\compressFullBarRests
r1 | R1*17 | R1*4 |
% Rest measures expanded
\expandFullBarRests
\time 3/4
R2.*2 |
```



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

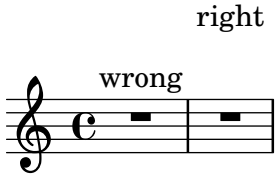
```
\compressFullBarRests
\time 3/4
R2.*10^\markup { \italic "ad lib." }
```

```
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 the correct object name to be specified
\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

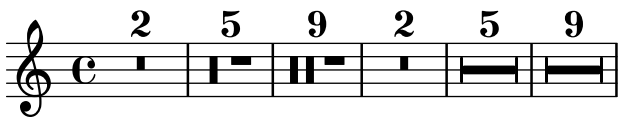
`\textLengthOn`, `\textLengthOff`, `\fermataMarkup`, `\compressFullBarRests`, `\expandFullBarRests`.

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

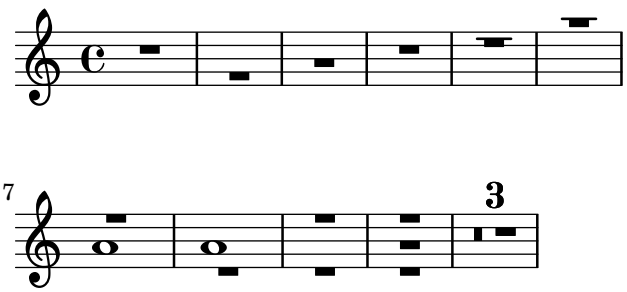
Unlike ordinary rests, there is no predefined command to change the staff position of a multi-measure rest symbol of either form by attaching it to a note. However, in polyphonic music multi-measure rests in odd-numbered and even-numbered voices are vertically separated. The positioning of multi-measure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

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

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

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

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

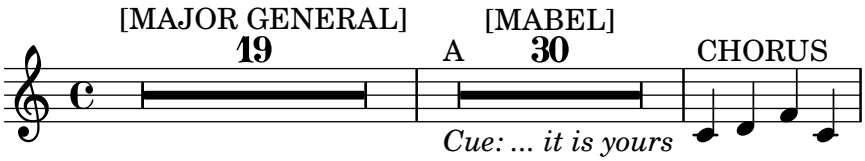


Multi-measure rest markup

Markups attached to a multi-measure rest will be centered above or below it. Long markups attached to multi-measure rests do not cause the measure to expand. To expand a multi-measure rest to fit the markup, use an empty chord with an attached markup before the multi-measure rest.

Text attached to a spacer rest in this way is left-aligned to the position where the note would be placed in the measure, but if the measure length is determined by the length of the text, the text will appear to be centered.

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



See also

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

Notation Reference: [Durations], page 41, Section 1.8 [Text], page 215, Section 1.8.2 [Formatting text], page 223, [Text scripts], page 216.

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

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

There is no way to automatically condense multiple ordinary rests into a single multi-measure rest.
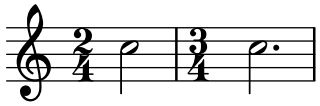
Multi-measure rests do not take part in rest collisions.

1.2.3 Displaying rhythms

Time signature

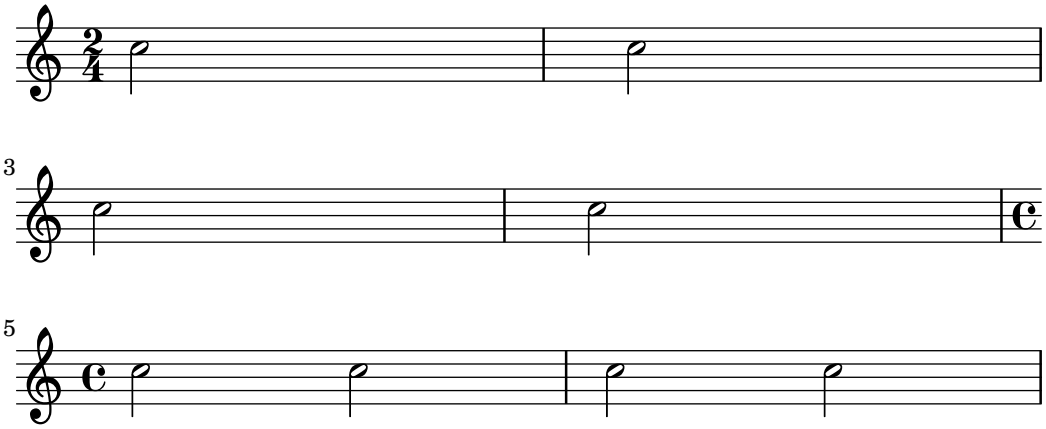
The time signature is set as follows:

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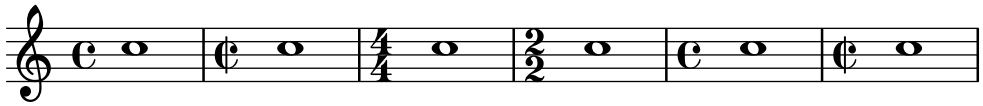


Time signatures are printed at the beginning of a piece and whenever the time signature changes. If a change takes place at the end of a line a warning time signature sign is printed there. This default behavior may be changed, see Section 5.4.6 [Visibility of objects], page 584.

```
\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
```
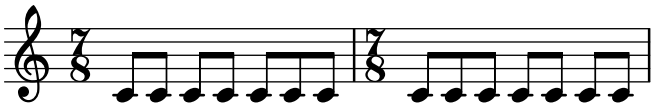


Mensural time signatures are covered in [Mensural time signatures], page 410.

In addition to setting the printed time signature, the `\time` command also sets the values of the time-signature-based properties `baseMoment`, `beatStructure`, and `beamExceptions`. The predefined default values for these properties can be found in '`scm/time-signature-settings.scm`'.
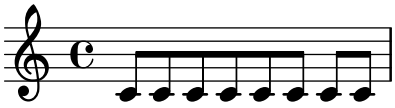
The default value of `beatStructure` can be overridden in the `\time` command itself by supplying it as the optional first argument:

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



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

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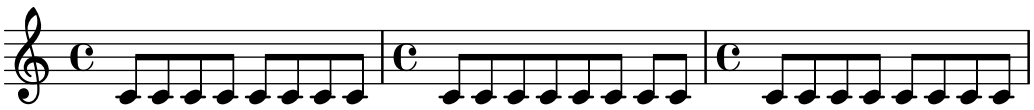


`\overrideTimeSignatureSettings` takes four arguments:

1. *`timeSignatureFraction`*, a fraction describing the time signature to which these values apply.
2. *`baseMomentFraction`*, a fraction containing the numerator and denominator of the basic timing unit for the time signature.
3. *`beatStructure`*, a Scheme list indicating the structure of the beats in the measure, in units of the base moment.
4. *`beamExceptions`*, an alist containing any beaming rules for the time signature that go beyond ending at every beat, as described in [Setting automatic beam behavior], page 78.

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

```
\score{
  \relative c' {
    \repeat unfold 8 { c8 } |
```

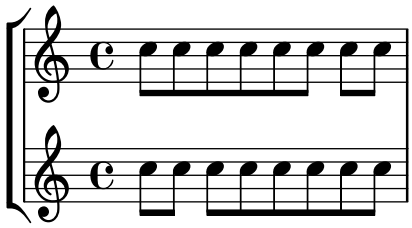
```
    \overrideTimeSignatureSettings
      4/4        % timeSignatureFraction
      1/4        % baseMomentFraction
      #'(3 1)    % beatStructure
      #'()       % beamExceptions
    \time 4/4
    \repeat unfold 8 { c8 } |
    \revertTimeSignatureSettings 4/4
    \time 4/4
    \repeat unfold 8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



Different values of default time signature properties can be established for different staves by moving the `Timing_translator` and the `Default_bar_line_engraver` from the `Score` context to the `Staff` context.

```
\score {
  \new StaffGroup <<
     \new Staff {
        \overrideTimeSignatureSettings
          4/4        % timeSignatureFraction
          1/4        % baseMomentFraction
          #'(3 1)    % beatStructure
          #'()       % beamExceptions
        \time 4/4
        \repeat unfold 8 {c''8}
     }
     \new Staff {
        \overrideTimeSignatureSettings
          4/4        % timeSignatureFraction
          1/4        % baseMomentFraction
          #'(1 3)    % beatStructure
          #'()       % beamExceptions
        \time 4/4
        \repeat unfold 8 {c''8}
     }
  >>
  \layout {
    \context {
      \Score
      \remove "Timing_translator"
      \remove "Default_bar_line_engraver"
    }
    \context {
      \Staff
      \consists "Timing_translator"
      \consists "Default_bar_line_engraver"
    }
```

```
  }
}
```



A further method of changing these time-signature-related variables, which avoids reprinting the time signature at the time of the change, is shown in [Setting automatic beam behavior], page 78.

Predefined commands
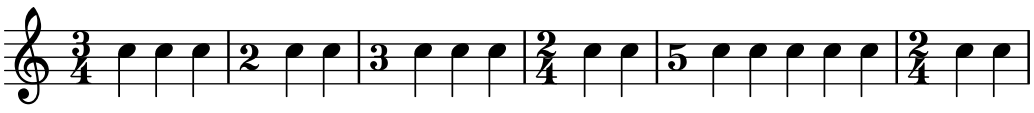
`\numericTimeSignature`, `\defaultTimeSignature`.

Selected Snippets

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

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

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



See also

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

Notation Reference: [Mensural time signatures], page 410, [Setting automatic beam behavior], page 78, [Time administration], page 110.

Installed Files: ‘`scm/time-signature-settings.scm`’.
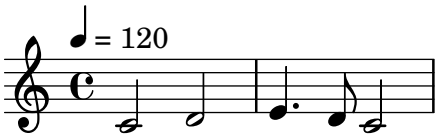
Snippets: Section “Rhythms” in *Snippets*.

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

Metronome marks
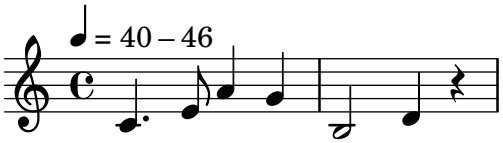
A basic metronome mark is simple to write:

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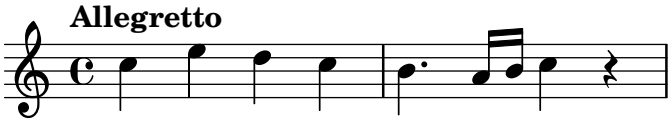


Metronome marks may also be printed as a range of two numbers:

```
\tempo 4 = 40 - 46
c4. e8 a4 g
b,2 d4 r
```
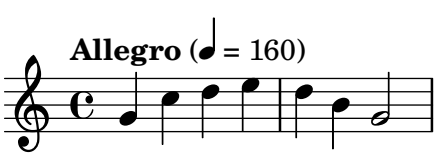


Tempo indications with text can be used instead:

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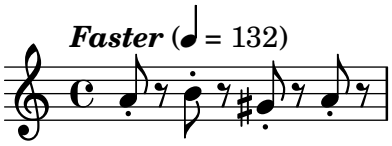


Combining a metronome mark and text will automatically place the metronome mark within parentheses:

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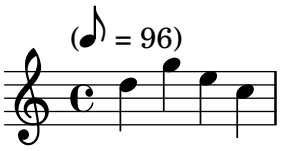


In general, the text can be any markup object:

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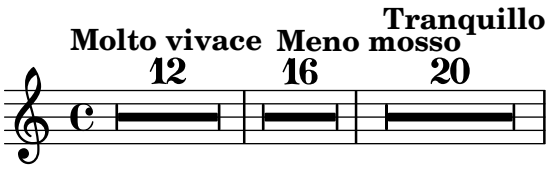


A parenthesized metronome mark with no textual indication may be written by including an empty string in the input:

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



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

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



Selected Snippets

Printing metronome and rehearsal marks below the staff

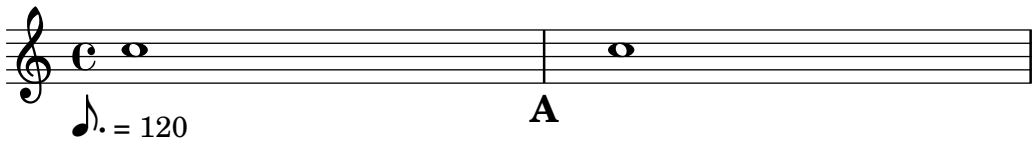
By default, metronome and rehearsal marks are printed above the staff. To place them below the staff simply set the `direction` property of `MetronomeMark` or `RehearsalMark` appropriately.

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

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

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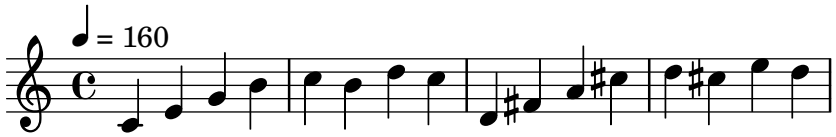
```
  \override Score.RehearsalMark.direction = #DOWN
  \mark \default
  c''1
}
```



Changing the tempo without a metronome mark

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

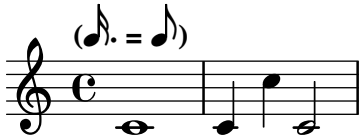
```
\score {
  \new Staff \relative c' {
    \tempo 4 = 160
    c4 e g b
    c4 b d c
    \set Score.tempoHideNote = ##t
    \tempo 4 = 96
    d,4 fis a cis
    d4 cis e d
  }
  \layout { }
  \midi { }
}
```



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 223.

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 223, Section 3.5 [MIDI output], page 483.

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

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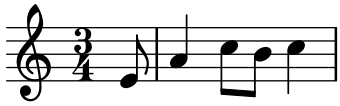
Upbeats

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

```
\partial duration
```
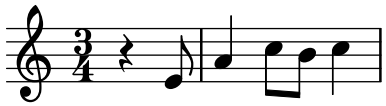
where *`duration`* is the *remaining* length of the partial measure *before* the start of the next full measure.

```
\time 3/4
\partial 8
e8 | a4 c8 b c4 |
```



The *duration* can be any value less than a full measure:

```
\time 3/4
\partial 4.
r4 e8 | a4 c8 b c4 |
```
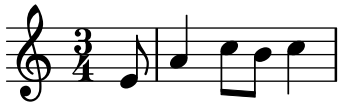


`\partial` *`duration`* can also be written as:

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

So the first example above could be written:

```
\time 3/4
\set Timing.measurePosition = #(ly:make-moment -1/8)
e8 | a4 c8 b c4 |
```



The property `measurePosition` contains a rational number, which is usually positive and indicates how much of the measure has passed at this point. The `\partial` *`duration`* command sets it to a negative number, when it has a different meaning: it then says that the current (first) bar will be *preceded* by a bar 0 (the partial bar) with a duration given by *duration*.

See also

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

Notation Reference: [Grace notes], page 104.
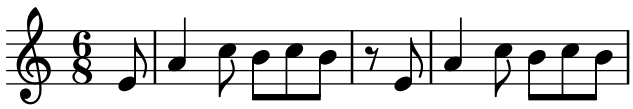
Snippets: Section “Rhythms” in *Snippets*.

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

Known issues and warnings

The `\partial` command should be used only at the beginning of a piece. If you use it after the beginning, warnings or problems may occur, so use `\set Timing.measurePosition` instead.
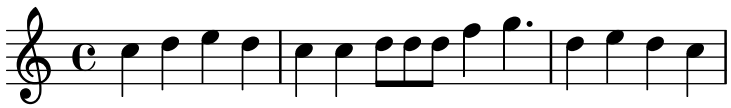
```
\time 6/8
\partial 8
e8 | a4 c8 b[ c b] |
\set Timing.measurePosition = #(ly:make-moment -1/4)
r8 e,8 | a4 c8 b[ c b] |
```



Unmetered music
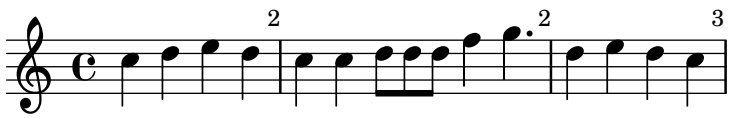
In metered music bar lines are inserted and bar numbers are calculated automatically. In unmetered music (i.e. cadenzas), this is not desirable and can be ‘switched off’ using the command `\cadenzaOn`, then ‘switched back on’ at the appropriate place using `\cadenzaOff`.

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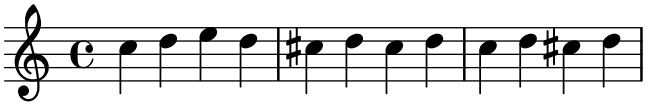
```
% Show all bar numbers
\override Score.BarNumber.break-visibility = #all-visible
c4 d e d
\cadenzaOn
c4 c d8[ d d] f4 g4.
\cadenzaOff
\bar "|"
d4 e d c
```



Inserting a `\bar` command within a cadenza does not start a new measure, even if a bar line is printed. So any accidentals – which are usually assumed to remain in force until the end of
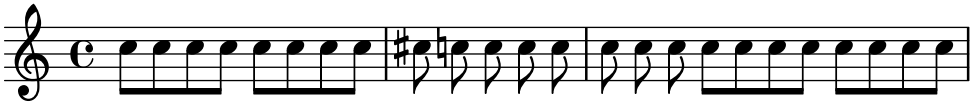
the measure – will still be valid after the bar line printed by `\bar`. If subsequent accidentals should be printed, forced accidentals or reminder accidentals need to be inserted manually, see [Accidentals], page 5.

```
c4 d e d
\cadenzaOn
cis4 d cis d
\bar "|"
% First cis is printed without alteration even if it's after a \bar
cis4 d cis! d
\cadenzaOff
\bar "|"
```



Automatic beaming is disabled by `\cadenzaOn`. Therefore, all beaming in cadenzas must be entered manually. See [Manual beams], page 86.

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



These predefined commands affect all staves in the score, even when placed in just one `Voice` context. To change this, move the `Timing_translator` from the `Score` context to the `Staff` context. See [Polymetric notation], page 69.

Predefined commands

`\cadenzaOn`, `\cadenzaOff`.

See also

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

Notation Reference: Section 5.4.6 [Visibility of objects], page 584, [Polymetric notation], page 69, [Manual beams], page 86, [Accidentals], page 5.

Snippets: Section “Rhythms” in *Snippets*.

Known issues and warnings

Automatic line and page breaks are inserted only at bar lines, so ‘invisible’ bar lines will need to be inserted manually in long stretches of unmetered music to permit breaking:

```
\bar ""
```

Polymetric notation

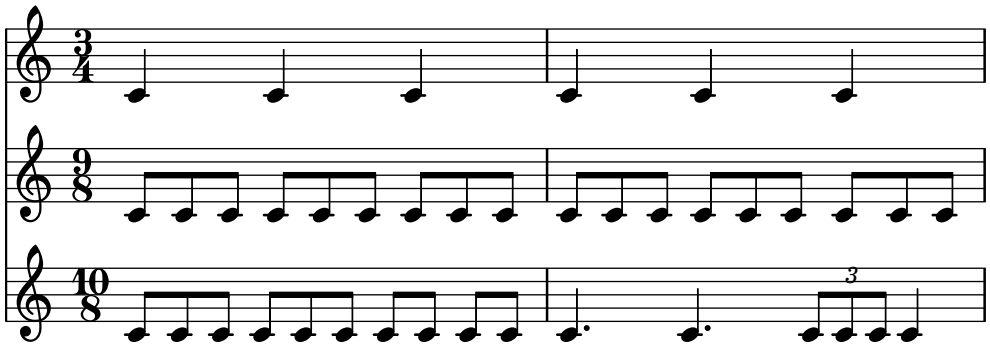
Polymetric notation is supported explicitly or by manually modifying the visible time signature symbol and/or scaling note durations.

Different time signatures with equal-length measures

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

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

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



Different time signatures with unequal-length measures

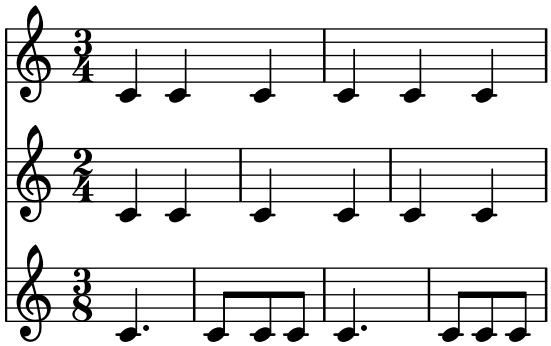
Each staff can be given its own independent time signature by moving the `Timing_translator` and the `Default_bar_line_engraver` to the `Staff` context.

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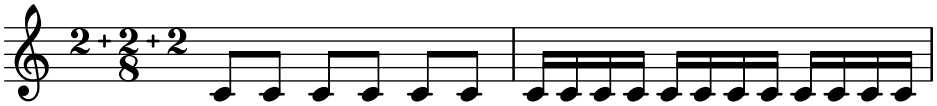


Compound time signatures

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

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

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

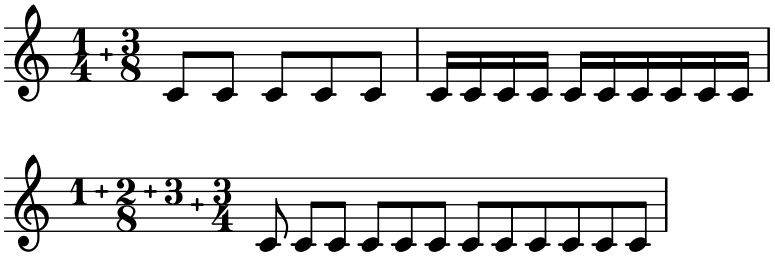
```
\relative c' {
  \compoundMeter #'((2 2 2 8))
  \repeat unfold 6 c8 \repeat unfold 12 c16
}
```



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

```
\relative c' {
  \compoundMeter #'((1 4) (3 8))
  \repeat unfold 5 c8 \repeat unfold 10 c16
}

\relative c' {
  \compoundMeter #'((1 2 3 8) (3 4))
  \repeat unfold 12 c8
}
```



See also

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

Notation Reference: [Automatic beams], page 76, [Manual beams], page 86, [Time signature], page 59, [Scaling durations], page 48.

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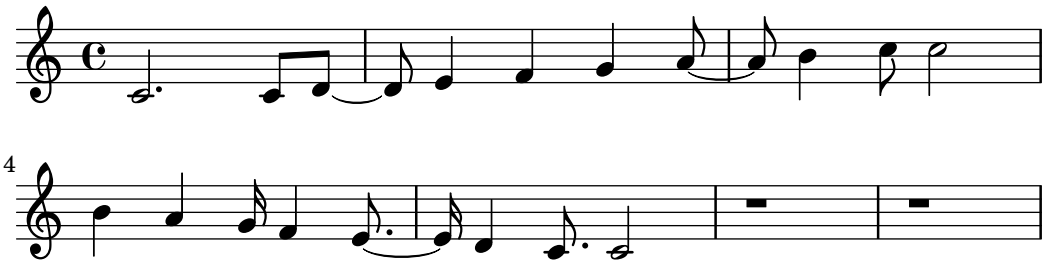
When using different time signatures in parallel, notes at the same moment will be placed at the same horizontal location. However, the bar lines in the different staves will cause the note spacing to be less regular in each of the individual staves than would be normal without the different time signatures.

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`. Similarly, long rests which overrun bar lines are split automatically by replacing the `Rest_engraver` with the `Completion_rest_engraver`. In the following example, notes and rests crossing the bar lines are split, notes are also tied.

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

```
{ c2. c8 d4 e f g a b c8 c2 b4 a g16 f4 e d c8. c2 r1*2 }
```



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

See also

Music Glossary: Section "tie" in *Music Glossary*

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

Snippets: Section "Rhythms" in *Snippets*.

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

Known issues and warnings

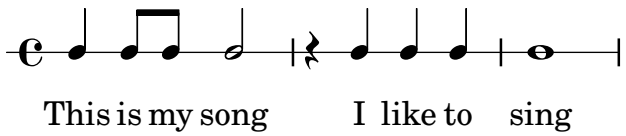
Not all durations (especially those containing tuplets) can be represented exactly with normal notes and dots, but the `Completion_heads_engraver` will not insert tuplets.

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

Showing melody rhythms

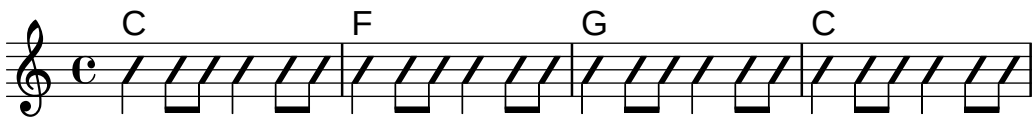
Sometimes you might want to show only the rhythm of a melody. This can be done with the rhythmic staff. All pitches of notes on such a staff are squashed, and the staff itself has a single line

```
<<
  \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`.

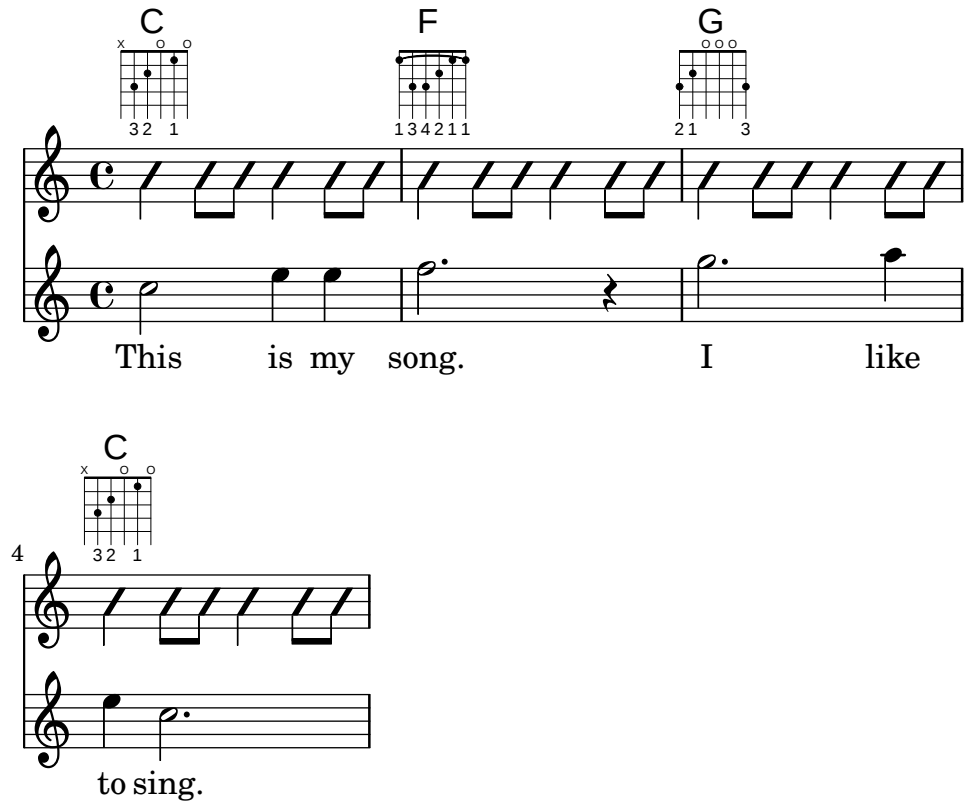
Selected Snippets

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*.

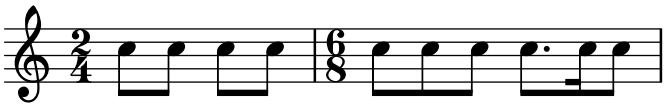
Internals Reference: Section “RhythmicStaff” in *Internals Reference*, Section “Pitch_squash_engraver” in *Internals Reference*.

1.2.4 Beams

Automatic beams

By default, beams are inserted automatically:
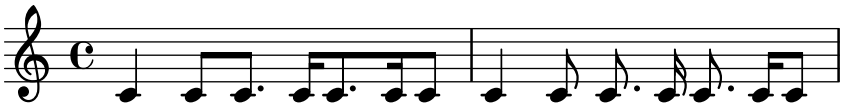
```
\time 2/4 c8 c c c
\time 6/8 c8 c c c8. c16 c8
```



If these automatic decisions are not satisfactory, beaming can be entered explicitly; see [Manual beams], page 86. Beams *must* be entered manually if beams are to be extended over rests.

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

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



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

Beaming patterns that differ from the automatic defaults can be created; see [Setting automatic beam behavior], page 78.

Predefined commands
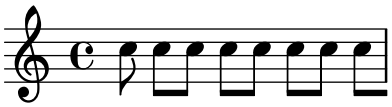
`\autoBeamOff`, `\autoBeamOn`.
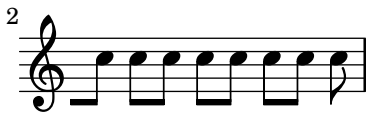
Selected Snippets

Beams across line breaks

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

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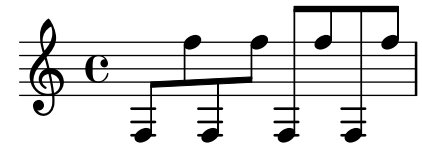




Changing beam knee gap

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

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



Partcombine and autoBeamOff

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

It may be preferable to use

`\set Staff.autoBeaming = ##f`
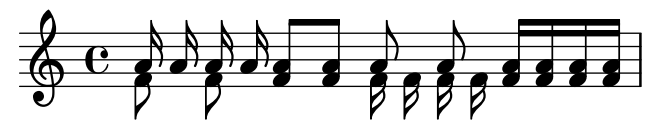
instead, to ensure that autobeaming will be turned off for the entire staff.

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

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

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

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



See also

Notation Reference: [Manual beams], page 86, [Setting automatic beam behavior], page 78.

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

Snippets: Section “Rhythms” in *Snippets*.

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

Known issues and warnings

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

Setting automatic beam behavior

When automatic beaming is enabled, the placement of automatic beams is determined by three context properties: `baseMoment`, `beatStructure`, and `beamExceptions`. The default values of these variables may be overridden as described below, or alternatively the default values themselves may be changed as explained in [Time signature], page 59.

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

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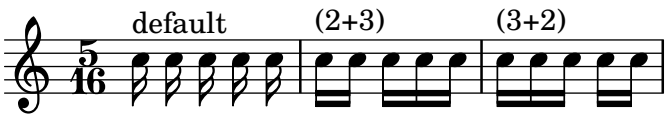
Beaming based on `baseMoment` *and* `beatStructure`

By default, `beamExceptions` rules are defined for most common time signatures, so the `beamExceptions` rules must be disabled if automatic beaming is to be based on `baseMoment` and `beatStructure`. The `beamExceptions` rules are disabled by
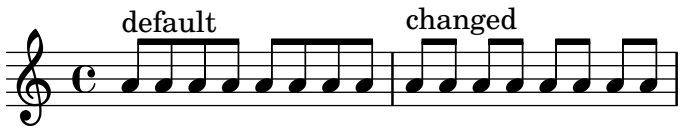
```
\set Timing.beamExceptions = #'()
```

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

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

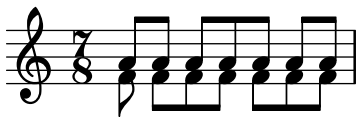


```
\time 4/4
a8^"default" a a a a a a a
% Disable beamExceptions because they are definitely
% defined for 4/4 time
\set Timing.beamExceptions = #'()
\set Timing.baseMoment = #(ly:make-moment 1/4)
\set Timing.beatStructure = #'(1 1 1 1)
a8^"changed" a a a a a a a
```



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

```
\new Staff {
  \time 7/8
  % No need to disable beamExceptions
  % as they are not defined for 7/8 time
  \set Staff.beatStructure = #'(2 3 2)
  <<
    \new Voice = one {
      \relative c'' {
        a8 a a a a a a
      }
    }
    \new Voice = two {
      \relative c' {
        \voiceTwo
        \set Voice.beatStructure = #'(1 3 3)
        f8 f f f f f f
      }
    }
  >>
}
```
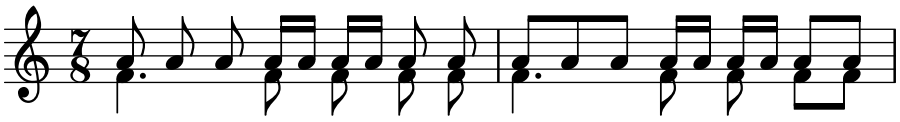


When multiple voices are used the `Staff` context must be specified if the beaming is to be applied to all voices in the staff:

```
\time 7/8
% rhythm 3-1-1-2
% Change applied to Voice by default --  does not work correctly
% Because of autogenerated voices, all beating will
% be at baseMoment (1 . 8)
\set beatStructure = #'(3 1 1 2)
<< {a8 a a a16 a a a a8 a} \\ {f4. f8 f f f} >>

% Works correctly with context Staff specified
```

```
\set Staff.beatStructure = #'(3 1 1 2)
<< {a8 a a a16 a a a a8 a} \\ {f4. f8 f f f} >>
```



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

```
\time 5/8
% No need to disable beamExceptions
% as they are not defined for 5/8 time
\set Timing.baseMoment = #(ly:make-moment 1/16)
\set Timing.beatStructure = #'(7 3)
\repeat unfold 10 { a16 }
```
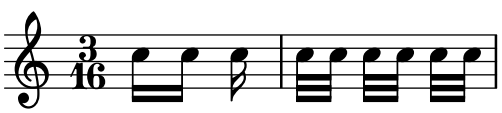


`baseMoment` is a *moment*; a unit of musical duration. A quantity of type *moment* is created by the scheme function `ly:make-moment`. For more information about this function, see [Time administration], page 110.

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

Beaming based on `beamExceptions`

Special autobeaming rules (other than ending a beam on a beat) are defined in the `beamExceptions` property.

```
\time 3/16
\set Timing.beatStructure = #'(2 1)
\set Timing.beamExceptions =
  #'(                          ;start of alist
     (end .                    ;entry for end of beams
      (                        ;start of alist of end points
       ((1 . 32) . (2 2 2))    ;rule for 1/32 beams -- end each 1/16
      )))                      %close all entries
c16 c c |
\repeat unfold 6 { c32 } |
```



`beamExceptions` is an alist with a key of rule-type and a value of beaming-rules.

At this time the only available value of rule-type is `'end` for beam ending.

Beaming-rules is a scheme alist (or list of pairs) that indicates the beam type and the grouping to be applied to beams containing notes with a shortest duration of that beam type.

```
#'((beam-type1 . grouping-1)
   (beam-type2 . grouping-2)
   (beam-type3 . grouping-3))
```

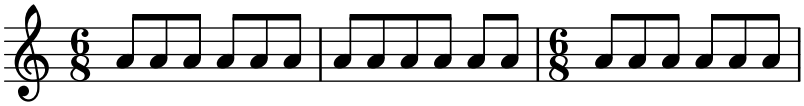
Beam type is a scheme pair indicating the duration of the beam, e.g., `(1 . 16)`.

Grouping is a scheme list indicating the grouping to be applied to the beam. The grouping is in units of the beam type.

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

When the time signature is changed, default values of `Timing.baseMoment`, `Timing.beatStructure`, and `Timing.beamExceptions` are set. Setting the time signature will reset the automatic beaming settings for the `Timing` context to the default behavior.
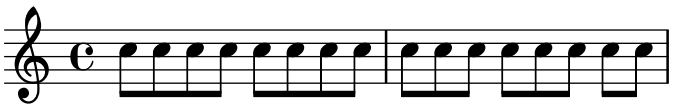
```
\time 6/8
\repeat unfold 6 { a8 }
% group (4 + 2)
\set Timing.beatStructure = #'(4 2)
\repeat unfold 6 { a8 }
% go back to default behavior
\time 6/8
\repeat unfold 6 { a8 }
```



The default automatic beaming settings for a time signature are determined in '`scm/time-signature-settings.scm`'. Changing the default automatic beaming settings for a time signature is described in [Time signature], page 59.

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

```
\time 4/4
\set Timing.baseMoment = #(ly:make-moment 1/8)
\set Timing.beatStructure = #'(3 3 2)
% This won't beam (3 3 2) because of beamExceptions
\repeat unfold 8 {c8} |
% This will beam (3 3 2) because we clear beamExceptions
\set Timing.beamExceptions = #'()
\repeat unfold 8 {c8}
```
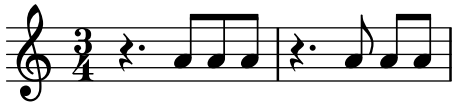


In a similar fashion, eighth notes in 3/4 time are beamed as a full measure by default. To beam eighth notes in 3/4 time on the beat, reset `beamExceptions`.

```
\time 3/4
% by default we beam in (6) due to beamExceptions
\repeat unfold 6 {a8} |
% This will beam (1 1 1) due to default baseMoment and beatStructure
\set Timing.beamExceptions = #'()
\repeat unfold 6 {a8}
```



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

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



How automatic beaming works

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

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

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

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

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

Selected Snippets
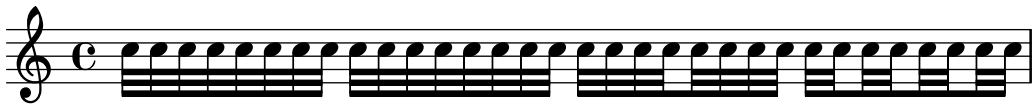
Subdividing beams

The beams of consecutive 16th (or shorter) notes are, by default, not subdivided. That is, the three (or more) beams stretch unbroken over entire groups of notes. This behavior can be modified to subdivide the beams into sub-groups by setting the property `subdivideBeams`. When set, multiple beams will be subdivided at intervals defined by the current value of `baseMoment` by reducing the multiple beams to just one beam between the sub-groups. Note that `baseMoment` defaults to one over the denominator of the current time signature if not set explicitly. It must be set to a fraction giving the duration of the beam sub-group using the `ly:make-moment` function, as shown in this snippet. Also, when `baseMoment` is changed, `beatStructure` should also be changed to match the new `baseMoment`:

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

  % Set beam sub-group length to an eighth note
  \set baseMoment = #(ly:make-moment 1/8)
  \set beatStructure = #'(2 2 2 2)
  c32[ c c c c c c c]
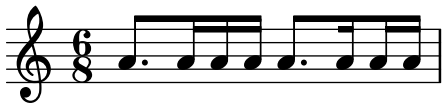
  % Set beam sub-group length to a sixteenth note
  \set baseMoment = #(ly:make-moment 1/16)
  \set beatStructure = #'(4 4 4 4)
  c32[ c c c c c c c]
}
```



Strict beat beaming

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

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



Conducting signs measure grouping signs

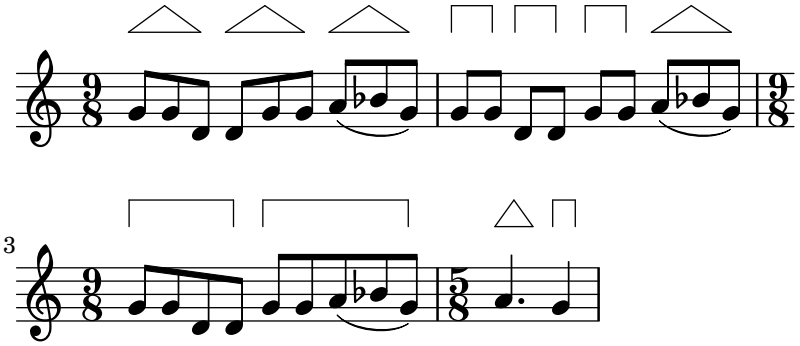
Beat grouping within a measure is controlled by the context property `beatStructure`. Values of `beatStructure` are established for many time signatures in '`scm/time-signature-settings.scm`'. Values of `beatStructure` can be changed or set with `\set`. Alternatively, `\time` can be used to both set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

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

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

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

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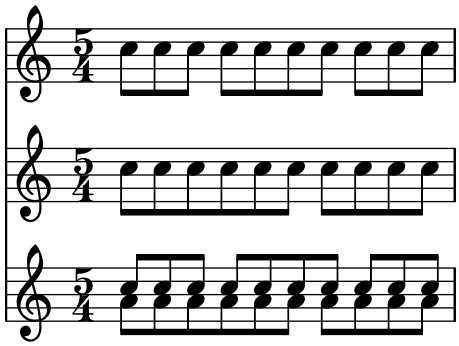


Beam endings in Score context

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

```
\relative c'' {
  \time 5/4
  % Set default beaming for all staves
  \set Score.baseMoment = #(ly:make-moment 1/8)
  \set Score.beatStructure = #'(3 4 3)
  <<
    \new Staff {
      c8 c c c c c c c c c
    }
    \new Staff {
      % Modify beaming for just this staff
      \set Staff.beatStructure = #'(6 4)
      c8 c c c c c c c c c
    }
    \new Staff {
      % Inherit beaming from Score context
      <<
        {
          \voiceOne
          c8 c c c c c c c c c
        }
        % Modify beaming for this voice only
```

```
        \new Voice {
          \voiceTwo
          \set Voice.beatStructure = #'(6 4)
          a8 a a a a a a a a
        }
      >>
    }
  >>
}
```



See also

Notation Reference: [Time signature], page 59.

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

Snippets: Section “Rhythms” in *Snippets*.

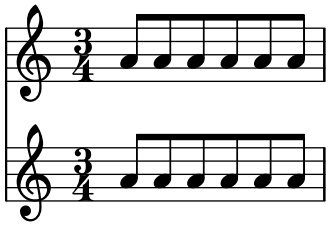
Internals Reference: Section “Auto_beam_engraver” in *Internals Reference*, Section “Beam” in *Internals Reference*, Section “BeamForbidEvent” in *Internals Reference*, Section “beam-interface” in *Internals Reference*.

Known issues and warnings

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

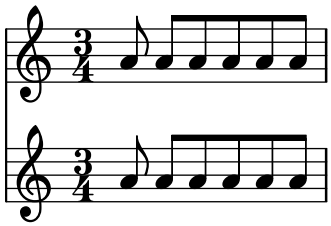
By default, the `Timing` translator is aliased to the `Score` context. This means that setting the time signature in one staff will affect the beaming of the other staves as well. Thus, a time signature setting in a later staff will reset custom beaming that was set in an earlier staff. One way to avoid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

```
<<
  \new Staff {
    \time 3/4
    \set Timing.baseMoment = #(ly:make-moment 1/8)
    \set Timing.beatStructure = #'(1 5)
    \repeat unfold 6 { a8 }
  }
  \new Staff {
    \repeat unfold 6 { a8 }
  }
>>
```



The default beam settings for the time signature can also be changed, so that the desired beaming will always be used. Changes in automatic beaming settings for a time signature are described in [Time signature], page 59.
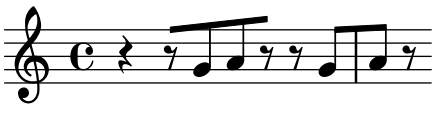
```
<<
  \new Staff {
    \overrideTimeSignatureSettings
      3/4               % timeSignatureFraction
      1/8               % baseMomentFraction
      #'(1 5)           % beatStructure
      #'()              % beamExceptions
    \time 3/4
    \repeat unfold 6 { a8 }
  }
  \new Staff {
    \time 3/4
    \repeat unfold 6 { a8 }
  }
>>
```



Manual beams

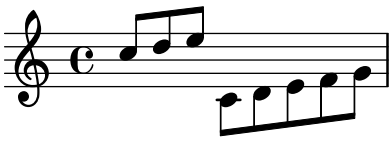
In some cases it may be necessary to override the automatic beaming algorithm. For example, the autobeamer will not put beams over rests or bar lines, and in choral scores the beaming is often set to follow the meter of the lyrics rather than the notes. Such beams can be specified manually by marking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

```
r4 r8[ g' a r] r g[ | a] r
```
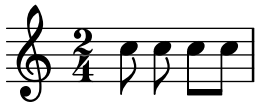


Beaming direction can be set manually using direction indicators:

```
c8^[ d e] c,_[ d e f g]
```



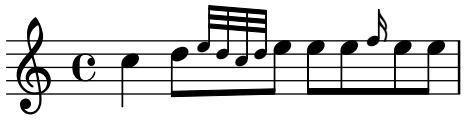
Individual notes may be marked with `\noBeam` to prevent them from being beamed:

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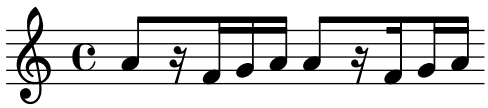


Grace note beams and normal note beams can occur simultaneously. Unbeamed grace notes are not put into normal note beams.

```
c4 d8[
\grace { e32 d c d }
e8] e[ e
\grace { f16 }
e8 e]
```



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

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



Predefined commands

`\noBeam`.

Selected Snippets

Flat flags and beam nibs

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

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

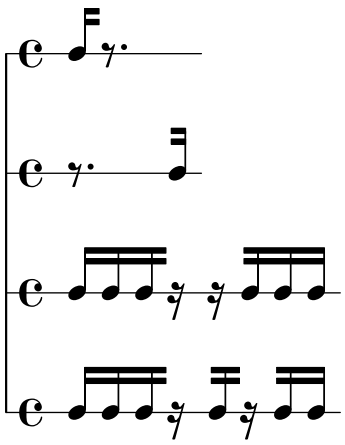
For left-pointing flat flags, set `stemRightBeamCount` instead (Example 2).

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

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

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

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



See also

Notation Reference: Section 5.4.2 [Direction and placement], page 577, [Grace notes], page 104.

Snippets: Section "Rhythms" in *Snippets*.

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

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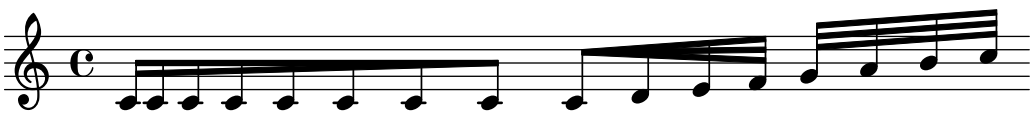
Feathered beams are used to indicate that a small group of notes should be played at an increasing (or decreasing) tempo, without changing the overall tempo of the piece. The extent of the feathered beam must be indicated manually using `[` and `]`, and the beam feathering is turned on by specifying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

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

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

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

```
\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.

Predefined commands

`\featherDurations`.

See also

Snippets: Section “Rhythms” in *Snippets*.

Known issues and warnings

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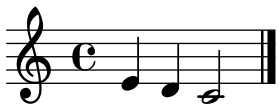
1.2.5 Bars

Bar lines

Bar lines 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 the following:

```
\bar ""
```
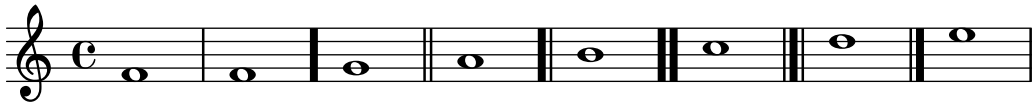
This will insert an invisible bar line and allow (but not force) a line break to occur at this point. The bar number counter is not increased. To force a line break see Section 4.3.1 [Line breaking], page 507.

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.

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

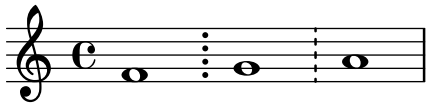
Two types of simple bar lines and five types of double bar lines are available for manual insertion:

```
f1 \bar "|"
f1 \bar "."
g1 \bar "||"
a1 \bar ".|"
b1 \bar ".."
c1 \bar "|.|"
d1 \bar "|."
e1
```



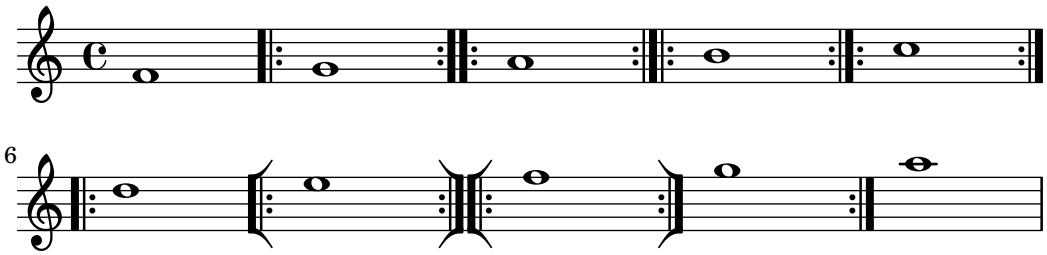
together with dotted and dashed bar lines:

```
f1 \bar ";"
g1 \bar "!"
a1
```



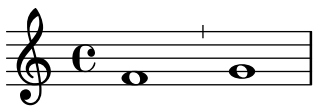
and nine types of repeat bar lines:

```
f1 \bar ".|:"
g1 \bar ":..:"
a1 \bar ":|.|:"
b1 \bar ":|.:"
c1 \bar ":.|.:"
d1 \bar "[|:"
e1 \bar ":|][|:"
f1 \bar ":|]"
g1 \bar ":|."
a1
```



Additionally, a bar line can be printed as a simple tick:

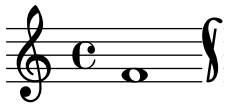
```
f1 \bar "'" g1
```



However, as such ticks are typically used in Gregorian chant, it is preferable to use `\divisioMinima` there instead, described in the section [Divisiones], page 418 in Gregorian chant.

Lilypond supports kievan notation and provides a special kievan bar line:
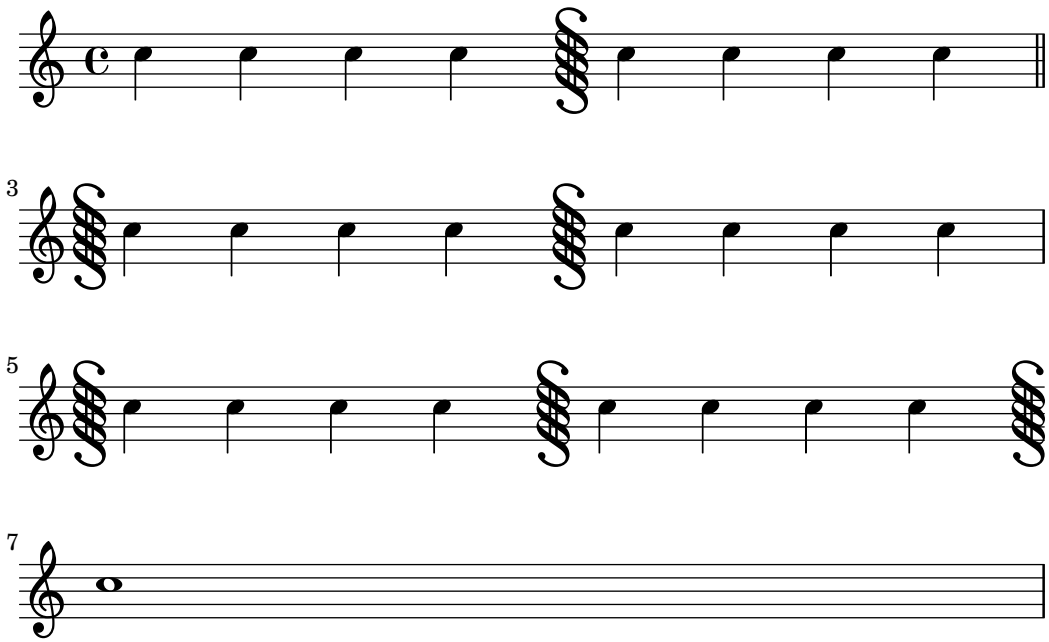
```
f1 \bar "k"
```



Further details of this notation are explained in Section 2.9.5 [Typesetting Kievan square notation], page 427.

For in-line segno signs, there are three types of bar lines which differ in their behavior at line breaks:

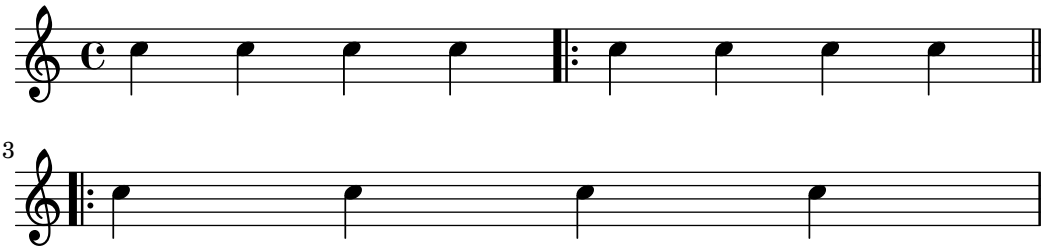
```
c4 c c c
\bar "S"
c4 c c c \break
\bar "S"
c4 c c c
\bar "S-|"
c4 c c c \break
\bar "S-|"
c4 c c c
\bar "S-S"
c4 c c c \break
\bar "S-S"
c1
```



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 137), which automatically print the appropriate bar lines.

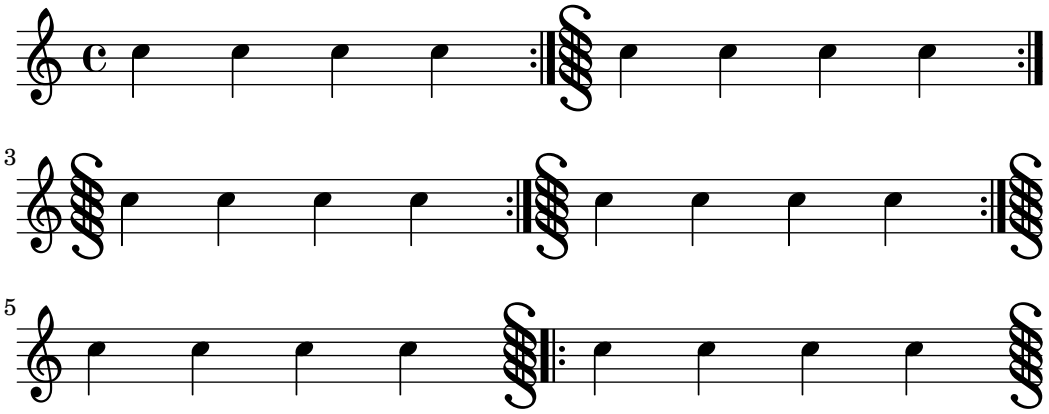
In addition, you can specify `".|:-||"`, which is equivalent to `".|:"` except at line breaks, where it gives a double bar line at the end of the line and a start repeat at the beginning of the next line.

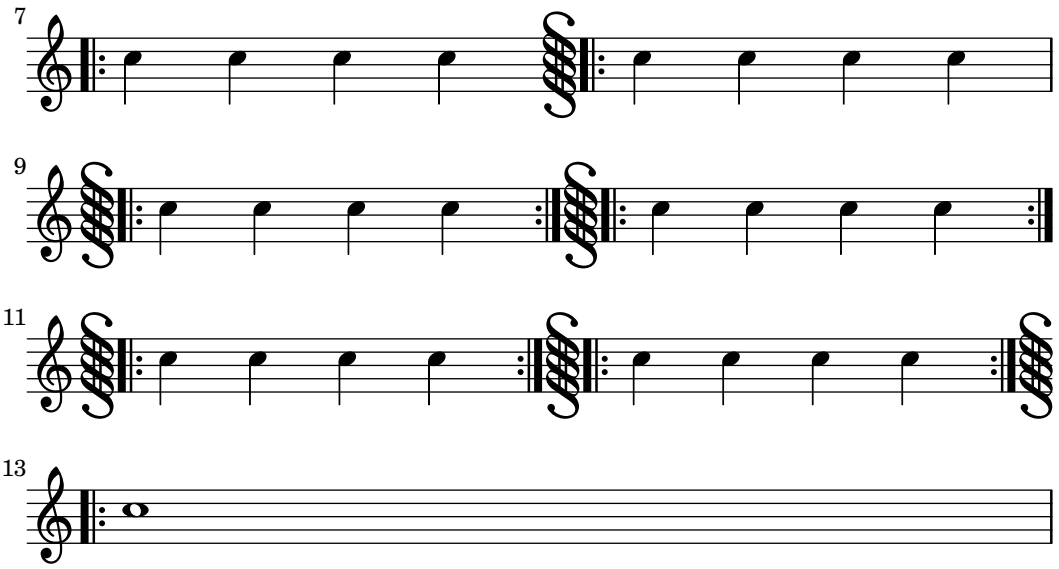
```
c4 c c c
\bar ".|:-||"
c4 c c c \break
\bar ".|:-||"
c4 c c c
```



For combinations of repeats with the segno sign, there are six different variations:

```
c4 c c c
\bar ":|.S"
c4 c c c \break
\bar ":|.S"
c4 c c c
\bar ":|.S-S"
c4 c c c \break
\bar ":|.S-S"
c4 c c c
\bar "S.|:-S"
c4 c c c \break
\bar "S.|:-S"
c4 c c c
\bar "S.|:"
c4 c c c \break
\bar "S.|:"
c4 c c c
\bar ":|.S.|:"
c4 c c c \break
\bar ":|.S.|:"
c4 c c c
\bar ":|.S.|:-S"
c4 c c c \break
\bar ":|.S.|:-S"
c1
```





Additionally there is an `\inStaffSegno` command which creates a segno bar line in conjunction with an appropriate repeat bar line when used with a `\repeat volta` command, see [Normal repeats], page 138.

New bar line types can be defined with `\defineBarLine`:

`\defineBarLine` *bartype* `#'(`*end begin span*`)`

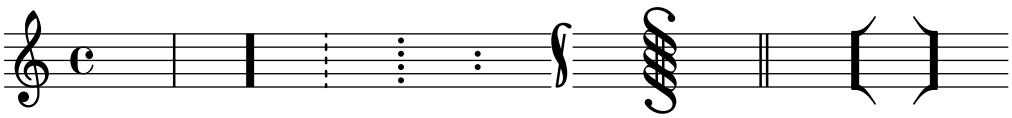
The `\defineBarline` variables can include the 'empty' string `""`, which is equivalent to an invisible bar line being printed. Or they can be set to `#f` which prints no bar line at all.

After the definiton, the new bar line can be used by `\bar` *bartype*.

There are currently ten bar line elements available:

```
\defineBarLine ":" #'("" ":" "")
\defineBarLine "=" #'("=" "" "")
\defineBarLine "[" #'("" "[" "")
\defineBarLine "]" #'("]" "" "")

\new Staff {
  s1 \bar "|"
  s1 \bar "."
  s1 \bar "!"
  s1 \bar ";"
  s1 \bar ":"
  s1 \bar "k"
  s1 \bar "S"
  s1 \bar "="
  s1 \bar "["
  s1 \bar "]"
  s1 \bar ""
}
```

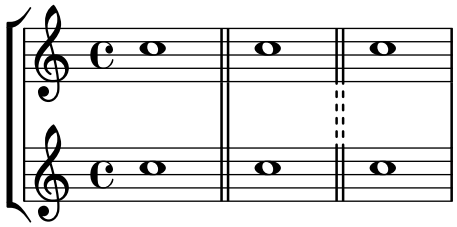


The `"="` bar line provides the double span bar line, used in combination with the segno sign. Do not use it as a standalone double thin bar line; here, `\bar "||"` is preferred.

The `"-"` sign starts annotations to bar lines which are useful to distinguish those with identical appearance but different behavior at line breaks and/or different span bars. The part following the `"-"` sign is not used for building up the bar line.

```
\defineBarLine "||-dashedSpan" #'("||" "" "!!")

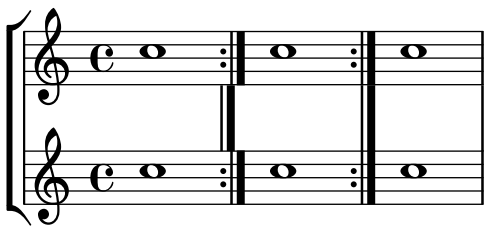
\new StaffGroup <<
  \new Staff {
    c1 \bar "||"
    c1 \bar "||-dashedSpan"
    c1
  }
  \new Staff {
    c1
    c1
    c1
  }
>>
```



Furthermore, the space character " " serves as a placeholder for defining span bars correctly aligned to the main bar lines:

```
\defineBarLine ":|.-wrong" #'(":|." "" "|.")
\defineBarLine ":|.-right" #'(":|." "" " |.")
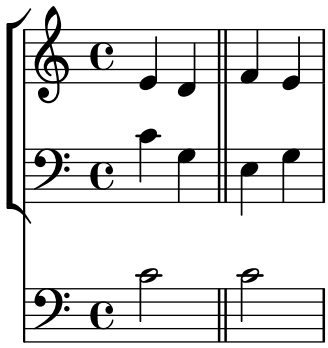
\new StaffGroup <<
  \new Staff {
    c1 \bar ":|.-wrong"
    c1 \bar ":|.-right"
    c1
  }
  \new Staff {
    c1
    c1
    c1
  }
>>
```



If additional elements are needed, LilyPond provides a simple way to define them. For more informations on modifying or adding bar lines, see file ‘`scm/bar-line.scm`’.

In scores with many staves, a `\bar` command in one staff is automatically applied to all staves. The resulting bar lines are connected between different staves of a `StaffGroup`, `PianoStaff`, or `GrandStaff`.

```
<<
  \new StaffGroup <<
    \new Staff {
      e4 d
      \bar "||"
      f4 e
    }
    \new Staff { \clef bass c4 g e g }
  >>
  \new Staff { \clef bass c2 c2 }
>>
```



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 507, Section 1.4 [Repeats], page 137, [Grouping staves], page 176.

Installed Files: '`scm/bar-line.scm`'.

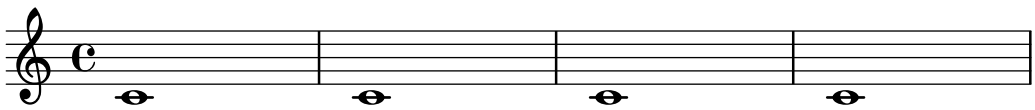
Snippets: Section "Rhythms" in *Snippets*.

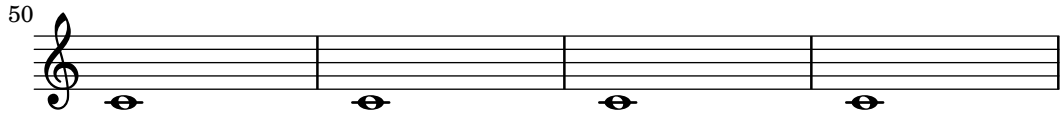
Internals Reference: Section "BarLine" in *Internals Reference* (created at `Staff` level), Section "SpanBar" in *Internals Reference* (across staves), Section "Timing_translator" in *Internals Reference* (for Timing properties).

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:

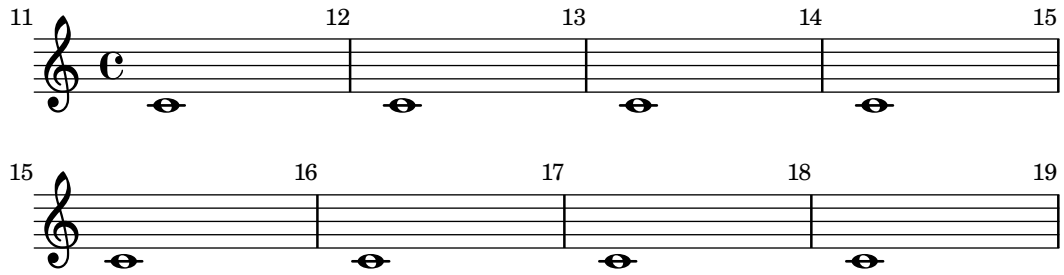
```
c1 c c c
\break
\set Score.currentBarNumber = #50
c1 c c c
```





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
% Permit first bar number to be printed
\bar ""
c1 | c | c | c
\break
c1 | c | c | c
```

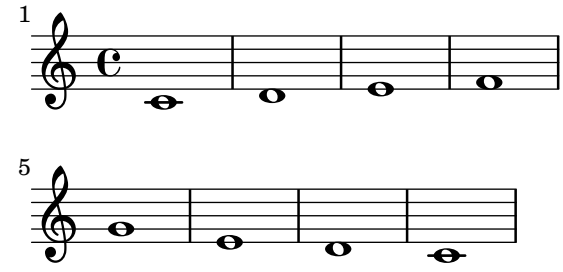


Selected Snippets

Printing the bar number for the first measure

By default, the first bar number in a score is suppressed if it is less than or equal to '1'. By setting `barNumberVisibility` to `all-bar-numbers-visible`, any bar number can be printed for the first measure and all subsequent measures. Note that an empty bar line must be inserted before the first note for this to work.

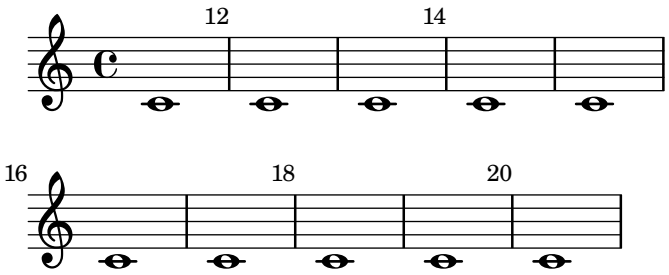
```
\relative c' {
  \set Score.barNumberVisibility = #all-bar-numbers-visible
  \bar ""
  c1 | d | e | f \break
  g1 | e | d | c
}
```



Printing bar numbers at regular intervals

Bar numbers can be printed at regular intervals by setting the property `barNumberVisibility`. Here the bar numbers are printed every two measures except at the end of the line.

```
\relative c' {
  \override Score.BarNumber.break-visibility = #end-of-line-invisible
  \set Score.currentBarNumber = #11
  % Permit first bar number to be printed
  \bar ""
  % Print a bar number every second measure
  \set Score.barNumberVisibility = #(every-nth-bar-number-visible 2)
  c1 | c | c | c | c
  \break
  c1 | c | c | c | c
}
```



Printing bar numbers inside boxes or circles

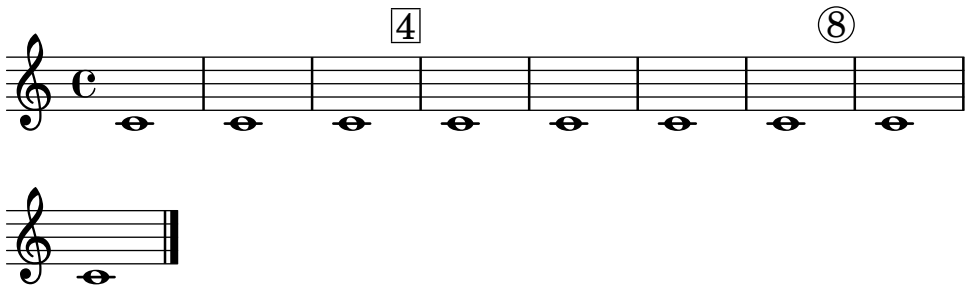
Bar numbers can also be printed inside boxes or circles.

```
\relative c' {
  % Prevent bar numbers at the end of a line and permit them elsewhere
  \override Score.BarNumber.break-visibility = #end-of-line-invisible
  \set Score.barNumberVisibility = #(every-nth-bar-number-visible 4)

  % Increase the size of the bar number by 2
  \override Score.BarNumber.font-size = #2

  % Draw a box round the following bar number(s)
  \override Score.BarNumber.stencil
    = #(make-stencil-boxer 0.1 0.25 ly:text-interface::print)
  \repeat unfold 5 { c1 }
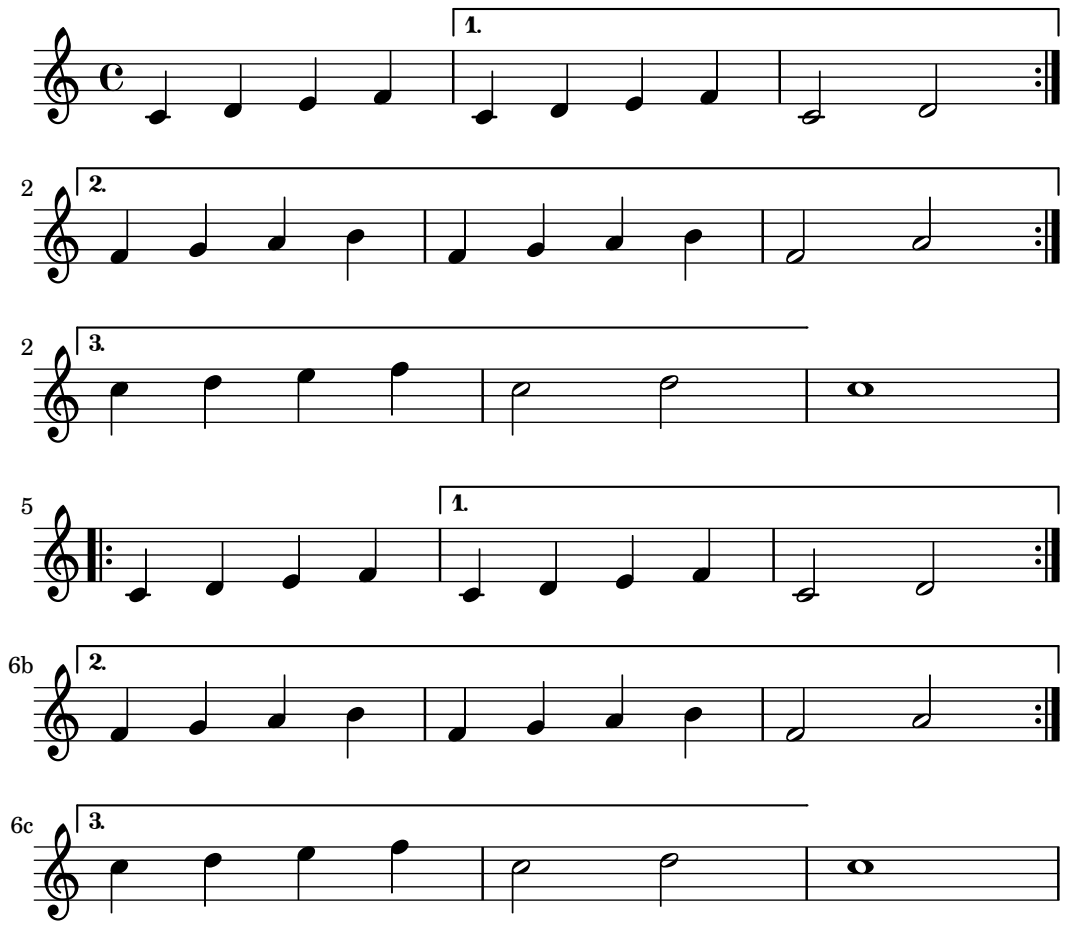
  % Draw a circle round the following bar number(s)
  \override Score.BarNumber.stencil
    = #(make-stencil-circler 0.1 0.25 ly:text-interface::print)
  \repeat unfold 4 { c1 } \bar "|."
}
```



Alternative bar numbering

Two alternative methods for bar numbering can be set, especially for when using repeated music.

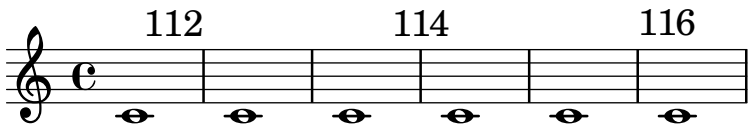
```
\relative c'{
  \set Score.alternativeNumberingStyle = #'numbers
  \repeat volta 3 { c4 d e f | }
    \alternative {
      { c4 d e f | c2 d \break }
      { f4 g a b | f4 g a b | f2 a | \break }
      { c4 d e f | c2 d }
    }
  c1 \break
  \set Score.alternativeNumberingStyle = #'numbers-with-letters
  \repeat volta 3 { c,4 d e f | }
    \alternative {
      { c4 d e f | c2 d \break }
      { f4 g a b | f4 g a b | f2 a | \break }
      { c4 d e f | c2 d }
    }
  c1
}
```



Aligning bar numbers

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

```
\relative c' {
  \set Score.currentBarNumber = #111
  \override Score.BarNumber.break-visibility = #all-visible
  % Increase the size of the bar number by 2
  \override Score.BarNumber.font-size = #2
  % Print a bar number every second measure
  \set Score.barNumberVisibility = #(every-nth-bar-number-visible 2)
  c1 | c1
  % Center-align bar numbers
  \override Score.BarNumber.self-alignment-X = #CENTER
  c1 | c1
  % Left-align bar numbers
  \override Score.BarNumber.self-alignment-X = #LEFT
  c1 | c1
}
```
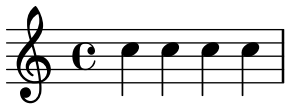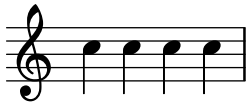


Removing bar numbers from a score

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

```
\layout {
  \context {
    \Score
    \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*, Section “Bar_number_engraver” in *Internals Reference*.

Known issues and warnings

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

Bar and bar number checks

Bar checks help detect errors in the entered durations. A bar check may be entered using the bar symbol, `|`, at any place where a bar line is expected to fall. If bar check lines are encountered at other places, a list of warnings is printed in the log file, showing the line numbers and lines in which the bar checks failed. In the next example, the second bar check will signal an error.

```
\time 3/4 c2 e4 | g2 |
```

Bar checks can also be used in lyrics:
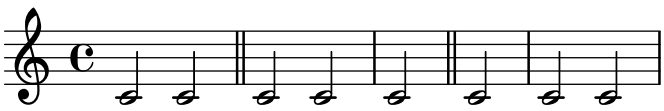
```
\lyricmode {
  \time 2/4
  Twin -- kle | Twin -- kle |
}
```

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 `"|"`. In the following example `|` is set to insert a double bar line wherever it appears in the input, rather than checking for end of bar.

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



When copying large pieces of music, it can be helpful to check that the LilyPond bar number corresponds to the original that you are entering from. This can be checked with `\barNumberCheck`, for example,

```
\barNumberCheck #123
```

will print a warning if the `currentBarNumber` is not 123 when it is processed.

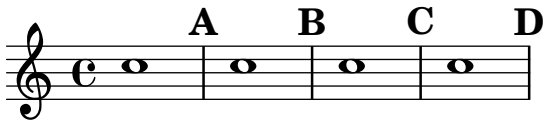
See also

Snippets: Section "Rhythms" in *Snippets*.

Rehearsal marks

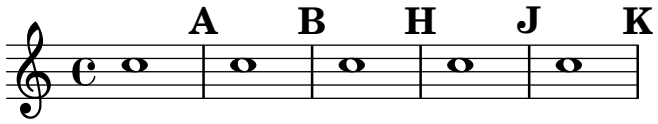
To print a rehearsal mark, use the `\mark` command.

```
c1 \mark \default
c1 \mark \default
c1 \mark \default
c1 \mark \default
```



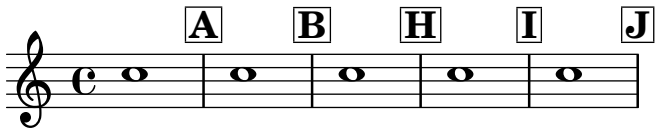
The mark is incremented automatically if you use `\mark \default`, but you can also use an integer argument to set the mark manually. The value to use is stored in the property `rehearsalMark`.

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



The letter 'I' is skipped in accordance with engraving traditions. If you wish to include the letter 'I', then use one of the following commands, depending on which style of rehearsal mark you want (letters only, letters in a hollow box, or letters in a hollow circle).

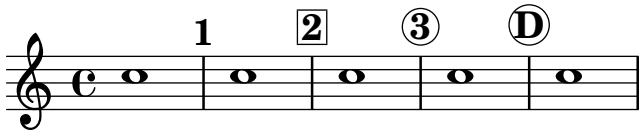
```
\set Score.markFormatter = #format-mark-alphabet
\set Score.markFormatter = #format-mark-box-alphabet
\set Score.markFormatter = #format-mark-circle-alphabet
\set Score.markFormatter = #format-mark-box-alphabet
c1 \mark \default
c1 \mark \default
c1 \mark #8
c1 \mark \default
c1 \mark \default
```



The style is defined by the property `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:

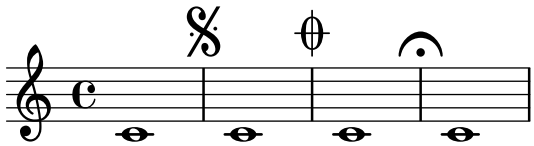
```
\mark "A1"
```

Note that `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 A.8 [The Feta font], page 624, 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 223. For more precise control, see `break-alignable-interface` in Section 5.5.1 [Aligning objects], page 591.

The file '`scm/translation-functions.scm`' contains the definitions of `format-mark-numbers` and `format-mark-letters`. They can be used as inspiration for other formatting functions.

See also

Notation Reference: Section A.8 [The Feta font], page 624, Section 1.8.2 [Formatting text], page 223, Section 5.5.1 [Aligning objects], page 591.

Installed Files: '`scm/translation-functions.scm`'.

Snippets: Section "Rhythms" in *Snippets*.
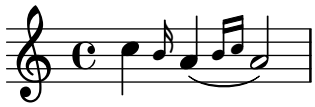
Internals Reference: Section "MarkEvent" in *Internals Reference*, Section "Mark_engraver" in *Internals Reference*, Section "RehearsalMark" in *Internals Reference*.

1.2.6 Special rhythmic concerns

Grace notes
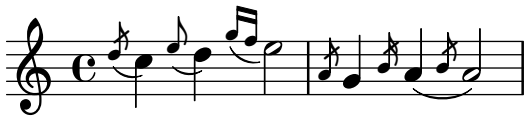
Grace notes are musical ornaments, printed in a smaller font, that take up no additional logical time in a measure.

```
c4 \grace b16 a4(
\grace { b16 c16 } a2)
```
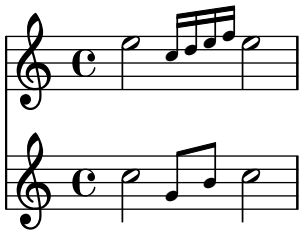


There are three other types of grace notes possible; the *acciaccatura* – an unmeasured grace note indicated by a slurred note with a slashed stem – and the *appoggiatura*, which takes a fixed fraction of the main note it is attached to and prints without the slash. It is also possible to write a grace note with a slashed stem, like the *acciaccatura* but without the slur, so as to place it between notes that are slurred themselves, using the `\slashedGrace` function.

```
\acciaccatura d8 c4
\appoggiatura e8 d4
\acciaccatura { g16 f } e2
\slashedGrace a,8 g4
\slashedGrace b16 a4(
\slashedGrace b8 a2)
```
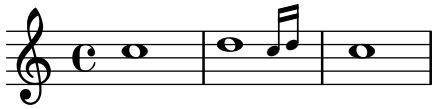


The placement of grace notes is synchronized between different staves. In the following example, there are two sixteenth grace notes for every eighth grace note

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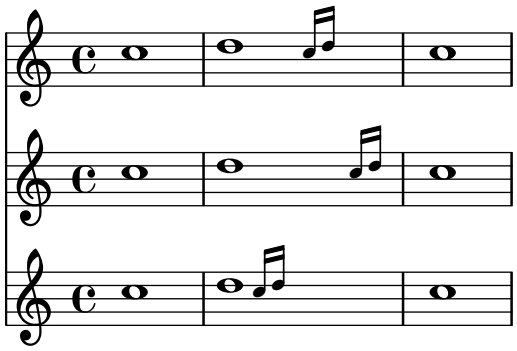


If you want to end a note with a grace, use the `\afterGrace` command. It takes two arguments: the main note, and the grace notes following the main note.

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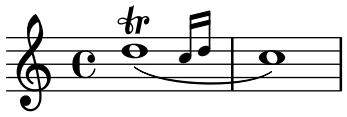


This will put the grace notes after a space lasting 3/4 of the length of the main note. The default fraction 3/4 can be changed by setting `afterGraceFraction`. The following example shows the results from setting the space at the default, at 15/16, and finally at 1/2 of the main note.

```
<<
  \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
  }
>>
```
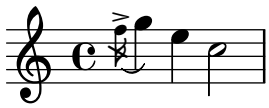


The space between the main note and the grace note may also be specified using spacers. The following example places the grace note after a space lasting 7/8 of the main note.

```
\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 overridden and then reverted.

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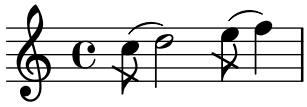


Selected Snippets

Using grace note slashes with normal heads

The slash through the stem found in acciaccaturas can be applied in other situations.
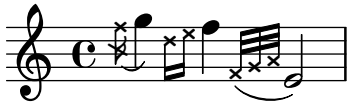
```
\relative c'' {
  \override Flag.stroke-style = #"grace"
  c8( d2) e8( f4)
}
```



Tweaking grace layout within music

The layout of grace expressions can be changed throughout the music using the functions `add-grace-property` and `remove-grace-property`. The following example undefines the `Stem` direction for this grace, so that stems do not always point up, and changes the default note heads to crosses.

```
\relative c'' {
  \new Staff {
    $(remove-grace-property 'Voice 'Stem 'direction)
    $(add-grace-property 'Voice 'NoteHead 'style 'cross)
    \new Voice {
       \acciaccatura { f16 } g4
       \grace { d16 e } f4
       \appoggiatura { f,32 g a } e2
    }
  }
}
```



Redefining grace note global defaults
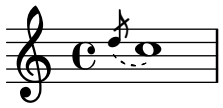
The global defaults for grace notes are stored in the identifiers `startGraceMusic`, `stopGraceMusic`, `startAcciaccaturaMusic`, `stopAcciaccaturaMusic`, `startAppoggiaturaMusic` and `stopAppoggiaturaMusic`, which are defined in the file `ly/grace-init.ly`. By redefining them other effects may be obtained.

```
startAcciaccaturaMusic = {
  <>(
  \override Flag.stroke-style = #"grace"
  \slurDashed
}

stopAcciaccaturaMusic = {
  \revert Flag.stroke-style
  \slurSolid
  <>)
```

```
}

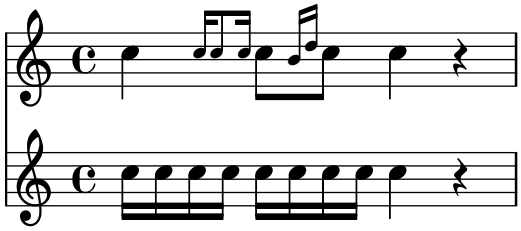
\relative c'' {
  \acciaccatura d8 c1
}
```



Positioning grace notes with floating space

Setting the property `'strict-grace-spacing` makes the musical columns for grace notes 'floating', i.e., decoupled from the non-grace notes: first the normal notes are spaced, then the (musical columns of the) graces are put left of the musical columns for the main notes.

```
\relative c'' {
  <<
    \override Score.SpacingSpanner.strict-grace-spacing = ##t
    \new Staff \new Voice {
      \afterGrace c4 { c16[ c8 c16] }
      c8[ \grace { b16 d } c8]
      c4 r
    }
    \new Staff {
      c16 c c c c c c c c4 r
    }
  >>
}
```



See also

Music Glossary: Section "grace notes" in *Music Glossary*, Section "acciaccatura" in *Music Glossary*, Section "appoggiatura" in *Music Glossary*.

Notation Reference: [Scaling durations], page 48, [Manual beams], page 86.

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

Snippets: Section "Rhythms" in *Snippets*.
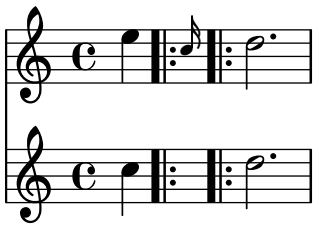
Internals Reference: Section "GraceMusic" in *Internals Reference*, Section "Grace_beam_engraver" in *Internals Reference*, Section "Grace_auto_beam_engraver" in *Internals Reference*, Section "Grace_engraver" in *Internals Reference*, Section "Grace_spacing_engraver" in *Internals Reference*.

Known issues and warnings

A multi-note beamed *acciaccatura* is printed without a slash, and looks exactly the same as a multi-note beamed *appoggiatura*.
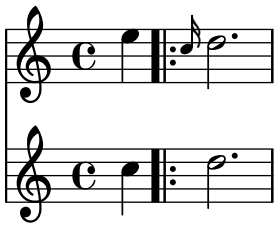
Grace note synchronization can also lead to surprises. Staff notation, such as key signatures, bar lines, etc., are also synchronized. Take care when you mix staves with grace notes and staves without, for example,

```
<<
  \new Staff { 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. }
>>
```



The use of grace notes within voice contexts confuses the way the voice is typeset. This can be overcome by inserting a rest or note between the voice command and the grace note.

```
accMusic = {
  \acciaccatura { f8 } e8 r8 \acciaccatura { f8 } e8 r4
}

\new Staff {
  <<
    \new Voice {
      \relative c'' {
        r8 r8 \voiceOne \accMusic \oneVoice r8 |
        r8 \voiceOne r8 \accMusic \oneVoice r8 |
      }
    }
    \new Voice {
      \relative c' {
        s8 s8 \voiceTwo \accMusic \oneVoice s8 |
        s8 \voiceTwo r8 \accMusic \oneVoice s8 |
```

```
      }
    }
  >>
}
```



Grace sections should only be used within sequential music expressions. Nesting or juxtaposing grace sections is not supported, and might produce crashes or other errors.

Each grace note in MIDI output has a length of 1/4 of its actual duration. If the combined length of the grace notes is greater than the length of the preceding note a "`Going back in MIDI time`" error will be generated. Either make the grace notes shorter in duration, for example:

```
c'8 \acciaccatura { c'8[ d' e' f' g'] }
```

becomes:

```
c'8 \acciaccatura { c'16[ d' e' f' g'] }
```

Or explicitly change the musical duration:

```
c'8 \acciaccatura { \scaleDurations 1/2 { c'8[ d' e' f' g'] } }
```

See [Scaling durations], page 48.

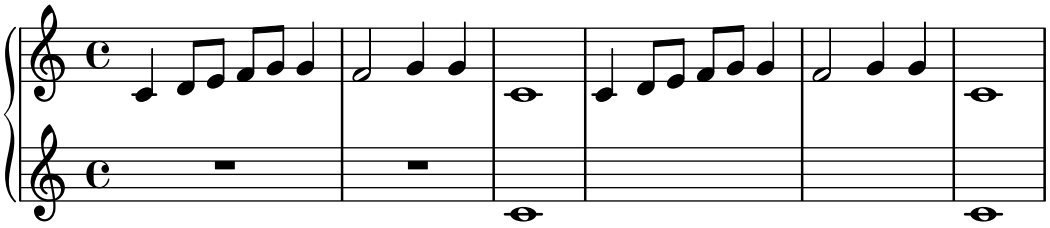
Aligning to cadenzas

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 {
    #(mmrest-of-length MyCadenza)
    c'1
    #(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. To ensure that the `Timing` alias is available, you may need to explicitly instantiate the containing context (such as `Voice` or `Staff`).

The following properties of `Timing` are used to keep track of timing within the score.

`currentBarNumber`
: The current measure number. For an example showing the use of this property see [Bar numbers], page 96.
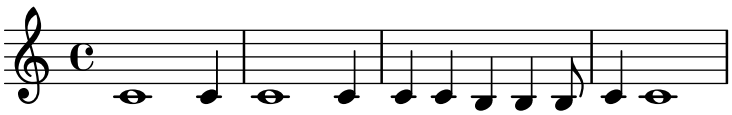
`measureLength`
: The length of the measures in the current time signature. For a 4/4 time this is 1, and for 6/8 it is 3/4. Its value determines when bar lines are inserted and how automatic beams should be generated.

`measurePosition`
: The point within the measure where we currently are. This quantity is reset by subtracting `measureLength` whenever `measureLength` is reached or exceeded. When that happens, `currentBarNumber` is incremented.

`timing`
: If set to true, the above variables are updated for every time step. When set to false, the engraver stays in the current measure indefinitely.

Timing can be changed by setting any of these variables explicitly. In the next example, the default 4/4 time signature is printed, but `measureLength` is set to 5/4. At 4/8 through the third measure, the `measurePosition` is advanced by 1/8 to 5/8, shortening that bar by 1/8. The next bar line then falls at 9/8 rather than 5/4.

```
\new Voice \relative c' {
  \set Timing.measureLength = #(ly:make-moment 5/4)
  c1 c4 |
  c1 c4 |
  c4 c
  \set Timing.measurePosition = #(ly:make-moment 5/8)
  b4 b 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.
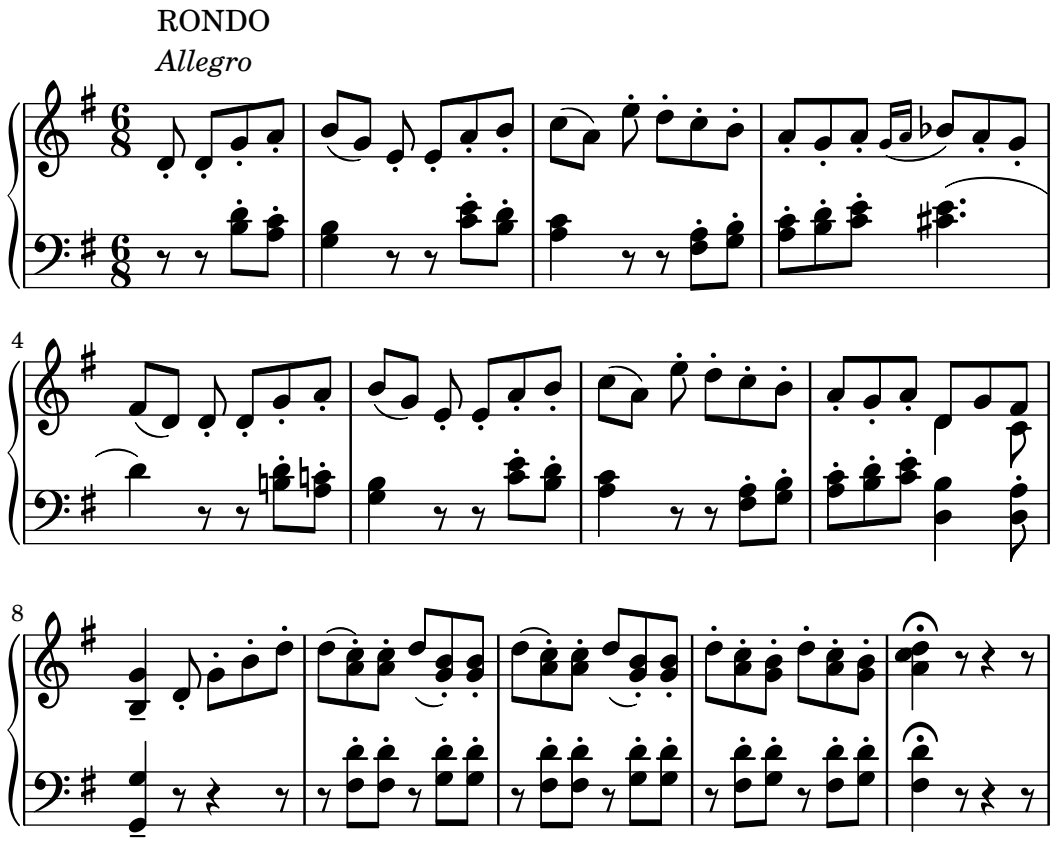
See also

Notation Reference: [Bar numbers], page 96, [Unmetered music], page 68.

Snippets: Section “Rhythms” in *Snippets*.

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

1.3 Expressive marks



This section lists various expressive marks that can be created in a score.

1.3.1 Expressive marks attached to notes

This section explains how to create expressive marks that are attached to notes: articulations, ornamentations, and dynamics. Methods to create new dynamic markings are also discussed.
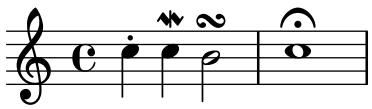
Articulations and ornamentations

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

```
note\name
```
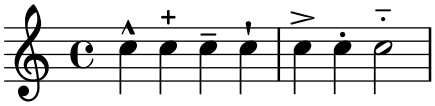
The possible values for *name* are listed in Section A.13 [List of articulations], page 699. For example:

```
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-_
```
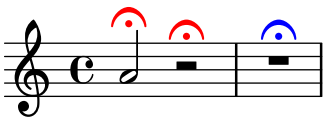


The rules for the default placement of articulations are defined in '`scm/script.scm`'. Articulations and ornamentations may be manually placed above or below the staff; see Section 5.4.2 [Direction and placement], page 577.

Articulations are `Script` objects. Their properties are described more fully in Section "Script" in *Internals Reference*.

Articulations can be attached to rests as well as notes but they cannot be attached to multi-measure rests. A special predefined command, `\fermataMarkup`, is available for attaching a fermata to a multi-measure rest (and only a multi-measure rest). This creates a `MultiMeasureRestText` object.

```
\override Script.color = #red
\override MultiMeasureRestText.color = #blue
a2\fermata r\fermata
R1\fermataMarkup
```



In addition to articulations, text and markups can be attached to notes. See [Text scripts], page 216.

For more information about the ordering of Scripts and TextScripts that are attached to the notes, see Section "Placement of objects" in *Learning Manual*.

Selected Snippets

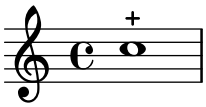
Modifying default values for articulation shorthand notation
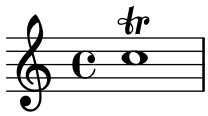
The shorthands are defined in '`ly/script-init.ly`', where the variables `dashHat`, `dashPlus`, `dashDash`, `dashBang`, `dashLarger`, `dashDot`, and `dashUnderscore` are assigned default values. The default values for the shorthands can be modified. For example, to associate the `-+` (`dashPlus`) shorthand with the trill symbol instead of the default `+` symbol, assign the value `trill` to the variable `dashPlus`:

```
\relative c'' { c1-+ }

dashPlus = "trill"

\relative c'' { c1-+ }
```
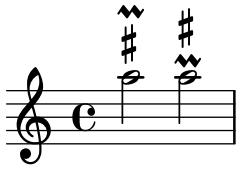




Controlling the vertical ordering of scripts

The vertical ordering of scripts is controlled with the `'script-priority` property. The lower this number, the closer it will be put to the note. In this example, the `TextScript` (the sharp symbol) first has the lowest priority, so it is put lowest in the first example. In the second, the prall trill (the `Script`) has the lowest, so it is on the inside. When two objects have the same priority, the order in which they are entered determines which one comes first.

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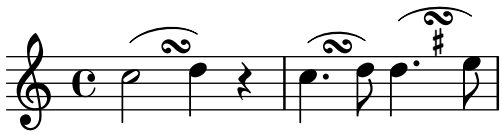
  \once \override Script.script-priority = #-100
  a2^\prall^\markup { \sharp }
}
```



Creating a delayed turn

Creating a delayed turn, where the lower note of the turn uses the accidental, requires several overrides. The `outside-staff-priority` property must be set to `#f`, as otherwise this would take precedence over the `avoid-slur property`. Changing the fractions `2/3` and `1/3` adjusts the horizontal position.

```
\relative c'' {
  c2*2/3 ( s2*1/3\turn d4) r
  <<
    { c4.( d8) }
    { s4 s\turn }
  >>
  \transpose c d \relative c'' <<
    { c4.( d8) }
    {
      s4
      \once \set suggestAccidentals = ##t
      \once \override AccidentalSuggestion #'outside-staff-priority = ##f
      \once \override AccidentalSuggestion #'avoid-slur = #'inside
      \once \override AccidentalSuggestion #'font-size = #-3
      \once \override AccidentalSuggestion #'script-priority = #-1
      \single \hideNotes
      b8-\turn \noBeam
      s8
    }
  >>
}
```



See also

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

Learning Manual: Section “Placement of objects” in *Learning Manual*.

Notation Reference: [Text scripts], page 216, Section 5.4.2 [Direction and placement], page 577, Section A.13 [List of articulations], page 699, [Trills], page 135.

Installed Files: ‘`scm/script.scm`’.

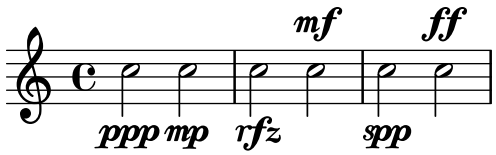
Snippets: Section “Expressive marks” in *Snippets*.

Internals Reference: Section “Script” in *Internals Reference*, Section “TextScript” in *Internals Reference*.

Dynamics

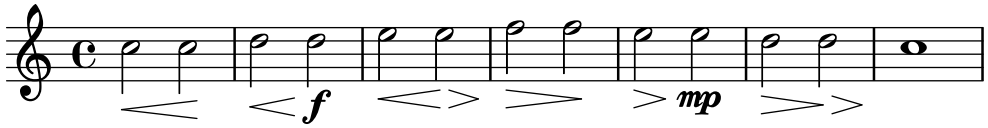
Absolute dynamic marks are specified using a command after a note, such as `c4\ff`. The available dynamic marks are `\ppppp`, `\pppp`, `\ppp`, `\pp`, `\p`, `\mp`, `\mf`, `\f`, `\ff`, `\fff`, `\ffff`, `\fffff`, `\fp`, `\sf`, `\sff`, `\sp`, `\spp`, `\sfz`, and `\rfz`. Dynamic marks may be manually placed above or below the staff; see Section 5.4.2 [Direction and placement], page 577.

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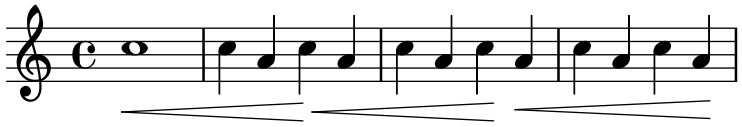


A *crescendo* mark is started with `\<` and terminated with `\!`, an absolute dynamic, or an additional crescendo or decrescendo mark. A *decrescendo* mark is started with `\>` and is also terminated with `\!`, an absolute dynamic, or another crescendo or decrescendo mark. `\cr` and `\decr` may be used 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\!
```
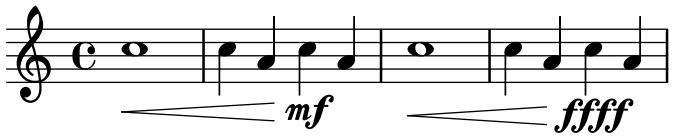


A hairpin that is terminated with `\!` will end at the right edge of the note that has the `\!` assigned to it. In the case where it is terminated with the start of another *crescendo* or *decrescendo* mark, it will end at the centre of the note that has the next `\<` or `\>` assigned to it. The next hairpin will then start at the right edge of the same note instead of the usual left edge had it been terminated with `\!` before.

```
c1\< | c4 a c\< a | c4 a c\! a\< | c4 a c a\!
```



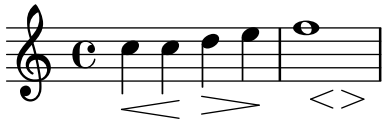
Hairpins that are terminated with absolute dynamic marks instead of `\!` will also be engraved in a similar way. However, the length of the absolute dynamic itself can alter where the preceding hairpin ends.

```
c1\< | c4 a c\mf a | c1\< | c4 a c\ffff a
```
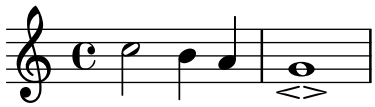


Spacer rests are needed to engrave multiple marks on one note. This is particularly useful when adding a *crescendo* and *decrescendo* to the same note:

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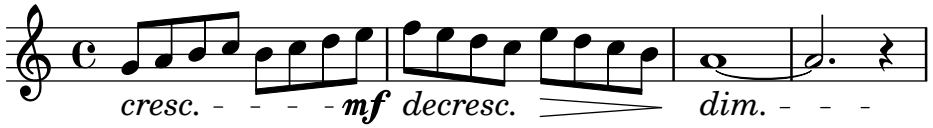


The `\espressivo` command can be used to indicate a crescendo and decrescendo on the same note. However, be warned that this is implemented as an articulation, not a dynamic.

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



Textual crescendo marks begin with `\cresc`. Textual decrescendos begin with `\decresc` or `\dim`. Extender lines are engraved as required.
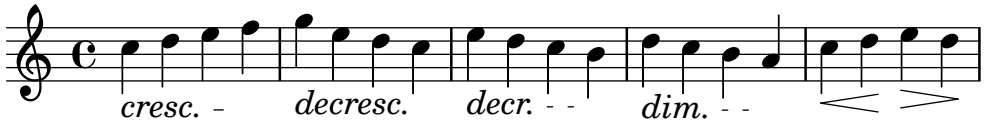
```
g8\cresc a b c b c d e\mf |
f8\decresc e d c e\> d c b |
a1\dim ~ |
a2. r4\! |
```



Textual marks for dynamic changes can also replace hairpins:

```
\crescTextCresc
c4\< d e f\! |
\dimTextDecresc
g4\> e d c\! |
\dimTextDecr
e4\> d c b\! |
\dimTextDim
d4\> c b a\! |
\crescHairpin
```

```
\dimHairpin
c4\< d\! e\> d\! |
```
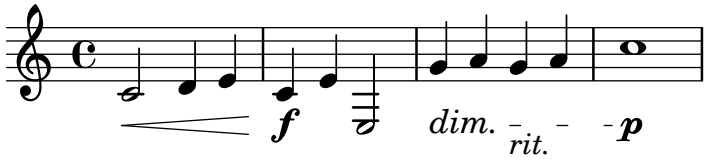


To create new absolute dynamic marks or text that should be aligned with dynamics, see [New dynamic marks], page 119.

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

A `Dynamics` context is available to engrave dynamics on their own horizontal line. Use spacer rests to indicate timing. (Notes in a `Dynamics` context will also take up musical time, but will not be engraved.) The `Dynamics` context can usefully contain some other items such as text scripts, text spanners, and piano pedal marks.

```
<<
  \new Staff \relative c' {
    c2 d4 e |
    c4 e e,2 |
    g'4 a g a |
    c1 |
  }
  \new Dynamics {
    s1\< |
    s1\f |
    s2\dim s2-"rit." |
    s1\p |
  }
>>
```



Predefined commands

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

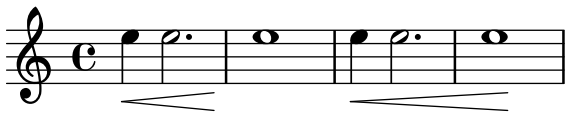
Selected Snippets

Setting hairpin behavior at bar lines

If the note which ends a hairpin falls on a downbeat, the hairpin stops at the bar line immediately preceding. This behavior can be controlled by overriding the `'to-barline` property.

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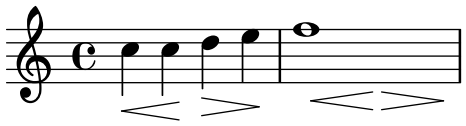
```
}
```



Setting the minimum length of hairpins

If hairpins are too short, they can be lengthened by modifying the `minimum-length` property of the `Hairpin` object.

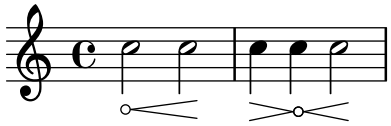
```
\relative c'' {
  c4\< c\! d\> e\!
  \override Hairpin.minimum-length = #5
  << f1 { s4 s\< s\> s\! } >>
}
```



Printing hairpins using al niente notation

Hairpin dynamics may be printed with a circled tip ("al niente" notation) by setting the `circled-tip` property of the `Hairpin` object to `#t`.

```
\relative c'' {
  \override Hairpin.circled-tip = ##t
  c2\< c\!
  c4\> c\< c2\!
}
```
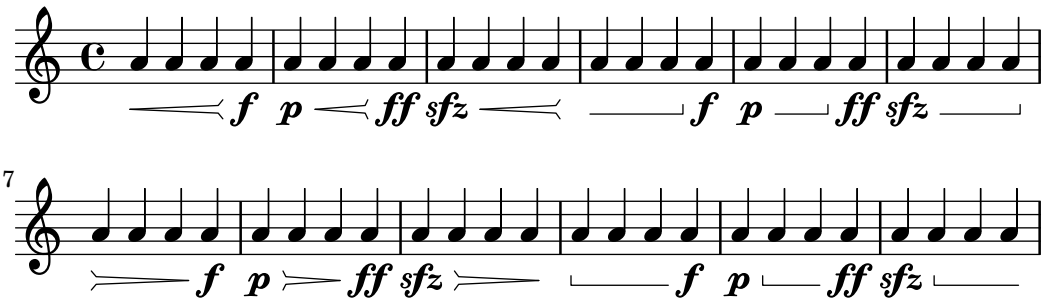


Printing hairpins in various styles

Hairpin dynamics may be created in a variety of styles

```
\relative c'' {
  \override Hairpin.stencil = #flared-hairpin
  a4\< a a a\f
  a4\p\< a a a\ff
  a4\sfz\< a a a\!
  \override Hairpin.stencil = #constante-hairpin
  a4\< a a a\f
  a4\p\< a a a\ff
  a4\sfz\< a a a\!
  \override Hairpin.stencil = #flared-hairpin
  a4\> a a a\f
  a4\p\> a a a\ff
  a4\sfz\> a a a\!
  \override Hairpin.stencil = #constante-hairpin
  a4\> a a a\f
  a4\p\> a a a\ff
```

```
  a4\sfz\> a a a\!
}
```



Vertically aligned dynamics and textscripts

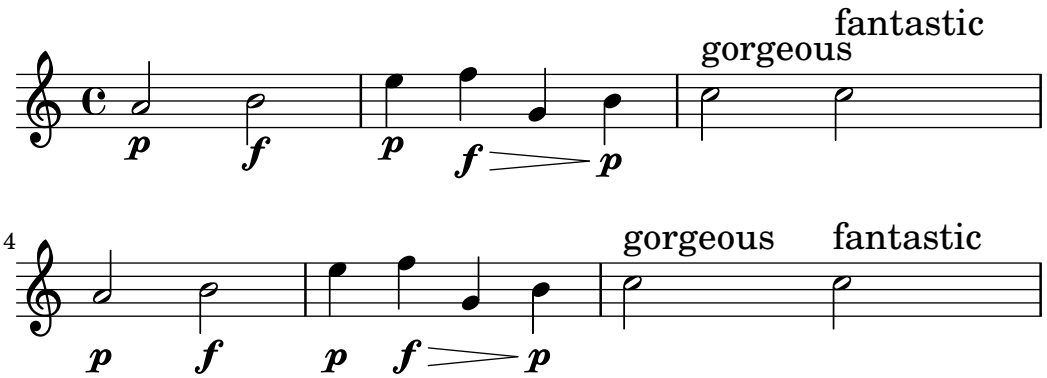
All `DynamicLineSpanner` objects (hairpins and dynamic texts) are placed with their reference line at least `'staff-padding` from the staff, unless other notation forces them to be farther. Setting `'staff-padding` to a sufficiently large value aligns the dynamics.

The same idea, together with `\textLengthOn`, is used to align the text scripts along their baseline.

```
\markup \vspace #1 %avoid LSR-bug

music = \relative c' {
  a'2\p b\f
  e4\p f\f\> g, b\p
  c2^\markup { \huge gorgeous } c^\markup { \huge fantastic }
}

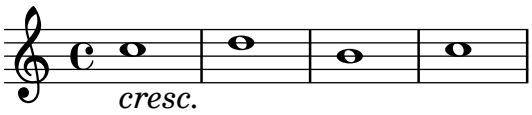
{
  \music
  \break
  \override DynamicLineSpanner.staff-padding = #3
  \textLengthOn
  \override TextScript.staff-padding = #1
  \music
}
```



Hiding the extender line for text dynamics

Text style dynamic changes (such as cresc. and dim.) are printed with a dashed line showing their extent. This line can be suppressed in the following way:

```
\relative c'' {
  \override DynamicTextSpanner.style = #'none
  \crescTextCresc
  c1\< | d | b | c\!
}
```
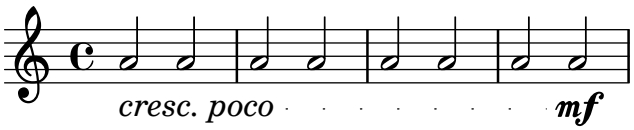


Changing text and spanner styles for text dynamics

The text used for crescendos and decrescendos can be changed by modifying the context properties `crescendoText` and `decrescendoText`.

The style of the spanner line can be changed by modifying the `'style` property of `DynamicTextSpanner`. The default value is `'dashed-line`, and other possible values include `'line`, `'dotted-line` and `'none`.

```
\relative c'' {
  \set crescendoText = \markup { \italic { cresc. poco } }
  \set crescendoSpanner = #'text
  \override DynamicTextSpanner.style = #'dotted-line
  a2\< a
  a2 a
  a2 a
  a2 a\mf
}
```



See also

Music Glossary: Section “al niente” in *Music Glossary*, Section “crescendo” in *Music Glossary*, Section “decrescendo” in *Music Glossary*, Section “hairpin” in *Music Glossary*.

Learning Manual: Section “Articulation and dynamics” in *Learning Manual*.

Notation Reference: Section 5.4.2 [Direction and placement], page 577, [New dynamic marks], page 119, Section 3.5.3 [What goes into the MIDI output?], page 486, Section 3.5.5 [Controlling MIDI dynamics], page 487.

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

Internals Reference: Section “DynamicText” in *Internals Reference*, Section “Hairpin” in *Internals Reference*, Section “DynamicLineSpanner” in *Internals Reference*, Section “Dynamics” in *Internals Reference*.
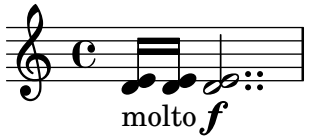
New dynamic marks

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

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

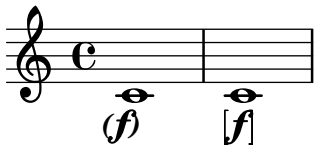
\relative c' {
  <d e>16_\moltoF <d e>
```

```
  <d e>2..
}
```
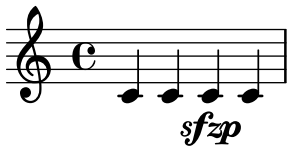


In markup mode, editorial dynamics (within parentheses or square brackets) can be created. The syntax for markup mode is described in Section 1.8.2 [Formatting text], page 223.

```
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.

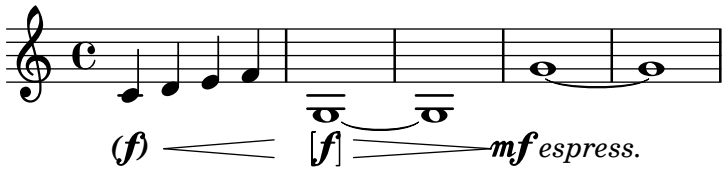
```
sfzp = #(make-dynamic-script "sfzp")
\relative c' {
  c4 c c\sfzp c
}
```



In general, `make-dynamic-script` takes any markup object as its argument. The dynamic font only contains the characters `f`,`m`,`p`,`r`,`s` and `z`, so if a dynamic mark that includes plain text or punctuation symbols is desired, markup commands that reverts font family and font encoding to normal text should be used, for example `\normal-text`. The interest of using `make-dynamic-script` instead of an ordinary markup is ensuring the vertical alignment of markup objects and hairpins that are attached to the same note head.

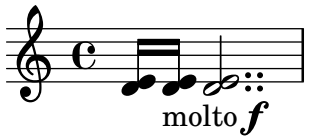
```
roundF = \markup { \center-align \concat {
           \normal-text { \bold { \italic ( } }
           \dynamic f
           \normal-text { \bold { \italic ) } } } }
boxF = \markup { \bracket { \dynamic f } }
mfEspress = \markup { \center-align \line {
              \hspace #3.7 mf \normal-text \italic espress. } }
roundFdynamic = #(make-dynamic-script roundF)
boxFdynamic = #(make-dynamic-script boxF)
mfEspressDynamic = #(make-dynamic-script mfEspress)
```

```
\relative c' {
  c4_\roundFdynamic\< d e f
  g,1~_\boxFdynamic\>
  g1
  g'1~\mfEspressDynamic
  g1
}
```
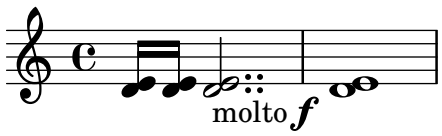


The Scheme form of markup mode may be used instead. Its syntax is explained in Section "Markup construction in Scheme" in *Extending*.

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



To left-align the dynamic text rather than centering it on a note use a `\tweak`:

```
moltoF = \tweak DynamicText.self-alignment-X #LEFT
         #(make-dynamic-script
            (markup #:normal-text "molto"
                    #:dynamic "f"))
\relative c' {
  <d e>16 <d e>
  <d e>2..\moltoF <d e>1
}
```



Font settings in markup mode are described in [Selecting font and font size], page 224.

See also

Notation Reference: Section 1.8.2 [Formatting text], page 223, [Selecting font and font size], page 224, Section 3.5.3 [What goes into the MIDI output?], page 486, Section 3.5.5 [Controlling MIDI dynamics], page 487.

Extending LilyPond: Section "Markup construction in Scheme" in *Extending*.

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

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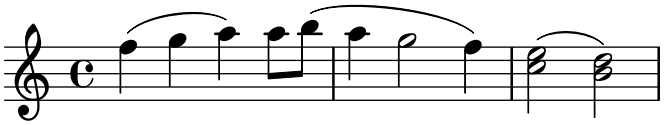
This section explains how to create various expressive marks that are curved: normal slurs, phrasing slurs, breath marks, falls, and doits.

Slurs

Slurs are entered using parentheses:

> **Note:** In polyphonic music, a slur must be terminated in the same voice it began.

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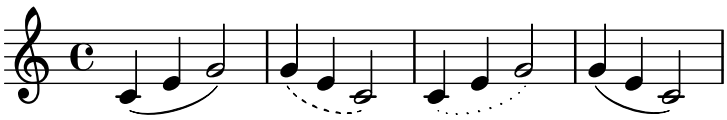


Slurs may be manually placed above or below the staff; see Section 5.4.2 [Direction and placement], page 577.

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 124.
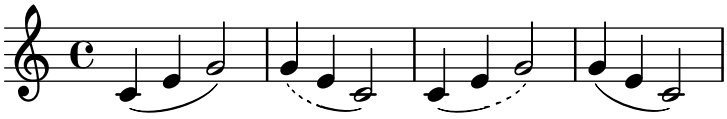
Slurs can be solid, dotted, or dashed. Solid is the default slur style:

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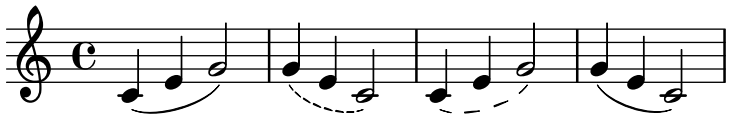


Slurs can also be made half-dashed (the first half dashed, the second half solid) or half-solid (the first half solid, the second half dashed):

```
c4( e g2)
\slurHalfDashed
g4( e c2)
\slurHalfSolid
c4( e g2)
\slurSolid
g4( e c2)
```



Custom dash patterns for slurs can be defined:

```
c4( e g2)
\slurDashPattern #0.7 #0.75
g4( e c2)
\slurDashPattern #0.5 #2.0
c4( e g2)
\slurSolid
g4( e c2)
```



Predefined commands

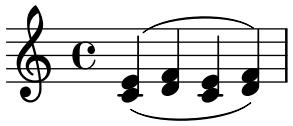
`\slurUp`, `\slurDown`, `\slurNeutral`, `\slurDashed`, `\slurDotted`, `\slurHalfDashed`, `\slurHalfSolid`, `\slurDashPattern`, `\slurSolid`.

Selected Snippets

Using double slurs for legato chords

Some composers write two slurs when they want legato chords. This can be achieved by setting `doubleSlurs`.
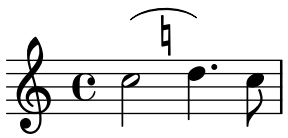
```
\relative c' {
  \set doubleSlurs = ##t
  <c e>4( <d f> <c e> <d f>)
}
```



Positioning text markups inside slurs

Text markups need to have the `outside-staff-priority` property set to false in order to be printed inside slurs.

```
\relative c'' {
  \override TextScript.avoid-slur = #'inside
  \override TextScript.outside-staff-priority = ##f
  c2(^\markup { \halign #-10 \natural } d4.) c8
}
```
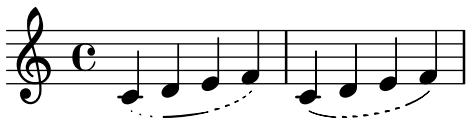


Making slurs with complex dash structure

Slurs can be made with complex dash patterns by defining the `dash-definition` property. `dash-definition` is a list of `dash-elements`. A `dash-element` is a list of parameters defining the dash behavior for a segment of the slur.

The slur is defined in terms of the bezier parameter t which ranges from 0 at the left end of the slur to 1 at the right end of the slur. `dash-element` is a list `(start-t stop-t`

`dash-fraction` `dash-period`). The region of the slur from `start-t` to `stop-t` will have a fraction `dash-fraction` of each `dash-period` black. `dash-period` is defined in terms of staff spaces. `dash-fraction` is set to 1 for a solid slur.

```
\relative c' {
  \once \override
    Slur.dash-definition = #'((0 0.3 0.1 0.75)
                              (0.3 0.6 1 1)
                              (0.65 1.0 0.4 0.75))
  c4( d e f)
  \once \override
    Slur.dash-definition = #'((0 0.25 1 1)
                              (0.3 0.7 0.4 0.75)
                              (0.75 1.0 1 1))
  c4( d e f)
}
```



See also

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

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

Notation Reference: Section 5.4.2 [Direction and placement], page 577, [Phrasing slurs], page 124.
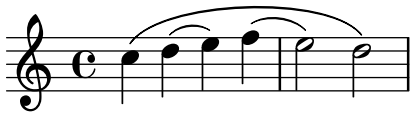
Snippets: Section "Expressive marks" in *Snippets*.

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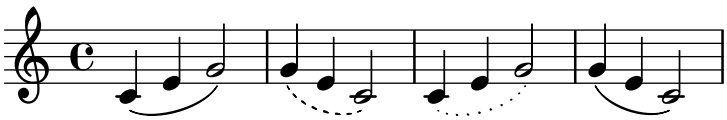


Typographically, a phrasing slur behaves almost exactly like a normal slur. However, they are treated as different objects; a `\slurUp` will have no effect on a phrasing slur. Phrasing may be manually placed above or below the staff; see Section 5.4.2 [Direction and placement], page 577.

Simultaneous or overlapping phrasing slurs are not permitted.

Phrasing slurs can be solid, dotted, or dashed. Solid is the default style for phrasing slurs:
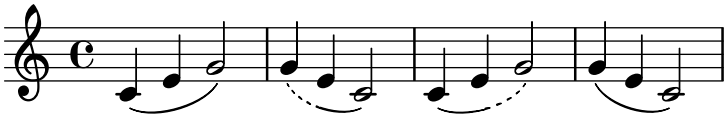
```
c4\( e g2\)
\phrasingSlurDashed
g4\( e c2\)
\phrasingSlurDotted
c4\( e g2\)
```

```
\phrasingSlurSolid
g4\( e c2\)
```
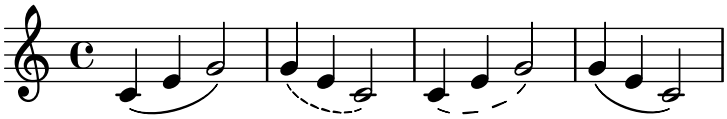


Phrasing slurs can also be made half-dashed (the first half dashed, the second half solid) or half-solid (the first half solid, the second half dashed):

```
c4\( e g2\)
\phrasingSlurHalfDashed
g4\( e c2\)
\phrasingSlurHalfSolid
c4\( e g2\)
\phrasingSlurSolid
g4\( e c2\)
```



Custom dash patterns for phrasing slurs can be defined:

```
c4\( e g2\)
\phrasingSlurDashPattern #0.7 #0.75
g4\( e c2\)
\phrasingSlurDashPattern #0.5 #2.0
c4\( e g2\)
\phrasingSlurSolid
g4\( e c2\)
```



Dash pattern definitions for phrasing slurs have the same structure as dash pattern definitions for slurs. For more information about complex dash patterns, see the snippets under [Slurs], page 122.

Predefined commands

`\phrasingSlurUp`, `\phrasingSlurDown`, `\phrasingSlurNeutral`, `\phrasingSlurDashed`, `\phrasingSlurDotted`, `\phrasingSlurHalfDashed`, `\phrasingSlurHalfSolid`, `\phrasingSlurDashPattern`, `\phrasingSlurSolid`.

See also

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

Notation Reference: Section 5.4.2 [Direction and placement], page 577, [Slurs], page 122.
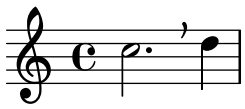
Snippets: Section “Expressive marks” in *Snippets*.

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

Breath marks
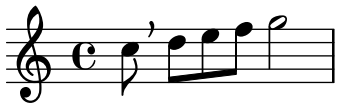
Breath marks are entered using `\breathe`:

```
c2. \breathe d4
```



A breath mark will end an automatic beam; to override this behavior, see [Manual beams], page 86.

```
c8 \breathe d e f g2
```
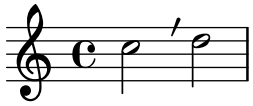


Musical indicators for breath marks in ancient notation, divisiones, are supported. For details, see [Divisiones], page 418.

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
}
```
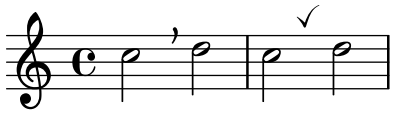


Using a tick as the breath mark symbol

Vocal and wind music frequently uses a tick mark as a breathing sign. This indicates a breath that subtracts a little time from the previous note rather than causing a short pause, which is indicated by the comma breath mark. The mark can be moved up a little to take it away from the stave.

```
\relative c'' {
  c2
  \breathe
  d2
  \override BreathingSign.Y-offset = #2.6
  \override BreathingSign.text =
    \markup { \musicglyph #"scripts.tickmark" }
  c2
  \breathe
  d2
```
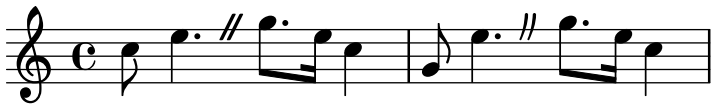
```
}
```



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 418.

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

Internals Reference: Section “BreathingEvent” in *Internals Reference*, Section “BreathingSign” in *Internals Reference*, Section “Breathing_sign_engraver” in *Internals Reference*.

Falls and doits

Falls and *doits* can be added to notes using the `\bendAfter` command. The direction of the fall or doit is indicated with a plus or minus (up or down). The number indicates the pitch interval that the fall or doit will extend *beyond* the main note.

```
c2\bendAfter #+4
c2\bendAfter #-4
c2\bendAfter #+6.5
c2\bendAfter #-6.5
c2\bendAfter #+8
c2\bendAfter #-8
```



Selected Snippets

Adjusting the shape of falls and doits

The `shortest-duration-space` property may be tweaked to adjust the shape of falls and doits.

```
\relative c'' {
  \override Score.SpacingSpanner.shortest-duration-space = #4.0
  c2-\bendAfter #5
  c2-\bendAfter #-4.75
  c2-\bendAfter #8.5
  c2-\bendAfter #-6
}
```



See also

Music Glossary: Section “fall” in *Music Glossary*, Section “doit” in *Music Glossary*.

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

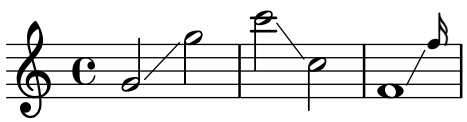
1.3.3 Expressive marks as lines

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

Glissando

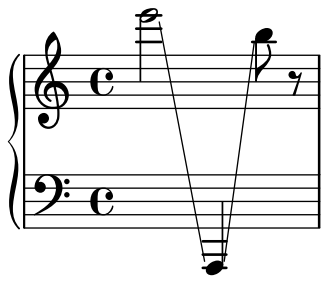
A *glissando* is created by appending `\glissando` to a note:

```
g2\glissando g'
c2\glissando c,
\afterGrace f,1\glissando f'16
```



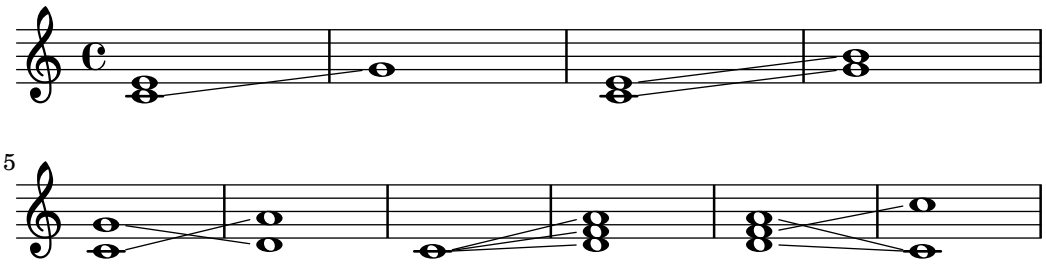
A glissando can connect notes across staves:

```
\new PianoStaff <<
  \new Staff = "right" {
    e'''2\glissando
    \change Staff = "left"
    a,,4\glissando
    \change Staff = "right"
    b''8 r |
  }
  \new Staff = "left" {
    \clef bass
    s1
  }
>>
```



A glissando can connect notes in chords. If anything other than a direct one-to-one pairing of the notes in the two chords is required the connections between the notes are defined by setting `\glissandoMap`, where the notes of a chord are assumed to be numbered from zero in the order in which they appear in the input '`.ly`' file.

```
<c, e>1\glissando g' |
<c, e>1\glissando |
<g' b> |
\break
\set glissandoMap = #'((0 . 1) (1 . 0))
<c, g'>1\glissando |
<d a'> |
\set glissandoMap = #'((0 . 0) (0 . 1) (0 . 2))
c1\glissando |
<d f a> |
\set glissandoMap = #'((2 . 0) (1 . 0) (0 . 1))
<f d a'>1\glissando |
<c c'> |
```
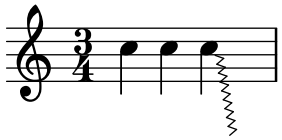


Different styles of glissandi can be created. For details, see Section 5.4.7 [Line styles], page 590.

Selected Snippets

Contemporary glissando

A contemporary glissando without a final note can be typeset using a hidden note and cadenza timing.

```
\relative c'' {
  \time 3/4
  \override Glissando.style = #'zigzag
  c4 c
  \cadenzaOn
  c4\glissando
  \hideNotes
  c,,4
  \unHideNotes
  \cadenzaOff
  \bar "|"
}
```



Adding timing marks to long glissandi

Skipped beats in very long glissandi are sometimes indicated by timing marks, often consisting of stems without noteheads. Such stems can also be used to carry intermediate expression markings.

If the stems do not align well with the glissando, they may need to be repositioned slightly.
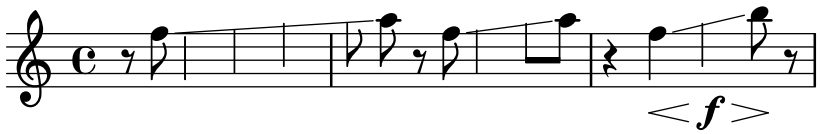
```
glissandoSkipOn = {
  \override NoteColumn.glissando-skip = ##t
  \hide NoteHead
  \override NoteHead.no-ledgers = ##t
}

glissandoSkipOff = {
  \revert NoteColumn.glissando-skip
  \undo \hide NoteHead
  \revert NoteHead.no-ledgers
}

\relative c'' {
  r8 f8\glissando
  \glissandoSkipOn
  f4 g a a8\noBeam
  \glissandoSkipOff
  a8

  r8 f8\glissando
  \glissandoSkipOn
  g4 a8
  \glissandoSkipOff
  a8 |

  r4 f\glissando \<
  \glissandoSkipOn
  a4\f \>
  \glissandoSkipOff
  b8\! r |
}
```



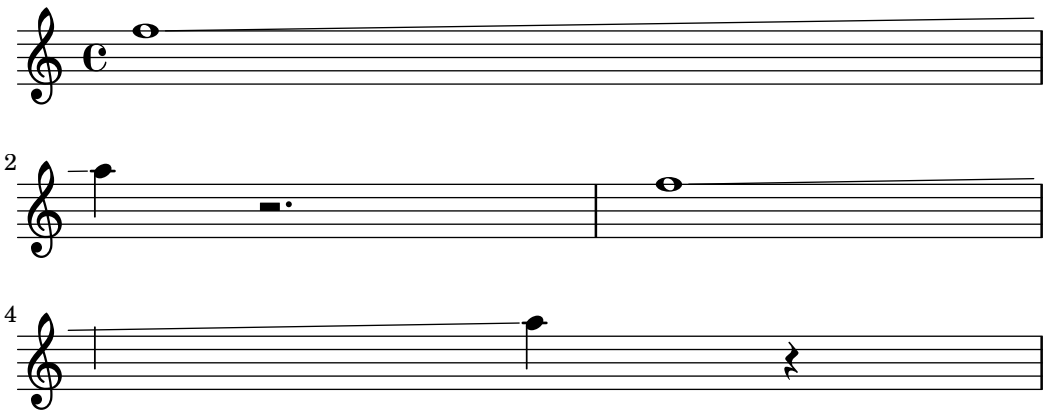
Making glissandi breakable

Setting the `breakable` property to `#t` in combination with `after-line-breaking` allows a glissando to break if it occurs at a line break:

```
glissandoSkipOn = {
  \override NoteColumn.glissando-skip = ##t
  \hide NoteHead
  \override NoteHead.no-ledgers = ##t
```

```
}

\relative c'' {
  \override Glissando.breakable = ##t
  \override Glissando.after-line-breaking = ##t
  f1\glissando |
  \break
  a4 r2. |
  f1\glissando
  \once \glissandoSkipOn
  \break
  a2 a4 r4 |
}
```



Extending glissandi across repeats

A glissando which extends into several `\alternative` blocks can be simulated by adding a hidden grace note with a glissando at the start of each `\alternative` block. The grace note should be at the same pitch as the note which starts the initial glissando. This is implemented here with a music function which takes the pitch of the grace note as its argument.

Note that in polyphonic music the grace note must be matched with corresponding grace notes in all other voices.
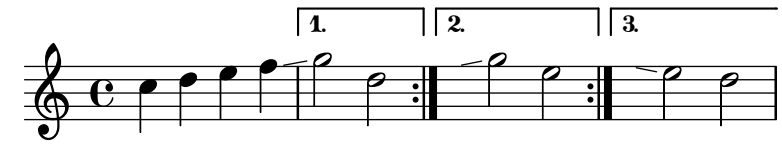
```
repeatGliss = #(define-music-function (parser location grace)
  (ly:pitch?)
  #{
    % the next two lines ensure the glissando is long enough
    % to be visible
    \once \override Glissando.springs-and-rods
      = #ly:spanner::set-spacing-rods
    \once \override Glissando.minimum-length = #3.5
    \once \hideNotes
    \grace $grace \glissando
  #})

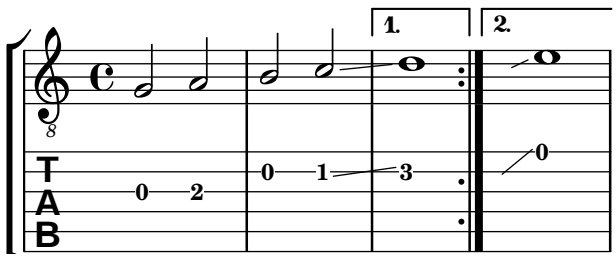
\score {
  \relative c'' {
    \repeat volta 3 { c4 d e f\glissando }
    \alternative {
      { g2 d }
      { \repeatGliss f g2 e }
```

```
      { \repeatGliss f e2 d }
    }
  }
}

music =  \relative c' {
  \voiceOne
  \repeat volta 2 {
    g a b c\glissando
  }
  \alternative {
    { d1 }
    { \repeatGliss c e1 }
  }
}

\score {
  \new StaffGroup <<
    \new Staff <<
      \context Voice { \clef "G_8" \music }
    >>
    \new TabStaff  <<
      \context TabVoice { \clef "moderntab" \music }
    >>
  >>
}
```





See also

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

Notation Reference: Section 5.4.7 [Line styles], page 590.

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

Internals Reference: Section “Glissando” in *Internals Reference*.
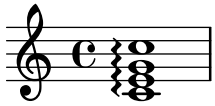
Known issues and warnings

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
```



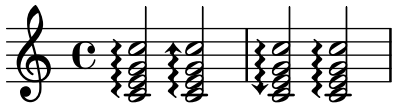
Different types of arpeggios may be written. `\arpeggioNormal` reverts to a normal arpeggio:

```
<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

\arpeggioParenthesisDashed
<c e g c>2\arpeggio

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



The dash properties of the parenthesis arpeggio are controlled with the `'dash-details` property, which is described at [Slurs], page 122.

Arpeggios can be explicitly written out with ties. For more information, see [Ties], page 49.

Predefined commands

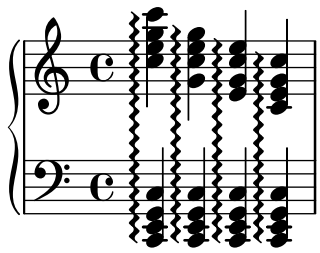
`\arpeggio`, `\arpeggioArrowUp`, `\arpeggioArrowDown`, `\arpeggioNormal`, `\arpeggioBracket`, `\arpeggioParenthesis` `\arpeggioParenthesisDashed`.

Selected Snippets

Creating cross-staff arpeggios in a piano staff

In a `PianoStaff`, it is possible to let an arpeggio cross between the staves by setting the property `PianoStaff.connectArpeggios`.

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

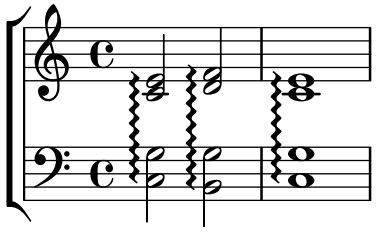


Creating cross-staff arpeggios in other contexts

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

```
\score {
  \new ChoirStaff {
    \set Score.connectArpeggios = ##t
    <<
      \new Voice \relative c' {
        <c e>2\arpeggio
        <d f>2\arpeggio
        <c e>1\arpeggio
      }
      \new Voice \relative c {
        \clef bass
        <c g'>2\arpeggio
        <b g'>2\arpeggio
        <c g'>1\arpeggio
      }
    >>
  }
  \layout {
    \context {
      \Score
```
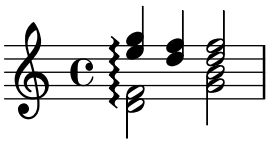
```
      \consists "Span_arpeggio_engraver"
    }
  }
}
```



Creating arpeggios across notes in different voices

An arpeggio can be drawn across notes in different voices on the same staff if the `Span_arpeggio_engraver` is added to the `Staff` context:

```
\new Staff \with {
  \consists "Span_arpeggio_engraver"
}
\relative c' {
  \set Staff.connectArpeggios = ##t
  <<
    { <e' g>4\arpeggio <d f> <d f>2 }
    \\
    { <d, f>2\arpeggio <g b>2 }
  >>
}
```



See also

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

Notation Reference: [Slurs], page 122, [Ties], page 49.

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

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

Known issues and warnings

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

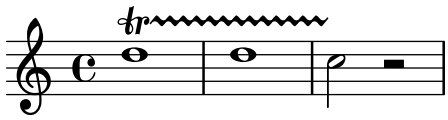
The simple way of setting parenthesis-style arpeggio brackets does not work for cross-staff arpeggios; see [Cross-staff stems], page 307.

Trills

Short trills without an extender line are printed with `\trill`; see [Articulations and ornamentations], page 111.

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

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



A trill spanner crossing a line break will restart exactly above the first note on the new line.

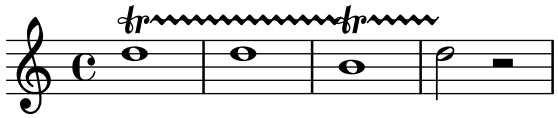
```
d1\startTrillSpan
\break
d1
c2\stopTrillSpan
r2
```
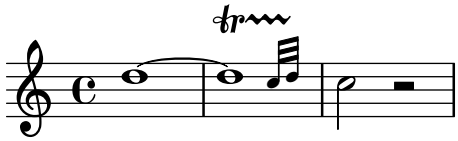




Consecutive trill spans will work without explicit `\stopTrillSpan` commands, since successive trill spanners will automatically become the right bound of the previous trill.

```
d1\startTrillSpan
d1
b1\startTrillSpan
d2\stopTrillSpan
r2
```
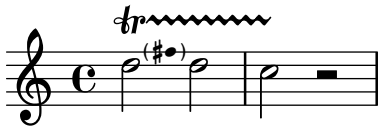


Trills can also be combined with grace notes. The syntax of this construct and the method to precisely position the grace notes are described in [Grace notes], page 104.

```
d1~\afterGrace
d1\startTrillSpan { c32[ d]\stopTrillSpan }
c2 r2
```
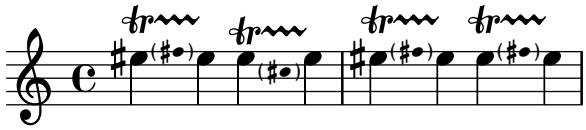


Trills that require an auxiliary note with an explicit pitch can be typeset with the `\pitchedTrill` command. The first argument is the main note, and the second is the *trilled* note, printed as a stemless note head in parentheses.

```
\pitchedTrill
d2\startTrillSpan fis
d2
c2\stopTrillSpan
r2
```



Subsequent accidentals of the same note in the same measure will need to be added manually. Only the accidental of the first pitched trill in a measure is printed.

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



Predefined commands

`\startTrillSpan`, `\stopTrillSpan`.

See also

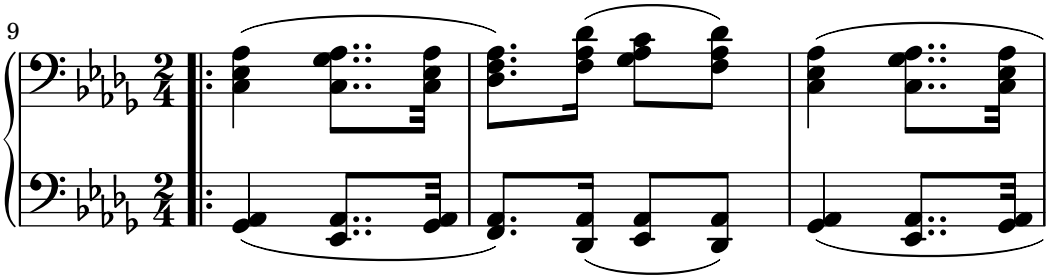
Music Glossary: Section “trill” in *Music Glossary*.
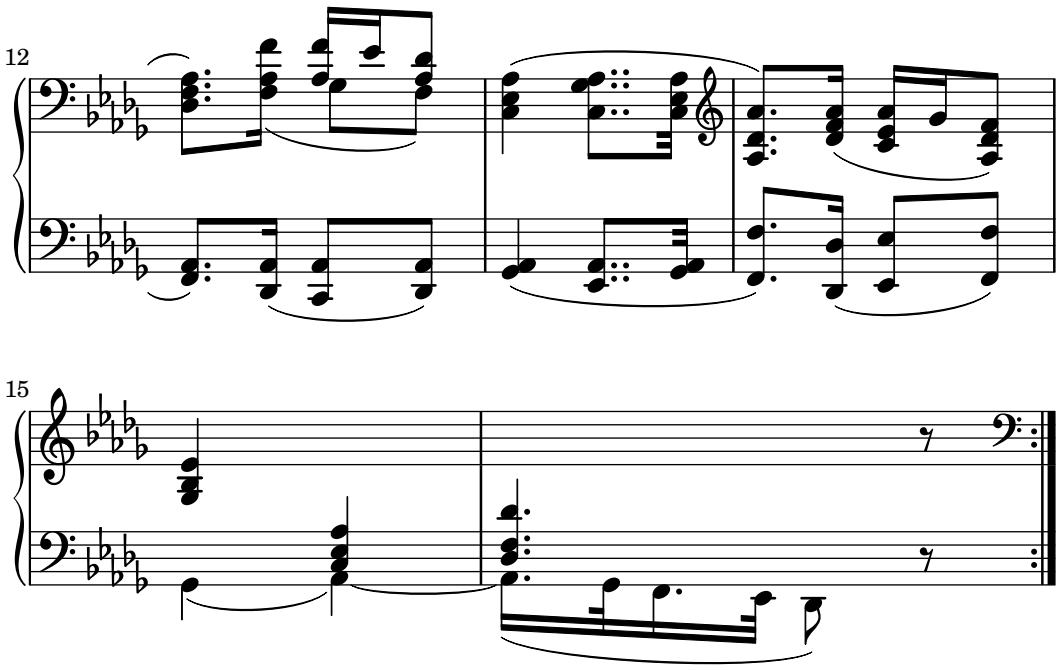
Notation Reference: [Articulations and ornamentations], page 111, [Grace notes], page 104.

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
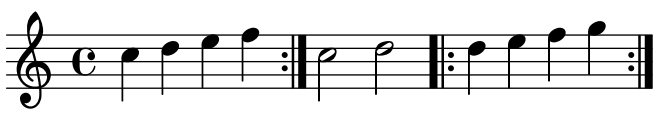
The syntax for a normal repeat is

```
\repeat volta repeatcount musicexpr
```

where *`musicexpr`* is a music expression.

A single repeat without an alternate ending:

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



Alternative endings can be produced using `\alternative`. Each group of alternatives must be themselves, enclosed in a set of braces.
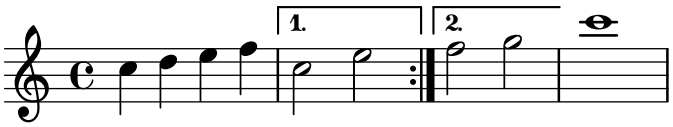
```
\repeat volta repeatcount musicexpr
\alternative {
  { musicexpr }
}
```

where *musicexpr* is a music expression.

If there are more repeats than there are alternate endings, the earliest repeats are given the first alternative.
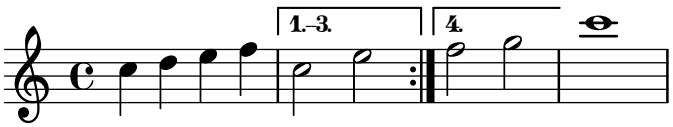
A single repeat with one alternate ending:

```
\repeat volta 2 { c4 d e f | }
\alternative {
  { c2 e | }
  { f2 g | }
}
c1
```



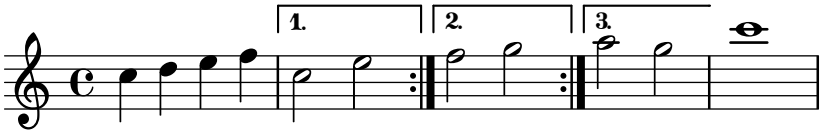
Multiple repeats with one alternate ending:

```
\repeat volta 4 { c4 d e f | }
\alternative {
  { c2 e | }
  { f2 g | }
}
c1
```



Multiple repeats with more than one alternate ending:

```
\repeat volta 3 { c4 d e f | }
\alternative {
  { c2 e | }
  { f2 g | }
  { a2 g | }
}
c1
```
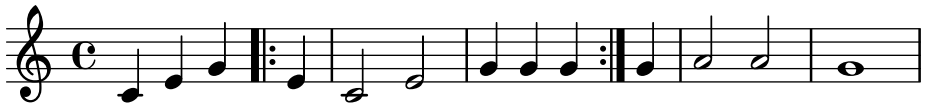


Note: If there are two or more alternatives, nothing should appear between the closing brace of one and the opening brace of the next in an `\alternative` block, otherwise you will not get the expected number of endings.

Note: If you include `\relative` inside a `\repeat` without explicitly instantiating the `Voice` context, extra (unwanted) staves will appear. See Section "An extra staff appears" in *Application Usage*.
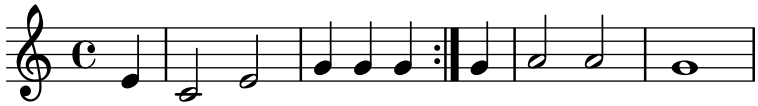
If a repeat starts in the middle of a measure and has no alternate endings, normally the end of the repeat will also fall in the middle of a measure, so that the two ends add up to one complete measure. In such cases, the repeat signs do not constitute true bar lines. Do not use `\partial` commands or bar checks where these repeat signs are printed:

```
% no \partial here
c4 e g  % no bar check here
% no \partial here
\repeat volta 4 {
  e4 |
  c2 e |
  % no \partial here
  g4 g g  % no bar check here
}
% no \partial here
g4 |
a2 a |
g1 |
```



Similarly, if a repeat begins with the initial partial measure of a score and has no alternate endings, the same conditions apply as in the above example, except that in this case the `\partial` command is required at the beginning of the score:
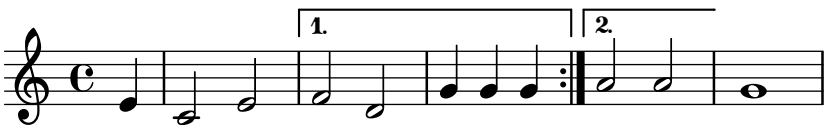
```
\partial 4  % required
\repeat volta 4 {
  e4 |
  c2 e |
  % no \partial here
  g4 g g  % no bar check here
}
% no \partial here
g4 |
a2 a |
g1 |
```



When alternate endings are added to a repeat that begins with an incomplete measure, it becomes necessary to set the `Timing.measureLength` context property manually, in the following specific places:

- at the start of any incomplete measures in the `\alternative` block, which normally occur at the end of each alternative, except (in most cases) the last.
- at the start of each alternative, except the first.

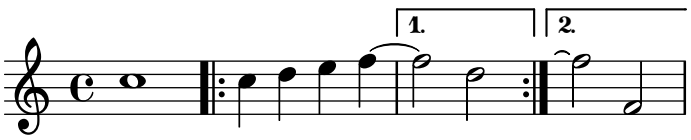
```
\partial 4
\repeat volta 2 { e4 | c2 e | }
\alternative {
  {
    f2 d |
    \set Timing.measureLength = #(ly:make-moment 3/4)
    g4 g g  % optional bar check is allowed here
  }
  {
    \set Timing.measureLength = #(ly:make-moment 4/4)
    a2 a |
  }
}
g1 |
```



The `measureLength` property is described in [Time administration], page 110.

Ties may be added to a second ending:
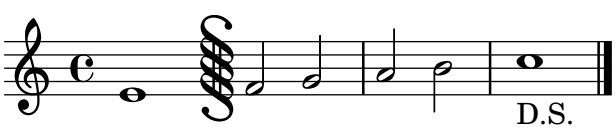
```
c1
\repeat volta 2 { c4 d e f~ }
\alternative {
  { f2 d }
  { f2\repeatTie f, }
}
```



The `\inStaffSegno` command can be used to generate a composite bar line incorporating the segno symbol with the appropriate repeat bar line when used with the `\repeat volta` command. The correct type of repeat bar line, viz. start repeat, end repeat or double repeat, is selected automatically. Note that the corresponding "D.S." mark must be added manually.

Away from a repeat:
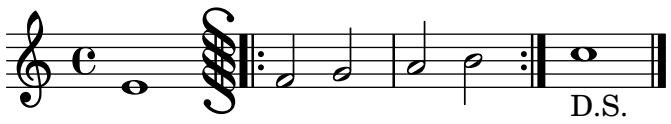
```
e1
\inStaffSegno
f2 g a b
c1_"D.S." \bar "|."
```



At the start of a repeat:
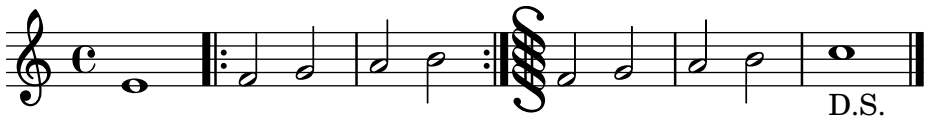
```
e1
\repeat volta 2 {
  \inStaffSegno  % start repeat
```

```
  f2 g a b
}
c1_"D.S." \bar "|."
```



At the end of a repeat:

```
e1
\repeat volta 2 {
  f2 g a b
  \inStaffSegno  % end repeat
}
f2 g a b
c1_"D.S." \bar "|."
```



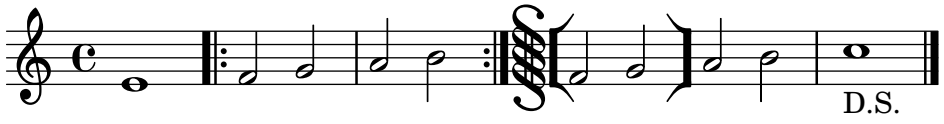
Between two repeats:

```
e1
\repeat volta 2 {
  f2 g a b
}
\inStaffSegno  % double repeat
\repeat volta 2 {
  f2 g a b
}
c1_"D.S." \bar "|."
```



Alternative bar line symbols can be obtained by setting (in the Score context) the properties `segnoType`, `startRepeatSegnoType`, `endRepeatSegnoType` or `doubleRepeatSegnoType` to the required bar line type. The alternative bar line types must be selected from the pre-defined types or types previously defined with the `\defineBarLine` command (see [Bar lines], page 90).

```
\defineBarLine ":|.S[" #'(":|." "S[" "")
\defineBarLine "]" #'("]" "" "")
e1
\repeat volta 2 {
  f2 g a b
  \once \set Score.endRepeatSegnoType = ":|.S["
  \inStaffSegno
}
f2 g \bar "]" a b
c1_"D.S." \bar "|."
```
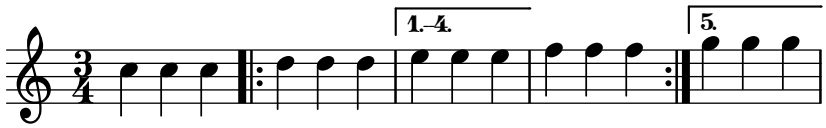


Selected Snippets

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.

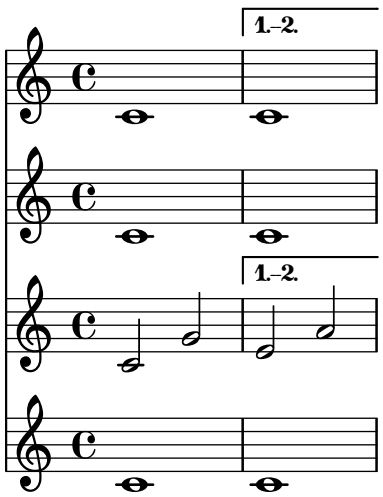
```
\relative c'' {
  \time 3/4
  c4 c c
  \set Score.voltaSpannerDuration = #(ly:make-moment 3/4)
  \repeat volta 5 { d4 d d }
  \alternative {
    {
      e4 e e
      f4 f f
    }
    { g4 g g }
  }
}
```



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.

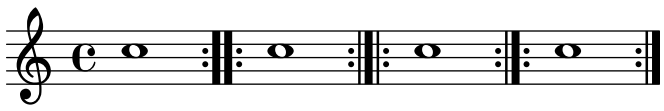
```
<<
  \new Staff { \repeat volta 2 { c'1 } \alternative { c' } }
  \new Staff { \repeat volta 2 { c'1 } \alternative { c' } }
  \new Staff \with { \consists "Volta_engraver" } { c'2 g' e' a' }
  \new Staff { \repeat volta 2 { c'1 } \alternative { c' } }
>>
```



Setting the double repeat default for volte

There are three different styles of double repeats for volte, that can be set using `doubleRepeatType`.
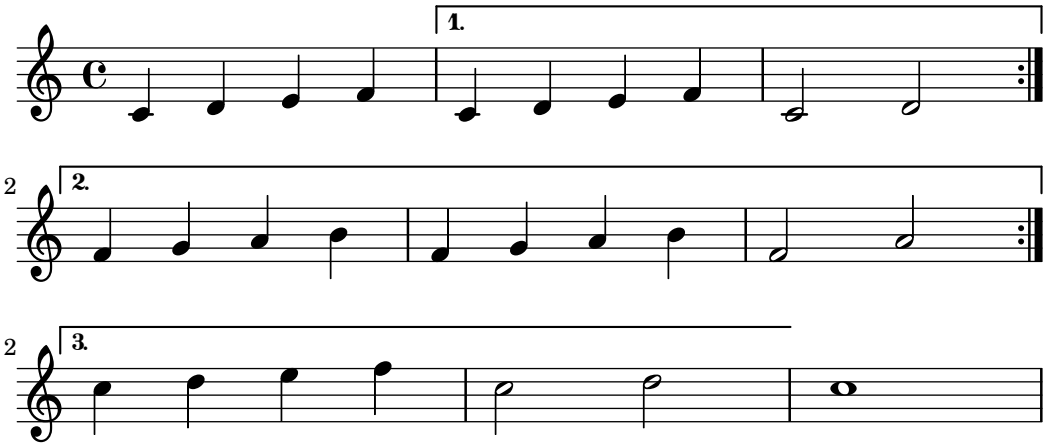
```
\relative c'' {
  \repeat volta 1 { c1 }
  \set Score.doubleRepeatType = #":..:"
  \repeat volta 1 { c1 }
  \set Score.doubleRepeatType = #":|.|:"
  \repeat volta 1 { c1 }
  \set Score.doubleRepeatType = #":|.:"
  \repeat volta 1 { c1 }
}
```
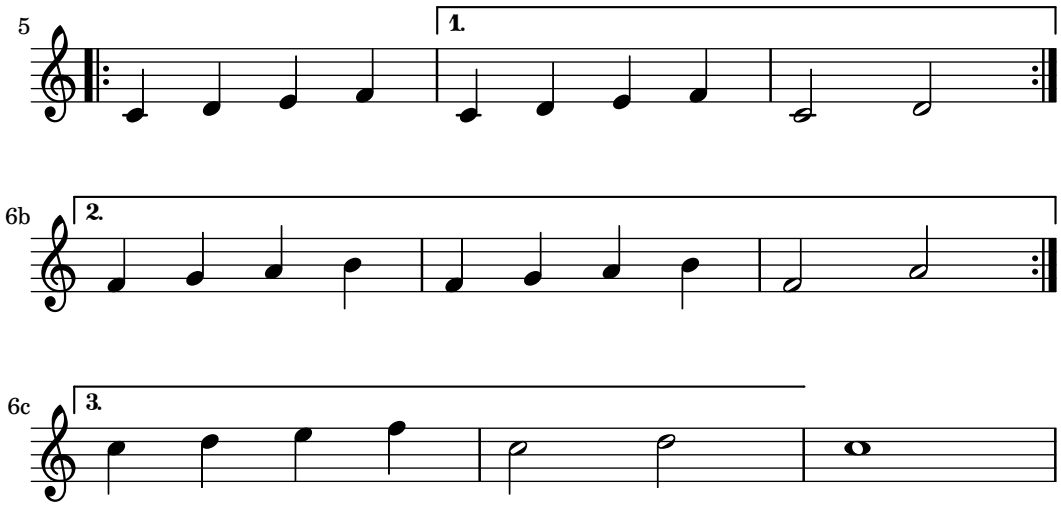


Alternative bar numbering

Two alternative methods for bar numbering can be set, especially for when using repeated music.

```
\relative c'{
  \set Score.alternativeNumberingStyle = #'numbers
  \repeat volta 3 { c4 d e f | }
    \alternative {
      { c4 d e f | c2 d \break }
      { f4 g a b | f4 g a b | f2 a | \break }
      { c4 d e f | c2 d }
    }
  c1 \break
  \set Score.alternativeNumberingStyle = #'numbers-with-letters
  \repeat volta 3 { c,4 d e f | }
    \alternative {
      { c4 d e f | c2 d \break }
      { f4 g a b | f4 g a b | f2 a | \break }
      { c4 d e f | c2 d }
    }
  c1
}
```





See also

Music Glossary: Section “repeat” in *Music Glossary*, Section “volta” in *Music Glossary*.

Notation Reference: [Bar lines], page 90, Section 5.1.4 [Modifying context plug-ins], page 553, [Modifying ties and slurs], page 597, [Time administration], page 110.

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

Slurs that span from a `\repeat` block into an `\alternative` block will only work for the first alternative ending. The visual appearance of a continuing slur in other alternative blocks may be simulated with `\repeatTie` if the slur extends into only one note in the alternative block, although this method does not work in `TabStaff`. Other methods which may be tailored to indicate continuing slurs over several notes in alternative blocks, and which also work in `TabStaff` contexts, are shown in [Modifying ties and slurs], page 597.

Also, slurs cannot wrap around from the end of one alternative back to the beginning of the repeat.

Glissandi that span from a `\repeat` block into an `\alternative` block will only work for the first alternative ending. The visual appearance of a continuing glissando in other alternative blocks may be indicated by coding a glissando starting on a hidden grace note. For an example, see “Extending glissandi across repeats” under Selected Snippets in [Glissando], page 128.

If a repeat that begins with an incomplete measure has an `\alternative` block that contains modifications to the `measureLength` property, using `\unfoldRepeats` will result in wrongly-placed bar lines and bar check warnings.

A nested repeat like

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

is ambiguous, since it is not clear to which `\repeat` the `\alternative` belongs. This ambiguity is resolved by always having the `\alternative` belong to the inner `\repeat`. For clarity, it is advisable to use braces in such situations.
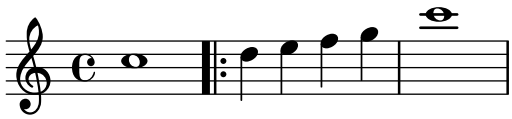
Manual repeat marks

> **Note:** These methods are only used for displaying unusual repeat constructs, and may produce unexpected behavior. In most cases, repeats should be created using the standard `\repeat` command or by printing the relevant bar lines. For more information, see [Bar lines], page 90.

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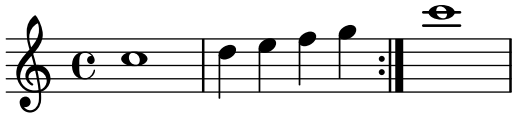
```
c1
\set Score.repeatCommands = #'(start-repeat)
d4 e f g
c1
```



As per standard engraving practice, repeat signs are not printed at the beginning of a piece.
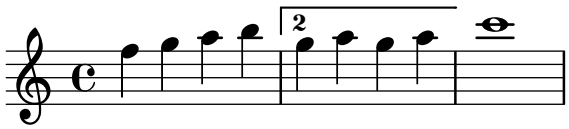
`end-repeat`
: Print a `:|.` bar line:

```
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.

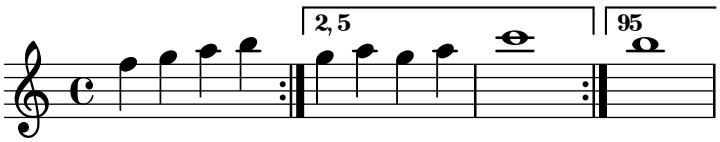
```
f4 g a b
\set Score.repeatCommands = #'((volta "2"))
g4 a g a
\set Score.repeatCommands = #'((volta #f))
c1
```



Multiple repeat commands may occur at the same point:
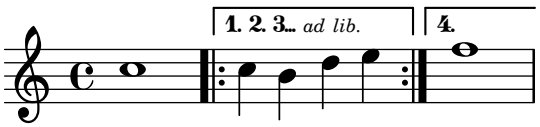
```
f4 g a b
\set Score.repeatCommands = #'((volta "2, 5") end-repeat)
g4 a g a
c1
\set Score.repeatCommands = #'((volta #f) (volta "95") end-repeat)
b1
```

```
\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 223. 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))
}
```

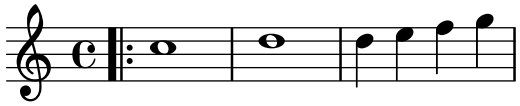


Selected Snippets

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
                      breathing-sign
                      clef
                      key-signature
                      time-signature
                      staff-bar
                      custos))
  \once \override Staff.TimeSignature.space-alist =
    #'((first-note . (fixed-space . 2.0))
       (right-edge . (extra-space . 0.5))
       ;; free up some space between time signature
       ;; and repeat bar line
       (staff-bar . (extra-space . 1)))
  \bar ".|:"
  c1
  d1
  d4 e f g
}
```



See also

Notation Reference: [Bar lines], page 90, Section 1.8.2 [Formatting text], page 223.

Snippets: Section "Repeats" in *Snippets*.

Internals Reference: Section "VoltaBracket" in *Internals Reference*, Section "RepeatedMusic" in *Internals Reference*, Section "VoltaRepeatedMusic" in *Internals Reference*.
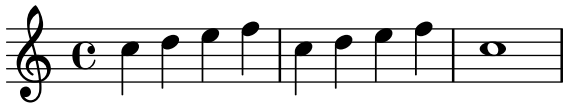
Written-out repeats

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.

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



In some cases, especially in a `\relative` context, the `\repeat unfold` function is not the same as writing out the music expression multiple times. E.g,
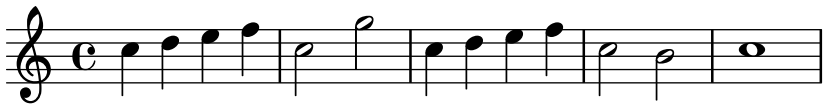
```
\repeat unfold 2 { a'4 b c }
```

is not equivalent to

```
a'4 b c | a'4 b c
```
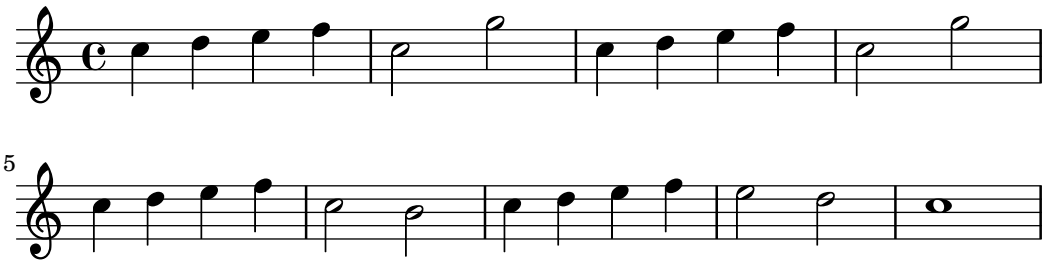
Unfold repeats can be made with alternate endings.

```
\repeat unfold 2 { c4 d e f }
\alternative {
  { c2 g' }
  { c,2 b }
}
c1
```
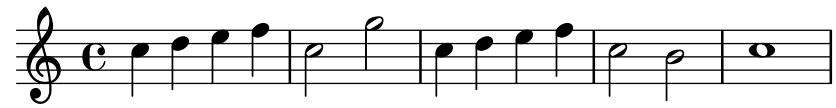


If there are more repeats than there are alternate endings, the first alternative is applied multiple times until the remaining alternatives make up the total number of repeats.

```
\repeat unfold 4 { c4 d e f }
\alternative {
  { c2 g' }
  { c,2 b }
  { e2 d }
 }
c1
```



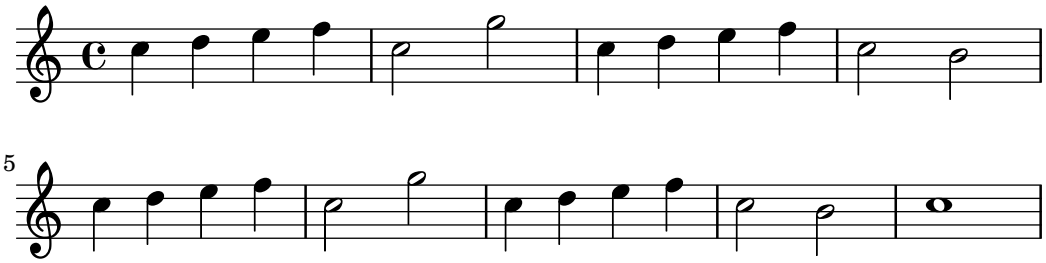
If there are more alternate endings than repeats then only the first alternatives are applied. The remaining alternatives will be ignored and not printed.

```
\repeat unfold 2 { c4 d e f }
\alternative {
  { c2 g' }
  { c,2 b }
  { e2 d }
}
c1
```



It is also possible to nest multiple `unfold` functions (with or without alternate endings).

```
\repeat unfold 2 {
  \repeat unfold 2 { c4 d e f }
  \alternative {
    { c2 g' }
    { c,2 b }
  }
}
c1
```



Chord constructs can be repeated by the chord repetition symbol `q`. See [Chord repetition], page 156.

> **Note:** If you include `\relative` inside a `\repeat` without explicitly instantiating the `Voice` context, extra (unwanted) staves will appear. See Section "An extra staff appears" in *Application Usage*.

See also

Notation Reference: [Chord repetition], page 156.

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 forms: slashes or percent signs to represent repeats of a single note, a single measure or two measures, and tremolos otherwise.

Percent repeats

Repeated short patterns are printed once, and the repeated pattern is replaced with a special sign.

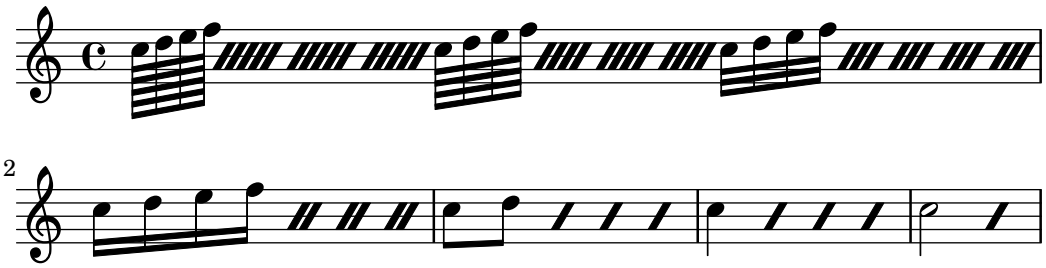
The syntax is

```
\repeat percent number musicexpr
```

where *musicexpr* is a music expression.
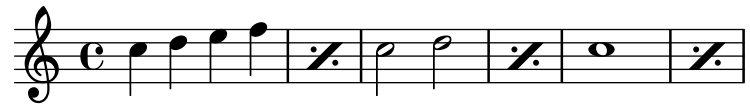
Patterns that are shorter than one measure are replaced by slashes.

```
\repeat percent 4 { c128 d e f }
\repeat percent 4 { c64 d e f }
\repeat percent 5 { c32 d e f }
\repeat percent 4 { c16 d e f }
\repeat percent 4 { c8 d }
\repeat percent 4 { c4 }
\repeat percent 2 { c2 }
```
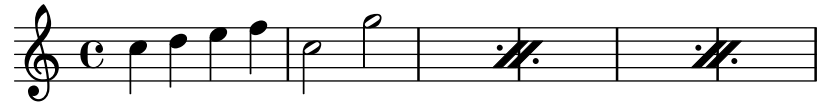


Patterns of one or two measures are replaced by percent-like symbols.

```
\repeat percent 2 { c4 d e f }
\repeat percent 2 { c2 d }
\repeat percent 2 { c1 }
```

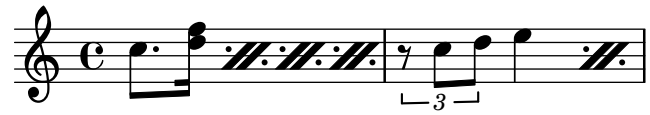


```
\repeat percent 3 { c4 d e f | c2 g' }
```



Patterns that are shorter than one measure but contain mixed durations use a double-percent symbol.

```
\repeat percent 4 { c8. <d f>16 }
\repeat percent 2 { \tuplet 3/2 { r8 c d } e4 }
```

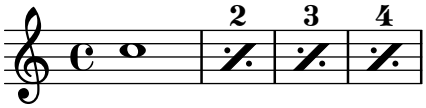


Selected Snippets

Percent repeat counter

Measure repeats of more than two repeats can get a counter when the convenient property is switched, as shown in this example:

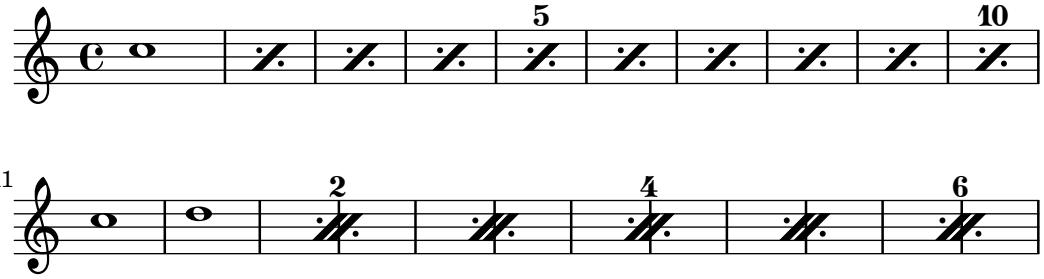
```
\relative c'' {
  \set countPercentRepeats = ##t
  \repeat percent 4 { c1 }
}
```



Percent repeat count visibility

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

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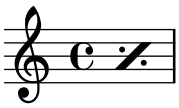


Isolated percent repeats

Isolated percents can also be printed.

```
makePercent =
#(define-music-function (parser location note) (ly:music?)
   "Make a percent repeat the same length as NOTE."
   (make-music 'PercentEvent
               'length (ly:music-length note)))

\relative c'' {
  \makePercent s1
}
```



See also

Music Glossary: Section "percent repeat" in *Music Glossary*, Section "simile" in *Music Glossary*.

Snippets: Section "Repeats" in *Snippets*.

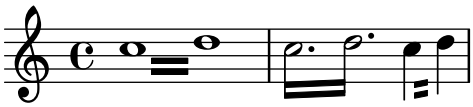
Internals Reference: Section "RepeatSlash" in *Internals Reference*, Section "RepeatSlashEvent" in *Internals Reference*, Section "DoubleRepeatSlash" in *Internals Reference*, Section "PercentRepeat" in *Internals Reference*, Section "PercentRepeatCounter" in *Internals Reference*, Section "PercentRepeatedMusic" in *Internals Reference*, Section "Percent_repeat_engraver" in *Internals Reference*, Section "DoublePercentEvent" in *Internals Reference*, Section "DoublePercentRepeat" in *Internals Reference*, Section "DoublePercentRepeatCounter" in *Internals Reference*, Section "Double_percent_repeat_engraver" in *Internals Reference*, Section "Slash_repeat_engraver" in *Internals Reference*.

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 }
```
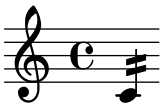


The `\repeat tremolo` syntax expects exactly two notes within the braces, and the number of repetitions must correspond to a note value that can be expressed with plain or dotted notes. Thus, `\repeat tremolo 7` is valid and produces a double dotted note, but `\repeat tremolo 9` is not.

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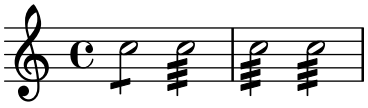
There are two ways to put tremolo marks on a single note. The `\repeat tremolo` syntax is also used here, in which case the note should not be surrounded by braces:

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



The same output can be obtained by adding `:`*N* after the note, where *N* indicates the duration of the subdivision (it must be at least 8). If *N* is 8, one beam is added to the note's stem. If *N* is omitted, the last value (stored in `tremoloFlags`) is used:

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

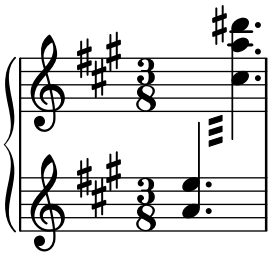


Selected Snippets

Cross-staff tremolos

Since `\repeat tremolo` expects exactly two musical arguments for chord tremolos, the note or chord which changes staff within a cross-staff tremolo should be placed inside curly braces together with its `\change Staff` command.

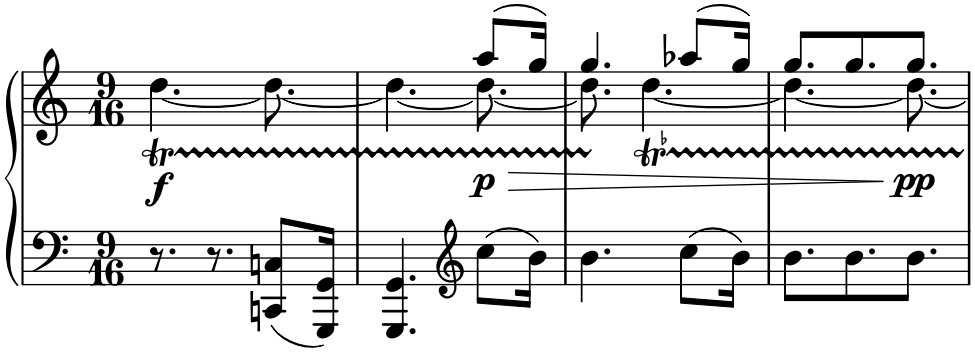
```
\new PianoStaff <<
  \new Staff = "up" \relative c'' {
    \key a \major
    \time 3/8
    s4.
  }
  \new Staff = "down" \relative c'' {
    \key a \major
    \time 3/8
    \voiceOne
    \repeat tremolo 6 {
      <a e'>32
      {
        \change Staff = "up"
        \voiceTwo
        <cis a' dis>32
      }
    }
  }
>>
```
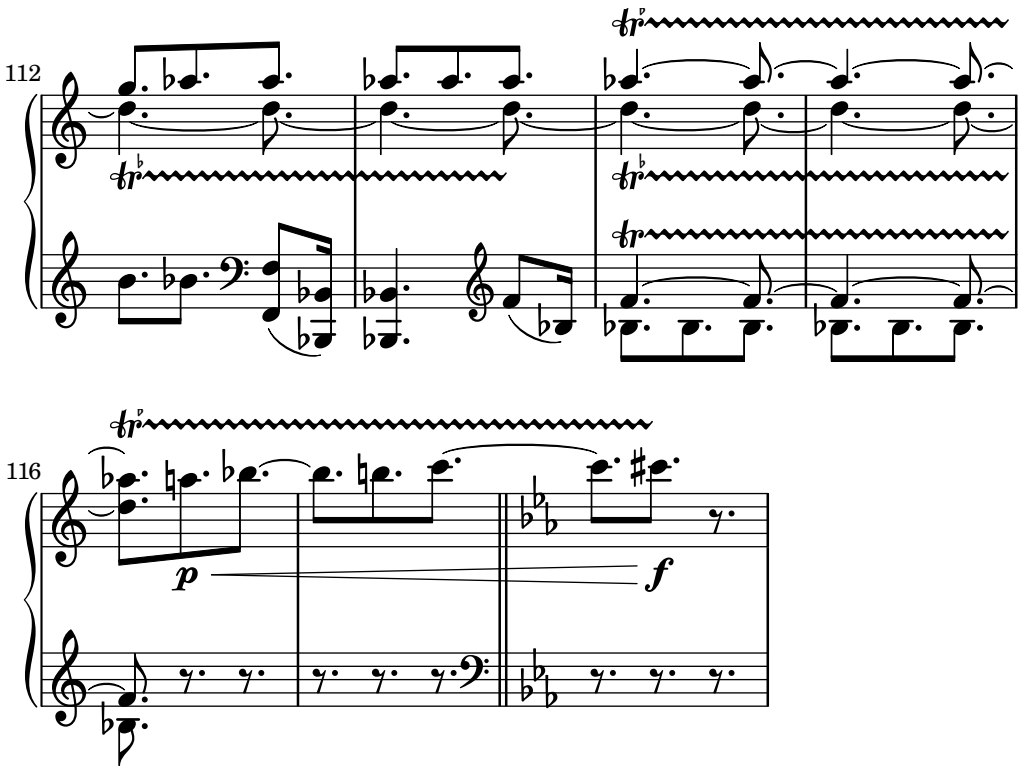


See also

Snippets: Section “Repeats” in *Snippets*.

1.5 Simultaneous notes





Polyphony in music refers to having more than one voice occurring in a piece of music. Polyphony in LilyPond refers to having more than one voice on the same staff.

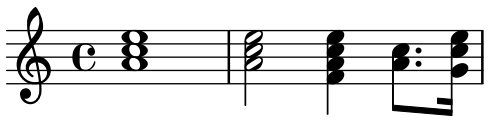
1.5.1 Single voice

This section discusses simultaneous notes inside the same voice.

Chorded notes

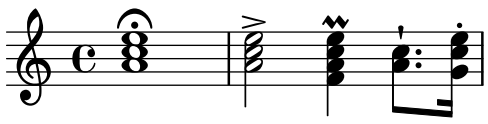
A chord is formed by enclosing a set of pitches between < and >. A chord may be followed by a duration just like simple notes.

```
<a c e>1 <a c e>2 <f a c e>4 <a c>8. <g c e>16
```



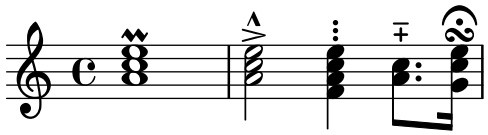
Chords may also be followed by articulations, again just like simple notes.

```
<a c e>1\fermata <a c e>2-> <f a c e>4\prall <a c>8.^! <g c e>16-.
```



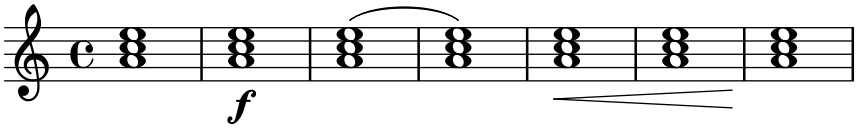
The notes within the chord themselves can also be followed by articulation and ornamentation.

```
<a c\prall e>1 <a-> c-^ e>2 <f-. a c-. e-.>4
<a-+ c-->8. <g\fermata c e\turn>16
```
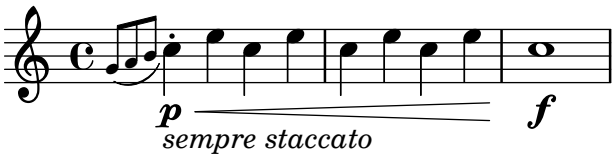


However some notation, such as dynamics, hairpins and slurs must be attached to the chord, rather than notes within the chord, otherwise they will not print.

```
<a\f c( e>1 <a c) e>\f <a\< c e>( <a\! c e>)
<a c e>\< <a c e> <a c e>\!
```



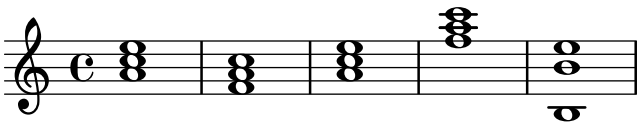
A chord acts merely as a container for its notes, its articulations and other attached elements. Consequently, a chord without notes inside does not actually have a duration. Any attached articulations will happen at the same musical time as the next following note or chord and be combined with them (for more complex possibilities of combining such elements, see [Simultaneous expressions], page 157):

```
\grace { g8( a b }
<> ) \p \< -. -\markup \italic "sempre staccato"
\repeat unfold 4 { c4 e }  c1\f
```



Relative mode can be used for pitches in chords. The first note of each chord is always relative to the first note of the chord that came before it, or in the case where no preceding chord exists, the pitch of the last note that came before the chord. All remaining notes in the chord are relative to the note that came before it *within the same chord*.

```
<a c e>1 <f a c> <a c e> <f' a c> <b, e b,>
```



For more information about chords, see Section 2.7 [Chord notation], page 384.

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 384, [Articulations and ornamentations], page 111, [Relative octave entry], page 2, Section 1.5.2 [Multiple voices], page 159.

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

Known issues and warnings

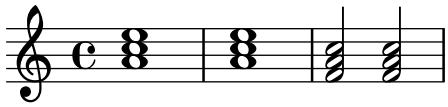
Chords containing more than two pitches within a staff space, such as ‘`<e f! fis!>`’, create overlapping noteheads. Depending on the situation, better representations might involve

- temporary use of Section 1.5.2 [Multiple voices], page 159, ‘`<< f! \\ <e fis!> >>`’,
- enharmonic transcription of one or more pitches, ‘`<e f ges>`’, or
- [Clusters], page 158.

Chord repetition

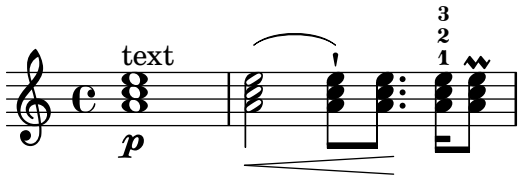
In order to save typing, a shortcut can be used to repeat the preceding chord. The chord repetition symbol is `q`:

```
<a c e>1 q <f a c>2 q
```



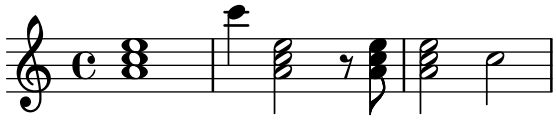
As with regular chords, the chord repetition symbol can be used with durations, articulations, markups, slurs, beams, etc. as only the pitches of the previous chord are duplicated.

```
<a c e>1\p^"text" q2\<( q8)[-! q8.]\! q16-1-2-3 q8\prall
```
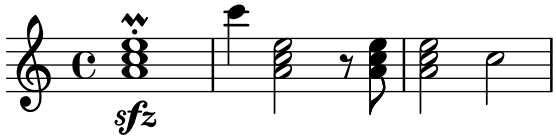


The chord repetition symbol always remembers the last instance of a chord so it is possible to repeat the most recent chord even if other non-chorded notes or rests have been added since.

```
<a c e>1 c'4 q2 r8 q8 |
q2 c, |
```



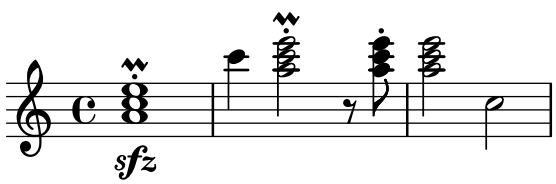
However, the chord repetition symbol does not retain any dynamics, articulation or ornamentation within, or attached to, the previous chord.

```
<a-. c\prall e>1\sfz c'4 q2 r8 q8 |
q2 c, |
```



To have some of them retained, the `\chordRepeats` function can be be called explicitly with an extra argument specifying a list of *event types* to keep unless events of that type are already present on the `q` chord itself.
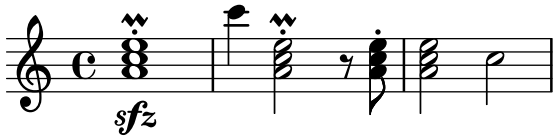
```
\relative c'' {
  \chordRepeats #'(articulation-event)
  { <a-. c\prall e>1\sfz c'4 q2 r8 q8-. } |
  q2 c, |
}
```



Here using `\chordRepeats` inside of a `\relative` construction produces unexpected results: once chord events have been expanded, they are indistinguishable from having been entered as regular chords, making `\relative` assign an octave based on their current context.

Since nested instances of `\relative` don't affect one another, another `\relative` inside of `\chordRepeats` can be used for establishing the octave relations before expanding the repeat chords. In that case, the whole content of the inner `\relative` does not affect the outer one; hence the different octave entry of the final note in this example.

```
\new Voice
\relative c'' {
  \chordRepeats #'(articulation-event)
  \relative c''
  { <a-. c\prall e>1\sfz c'4 q2 r8 q8-. } |
  q2 c |
}
```



Interactions with `\relative` occur only with explicit calls of `\chordRepeats`: the implicit expansion at the start of typesetting is done at a time where all instances of `\relative` have already been processed.

See also

Notation Reference: Section 2.7 [Chord notation], page 384, [Articulations and ornamentations], page 111.
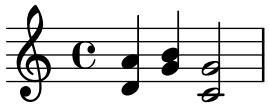
Installed Files: '`ly/chord-repetition-init.ly`'.

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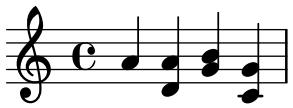
One or more music expressions enclosed in double angle brackets are taken to be simultaneous. If the first expression begins with a single note or if the whole simultaneous expression appears explicitly within a single voice, the whole expression is placed on a single staff; otherwise the elements of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

The following examples show simultaneous expressions on one staff:

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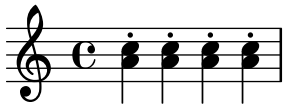


```
% single first note
a << { a4 b g } { d4 g c, } >>
```



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. Notes, articulations, and property changes in a *single* '`Voice`' are collected and engraved in musical order:
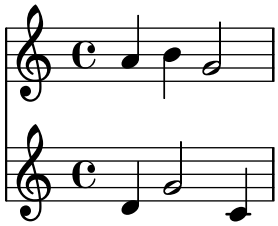
```
<a c>4-.  <>-. << c a >>  << { c-. <c a> } { a s-. } >>
```



Multiple stems or beams or different note durations or properties at the same musical time require the use of multiple voices.

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

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



Here different rhythms cause no problems because they are interpreted in different voices.

Known issues and warnings

If notes from two or more voices, with stems in the same direction, are placed at the same position on the staff and have no shift (or have the same shift specified), the message:

```
warning: ignoring too many clashing note columns
```

will appear during compilation. This message can be suppressed by:

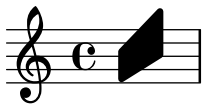
```
\override NoteColumn.ignore-collision = ##t
```

However, this not only suppresses the warning but will prevent any collision resolution whatsover and may have other unintended effects (also see *Known Issues* in [Collision resolution], page 162).

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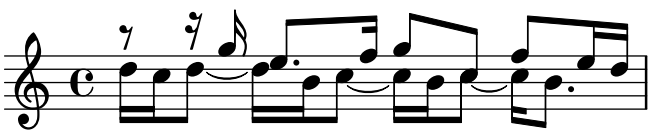
This section discusses simultaneous notes in multiple voices or multiple staves.

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
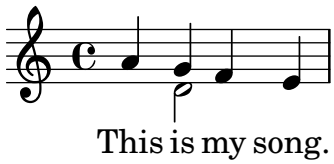
A temporary polyphonic passage can be created with the following construct:

```
<< { \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.
  }
>>
```
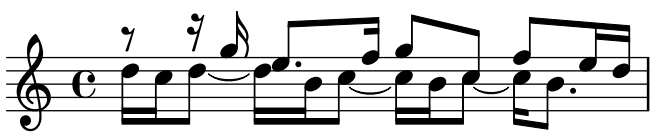


Here, the `\voiceOne` and `\voiceTwo` commands are required to define the settings of each voice.

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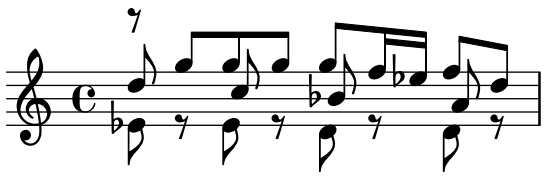
```
<<
  { r8 r16 g e8. f16 g8[ c,] f e16 d }
  \\
  { d16 c d8~ d16 b c8~ c16 b c8~ c16 b8. }
>>
```



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*.
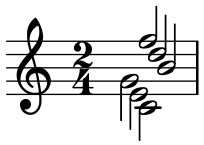
Voice order

When entering multiple voices in the input file, use the following order:

```
Voice 1: highest
Voice 2: lowest
Voice 3: second highest
Voice 4: second lowest
Voice 5: third highest
Voice 6: third lowest
etc.
```

Though this may seem counterintuitive, it simplifies the automatic layout process. Note that the odd-numbered voices are given upstems, and the even-numbered voices are given downstems:

```
\new Staff <<
  \time 2/4
  { f''2 }  % 1: highest
  \\
  { c'2  }  % 2: lowest
  \\
  { d''2 }  % 3: second-highest
  \\
  { e'2  }  % 4: second-lowest
  \\
  { b'2  }  % 5: third-highest
  \\
  { g'2  }  % 6: third-lowest
>>
```
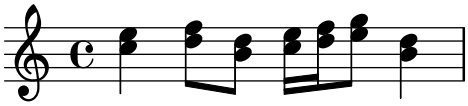


Note: Lyrics, spanners (such as slurs, ties, hairpins etc.) cannot be created 'across' voices.

Identical rhythms

In the special case that we want to typeset parallel pieces of music that have the same rhythm, we can combine them into a single `Voice` context, thus forming chords. To achieve this, enclose them in a simple simultaneous music construct within an explicit voice:

```
\new Voice <<
  { 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*.

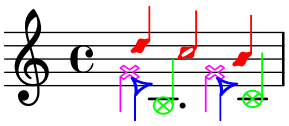
Notation Reference: [Percussion staves], page 363, [Invisible rests], page 54, [Stems], page 210.

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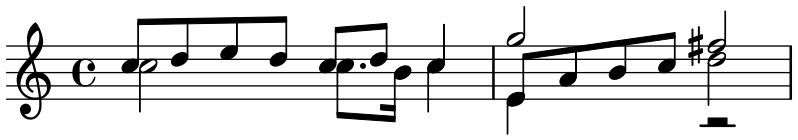
Snippets: Section "Simultaneous notes" in *Snippets*.

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. The following example shows three different circumstances, on beats 1 and 3 in bar 1 and beat 1 in bar 2, where the automatic merging fails.
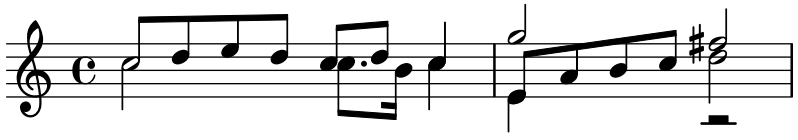
```
<<
  {
    c8 d e d c d c4
```

```
    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 as shown below. In this example the note heads on beat 1 of bar 1 are now merged:

```
<<
  {
    \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
  }
>>
```
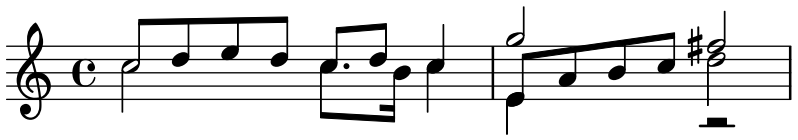


Quarter and half notes are not merged in this way, since it would be difficult to tell them apart.

Note heads with different dots as shown in beat 3 of bar 1 may be also be merged:
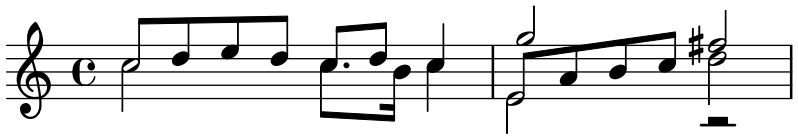
```
<<
  {
    \mergeDifferentlyHeadedOn
    \mergeDifferentlyDottedOn
    c8 d e d c d c4
    g'2 fis
  } \\ {
    c2 c8. b16 c4
    e,2 r
  } \\ {
    \oneVoice
```

```
    s1
    e8 a b c d2
  }
>>
```



The half note and eighth note at the start of the second measure are incorrectly merged because the automatic merge cannot successfully complete the merge when three or more notes line up in the same note column, and in this case the merged note head is incorrect. To allow the merge to select the correct note head a `\shift` must be applied to the note that should not be merged. Here, `\shiftOn` is applied to move the top *g* out of the column, and `\mergeDifferentlyHeadedOn` then works properly.

```
<<
  {
    \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
  }
>>
```
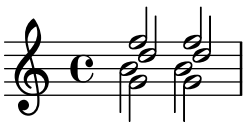


The `\shiftOn` command allows (but does not force) the notes in a voice to be shifted. When `\shiftOn` is applied to a voice, a note or chord in that voice is shifted only if its stem would otherwise collide with a stem from another voice, and only if the colliding stems point in the same direction. The `\shiftOff` command prevents this type of shifting from occurring.

By default, the outer voices (normally voices one and two) have `\shiftOff` specified, while the inner voices (three and above) have `\shiftOn` specified. When a shift is applied, voices with upstems (odd-numbered voices) are shifted to the right, and voices with downstems (even-numbered voices) are shifted to the left.

Here is an example to help you visualize how an abbreviated polyphonic expression would be expanded internally.

> **Note:** Note that with three or more voices, the vertical order of voices in your input file should not be the same as the vertical order of voices on the staff!

```
\new Staff \relative c'' {
  %% abbreviated entry
  <<
    { f2  }  % 1: highest
    \\
    { g,2 }  % 2: lowest
    \\
    { d'2 }  % 3: upper middle
    \\
    { b2  }  % 4: lower middle
  >>
  %% internal expansion of the above
  <<
    \new Voice = "1" { \voiceOne   \shiftOff f'2 }
    \new Voice = "2" { \voiceTwo   \shiftOff g,2 }
    \new Voice = "3" { \voiceThree \shiftOn  d'2 } % shifts right
    \new Voice = "4" { \voiceFour  \shiftOn  b2  } % shifts left
  >>
}
```



Two additional commands, `\shiftOnn` and `\shiftOnnn` provide further shift levels which may be specified temporarily to resolve collisions in complex situations – see Section "Real music example" in *Learning Manual*.

Notes are only merged if they have opposing stem directions (as they have, for example, in voices one and two by default or when the stems are explicitly set in opposite directions).

Predefined commands

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

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

Selected Snippets
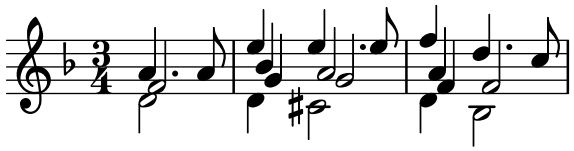
Additional voices to avoid collisions

In some instances of complex polyphonic music, additional voices are necessary to prevent collisions between notes. If more than four parallel voices are needed, additional voices can be added by defining a variable using the Scheme function `context-spec-music`.

```
voiceFive = #(context-spec-music (make-voice-props-set 4) 'Voice)

\relative c'' {
  \time 3/4
  \key d \minor
  \partial 2
  <<
    \new Voice  {
      \voiceOne
      a4. a8
```

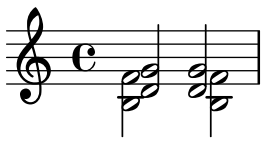
```
      e'4 e4. e8
      f4 d4. c8
    }
    \new Voice {
      \voiceTwo
      d,2
      d4 cis2
      d4 bes2
    }
    \new Voice {
      \voiceThree
      f'2
      bes4 a2
      a4 s2
    }
    \new Voice {
      \voiceFive
      s2
      g4 g2
      f4 f2
    }
  >>
}
```



Forcing horizontal shift of notes

When the typesetting engine cannot cope, the following syntax can be used to override typesetting decisions. The units of measure used here are staff spaces.

```
\relative c' <<
  {
    <d g>2 <d g>
  }
  \\
  {
    <b f'>2
    \once \override NoteColumn.force-hshift = #1.7
    <b f'>2
  }
>>
```



See also

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

Learning Manual: Section “Multiple notes at once” in *Learning Manual*, Section “Voices contain music” in *Learning Manual*, Section “Real music example” in *Learning Manual*.

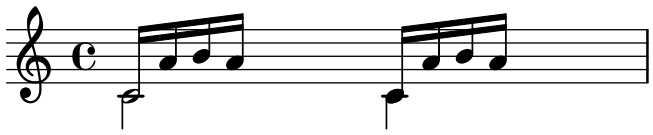
Snippets: Section “Simultaneous notes” in *Snippets*.

Internals Reference: Section “NoteColumn” in *Internals Reference*, Section “NoteCollision” in *Internals Reference*, Section “RestCollision” in *Internals Reference*.

Known issues and warnings

Using `\override NoteColumn.ignore-collision = ##t` will cause differently headed notes in different voices to merge incorrectly.

```
\mergeDifferentlyHeadedOn
<< { c16 a' b a } \\ { c,2 } >>
\override NoteColumn.ignore-collision = ##t
<< { c16 a' b a } \\ { c,2 } >>
```



Automatic part combining

Automatic part combining is used to merge two separate parts of music onto a single staff. This can be especially helpful when typesetting orchestral scores. A single `Voice` is printed while the two parts of music are the same, but in places where they differ, a second `Voice` is printed. Stem directions are set up & down accordingly while Solo and *a due* parts are also identified and marked appropriately.

The syntax for automatic part combining is:

`\partcombine` *musicexpr1 musicexpr2*
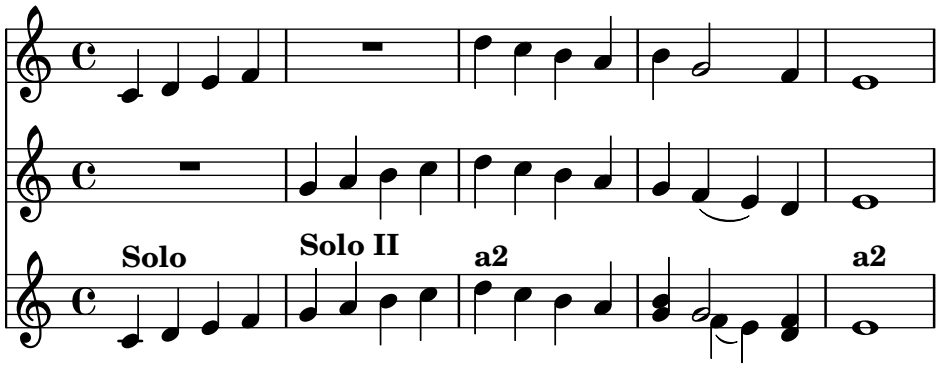
The following example demonstrates the basic functionality, putting parts on a single staff as polyphony and setting stem directions accordingly. The same variables are used for the independent parts and the combined staff.

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

instrumentTwo = \relative g' {
  R1 |
  g4 a b c |
  d4 c b a |
  g4 f( e) d |
  e1 |
}

<<
```

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



Both parts have identical notes in the third measure, so only one instance of the notes is printed. Stem, slur, and tie directions are set automatically, depending on whether the parts are playing solo or in unison. When needed in polyphony situations, the first part (with context called `one`) gets "up" stems, while the second (called `two`) always gets "down" stems. In solo situations, the first and second parts get marked with "Solo" and "Solo II", respectively. The unison (*a due*) parts are marked with the text "a2".

Both arguments to `\partcombine` will be interpreted as separate `Voice` contexts, so if the music is being specified in relative mode then *both* parts must contain a `\relative` function, i.e.,

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

A `\relative` section that encloses a `\partcombine` has no effect on the pitches of *`musicexpr1`* or *`musicexpr2`*.

In professional scores, voices are often kept apart from each other for long passages of music even if some of the notes are the same in both voices, and could just as easily be printed as unison. Combining notes into a chord, or showing one voice as solo is, therefore, not ideal as the `\partcombine` function considers each note separately. In this case the `\partcombine` function can be overriden with the following commands:

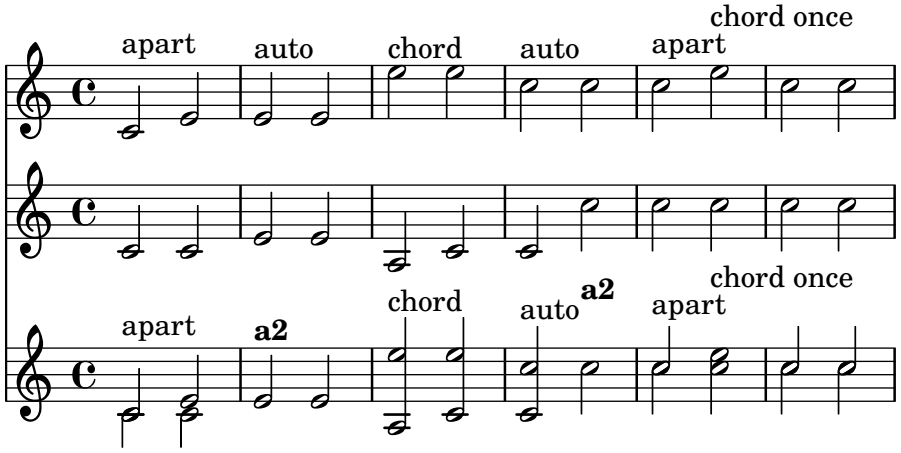
Commands ending in `...Once` apply only to the next note in the music expression.

- `\partcombineApart` and `\partcombineApartOnce` keep the notes as two separate voices, even if they can be combined into a chord or unison.
- `\partcombineChords` and `\partcombineChordsOnce` combine the notes into a chord.
- `\partcombineUnisono` and `\partcombineUnisonoOnce` combine both voices as "unison".
- `\partcombineSoloI` and `\partcombineSoloIOnce` print only voice one, and mark it as a "Solo".
- `\partcombineSoloII` or `\partcombineSoloIIOnce` print only voice two and mark it as a "Solo".
- `\partcombineAutomatic` and `\partcombineAutomaticOnce` end the functions of the commands above, and revert back to the standard `\partcombine` functionality.

```
instrumentOne = \relative c' {
  \partcombineApart c2^"apart" e |
  \partcombineAutomatic e2^"auto" e |
```

```
  \partcombineChords e'2^"chord" e |
  \partcombineAutomatic c2^"auto" c |
  \partcombineApart c2^"apart" \partcombineChordsOnce e^"chord once" |
  c2 c |
}
instrumentTwo = \relative c' {
  c2 c |
  e2 e |
  a,2 c |
  c2 c' |
  c2 c |
  c2 c |
}

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



Using \partcombine with lyrics

The `\partcombine` command is not designed to work with lyrics; if one of the voices is explicitly named in order to attach lyrics to it, the partcombiner will stop working. However, this effect can be achieved using a `NullVoice` context. See [Polyphony with shared lyrics], page 268.

Selected Snippets

Combining two parts on the same staff

The part combiner tool (`\partcombine` command) allows the combination of several different parts on the same staff. Text directions such as “solo” or “a2” are added by default; to remove them, simply set the property `printPartCombineTexts` to `f`. For vocal scores (hymns), there is no need to add “solo/a2” texts, so they should be switched off. However, it might be better not to use it if there are any solos, as they won’t be indicated. In such cases, standard polyphonic notation may be preferable.

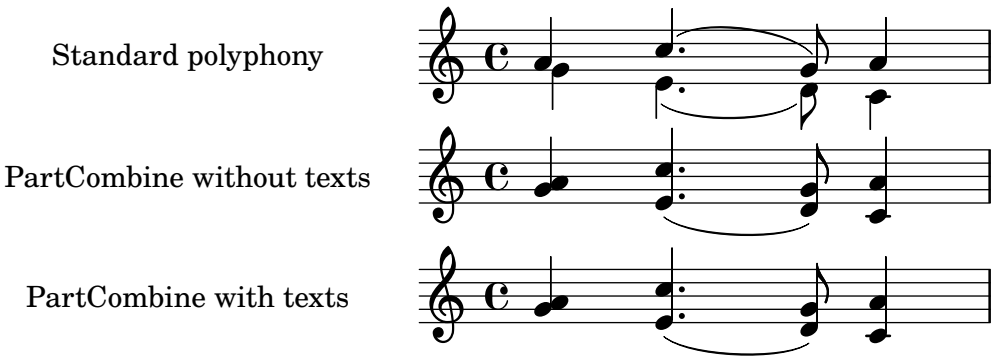
This snippet presents the three ways two parts can be printed on a same staff: standard polyphony, `\partcombine` without texts, and `\partcombine` with texts.
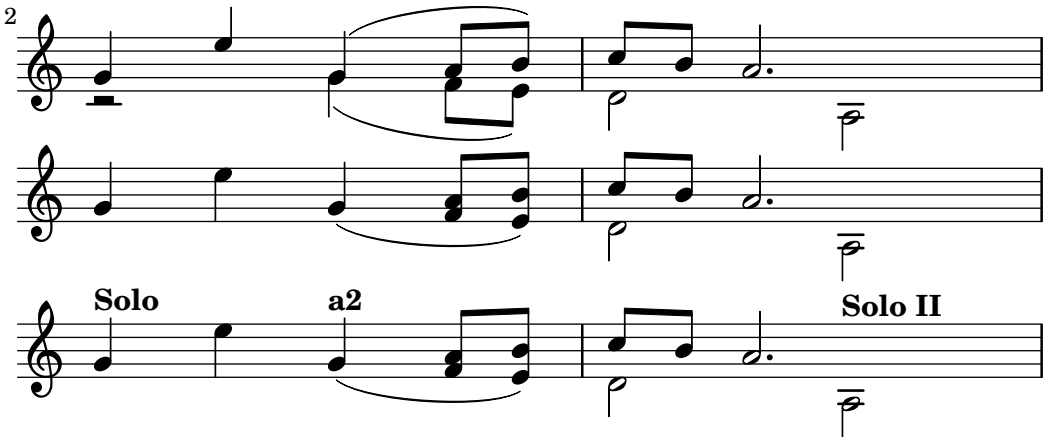
```
musicUp = \relative c'' {
  \time 4/4
```

```
  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
    }
  }
}
```
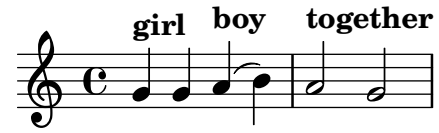




Changing partcombine texts

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 192.

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

Internals Reference: Section “PartCombineMusic” in *Internals Reference*, Section “Voice” in *Internals Reference*.

Known issues and warnings

All `\partcombine...` functions can only accept two voices.

`\partcombine...` functions cannot be placed inside a `\tuplet` or `\relative` block.

If `printPartCombineTexts` is set and the two voices play the same notes “on and off”, in the same measure, the part combiner may typeset `a2` more than once in that measure.

`\partcombine` only knows when a note starts in a `Voice`; it cannot, for example, remember if a note in one `Voice` has already started when combining notes that have just started in the other `Voice`. This can lead to a number of unexpected issues including “Solo” or “Unison” marks being printed incorrectly.

`\partcombine` keeps all spanners (slurs, ties, hairpins etc.) in the same `Voice` so that if any such spanners start or end in a different `Voice`, they may not be printed properly or at all.

If the `\partcombine` function cannot combine both music expressions (i.e. when both voices have different durations), it will give the voices, internally, its own custom names: `one` and `two` respectively. This means if there is any "switch" to a differently named `Voice` context, the events in that differently named `Voice` will be ignored.

Refer also to *Known issues and warnings* when using `\partcombine` with tablature in [Default tablatures], page 318 and the *Note* in [Automatic beams], page 76 when using automatic beaming.

Writing music in parallel
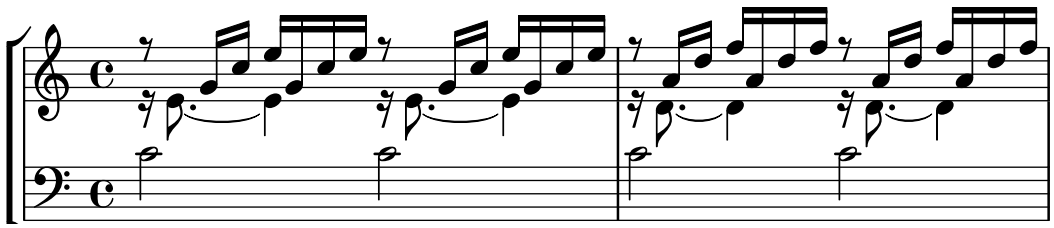
Music for multiple parts can be interleaved in input code. The function `\parallelMusic` accepts a list with the names of a number of variables to be created, and a musical expression. The content of alternate measures from the expression become the value of the respective variables, so you can use them afterwards to print the music.

> **Note:** Bar checks `|` must be used, and the measures must be of the same length.

```
\parallelMusic #'(voiceA voiceB voiceC) {
  % Bar 1
  r8 g'16 c'' e'' g' c'' e'' r8 g'16 c'' e'' g' c'' e'' |
  r16 e'8.~   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 }
>>
```
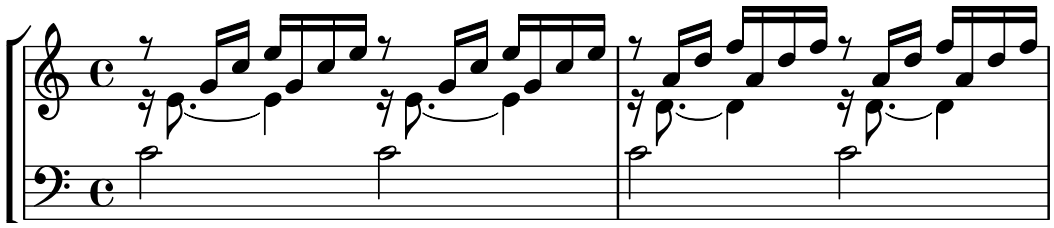


Relative mode may be used. Note that the `\relative` command is not used inside `\parallelMusic` itself. The notes are relative to the preceding note in the voice, not to the previous note in the input – in other words, relative notes for `voiceA` ignore the notes in `voiceB`.

```
\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
}
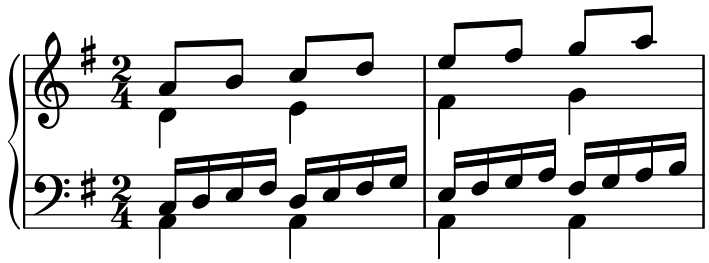
\parallelMusic #'(voiceA voiceB voiceC voiceD) {
  % Bar 1
  a8    b     c   d     |
  d4          e         |
  c16 d e fis d e fis g |
  a4          a         |

  % 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
        >>
      }
    >>
}
```
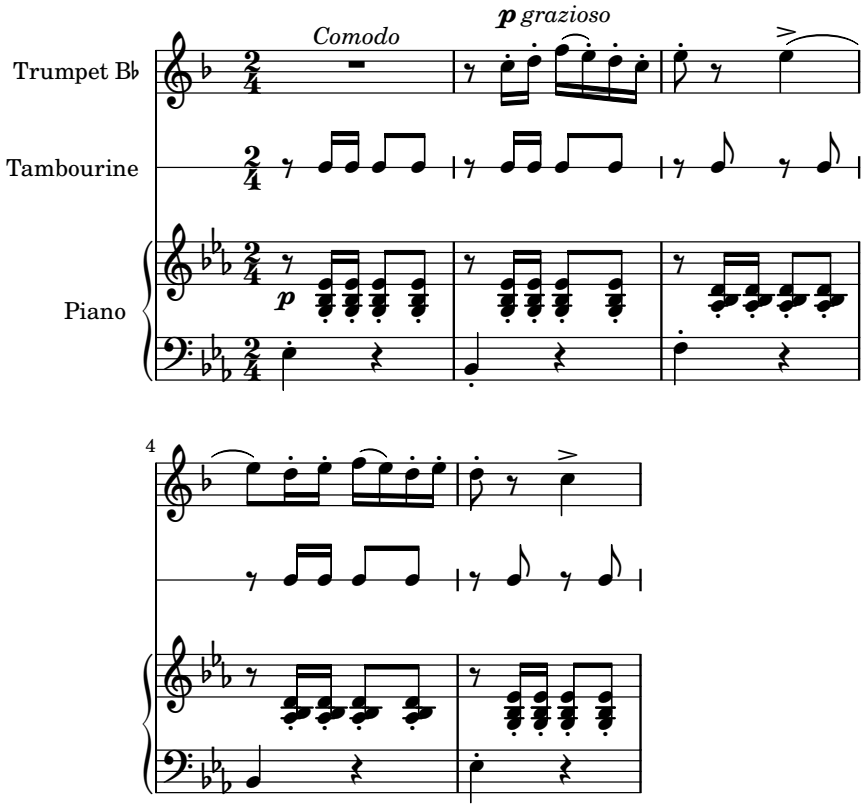


See also

Learning Manual: Section “Organizing pieces with variables” in *Learning Manual*.

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

1.6 Staff notation



This section explains how to influence the appearance of staves, how to print scores with more than one staff, and how to add tempo indications and cue notes to staves.

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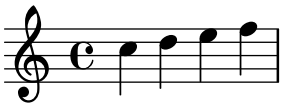
This section describes the different methods of creating and grouping staves.

Instantiating new staves

Staves (singular: *staff*) are created with the `\new` or `\context` commands. For details, see Section 5.1.2 [Creating and referencing contexts], page 547.

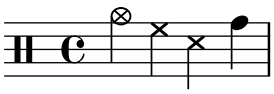
The basic staff context is `Staff`:

```
\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 363.

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



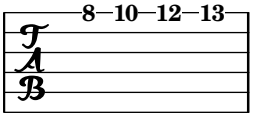
`RhythmicStaff` creates a single-line staff that only displays the rhythmic values of the input. Real durations are preserved. For details, see [Showing melody rhythms], page 73.

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



`TabStaff` creates a tablature with six strings in standard guitar tuning. For details, see [Default tablatures], page 318.
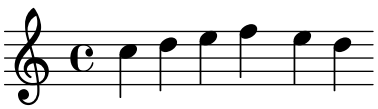
```
\new TabStaff { c4 d e f }
```



There are two staff contexts specific for the notation of ancient music: `MensuralStaff` and `VaticanaStaff`. They are described in [Pre-defined contexts], page 407.

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 5.1.6 [Defining new contexts], page 560.

See also

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

Notation Reference: Section 5.1.2 [Creating and referencing contexts], page 547, [Percussion staves], page 363, [Showing melody rhythms], page 73, [Default tablatures], page 318, [Predefined contexts], page 407, [Staff symbol], page 182, [Gregorian chant contexts], page 416, [Mensural contexts], page 408, Section 5.1.6 [Defining new contexts], page 560.

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

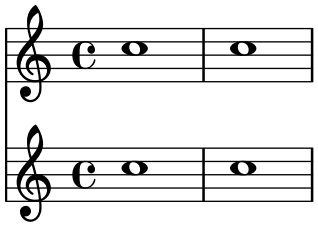
Internals Reference: Section “Staff” in *Internals Reference*, Section “DrumStaff” in *Internals Reference*, Section “GregorianTranscriptionStaff” in *Internals Reference*, Section “RhythmicStaff” in *Internals Reference*, Section “TabStaff” in *Internals Reference*, Section “MensuralStaff” in *Internals 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.

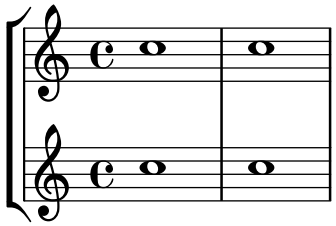
If no context is specified, the default properties will be used: the group is started with a vertical line, and the bar lines are not connected.

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



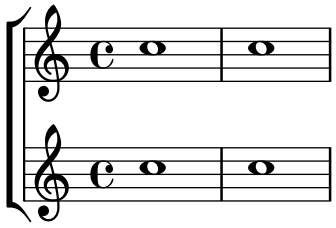
In the `StaffGroup` context, the group is started with a bracket and bar lines are drawn through all the staves.

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



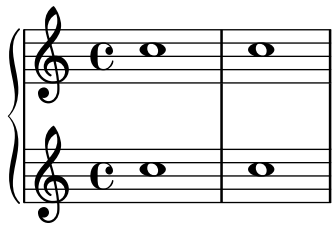
In a `ChoirStaff`, the group starts with a bracket, but bar lines are not connected.

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



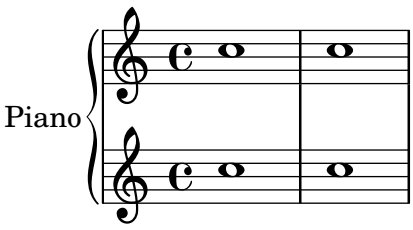
In a `GrandStaff`, the group begins with a brace, and bar lines are connected between the staves.

```
\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 192.

```
\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.

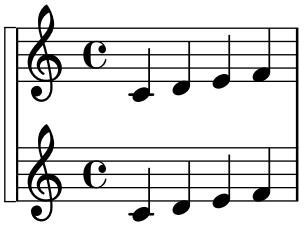
New staff group contexts may be defined. For details, see Section 5.1.6 [Defining new contexts], page 560.

Selected Snippets

Use square bracket at the start of a staff group

The system start delimiter `SystemStartSquare` can be used by setting it explicitly in a `StaffGroup` or `ChoirStaff` context.

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

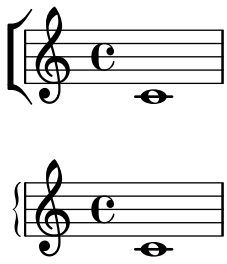


Display bracket with only one staff in a system

If there is only one staff in one of the staff types `ChoirStaff` or `StaffGroup`, by default the bracket and the starting bar line will not be displayed. This can be changed by overriding `collapse-height` to set its value to be less than the number of staff lines in the staff.

Note that in contexts such as `PianoStaff` and `GrandStaff` where the systems begin with a brace instead of a bracket, another property has to be set, as shown on the second system in the example.

```
\score {
  \new StaffGroup <<
    % Must be lower than the actual number of staff lines
    \override StaffGroup.SystemStartBracket.collapse-height = #4
    \override Score.SystemStartBar.collapse-height = #4
    \new Staff {
      c'1
    }
  >>
}
\score {
  \new PianoStaff <<
    \override PianoStaff.SystemStartBrace.collapse-height = #4
    \override Score.SystemStartBar.collapse-height = #4
    \new Staff {
      c'1
    }
  >>
}
```

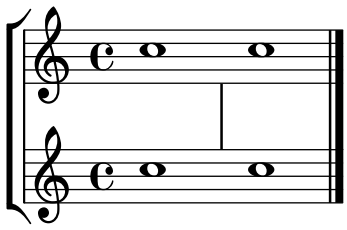


Mensurstriche layout (bar lines between the staves)

The mensurstriche-layout where 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 = {
  \hide Staff.BarLine
  s1 s
  % the final bar line is not interrupted
  \undo \hide Staff.BarLine
  \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 192, Section 5.1.6 [Defining new contexts], page 560.

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*.
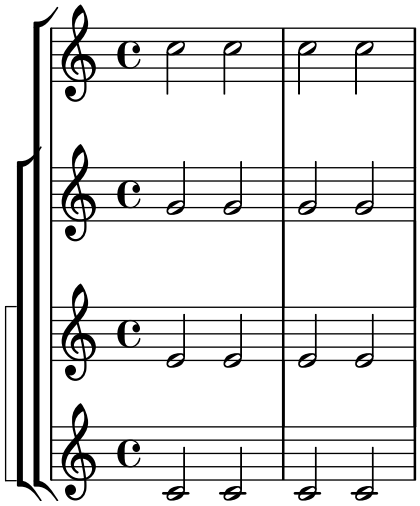
Known issues and warnings

`PianoStaff` does not, by default, accept `ChordNames`.

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 }
    >>
  >>
>>
```



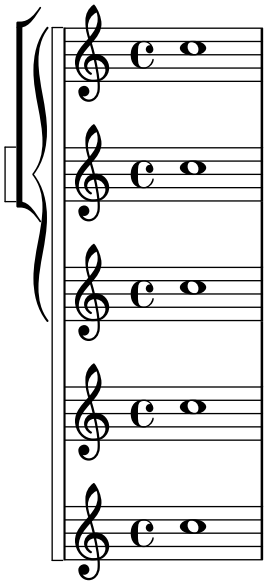
New nested staff group contexts can be defined. For details, see Section 5.1.6 [Defining new contexts], page 560.

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 176, [Instrument names], page 192, Section 5.1.6 [Defining new contexts], page 560.

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

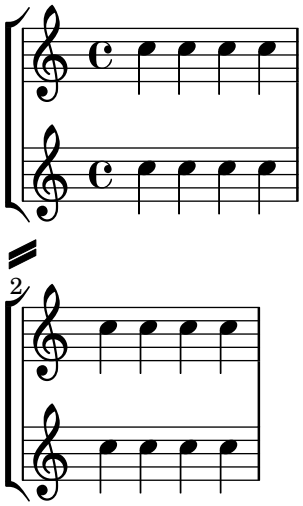
Internals Reference: Section "StaffGroup" in *Internals Reference*, Section "ChoirStaff" in *Internals Reference*, Section "SystemStartBar" in *Internals Reference*, Section "SystemStartBrace" in *Internals Reference*, Section "SystemStartBracket" in *Internals Reference*, Section "SystemStartSquare" in *Internals Reference*.

Separating systems

If the number of systems per page changes from page to page it is customary to separate the systems by placing a system separator mark between them. By default the system separator is blank, but can be turned on with a `\paper` option.

```
\book {
  \score {
    \new StaffGroup <<
      \new Staff {
        \relative c'' {
          c4 c c c
          \break
          c4 c c c
        }
      }
      \new Staff {
        \relative c'' {
          c4 c c c
          \break
          c4 c c c
        }
      }
    >>
  }
  \paper {
    system-separator-markup = \slashSeparator
    % following commands are needed only to format this documentation
```

```
    paper-width = 100\mm
    paper-height = 100\mm
    tagline = ##f
  }
}
```



See also

Notation Reference: Section 4.1 [Page layout], page 494.

Snippets: Section “Staff notation” in *Snippets*.
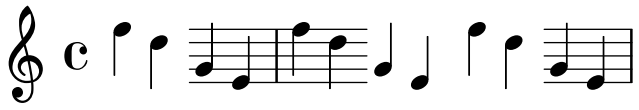
1.6.2 Modifying single staves

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

Staff symbol

The `\stopStaff` and `\startStaff` commands can be used to stop or (re)start the staff lines respectively, from being printed at any point witin a score.

```
\stopStaff f4 d \startStaff g, e
f'4 d \stopStaff g, e
f'4 d \startStaff g, e
```



Predefined commands
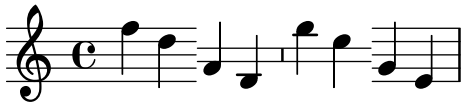
`\startStaff`, `\stopStaff`.

The lines of a staff belong to the `StaffSymbol` grob (including ledger lines) and can be modified using `StaffSymbol` properties, but these modifications must be made before the staff is (re)started.

The number of staff lines can be altered:
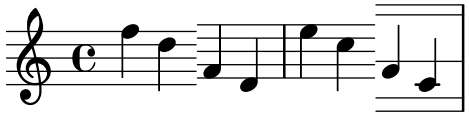
```
f4 d \stopStaff
\override Staff.StaffSymbol.line-count = #2
\startStaff g, e |

f'4 d \stopStaff
\revert Staff.StaffSymbol.line-count
\startStaff g, e |
```



The position of each staff line can also be altered. A list of numbers sets each line's position. `0` corresponds to the normal center line, and the normal line positions are `(-4 -2 0 2 4)`. A single staff line is printed for every value entered so that the number of staff lines, as well as their position, can be changed with a single override.
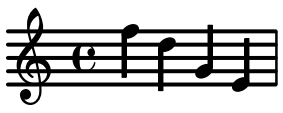
```
f4 d \stopStaff
\override Staff.StaffSymbol.line-positions = #'(1 3 5 -1 -3)
\startStaff g, e |
f'4 d \stopStaff
\override Staff.StaffSymbol.line-positions = #'(8 6.5 -6 -8 -0.5)
\startStaff g, e
```



To preserve typical stem directions (in the bottom half of the staff stems point up, in the top half they point down), align the center line (or space) of the customized staff with the position of the normal center line (0). The clef position and the position of middle C may need to be adjusted accordingly to fit the new lines. See [Clef], page 16.
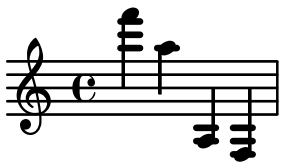
Staff line thickness can be altered. Ledger lines and note stems, by default, are also affected.

```
\new Staff \with {
  \override StaffSymbol.thickness = #3
}
{ f4 d g, e }
```



It is also possible to set ledger line thickness independently of staff lines.

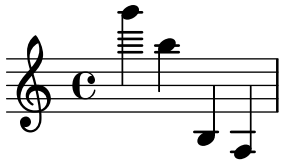
```
\new Staff \with {
  \override StaffSymbol.thickness = #2
  \override StaffSymbol.ledger-line-thickness = #'(0.5 . 0.4)
}
{ f'4 a, a,, f }
```



The first value is multiplied by the staff line thickness, the second by the staff space and then the two values are added together to give the new thickness of the ledger line.
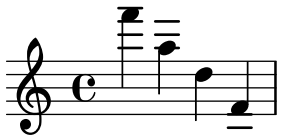
The vertical positions of ledger lines can be altered,

```
\new Staff \with {
  \override StaffSymbol.ledger-positions = #'(-3 -2 -1 2 5 6)
}
{ f'4 a, a,, f }
```
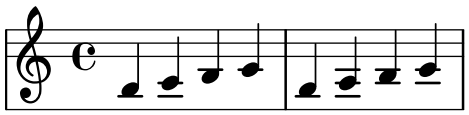


Additional ledger lines can be made to appear above or below note heads depending on the current position relative to other note heads that also have their own ledger lines.

```
\new Staff \with {
  \override StaffSymbol.ledger-extra = #4
}
{ f'4 a, d, f, }
```



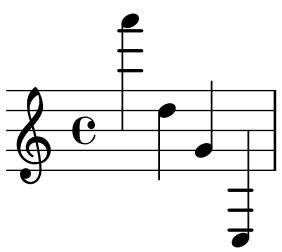
Ledger lines can also be made to appear inside the staff where custom staff lines are required. The example shows the default position of ledger lines when the explicit `ledger-position` is and is not set. The `\stopStaff` is needed in the example to revert the `\override` for the whole `StaffSymbol`.

```
\override Staff.StaffSymbol.line-positions = #'(-8 0 2 4)
d4 e f g
\stopStaff
\startStaff
\override Staff.StaffSymbol.ledger-positions = #'(-8 -6 (-4 -2) 0)
d4 e f g
```



The distance between staff lines can be altered. This affects ledger line spacing as well.

```
\new Staff \with {
  \override StaffSymbol.staff-space = #1.5
}
{ f'4 d, g, e, }
```
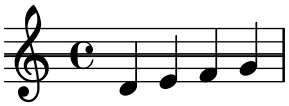


Selected Snippets

Making some staff lines thicker than the others

For educational purposes, a staff line can be thickened (e.g., the middle line, or to emphasize the line of the G clef). This can be achieved by adding extra lines very close to the line that should be emphasized, using the `line-positions` property of the `StaffSymbol` object.

```
{
  \override Staff.StaffSymbol.line-positions =
    #'(-4 -2 -0.2 0 0.2 2 4)
  d'4 e' f' g'
}
```



See also

Music Glossary: Section "line" in *Music Glossary*, Section "ledger line" in *Music Glossary*, Section "staff" in *Music Glossary*.

Notation Reference: [Clef], page 16.
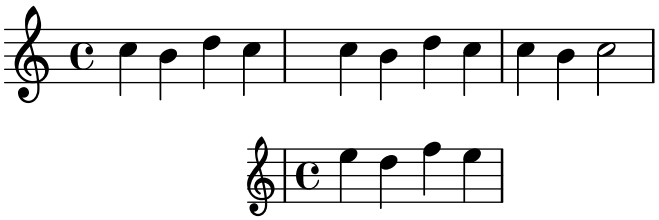
Snippets: Section "Staff notation" in *Snippets*.

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
}
```

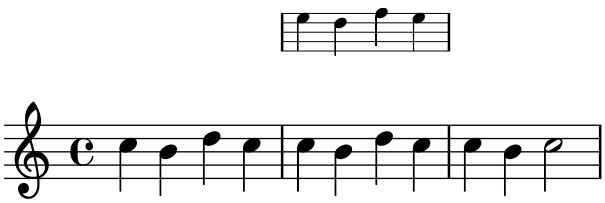


However, the above example is not what is usually desired. To create ossia staves that are above the original staff, have no time signature or clef, and have a smaller font size, tweaks must be used. The Learning Manual describes a specific technique to achieve this goal, beginning with Section "Nesting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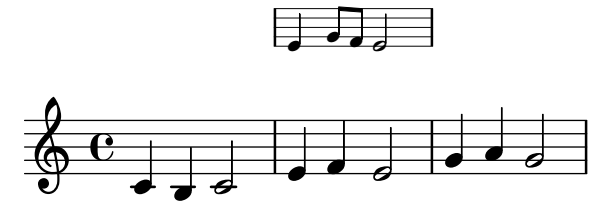


If many isolated ossia staves are needed, creating an empty `Staff` context with a specific *context id* may be more appropriate; the ossia staves may then be created by *calling* this context and using `\startStaff` and `\stopStaff` at the desired locations. The benefits of this method are more apparent if the piece is longer than the following example.
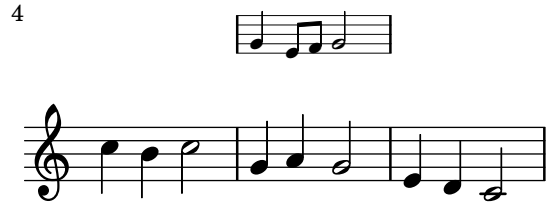
```
<<
  \new Staff = "ossia" \with {
    \remove "Time_signature_engraver"
    \hide Clef
    fontSize = #-3
    \override StaffSymbol.staff-space = #(magstep -3)
    \override StaffSymbol.thickness = #(magstep -3)
  }
  { \stopStaff s1*6 }

  \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
  }
>>
```
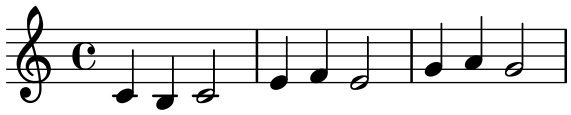


4
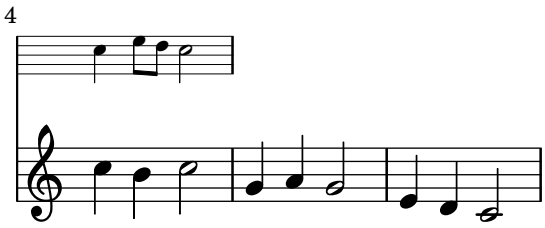


Using the `\Staff \RemoveEmptyStaves` command to create ossia staves may be used as an alternative. This method is most convenient when ossia staves occur immediately following a line break. For more information about `\Staff \RemoveEmptyStaves`, see [Hiding staves], page 189.

```
<<
  \new Staff = "ossia" \with {
    \remove "Time_signature_engraver"
    \hide Clef
    fontSize = #-3
    \override StaffSymbol.staff-space = #(magstep -3)
    \override StaffSymbol.thickness = #(magstep -3)
  } \relative c'' {
    R1*3
    c4 e8 d c2
  }
  \new Staff \relative c' {
    c4 b c2
    e4 f e2
    g4 a g2 \break
    c4 b c2
    g4 a g2
    e4 d c2
  }
>>

\layout {
  \context {
    \Staff \RemoveEmptyStaves
    \override VerticalAxisGroup.remove-first = ##t
  }
}
```





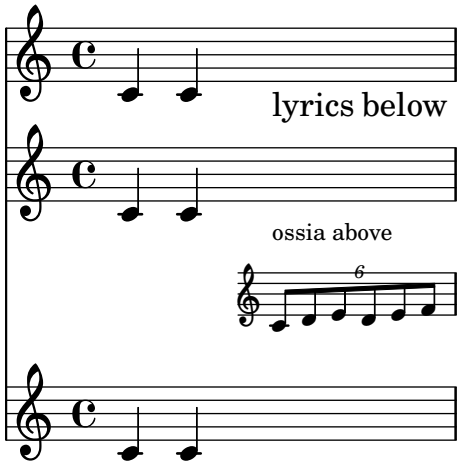
Selected Snippets

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"
      } {
        \tuplet 6/4 {
          \override TextScript.padding = #3
          c8[^"ossia above" d e d e f]
        }
      }
    >>
  }
>>
```



See also

Music Glossary: Section “ossia” in *Music Glossary*, Section “staff” in *Music Glossary*, Section “Frenched staff” in *Music Glossary*.

Learning Manual: Section “Nesting music expressions” in *Learning Manual*, Section “Size of objects” in *Learning Manual*, Section “Length and thickness of objects” in *Learning Manual*.

Notation Reference: [Hiding staves], page 189.

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 }
```



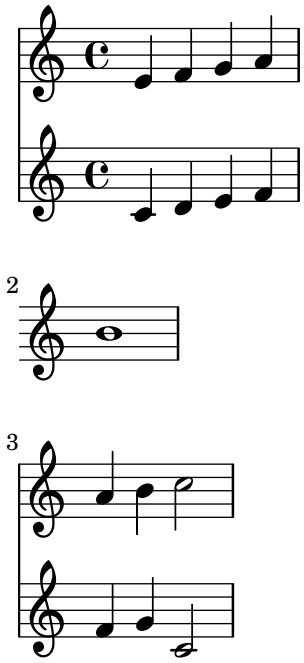
Empty staves can be hidden by setting the `\Staff \RemoveEmptyStaves` command in the `\layout` block. In orchestral scores, this style is known as ‘Frenched Score’. By default, this command hides and removes all empty staves in a score except for those in the first system.

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

```
\layout {
  \context {
    \Staff \RemoveEmptyStaves
  }
}

\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
  }
>>
```



\Staff \RemoveEmptyStaves can also be used to create ossia sections for a staff. For details, see [Ossia staves], page 185.

The \VaticanaStaff \RemoveEmptyStaves command may be used to hide empty staves in ancient music contexts. Similarly, \RhythmicStaff \RemoveEmptyStaves may be used to hide empty RhythmicStaff contexts.

Predefined commands

\Staff \RemoveEmptyStaves, \VaticanaStaff \RemoveEmptyStaves, \RhythmicStaff \RemoveEmptyStaves.

Selected Snippets

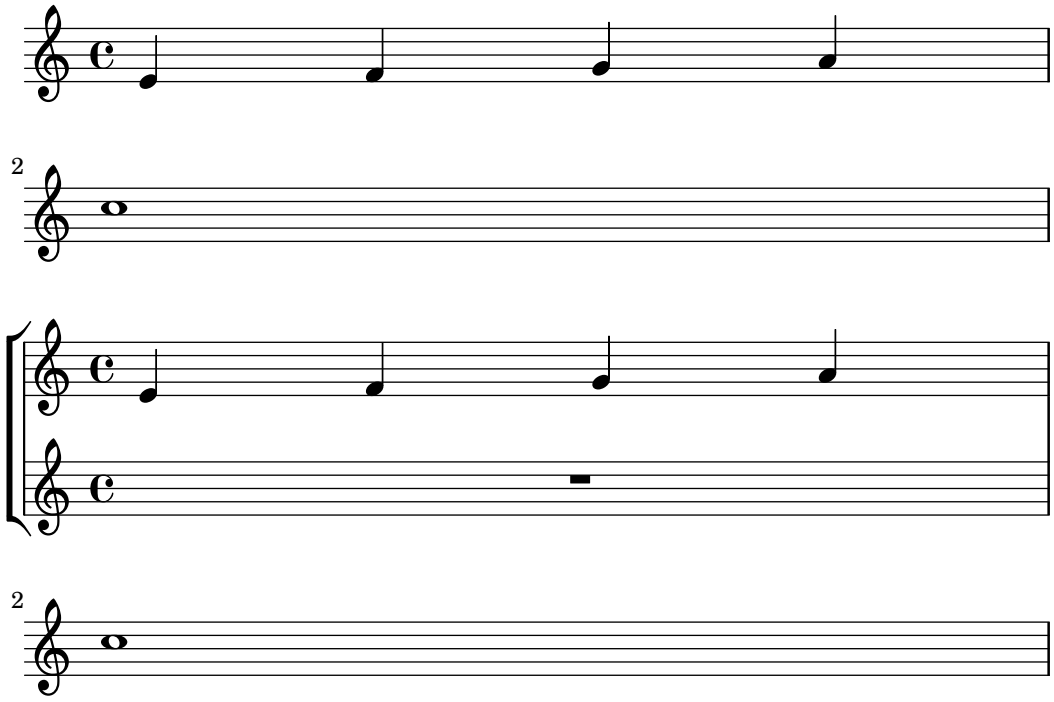
Removing the first empty line

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 {
    \Staff \RemoveEmptyStaves
    % 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*.

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

Notation Reference: Section 5.1.5 [Changing context default settings], page 555, [Staff symbol], page 182, [Ossia staves], page 185, [Hidden notes], page 207, [Invisible rests], page 54, Section 5.4.6 [Visibility of objects], page 584.

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:

```
\omit StaffSymbol
\override NoteHead.no-ledgers = ##t
```

For the Known issues and warnings associated with `\Staff \RemoveEmptyStaves` see Section 5.1.5 [Changing context default settings], page 555.
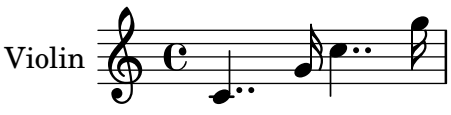
1.6.3 Writing parts
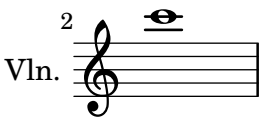
This section explains how to insert tempo indications and instrument names into a score. Methods to quote other voices and format cue notes are also described.

Instrument names

Instrument names can be printed on the left side of staves in the `Staff`, `PianoStaff`, `StaffGroup`, `GrandStaff` and `ChoirStaff` contexts. The value of `instrumentName` is used for the first staff, and the value of `shortInstrumentName` is used for all succeeding staves.
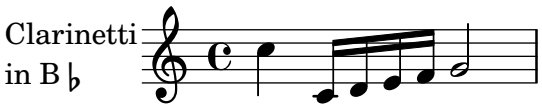
```
\new Staff \with {
  instrumentName = #"Violin "
  shortInstrumentName = #"Vln. "
}
{ c4.. g'16 c4.. g'16 \break | c1 }
```
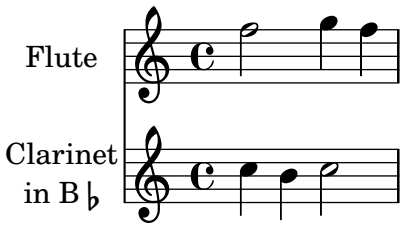




`\markup` can be used to create more complex instrument names:

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

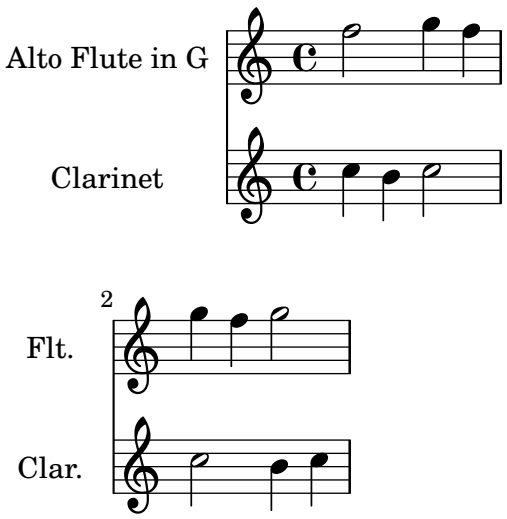


However, if the instrument names are longer, the instrument names in a staff group may not be centered unless the `indent` and `short-indent` settings are increased. For details about these settings, see [\paper variables for shifts and indents], page 501.

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

\layout {
```

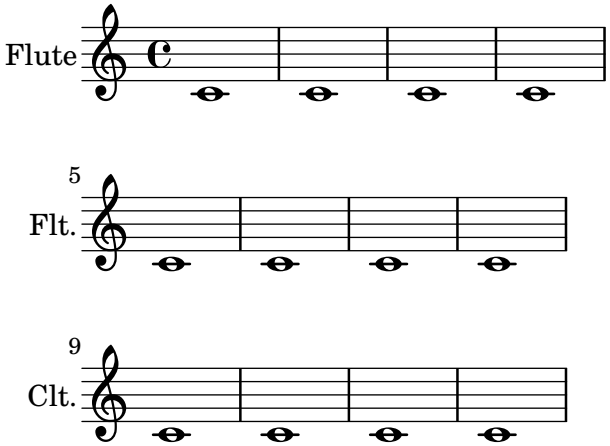
```
  indent = 3.0\cm
  short-indent = 1.5\cm
}
```

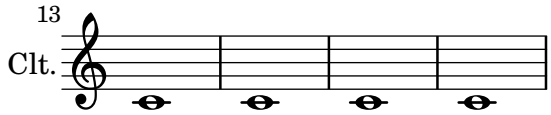


To add instrument names to other contexts (such as `ChordNames` or `FiguredBass`), `Instrument_name_engraver` must be added to that context. For details, see Section 5.1.4 [Modifying context plug-ins], page 553.

The `shortInstrumentName` may be changed in the middle of a piece. However, only the first instance of `instrumentName` will be printed and subsequent changes will be ignored:

```
\new Staff \with {
  instrumentName = #"Flute"
  shortInstrumentName = #"Flt."
}
{
  c1 c c c \break
  c1 c c c \break
  \set Staff.instrumentName = #"Clarinet"
  \set Staff.shortInstrumentName = #"Clt."
  c1 c c c \break
  c1 c c c \break
}
```

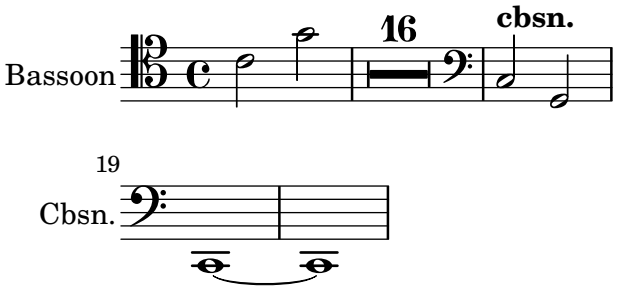




If an instrument *switch* is needed, `\addInstrumentDefinition` may be used in combination with `\instrumentSwitch` to create a detailed list of the necessary changes for the switch. The `\addInstrumentDefinition` command has two arguments: an identifying string, and an association list of context properties 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: [`\paper` variables for shifts and indents], page 501, Section 5.1.4 [Modifying context plug-ins], page 553.

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

Internals Reference: Section "InstrumentName" in *Internals Reference*, Section "PianoStaff" in *Internals Reference*, Section "Staff" in *Internals Reference*.

Quoting other voices

It is very common for one voice to use the same notes as those from another voice. For example, first and second violins playing the same phrase during a particular passage of the music. This is done by letting one voice *quote* the other, without having to re-enter the music all over again for the second voice.

The `\addQuote` command, used in the top level scope, defines a stream of music from which fragments can be quoted.
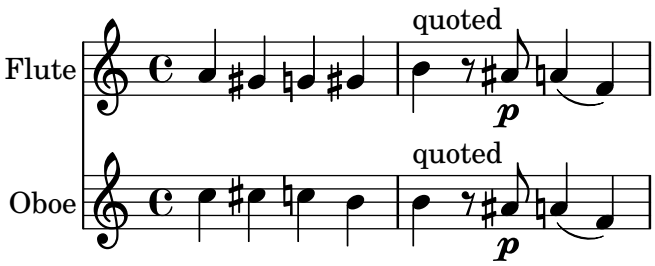
The `\quoteDuring` command is used to indicate the point where the quotation begins. It is followed by two arguments: the name of the quoted voice, as defined with `\addQuote`, and a music expression for the duration of the quote.

```
fluteNotes = \relative c'' {
  a4 gis g gis | b4^"quoted" r8 ais\p a4( f)
}

oboeNotes = \relative c'' {
  c4 cis c b \quoteDuring #"flute" { s1 }
}

\addQuote "flute" { \fluteNotes }

\score {
  <<
    \new Staff \with { instrumentName = "Flute" } \fluteNotes
    \new Staff \with { instrumentName = "Oboe" } \oboeNotes
  >>
}
```
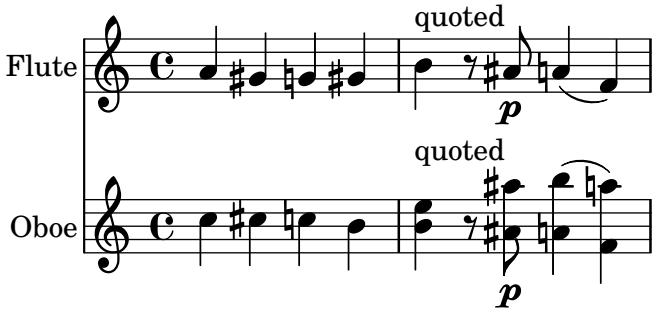


If the music expression used in `\quoteDuring` contains notes instead of spacer or multimeasure rests then the quote will appear as polyphony and may produce unexpected results.

```
fluteNotes = \relative c'' {
  a4 gis g gis | b4^"quoted" r8 ais\p a4( f)
}

oboeNotes = \relative c'' {
  c4 cis c b \quoteDuring #"flute" { e4 r8 ais b4 a }
}

\addQuote "flute" { \fluteNotes }

\score {
  <<
    \new Staff \with { instrumentName = "Flute" } \fluteNotes
    \new Staff \with { instrumentName = "Oboe" } \oboeNotes
  >>
}
```
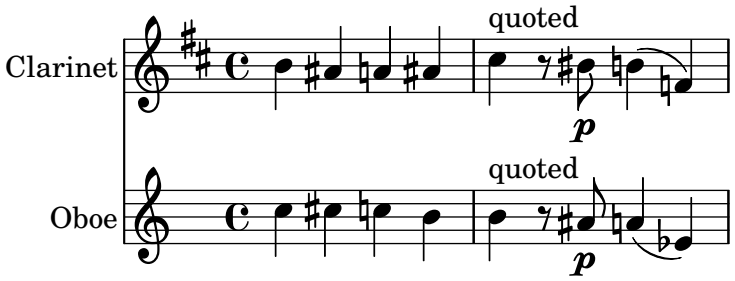


The `\quoteDuring` command uses the `\transposition` settings of both quoted and quoting parts to produce notes for the quoting part that have the same sounding pitch as those in the quoted part.

```
clarinetNotes = \relative c'' {
  \transposition bes
  \key d \major
  b4 ais a ais | cis4^"quoted" r8 bis\p b4( f)
}

oboeNotes = \relative c'' {
  c4 cis c b \quoteDuring #"clarinet" { s1 }
}

\addQuote "clarinet" { \clarinetNotes }


\score {
  <<
    \new Staff \with { instrumentName = "Clarinet" } \clarinetNotes
    \new Staff \with { instrumentName = "Oboe" } \oboeNotes
  >>
}
```
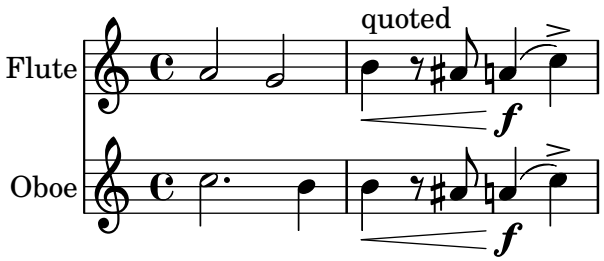


By default quoted music will include all articulations, dynamics, markups, etc., in the quoted expression. It is possible to choose which of these objects from the quoted music are displayed by using the `quotedEventTypes` context property.

```
fluteNotes = \relative c'' {
  a2 g2 |
  b4\<^"quoted" r8 ais a4\f( c->)
 }

oboeNotes = \relative c'' {
  c2. b4 |
  \quoteDuring #"flute" { s1 }
}
```

```
\addQuote "flute" { \fluteNotes }

\score {
  <<
    \set Score.quotedEventTypes = #'(note-event articulation-event
                                     crescendo-event rest-event
                                     slur-event dynamic-event)
    \new Staff \with { instrumentName = "Flute" } \fluteNotes
    \new Staff \with { instrumentName = "Oboe" } \oboeNotes
  >>
 }
```



Quotes can also be tagged, see [Using tags], page 475.

See also

Notation Reference: [Instrument transpositions], page 24, [Using tags], page 475.

Installed Files: ‘`scm/define-event-classes.scm`’.

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

Internals Reference: Section “Music classes” in *Internals Reference*, Section “QuoteMusic” in *Internals Reference*, Section “Voice” in *Internals Reference*.
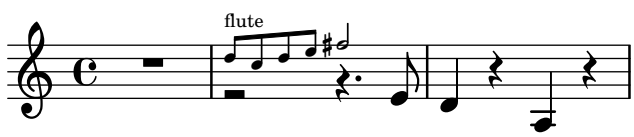
Known issues and warnings

Only the contents of the first `Voice` occurring in an `\addQuote` command will be considered for quotation, so if the music expression contains `\new` or `\context Voice` statements, their contents will not be quoted. Quoting grace notes is unsupported and may cause LilyPond to crash whereas quoting nested triplets may result in poor notation.

Formatting cue notes
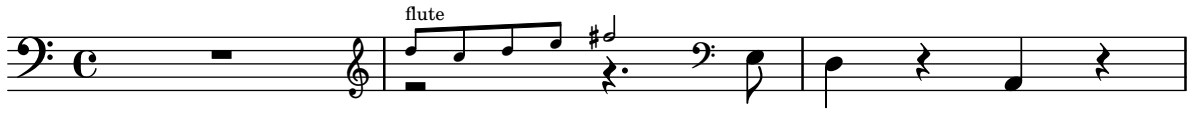
The simplest way to format cue notes is to explicitly create a `CueVoice` context within the part.

```
R1
<<
  { e2\rest r4. e8 }
  \new CueVoice {
    \stemUp d'8^"flute" c d e fis2
  }
>>
d,4 r a r
```
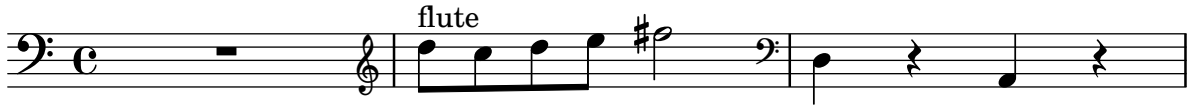


The `\cueClef` command can also be used with an explict `CueVoice` context if a change of clef is required and will print an appropriately sized clef for the cue notes. The `\cueClefUnset` command can then be used to switch back to the original clef, again with an appropriately sized clef.

```
\clef "bass"
R1
<<
  { e2\rest r4. \cueClefUnset e,8 }
  \new CueVoice {
    \cueClef "treble" \stemUp d''8^"flute" c d e fis2
  }
>>
d,,4 r a r
```



The `\cueClef` and `\cueClefUnset` command can also be used without a `CueVoice` if required.

```
\clef "bass"
R1
\cueClef "treble"
d'8^"flute" c d e fis2
\cueClefUnset
d,,4 r a r
```



For more complex cue note placement, e.g including transposition, or inserting cue notes from multiple music sources the `\cueDuring` or `\cueDuringWithClef` commands can be used. These are more specialized form of `\quoteDuring`, see [Quoting other voices], page 195 in the previous section.

The syntax is:

`\cueDuring #`*`quotename #direction #music`*

and

`\cueDuringWithClef #`*`quotename #direction #clef #music`*

The music from the corresponding measures of the *`quote name`* is added as a `CueVoice` context and occurs simultaneously with the *`music`*, which then creates a polyphonic situation. The *`direction`* takes the argument `UP` or `DOWN`, and corresponds to the first and second voices respectively, determining how the cue notes are printed in relation to the other voice.

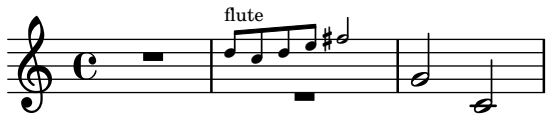
```
fluteNotes = \relative c'' {
  r2. c4 | d8 c d e fis2 | g2 d |
}

oboeNotes = \relative c'' {
  R1
  \new CueVoice { \set instrumentCueName = "flute" }
  \cueDuring #"flute" #UP { R1 }
```

```
  g2 c,
}

\addQuote "flute" { \fluteNotes }

\new Staff {
  \oboeNotes
}
```
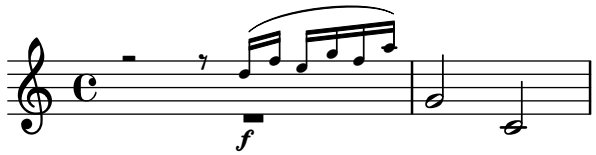


It is possible to adjust which aspects of the music are quoted with `\cueDuring` by setting the `quotedCueEventTypes` property. Its default value is `'(note-event rest-event tie-event beam-event tuplet-span-event)`, which means that only notes, rests, ties, beams and tuplets are quoted, but not articulations, dynamic marks, markup etc.

Note: When a `Voice` starts with `\cueDuring`, as in the following example, the `Voice` context must be explicitly declared, or else the entire music expression would belong to the `CueVoice` context.

```
oboeNotes = \relative c'' {
  r2 r8 d16(\f f e g f a)
  g8 g16 g g2.
}
\addQuote "oboe" { \oboeNotes }

\new Voice \relative c'' {
  \set Score.quotedCueEventTypes = #'(note-event rest-event tie-event
                                      beam-event tuplet-span-event
                                      dynamic-event slur-event)
  \cueDuring #"oboe" #UP { R1 }
  g2 c,
}
```



The name of the instrument playing the cue can be printed by setting the `instrumentCueName` property in a temporary `CueVoice` context. The placement and style of the `instrumentCueName` is controlled by the `InstrumentSwitch` object, see [Instrument names], page 192. If the cue notes require a change in clef, this can be done manually but the original clef should also be restored manually at the end of the cue notes.

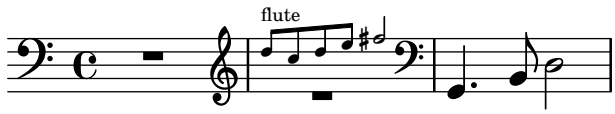
```
fluteNotes = \relative c'' {
  r2. c4 d8 c d e fis2 g2 d2
}

bassoonNotes = \relative c {
```

```
  \clef bass
  R1
  \clef treble
  \new CueVoice { \set instrumentCueName = "flute" }
  \cueDuring #"flute" #UP { R1 }
  \clef bass
  g4. b8 d2
}

\addQuote "flute" { \fluteNotes }

\new Staff {
  \bassoonNotes
}
```
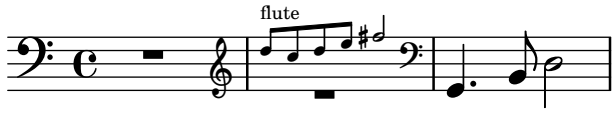


Alternatively, the `\cueDuringWithClef` function can be used instead. This command takes an extra argument to specify the change of clef that needs to be printed for the cue notes but will automatically print the original clef once the cue notes have finished.

```
fluteNotes = \relative c'' {
  r2. c4 d8 c d e fis2 g2 d2
}

bassoonNotes = \relative c {
  \clef bass
  R1
  \new CueVoice { \set instrumentCueName = "flute" }
  \cueDuringWithClef #"flute" #UP #"treble" { R1 }
  g4. b8 d2
}

\addQuote "flute" { \fluteNotes }

\new Staff {
  \bassoonNotes
}
```



Like `\quoteDuring`, `\cueDuring` takes instrument transpositions into account. Cue notes are produced at the pitches that would be written for the instrument receiving the cue to produce the sounding pitches of the source instrument.

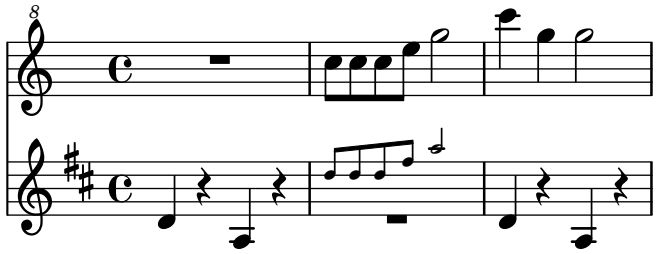
To transpose cue notes differently, use `\transposedCueDuring`. This command takes an extra argument to specify (in absolute mode) the printed pitch that you want to represent the sound of a concert middle C. This is useful for taking cues from an instrument in a completely different register.

```
piccoloNotes = \relative c''' {
  \clef "treble^8"
  R1
  c8 c c e g2
  c4 g g2
}

bassClarinetNotes = \relative c' {
  \key d \major
  \transposition bes,
  d4 r a r
  \transposedCueDuring #"piccolo" #UP d { R1 }
  d4 r a r
}

\addQuote "piccolo" { \piccoloNotes }

<<
  \new Staff \piccoloNotes
  \new Staff \bassClarinetNotes
>>
```



The `\killCues` command removes cue notes from a music expression, so the same music expression can be used to produce the instrument part with cues and the score. The `\killCues` command removes only the notes and events that were quoted by `\cueDuring`. Other markup associated with cues, such as clef changes and a label identifying the source instrument, can be tagged for selective inclusion in the score; see [Using tags], page 475.
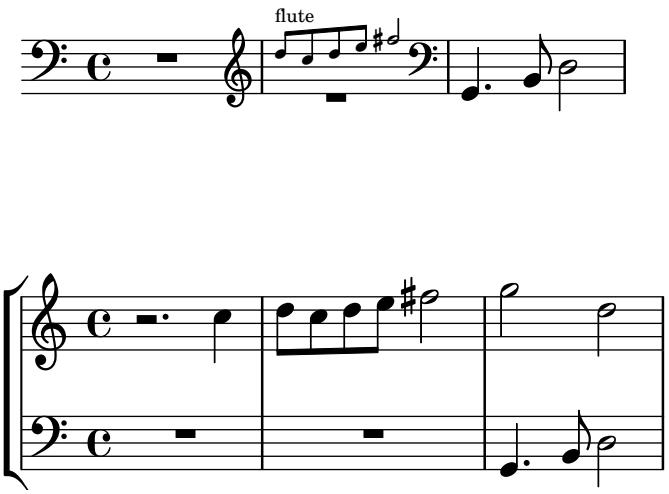
```
fluteNotes = \relative c'' {
  r2. c4 d8 c d e fis2 g2 d2
}

bassoonNotes = \relative c {
  \clef bass
  R1
  \tag #'part {
    \clef treble
    \new CueVoice { \set instrumentCueName = "flute" }
  }
  \cueDuring #"flute" #UP { R1 }
  \tag #'part \clef bass
  g4. b8 d2
}

\addQuote "flute" { \fluteNotes }
```

```
\new Staff {
  \bassoonNotes
}

\new StaffGroup <<
  \new Staff {
    \fluteNotes
  }
  \new Staff {
    \removeWithTag #'part { \killCues { \bassoonNotes } }
  }
>>
```



Alternatively, Clef changes and instrument labels can be collected into an instrument definition for repeated use, using `\addInstrumentDefinition` described in [Instrument names], page 192.

See also

Notation Reference: [Quoting other voices], page 195, [Instrument transpositions], page 24, [Instrument names], page 192, [Clef], page 16, [Musical cues], page 284, [Using tags], page 475.

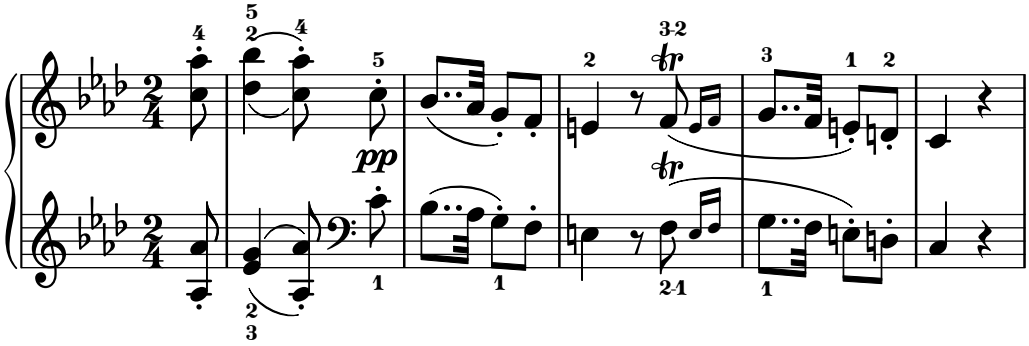
Snippets: Section “Staff notation” in *Snippets*.

Internals Reference: Section “CueVoice” in *Internals Reference*, Section “Voice” in *Internals Reference*.

Known issues and warnings

Collisions can occur with rests, when using `\cueDuring`, between `Voice` and `CueVoice` contexts. When using `\cueDuringWithClef` or `\transposedCueDuring` the extra argument required for each case must come after the quote and the direction.

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
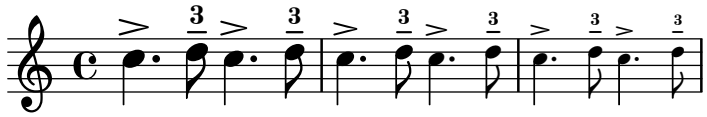
This section discusses how to add emphasis to elements that are inside the staff.

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 224.
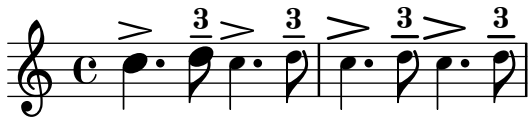
```
\huge
c4.-> d8---3
\large
c4.-> d8---3
\normalsize
c4.-> d8---3
\small
c4.-> d8---3
\tiny
c4.-> d8---3
\teeny
c4.-> d8---3
```



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
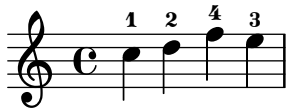
Snippets: Section "Editorial annotations" in *Snippets*.

Internals Reference: Section "font-interface" in *Internals Reference*.

Fingering instructions
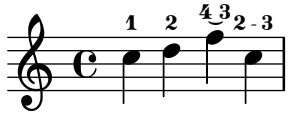
Fingering instructions can be entered using '*`note-digit`*':

```
c4-1 d-2 f-4 e-3
```
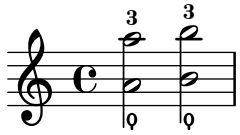


Markup texts or strings may be used for finger changes.

```
c4-1 d-2 f\finger \markup \tied-lyric #"4~3" c\finger "2 - 3"
```
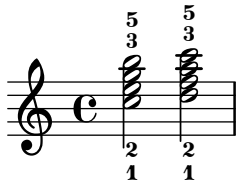


A thumb-script can be added (e.g. cello music) to indicate that a note should be played with the thumb.

```
<a_\thumb a'-3>2 <b_\thumb b'-3>
```



Fingerings for chords can also be added to individual notes by adding them after the pitches.

```
<c-1 e-2 g-3 b-5>2 <d-1 f-2 a-3 c-5>
```



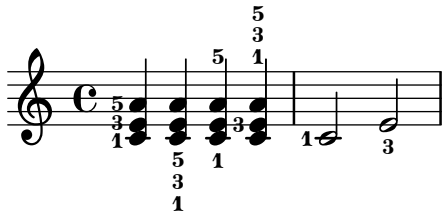
Fingering instructions may be manually placed above or below the staff, see Section 5.4.2 [Direction and placement], page 577.

Selected Snippets

Controlling the placement of chord fingerings

The placement of fingering numbers can be controlled precisely. For fingering orientation to apply, you must use a chord construct <> even if it is a single note.

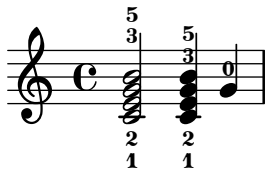
```
\relative c' {
  \set fingeringOrientations = #'(left)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(down)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(down right up)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(up)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(left)
  <c-1>2
  \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. Note: you must use a chord construct <>, even if it is only a single note.

```
\relative c' {
  <c-1 e-2 g-3 b-5>2
  \override Fingering.staff-padding = #'()
  <c-1 e-2 g-3 b-5>4 <g'-0>
}
```



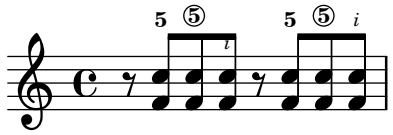
Avoiding collisions with chord fingerings

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 577.

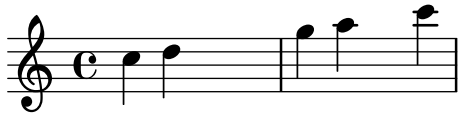
Snippets: Section "Editorial annotations" in *Snippets*.

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
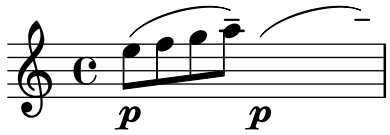
Hidden (or invisible or transparent) notes can be useful in preparing theory or composition exercises.

```
c4 d
\hideNotes
e4 f
\unHideNotes
g a
\hideNotes
b
\unHideNotes
c
```



Note heads, stems, and flags, and rests are invisible. Beams are invisible if they start on a hidden note. Objects that are attached to invisible notes are still visible.

```
e8(\p f g a)--
\hideNotes
e8(\p f g a)--
```



Predefined commands

`\hideNotes`, `\unHideNotes`.

See also

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

Notation Reference: [Invisible rests], page 54, Section 5.4.6 [Visibility of objects], page 584, [Hiding staves], page 189.

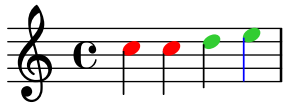
Snippets: Section "Editorial annotations" in *Snippets*.

Internals Reference: Section "Note_spacing_engraver" in *Internals Reference*, Section "NoteSpacing" in *Internals Reference*.

Coloring objects

Individual objects may be assigned colors. Valid color names are listed in the Section A.7 [List of colors], page 622.

```
\override NoteHead.color = #red
c4 c
\override NoteHead.color = #(x11-color 'LimeGreen)
d
\override Stem.color = #blue
e
```
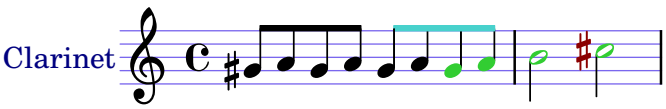


The full range of colors defined for X11 can be accessed by using the Scheme function `x11-color`. The function takes one argument; this can be a symbol in the form `'FooBar` or a string in the form `"FooBar"`. The first form is quicker to write and is more efficient. However, using the second form it 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")
```
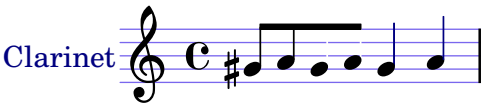
```
gis a
\override Accidental.color = #(x11-color 'DarkRed)
gis a
\override NoteHead.color = #(x11-color "LimeGreen")
gis a
% this is deliberate nonsense; note that the stems remain black
\override Stem.color = #(x11-color 'Boggle)
b2 cis
```



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 A.7 [List of colors], page 622, Section 5.3.4 [The tweak command], page 571.

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.
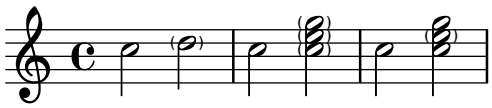
Not all X11 colors are distinguishable in a web browser, i.e., a web browser might not display a difference between `LimeGreen` and `ForestGreen`. For web use normal colors are recommended (i.e., `blue`, `green`, `red`).

Notes in a chord cannot be colored with `\override`; use `\tweak` instead, see Section 5.3.4 [The tweak command], page 571.

Parentheses
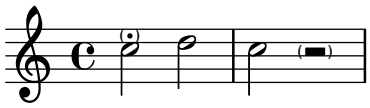
Objects may be parenthesized by prefixing `\parenthesize` to the music event. When prefixed to a chord, it parenthesizes every note. Individual notes inside a chord may also be parenthesized.

```
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.

Stems may be manually placed to point up or down; see Section 5.4.2 [Direction and placement], page 577.

Predefined commands
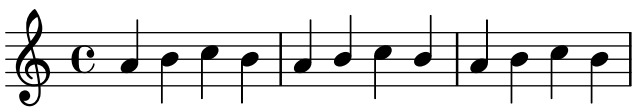
`\stemUp`, `\stemDown`, `\stemNeutral`.

Selected Snippets

Default direction of stems on the center line of the staff

The default direction of stems on the center line of the staff is set by the `Stem` property `neutral-direction`.

```
\relative c'' {
  a4 b c b
  \override Stem.neutral-direction = #up
  a4 b c b
  \override Stem.neutral-direction = #down
  a4 b c b
}
```
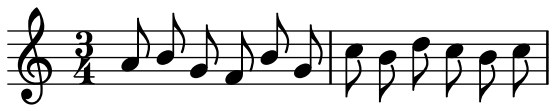


Automatically changing the stem direction of the middle note based on the melody

LilyPond can alter the stem direction of the middle note on a staff so that it follows the melody, by adding the `Melody_engraver` to the Voice context and overriding the `neutral-direction` of Stem.

```
\relative c'' {
  \time 3/4
  \autoBeamOff
  a8 b g f b g |
  c b d c b c
}

\layout {
  \context {
    \Voice
    \consists "Melody_engraver"
    \override Stem.neutral-direction = #'()
  }
}
```



See also

Notation Reference: Section 5.4.2 [Direction and placement], page 577.

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*.
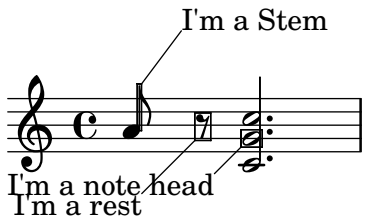
1.7.2 Outside the staff

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.

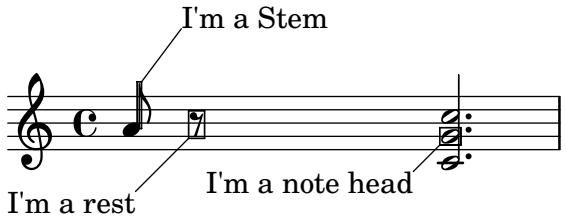
```
\new Voice \with { \consists "Balloon_engraver" }
{
  \balloonGrobText #'Stem #'(3 . 4) \markup { "I'm a Stem" }
  a8
  \balloonGrobText #'Rest #'(-4 . -4) \markup { "I'm a rest" }
  r
  <c, g'-\balloonText #'(-2 . -2) \markup { "I'm a note head" } c>2.
}
```



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 does not influence note spacing, but this can be altered:

```
\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
  \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

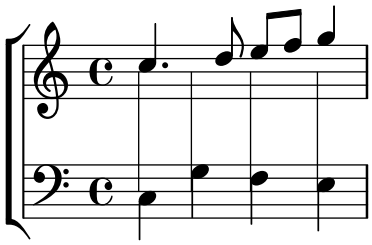
Vertical lines can be drawn between staves synchronized with the notes.

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
    }
  >>
}
```
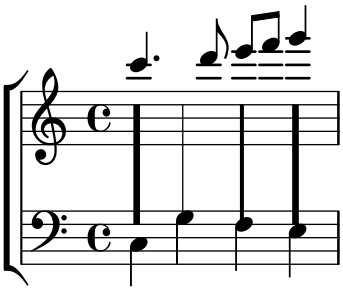


Selected Snippets

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
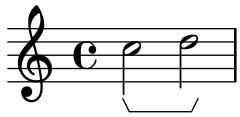
Snippets: Section “Editorial annotations” in *Snippets*.

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.
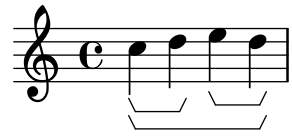
```
\layout {
  \context {
    \Voice
    \consists "Horizontal_bracket_engraver"
  }
}
\relative c'' {
  c2\startGroup
  d\stopGroup
}
```



Analysis brackets may be nested.

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

```
\relative c'' {
  c4\startGroup\startGroup
  d4\stopGroup
  e4\startGroup
  d4\stopGroup\stopGroup
}
```

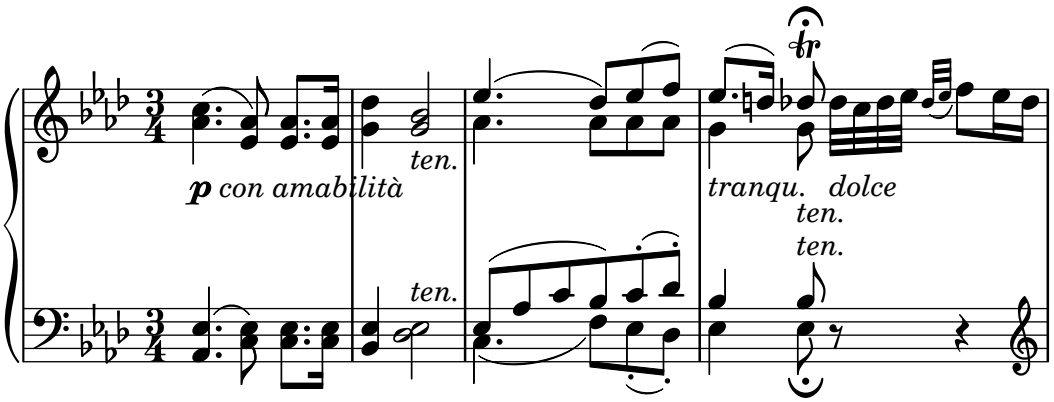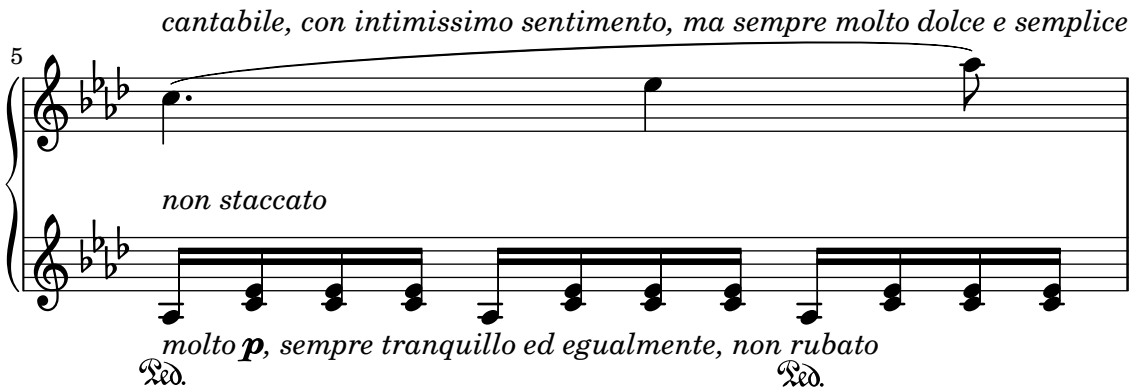


See also

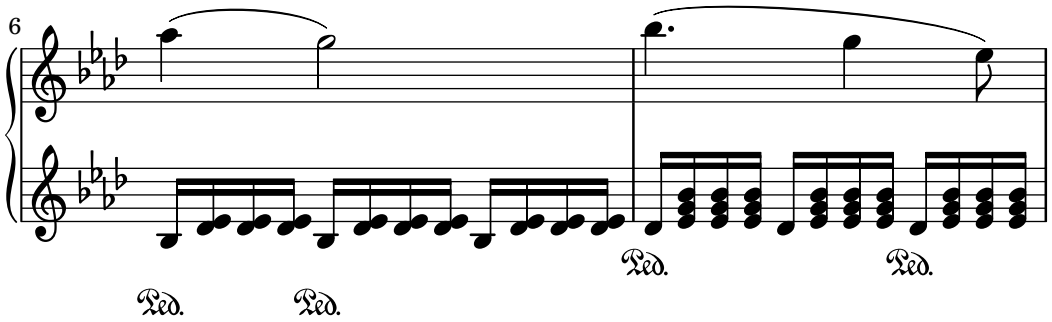
Snippets: Section "Editorial annotations" in *Snippets*.

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







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 239, Section 3.2 [Titles and headers], page 448.

1.8.1 Writing text

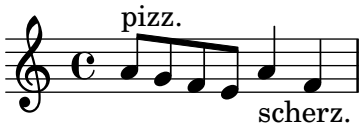
This section introduces different ways of adding text to a score.

Note: To write accented and special text (such as characters from other languages), simply insert the characters directly into the LilyPond file. The file must be saved as UTF-8. For more information, see [Text encoding], page 478.

Text scripts
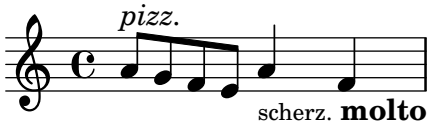
Simple "quoted text" indications may be added to a score, as demonstrated in the following example. Such indications may be manually placed above or below the staff, using the syntax described in Section 5.4.2 [Direction and placement], page 577.

```
a8^"pizz." g f e a4-"scherz." f
```
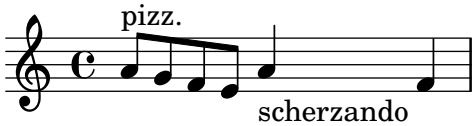


This syntax is actually a shorthand; more complex text formatting may be added to a note by explicitly using a `\markup` block, as described in Section 1.8.2 [Formatting text], page 223.

```
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
```



In addition to text scripts, articulations can be attached to notes. For more information, see [Articulations and ornamentations], page 111.

For more information about the relative ordering of text scripts and articulations, see Section "Placement of objects" in *Learning Manual*.

Predefined commands

`\textLengthOn`, `\textLengthOff`.

See also

Learning Manual: Section "Placement of objects" in *Learning Manual*.

Notation Reference: Section 1.8.2 [Formatting text], page 223, Section 5.4.2 [Direction and placement], page 577, [Articulations and ornamentations], page 111.

Snippets: Section "Text" in *Snippets*.

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

Known issues and warnings
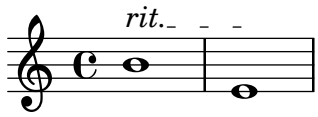
Checking to make sure that text scripts and lyrics are within the margins requires additonal calculations. In cases where slightly faster performance is desired, use

```
\override Score.PaperColumn.keep-inside-line = ##f
```

Text spanners

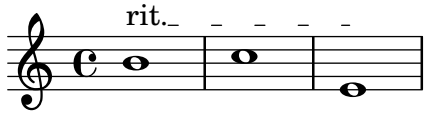
Some performance indications, e.g., *rallentando* or *accelerando*, are written as text and are extended over multiple notes with dotted lines. Such objects, called "spanners", may be created from one note to another using the following syntax:

```
\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 223.

```
\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 590.

Predefined commands

`\textSpannerUp`, `\textSpannerDown`, `\textSpannerNeutral`.

Known issues and warnings

LilyPond is only able to handle one text spanner per voice.
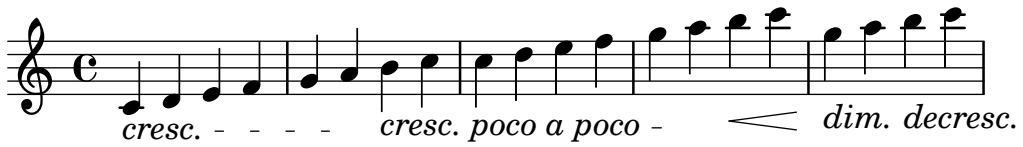
Selected Snippets

Dynamics text spanner postfix

Custom text spanners can be defined and used with hairpin and text crescendos. \< and \> produce hairpins by default, \cresc etc. produce text spanners by default.

```
% Some sample text dynamic spanners, to be used as postfix operators
crpoco =
#(make-music 'CrescendoEvent
             'span-direction START
             'span-type 'text
             'span-text "cresc. poco a poco")

\relative c' {
  c4\cresc d4 e4 f4 |
  g4 a4\! b4\crpoco c4 |
  c4 d4 e4 f4 |
  g4 a4\! b4\< c4 |
  g4\dim a4 b4\decresc c4\!
}
```



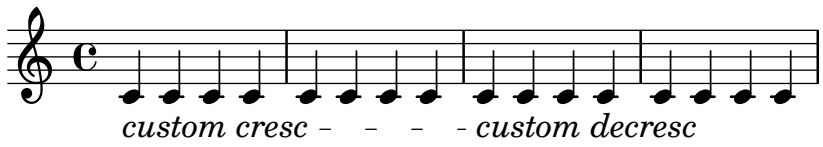
Dynamics custom text spanner postfix

Postfix functions for custom crescendo text spanners. The spanners should start on the first note of the measure. One has to use -\mycresc, otherwise the spanner start will rather be assigned to the next note.

```
% Two functions for (de)crescendo spanners where you can explicitly give the
% spanner text.
mycresc =
#(define-music-function (parser location mymarkup) (markup?)
   (make-music 'CrescendoEvent
               'span-direction START
               'span-type 'text
               'span-text mymarkup))
mydecresc =
#(define-music-function (parser location mymarkup) (markup?)
   (make-music 'DecrescendoEvent
               'span-direction START
               'span-type 'text
               'span-text mymarkup))

\relative c' {
  c4-\mycresc "custom cresc" c4 c4 c4 |
  c4 c4 c4 c4 |
  c4-\mydecresc "custom decresc" c4 c4 c4 |
  c4 c4\! c4 c4
```

```
}
```



See also

Notation Reference: Section 5.4.7 [Line styles], page 590, [Dynamics], page 114, Section 1.8.2 [Formatting text], page 223.
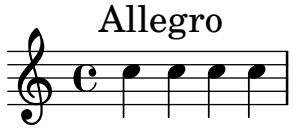
Snippets: Section "Text" in *Snippets*, Section "Expressive marks" in *Snippets*.

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

Text marks
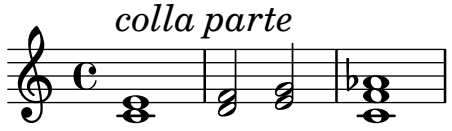
Various text elements may be added to a score using the syntax described in [Rehearsal marks], page 101:

```
c4
\mark "Allegro"
c c c
```
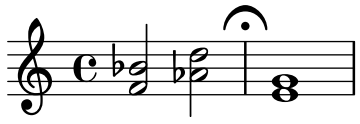


This syntax makes it possible to put any text on a bar line; more complex text formatting may be added using a `\markup` block, as described in Section 1.8.2 [Formatting text], page 223:

```
<c e>1
\mark \markup { \italic { colla parte } }
<d f>2 <e g>
<c f aes>1
```



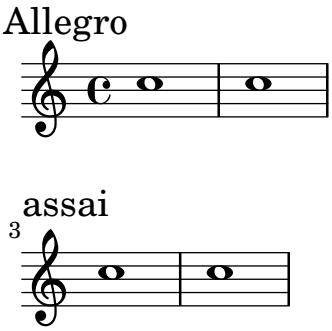
This syntax also allows to print special signs, like coda, segno or fermata, by specifying the appropriate symbol name as explained in [Music notation inside markup], page 233:

```
<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
```



Predefined commands
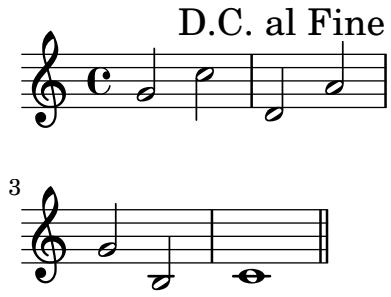
`\markLengthOn`, `\markLengthOff`.

Selected Snippets

Printing marks at the end of a line

Marks can be printed at the end of the current line, instead of the beginning of the following line. In such cases, it might be preferable to align the right end of the mark with the bar line.

```
\relative c'' {
  g2 c
  d,2 a'
  \once \override Score.RehearsalMark.break-visibility = #end-of-line-visible
  \once \override Score.RehearsalMark.self-alignment-X = #RIGHT
  \mark "D.C. al Fine"
  \break
  g2 b,
  c1 \bar "||"
}
```

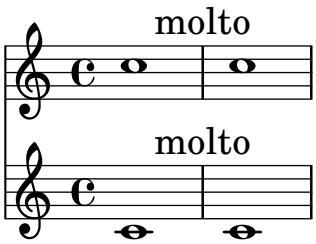


Printing marks on every staff

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 101, Section 1.8.2 [Formatting text], page 223, [Music notation inside markup], page 233, Section A.8 [The Feta font], page 624.

Snippets: Section "Text" in *Snippets*.

Internals Reference: Section "MarkEvent" in *Internals Reference*, Section "Mark_engraver" in *Internals Reference*, Section "RehearsalMark" in *Internals Reference*.

Separate text

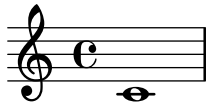
A `\markup` block can exist by itself, outside of any `\score` block, as a "top-level expression". This syntax is described in Section 3.1.5 [File structure], page 446.

```
\markup {
  Tomorrow, and tomorrow, and tomorrow...
}
```

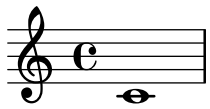
Tomorrow, and tomorrow, and tomorrow...

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 443.

```
\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 235.

Predefined commands

`\markup`, `\markuplist`.

Selected Snippets

Stand-alone two-column markup

Stand-alone text may be arranged in several columns using `\markup` commands:

```
\markup {
  \fill-line {
    \hspace #1
    \column {
      \line { O sacrum convivium }
      \line { in quo Christus sumitur, }
      \line { recolitur memoria passionis ejus, }
      \line { mens impletur gratia, }
      \line { futurae gloriae nobis pignus datur. }
      \line { Amen. }
    }
    \hspace #2
    \column \italic {
      \line { O sacred feast }
      \line { in which Christ is received, }
      \line { the memory of His Passion is renewed, }
      \line { the mind is filled with grace, }
      \line { and a pledge of future glory is given to us. }
      \line { Amen. }
    }
    \hspace #1
  }
}
```

O sacrum convivium
in quo Christus sumitur,
recolitur memoria passionis ejus,
mens impletur gratia,
futurae gloriae nobis pignus datur.
Amen.

O sacred feast
in which Christ is received,
the memory of His Passion is renewed,
the mind is filled with grace,
and a pledge of future glory is given to us.
Amen.

See also

Notation Reference: Section 1.8.2 [Formatting text], page 223, Section 3.1.5 [File structure], page 446, Section 3.1.2 [Multiple scores in a book], page 443, [Multi-page markup], page 235.

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.

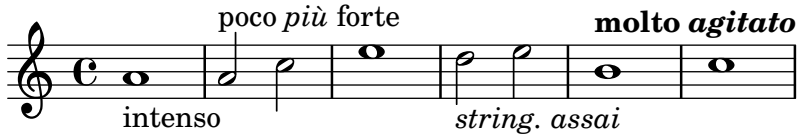
Text markup introduction

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.
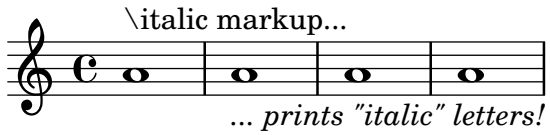
Unlike simple "quoted text" indications, `\markup` blocks may contain nested expressions or markup commands, entered using the backslash `\` character. Such commands only affect the first following expression.

```
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.

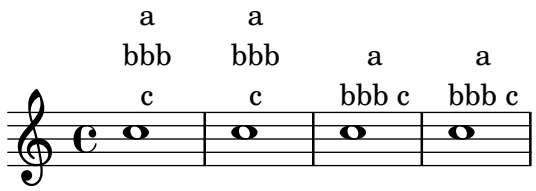
```
a1^"\italic markup..."
a_\markup { \italic "... prints \"italic\" letters!" }
a a
```



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 } } }
```
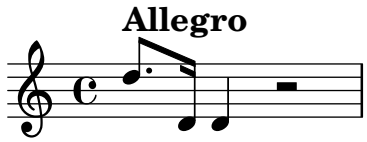
```
c1^\markup { \center-column { a "bbb c" } }
```



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 A.10 [Text markup commands], page 645.

See also

Notation Reference: Section A.10 [Text markup commands], page 645.

Snippets: Section “Text” in *Snippets*.

Installed Files: ‘`scm/markup.scm`’.
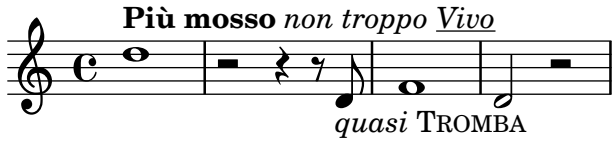
Known issues and warnings

Syntax errors for markup mode can be confusing.

Selecting font and font size

Basic font switching is supported in markup mode:

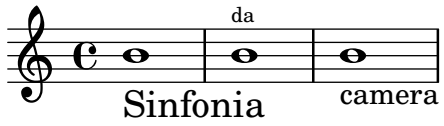
```
d1^\markup {
  \bold { Più mosso }
  \italic { non troppo \underline Vivo }
}
r2 r4 r8
d,_\markup { \italic quasi \smallCaps Tromba }
f1 d2 r
```



The font size can be altered, relative to the global staff size, in a number of different ways

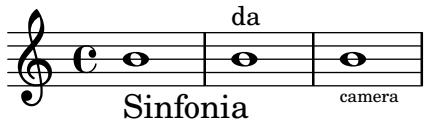
It can be set to predefined size,

```
b1_\markup { \huge Sinfonia }
b1^\markup { \teeny da }
b1-\markup { \normalsize camera }
```



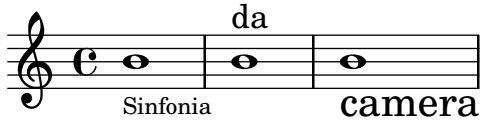
It can be set relative to its previous value,

```
b1_\markup { \larger Sinfonia }
b1^\markup { \smaller da }
b1-\markup { \magnify #0.6  camera }
```



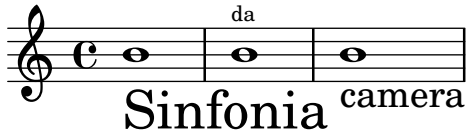
It can be increased or decreased relative to the value set by the global staff size,

```
b1_\markup { \fontsize #-2 Sinfonia }
b1^\markup { \fontsize #1 da }
b1-\markup { \fontsize #3 camera }
```



It can also be set to a fixed point-size, regardless of the global staff size,

```
b1_\markup { \abs-fontsize #20 Sinfonia }
b1^\markup { \abs-fontsize #8 da }
b1-\markup { \abs-fontsize #14 camera }
```



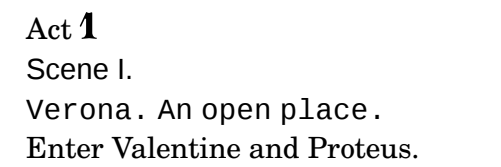
Text may be printed as subscript or superscript. By default these are printed in a smaller size, but a normal size can be used as well:

```
\markup {
  \column {
    \line { 1 \super st movement }
    \line { 1 \normal-size-super st movement
      \sub { (part two) }  }
  }
}
```

1 st movement
1 st movement (part two)

The markup mode provides an easy way to select alternate font families. The default serif font, of roman type, is automatically selected unless specified otherwise; on the last line of the following example, there is no difference between the first and the second word.

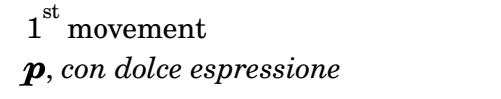
```
\markup {
  \column {
    \line { Act \number 1 }
    \line { \sans { Scene I. } }
    \line { \typewriter { Verona. An open place. } }
    \line { Enter \roman Valentine and Proteus. }
  }
}
```



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 119 and [Manual repeat marks], page 145.

When used inside a word, some font-switching or formatting commands may produce an unwanted blank space. This can easily be solved by concatenating the text elements together:

```
\markup {
  \column {
    \line {
      \concat { 1 \super st }
      movement
    }
    \line {
      \concat { \dynamic p , }
      \italic { con dolce espressione }
    }
  }
}
```



An exhaustive list of font switching commands and custom font usage commands can be found in Section A.10.1 [Font], page 645.

Defining custom font sets is also possible, as explained in Section 1.8.3 [Fonts], page 236.

Predefined commands

`\teeny`, `\tiny`, `\small`, `\normalsize`, `\large`, `\huge`, `\smaller`, `\larger`.

See also

Notation Reference: Section A.10.1 [Font], page 645, [New dynamic marks], page 119, [Manual repeat marks], page 145, Section 1.8.3 [Fonts], page 236.

Installed Files: '`scm/define-markup-commands.scm`'.

Snippets: Section "Text" in *Snippets*.

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

Known issues and warnings
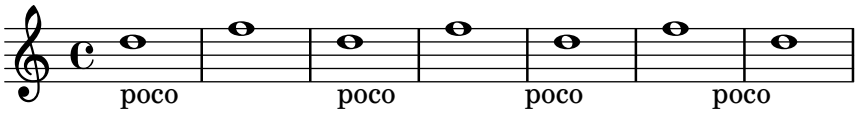
Using the font sizing commands `\teeny`, `\tiny`, `\small`, `\normalsize`, `\large`, and `\huge` will lead to inconsistent line spacing compared to using `\fontsize`.

Text alignment

This subsection discusses how to place text in markup mode. Markup objects can also be moved as a whole, using the syntax described in Section "Moving objects" in *Learning Manual*.

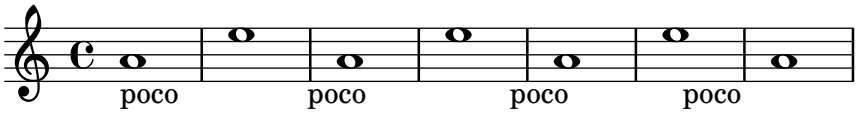
Markup objects may be aligned in different ways. By default, a text indication is aligned on its left edge: in the following example, there is no difference between the first and the second markup.

```
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 }
```

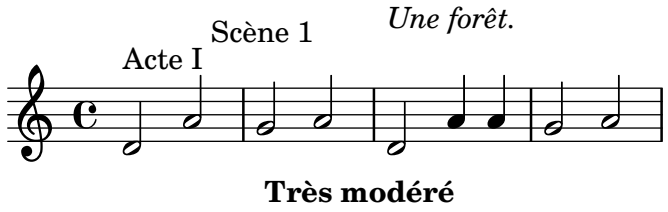


Some objects may have alignment procedures of their own, and therefore are not affected by these commands. It is possible to move such markup objects as a whole, as shown for instance in [Text marks], page 219.

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.

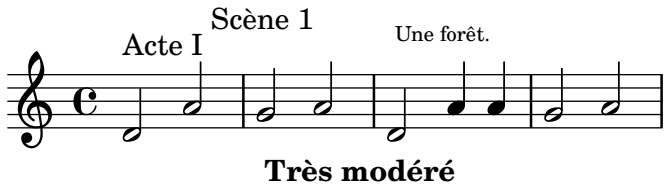
```
d2^\markup {
  Acte I
  \raise #2 { Scène 1 }
}
a'
g_\markup {
  \null
```

```
  \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 A.10.2 [Align], page 654.

See also

Learning Manual: Section “Moving objects” in *Learning Manual*.

Notation Reference: Section A.10.2 [Align], page 654, [Text marks], page 219.

Installed Files: ‘`scm/define-markup-commands.scm`’.

Snippets: Section “Text” in *Snippets*.

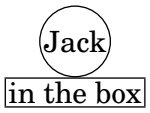
Internals Reference: Section “TextScript” in *Internals Reference*.

Graphic notation inside markup

Various graphic objects may be added to a score, using markup commands.

Some markup commands allow decoration of text elements with graphics, as demonstrated in the following example.

```
\markup \fill-line {
  \center-column {
    \circle Jack
    \box "in the box"
    \null
    \line {
      Erik Satie
      \hspace #3
      \bracket "1866 - 1925"
    }
    \null
    \rounded-box \bold Prelude
  }
}
```

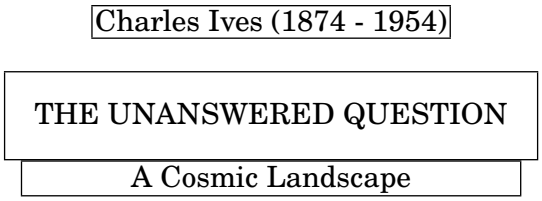


Erik Satie [1866 - 1925]

Prelude

Some commands may require an increase in the padding around the text; this is achieved with some markup commands exhaustively described in Section A.10.2 [Align], page 654.

```
\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."
}
```

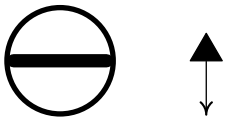


Other graphic elements or symbols may be printed without requiring any text. As with any markup expression, such objects can be combined.

```
\markup {
  \combine
    \draw-circle #4 #0.4 ##f
    \filled-box #'(-4 . 4) #'(-0.5 . 0.5) #1
  \hspace #5

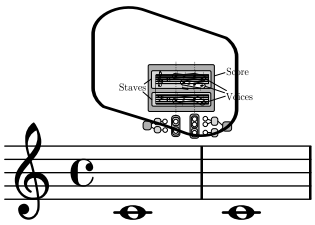
  \center-column {
```

```
    \triangle ##t
    \combine
      \draw-line #'(0 . 4)
      \arrow-head #Y #DOWN ##f
  }
}
```



Advanced graphic features include the ability to include external image files converted to the Encapsulated PostScript format (*eps*), or to directly embed graphics into the input file, using native PostScript code. In such a case, it may be useful to explicitly specify the size of the drawing, as demonstrated below:

```
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 A.10.3 [Graphic], page 669.

See also

Notation Reference: Section A.10.3 [Graphic], page 669, Section 1.7 [Editorial annotations], page 204, Section A.10.2 [Align], page 654.

Installed Files: ‘`scm/define-markup-commands.scm`’, ‘`scm/stencil.scm`’.

Snippets: Section “Text” in *Snippets*.

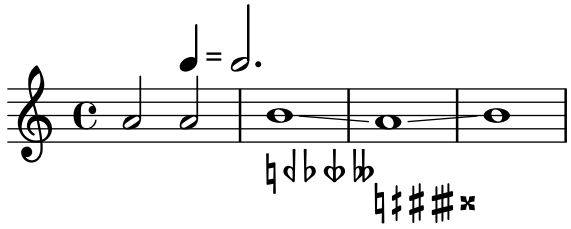
Internals Reference: Section “TextScript” in *Internals Reference*.

Music notation inside markup

Various musical notation elements may be added to a score, inside a markup object.

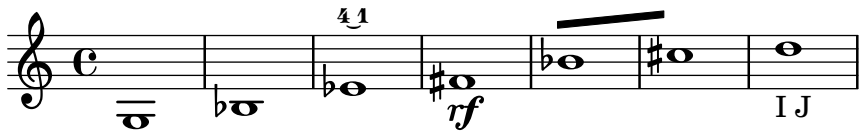
Notes and accidentals can be entered using markup commands:

```
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:

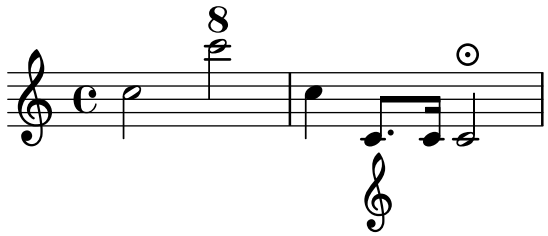
```
g1 bes
ees\finger \markup \tied-lyric #"4~1"
fis_\markup { \dynamic rf }
bes^\markup {
  \beam #8 #0.1 #0.5
}
cis
d-\markup {
  \markalphabet #8
  \markletter #8
}
```



More generally, any available musical symbol may be included separately in a markup object, as demonstrated below; an exhaustive list of these symbols and their names can be found in Section A.8 [The Feta font], page 624.

```
c2
c'^\markup { \musicglyph #"eight" }
c,4
c,8._\markup { \musicglyph #"clefs.G_change" }
```

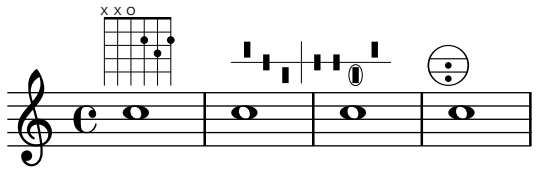
```
c16
c2^\markup { \musicglyph #"timesig.neomensural94" }
```



Another way of printing non-text glyphs is described in [Fonts explained], page 236. This is useful for printing braces of various sizes.

The markup mode also supports diagrams for specific instruments:
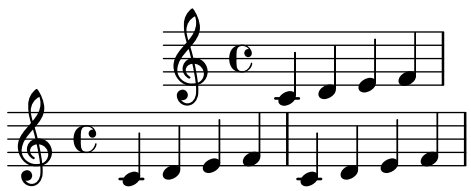
```
c1^\markup {
  \fret-diagram-terse #"x;x;o;2;3;2;"
}
c^\markup {
  \harp-pedal #"^-v|--ov^"
}
c
c^\markup {
  \combine
    \musicglyph #"accordion.discant"
    \combine
      \raise #0.5 \musicglyph #"accordion.dot"
      \raise #1.5 \musicglyph #"accordion.dot"
}
```



Such diagrams are documented in Section A.10.5 [Instrument Specific Markup], page 682.

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 A.10.4 [Music], page 676.

See also

Notation Reference: Section A.10.4 [Music], page 676, Section A.8 [The Feta font], page 624, [Fonts explained], page 236.

Installed Files: 'scm/define-markup-commands.scm', 'scm/fret-diagrams.scm', 'scm/harp-pedals.scm'.

Snippets: Section "Text" in *Snippets*.

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

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:

```
\markuplist {
  \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 A.11 [Text markup list commands], page 696.

See also

Notation Reference: Section A.11 [Text markup list commands], page 696.

Extending LilyPond: Section "New markup list command definition" in *Extending*.

Installed Files: 'scm/define-markup-commands.scm'.

Snippets: Section "Text" in *Snippets*.

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

Predefined commands

`\markuplist`.

1.8.3 Fonts

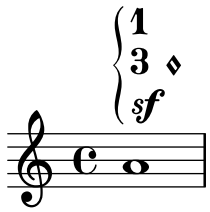
This section presents the way fonts are handled, and how they may be changed in scores.

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 . fetaText)
    \column { 1 3 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 233.

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 590.
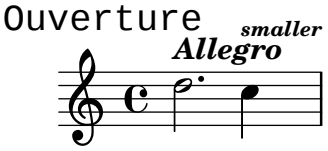
Three families of text fonts are made available: the *roman* (serif) font, that defaults to New Century Schoolbook, the *sans* font and the monospaced *typewriter* font – these last two families are determined by the Pango installation.

Note: There are no default fonts associated with the *sans* and *typewriter* font-families. An input file that specifies either of these can lead to different output on different computers. To ensure consistent output among multiple platforms, fonts must be specified by name, and those fonts must be available on any system that processes the file. See [Single entry fonts], page 237 and [Entire document fonts], page 238.

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 224:

```
\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
    }
  }
}
```



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 237 and [Entire document fonts], page 238.

See also
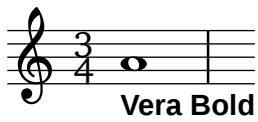
Notation Reference: Section A.8 [The Feta font], page 624, [Music notation inside markup], page 233, Section 5.4.8 [Rotating objects], page 590, [Selecting font and font size], page 224, Section A.10.1 [Font], page 645.

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 = #"Bitstream 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
```

See also

Notation Reference: [Fonts explained], page 236, [Entire document fonts], page 238.

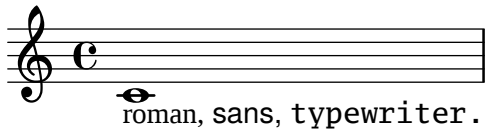
Snippets: Section "Text" in *Snippets*.

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, which automatically scales the fonts with the value set for the global staff size. For an explanation of fonts, see [Fonts explained], page 236.

```
\paper  {
  #(define fonts
    (make-pango-font-tree "Times New Roman"
                          "Nimbus Sans"
                          "Luxi Mono"
                          (/ staff-height pt 20)))
}

\relative c'{
  c1-\markup {
    roman,
    \sans sans,
    \typewriter typewriter. }
}
```



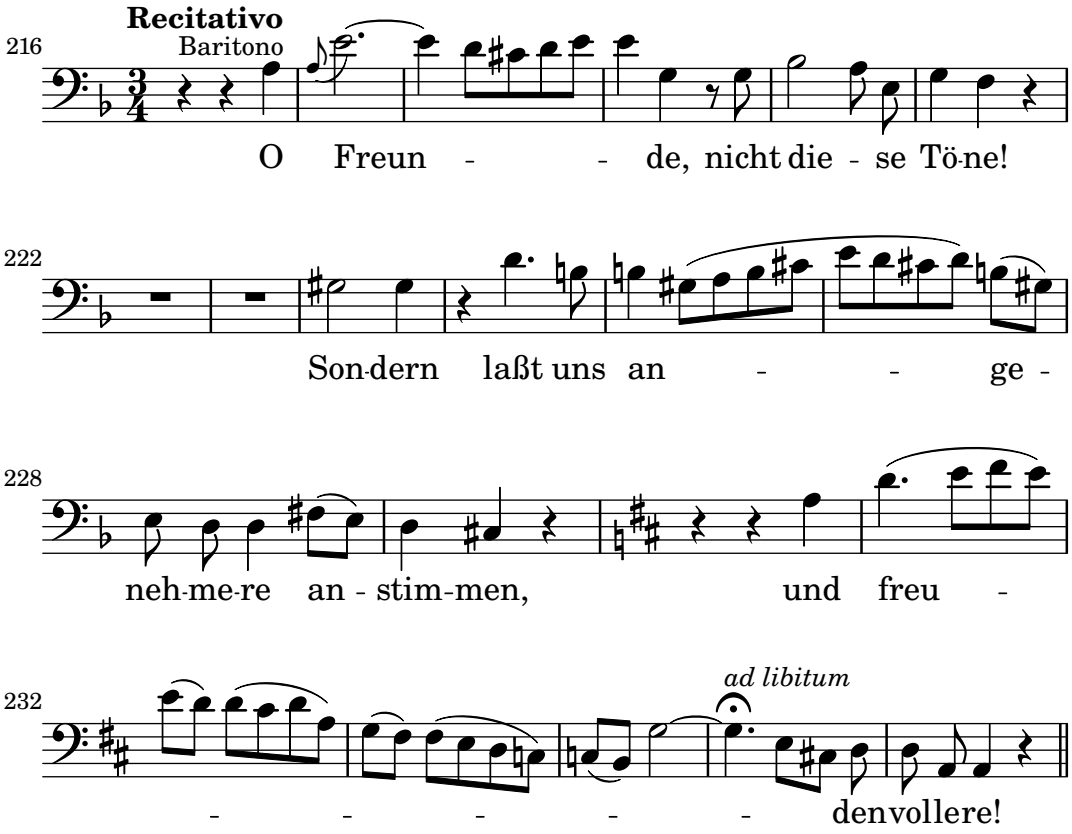
See also

Notation Reference: [Fonts explained], page 236, [Single entry fonts], page 237, [Selecting font and font size], page 224, Section A.10.1 [Font], page 645.

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 common to most types of vocal music.

References for vocal music

This section indicates where to find details of notation issues that may arise in any type of vocal music.

- Most styles of vocal music use written text as lyrics. An introduction to this notation is to be found in Section “Setting simple songs” in *Learning Manual*.
- Vocal music is likely to require the use of `markup` mode, either for lyrics or for other text elements (characters’ names, etc.) This syntax is described in [Text markup introduction], page 223.
- *Ambitus* may be added at the beginning of vocal staves, as explained in [Ambitus], page 32.
- Dynamic markings by default are placed below the staff, but in choral music they are usually placed above the staff in order to avoid the lyrics, as explained in [Score layouts for choral], page 279.

See also

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

Learning Manual: Section “Setting simple songs” in *Learning Manual*.

Notation Reference: [Text markup introduction], page 223, [Ambitus], page 32, [Score layouts for choral], page 279.

Snippets: Section “Vocal music” in *Snippets*.

Entering lyrics

Lyrics are entered in a special input mode, which can be introduced by the keyword `\lyricmode`, or by using `\addlyrics` or `\lyricsto`. In this special input mode, the input `d` is not parsed as the pitch *D*, but rather as a one-letter syllable of text. In other words, syllables are entered like notes but with pitches replaced by text.

For example:

```
\lyricmode { Three4 blind mice,2 three4 blind mice2 }
```

There are two main methods for specifying the horizontal placement of the syllables, either by specifying the duration of each syllable explicitly, as in the example above, or by leaving the lyrics to be aligned automatically to a melody or other voice of music, using `\addlyrics` or `\lyricsto`. The former method is described below in [Manual syllable durations], page 245. The latter method is described in [Automatic syllable durations], page 243.

A word or syllable of lyrics begins with an alphabetic character (plus some other characters, see below) and is terminated by any white space or a digit. Later characters in the syllable can be any character that is not a digit or white space.

Because any character that is not a digit or white space is regarded as part of the syllable, a word is valid even if it ends with `}`, which often leads to the following mistake:
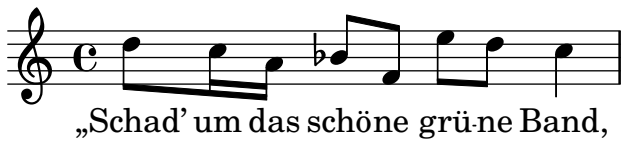
```
\lyricmode { lah lah lah}
```

In this example, the `}` is included in the final syllable, so the opening brace is not balanced and the input file will probably not compile. Instead, braces should always be surrounded with white space:

```
\lyricmode { lah lah lah }
```
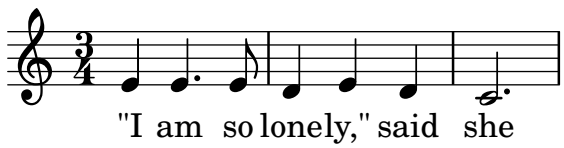
Punctuation, lyrics with accented characters, characters from non-English languages, or special characters (such as the heart symbol or slanted quotes), may simply be inserted directly into the input file, providing it is saved with UTF-8 encoding. For more information, see Section 3.3.3 [Special characters], page 478.

```
\relative c'' { d8 c16 a bes8 f e' d c4 }
\addlyrics { „Schad’ um das schö -- ne grü -- ne Band, }
```



Normal quotes may be used in lyrics, but they have to be preceded with a backslash character and the whole syllable has to be enclosed between additional quotes. For example,

```
\relative 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 is one that begins with an alphabetic character, `_`, `?`, `!`, `:`, `'`, the control characters `^A` through `^F`, `^Q` through `^W`, `^Y`, `^^`, any 8-bit character with an ASCII code over 127, or a two-character combination of a backslash followed by one of `` ` ``, `'`, `"`, or `^`.

Great control over the appearance of lyrics comes from using `\markup` inside the lyrics themselves. For explanation of many options, see Section 1.8.2 [Formatting text], page 223.

Selected Snippets

Formatting lyrics syllables

Markup mode may be used to format individual syllables in lyrics.

```
mel = \relative c'' { c4 c c c }
lyr = \lyricmode {
  Lyrics \markup { \italic can } \markup { \with-color #red contain }
  \markup { \fontsize #8 \bold Markup! }
}

<<
  \new Voice = melody \mel
  \new Lyrics \lyricsto melody \lyr
>>
```



See also

Learning Manual: Section “Songs” in *Learning Manual*.

Notation Reference: [Automatic syllable durations], page 243, Section 1.8.3 [Fonts], page 236, Section 1.8.2 [Formatting text], page 223, Section 5.4.1 [Input modes], page 575, [Manual syllable durations], page 245, Section 3.3.3 [Special characters], page 478.

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

Snippets: Section “Text” in *Snippets*.

Aligning lyrics to a melody

Lyrics are printed by interpreting them in the context called `Lyrics`, see Section 5.1.1 [Contexts explained], page 545.

```
\new Lyrics \lyricmode { ... }
```

Lyrics can be aligned with melodies in two main ways:

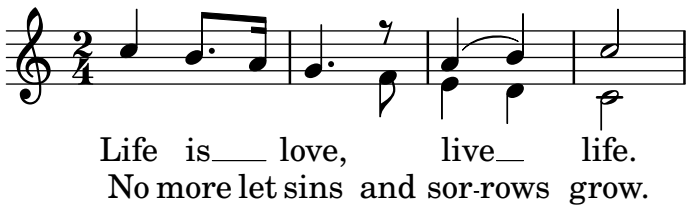
- Lyrics can be aligned automatically, with the durations of the syllables being taken from another voice of music or (in special circumstances) an associated melody, using `\addlyrics`, `\lyricsto`, or by setting the `associatedVoice` property. For more details, see [Automatic syllable durations], page 243.

  ```
  <<
    \new Staff <<
      \time 2/4
      \new Voice = "one" \relative c'' {
  ```

```
      \voiceOne
      c4 b8. a16 g4. r8 a4 ( b ) c2
    }
    \new Voice = "two" \relative c' {
      \voiceTwo
       s2 s4. f8 e4 d c2
    }
  >>

% takes durations and alignment from notes in "one"
  \new Lyrics \lyricsto "one" {
    Life is __ _ love, live __ life.
  }

% takes durations and alignment from notes in "one" initially
% then switches to "two"
  \new Lyrics \lyricsto "one" {
    No more let
    \set associatedVoice = "two"  % must be set one syllable early
    sins and sor -- rows grow.
  }
>>
```



The first stanza shows the normal way of entering lyrics.

The second stanza shows how the voice from which the lyric durations are taken can be changed. This is useful if the words to different stanzas fit the notes in different ways and all the durations are available in Voice contexts. For more details, see Section 2.1.3 [Stanzas], page 270.
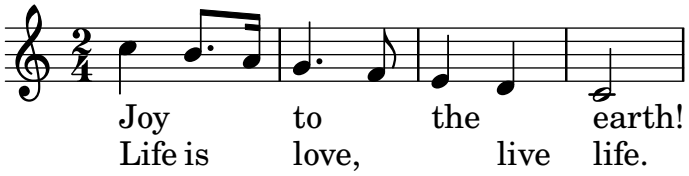
- Lyrics can be aligned independently of the duration of any notes if the durations of the syllables are specified explicitly, and entered with `\lyricmode`.

```
<<
  \new Voice = "one" \relative c'' {
    \time 2/4
    c4 b8. a16 g4. f8 e4 d c2
  }

% uses previous explicit duration of 2;
  \new Lyrics \lyricmode {
    Joy to the earth!
  }

% explicit durations, set to a different rhythm
  \new Lyrics \lyricmode {
    Life4 is love,2. live4 life.2
  }
```

```
>>
```



The first stanza is not aligned with the notes because the durations were not specified, and the previous value of 2 is used for each word.

The second stanza shows how the words can be aligned quite independently from the notes. This is useful if the words to different stanzas fit the notes in different ways and the required durations are not available in a music context. For more details see [Manual syllable durations], page 245. This technique is also useful when setting dialogue over music; for examples showing this, see [Dialogue over music], page 288.

When entered in this way the words are left-aligned to the notes by default, but may be center-aligned to the notes of a melody by specifying an associated voice, if one exists. For details, see [Manual syllable durations], page 245.

See also

Learning Manual: Section "Aligning lyrics to a melody" in *Learning Manual*.

Notation Reference: Section 5.1.1 [Contexts explained], page 545, [Automatic syllable durations], page 243, Section 2.1.3 [Stanzas], page 270, [Manual syllable durations], page 245, [Dialogue over music], page 288, [Manual syllable durations], page 245.

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

Automatic syllable durations

Lyrics can be automatically aligned to the notes of a melody in three ways:

- by specifying the named Voice context containing the melody with `\lyricsto`,
- by introducing the lyrics with `\addlyrics` and placing them immediately after the Voice context containing the melody,
- by setting the `associatedVoice` property, the alignment of the lyrics may be switched to a different named Voice context at any musical moment.

In all three methods hyphens can be drawn between the syllables of a word and extender lines can be drawn beyond the end of a word. For details, see [Extenders and hyphens], page 251.
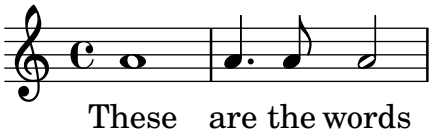
The `Voice` context containing the melody to which the lyrics are being aligned must not have "died", or the lyrics after that point will be lost. This can happen if there are periods when that voice has nothing to do. For methods of keeping contexts alive, see Section 5.1.3 [Keeping contexts alive], page 550.

Using `\lyricsto`

Lyrics can be aligned under a melody automatically by specifying the named Voice context containing the melody with `\lyricsto`:

```
<<
  \new Voice = "melody" {
    a1 a4. a8 a2
  }
  \new Lyrics \lyricsto "melody" {
    These are the words
```

```
  }
>>
```



This aligns the lyrics to the notes of the named `Voice` context, which must already exist. Therefore normally the `Voice` context is specified first, followed by the `Lyrics` context. The lyrics themselves follow the `\lyricsto` command. The `\lyricsto` command invokes lyric mode automatically, so the `\lyricmode` keyword may be omitted. By default, the lyrics are placed underneath the notes. For other placements, see [Placing lyrics vertically], page 253.

Using `\addlyrics`

The `\addlyrics` command is just a convenient shortcut that can sometimes be used instead of having to set up the lyrics through a more complicated LilyPond structure.
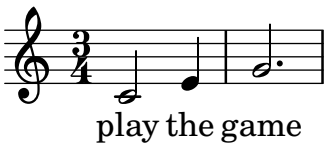
```
{ MUSIC }
\addlyrics { LYRICS }
```

is the same as

```
\new Voice = "blah" { MUSIC }
\new Lyrics \lyricsto "blah" { LYRICS }
```
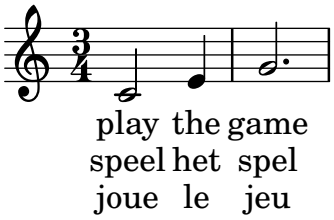
Here is an example,

```
{
  \time 3/4
  \relative c' { 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 polyphonic settings. Also, it cannot be used to associate lyrics to a `TabVoice`. For these cases one should use `\lyricsto`.

Using associatedVoice
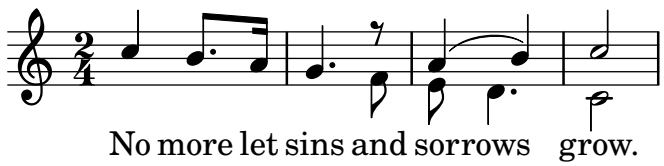
The melody to which the lyrics are being aligned can be changed by setting the `associatedVoice` property,

```
\set associatedVoice = #"lala"
```

The value of the property (here: `"lala"`) should be the name of a `Voice` context. For technical reasons, the `\set` command must be placed one syllable before the one to which the change in voice is to apply.

Here is an example demonstrating its use:

```
<<
  \new Staff <<
    \time 2/4
    \new Voice = "one" \relative c'' {
      \voiceOne
      c4 b8. a16 g4. r8 a4 ( b ) c2
    }
    \new Voice = "two" \relative c' {
      \voiceTwo
       s2 s4. f8 e8 d4. c2
    }
  >>
% takes durations and alignment from notes in "one" initially
% then switches to "two"
  \new Lyrics \lyricsto "one" {
    No more let
    \set associatedVoice = "two"  % must be set one syllable early
    sins and sor -- rows grow.
  }
>>
```



See also

Notation Reference: [Extenders and hyphens], page 251, Section 5.1.3 [Keeping contexts alive], page 550, [Placing lyrics vertically], page 253.

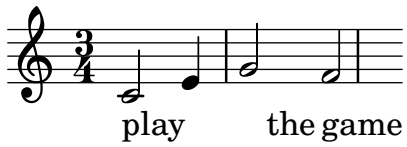
Manual syllable durations

In some complex vocal music, it may be desirable to place lyrics completely independently of notes. In this case do not use `\lyricsto` or `\addlyrics` and do not set `associatedVoice`. Syllables are entered like notes – but with pitches replaced by text – and the duration of each syllable is entered explicitly after the syllable.

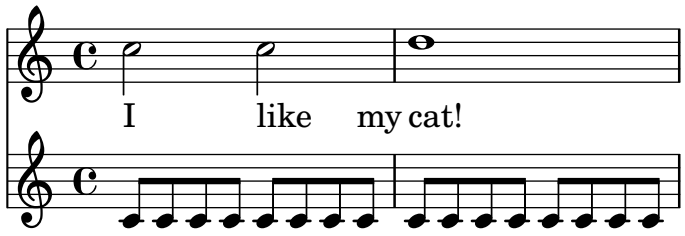
By default, syllables will be left-aligned to the corresponding musical moment. Hyphenated lines may be drawn between syllables as usual, but extender lines cannot be drawn when there is no associated voice.

Here are two examples:

```
<<
  \new Voice = "melody" {
    \time 3/4
    c2 e4 g2 f
  }
  \new Lyrics \lyricmode {
    play1 the4 game4
  }
>>
```




```
<<
  \new Staff {
    \relative c'' {
      c2 c2
      d1
    }
  }
  \new Lyrics {
    \lyricmode {
      I2 like4. my8 cat!1
    }
  }
  \new Staff {
    \relative c' {
      c8 c c c c c c c
      c8 c c c c c c c
    }
  }
>>
```
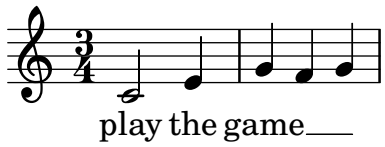


This technique is useful when writing dialogue over music, see [Dialogue over music], page 288.

To center-align syllables on the notes at the corresponding musical moments, set `associatedVoice` to the name of the Voice context containing those notes. When `associatedVoice` is set, both double hyphens and double underscores can be used to draw hyphenated lines and extenders under melismata correctly.

```
<<
  \new Voice = "melody" {
    \time 3/4
    c2 e4 g f g
```

```
  }
  \new Lyrics \lyricmode {
    \set associatedVoice = #"melody"
    play2 the4 game2. __
  }
>>
```



See also

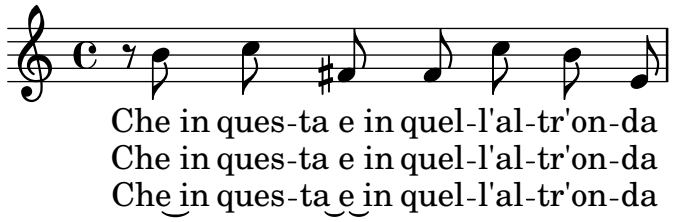
Notation Reference: [Dialogue over music], page 288.

Internals Reference: Section “Lyrics” in *Internals Reference*, Section “Voice” in *Internals Reference*.

Multiple syllables to one note

In order to assign more than one syllable to a single note with spaces between the syllables, you can surround the phrase with quotes or use a _ character. Alternatively, you can use the tilde symbol (~) to get a lyric tie.

```
{
  { \autoBeamOff
    r8 b c fis, fis c' b e,
  }
  \addlyrics
  {
    \override LyricHyphen.minimum-distance = #1.0 % Ensure hyphens are visible
    Che_in ques -- ta_e_in quel -- l'al -- tr'on -- da
  }
  \addlyrics { "Che in" ques -- "ta e in" quel -- l'al -- tr'on -- da }
  \addlyrics { Che~in ques -- ta~e~in quel -- l'al -- tr'on -- da }
}
```



See also

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

Multiple notes to one syllable

Sometimes, particularly in Medieval and baroque music, several notes are sung on one syllable; this is called melisma, see Section “melisma” in *Music Glossary*. The syllable to a melisma is usually left-aligned with the first note of the melisma.
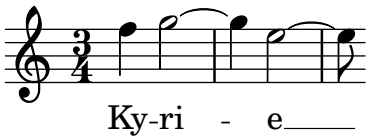
When a melisma occurs on a syllable other than the last one in a word, that syllable is usually joined to the following one with a hyphenated line. This is indicated by placing a double hyphen, `--`, immediately after the syllable.

Alternatively, when a melisma occurs on the last or only syllable in a word an extender line is usually drawn from the end of the syllable to the last note of the melisma. This is indicated by placing a double underscore, `__`, immediately after the word.

There are five ways in which melismata can be indicated:

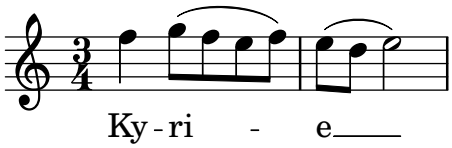
- Melismata are created automatically over notes which are tied together:

```
<<
  \new Voice = "melody" {
    \time 3/4
    f4 g2 ~ |
    g4 e2 ~ |
    e8
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- e __
  }
>>
```



- Melismata can be created automatically from the music by placing slurs over the notes of each melisma. This is the usual way of entering lyrics:

```
<<
  \new Voice = "melody" {
    \time 3/4
    f4 g8 ( f e f )
    e8 ( d e2 )
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- e __
  }
>>
```
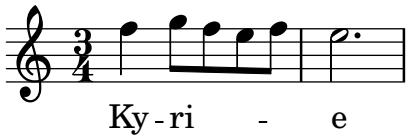


  Note that phrasing slurs do not affect the creation of melismata.

- Notes are considered a melisma if they are manually beamed, providing automatic beaming is switched off. See [Setting automatic beam behavior], page 78.

```
<<
  \new Voice = "melody" {
    \time 3/4
    \autoBeamOff
    f4 g8[ f e f]
```
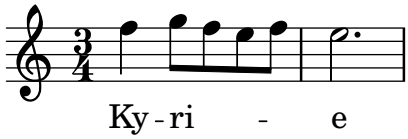
```
    e2.
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- e
  }
>>
```



Clearly this is not suited to melismata over notes which are longer than eighth notes.
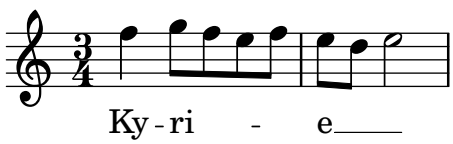
- An unslurred group of notes will be treated as a melisma if they are bracketed between `\melisma` and `\melismaEnd`.

```
<<
  \new Voice = "melody" {
    \time 3/4
    f4 g8
    \melisma
    f e f
    \melismaEnd
    e2.
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- e
  }
>>
```
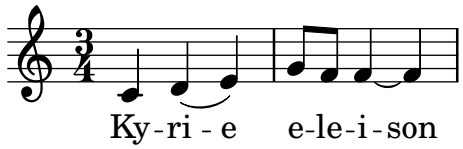


- A melisma can be defined entirely in the lyrics by entering a single underscore character, `_`, for every extra note that has to be added to the melisma.

```
<<
  \new Voice = "melody" {
    \time 3/4
    f4 g8 f e f
    e8 d e2
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- _ _ _ e __ _ _
  }
>>
```



It is possible to have ties, slurs and manual beams in the melody without their indicating melismata. To do this, set `melismaBusyProperties`:

```
<<
  \new Voice = "melody" {
    \time 3/4
    \set melismaBusyProperties = #'()
    c4 d ( e )
    g8 [ f ] f4 ~ f
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- e e -- le -- i -- son
  }
>>
```
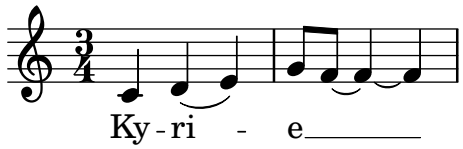


Other settings for `melismaBusyProperties` can be used to selectively include or exclude ties, slurs, and beams from the automatic detection of melismata; see `melismaBusyProperties` in Section "Tunable context properties" in *Internals Reference*.

Alternatively, if all melismata indications are to be ignored, `ignoreMelismata` may be set true; see [Stanzas with different rhythms], page 271.

If a melisma is required during a passage in which `melismaBusyProperties` is active, it may be indicated by placing a single underscore in the lyrics for each note which should be included in the melisma:

```
<<
  \new Voice = "melody" {
    \time 3/4
    \set melismaBusyProperties = #'()
    c4 d ( e )
    g8 [ f ] ~ f4 ~ f
  }
  \new Lyrics \lyricsto "melody" {
    Ky -- ri -- _ e __ _ _ _
  }
>>
```



Predefined commands

`\autoBeamOff`, `\autoBeamOn`, `\melisma`, `\melismaEnd`.

See also

Musical Glossary: Section "melisma" in *Music Glossary*.

Learning Manual: Section "Aligning lyrics to a melody" in *Learning Manual*.

Notation Reference: [Aligning lyrics to a melody], page 241, [Automatic syllable durations], page 243, [Setting automatic beam behavior], page 78, [Stanzas with different rhythms], page 271.

Internals Reference: Section “Tunable context properties” in *Internals Reference*.

Known issues and warnings

Extender lines under melismata are not created automatically; they must be inserted manually with a double underscore.

Extenders and hyphens

In the last syllable of a word, melismata are sometimes indicated with a long horizontal line starting in the melisma syllable, and ending in the next one. Such a line is called an extender line, and it is entered as ‘ `__` ’ (note the spaces before and after the two underscore characters).

Note: Melismata are indicated in the score with extender lines, which are entered as one double underscore; but short melismata can also be entered by skipping individual notes, which are entered as single underscore characters; these do not make an extender line to be typeset by default.

Centered hyphens are entered as ‘ `--` ’ between syllables of a same word (note the spaces before and after the two hyphen characters). The hyphen will be centered between the syllables, and its length will be adjusted depending on the space between the syllables.

In tightly engraved music, hyphens can be removed. Whether this happens can be controlled with the `minimum-distance` (minimum distance between two syllables) and the `minimum-length` (threshold below which hyphens are removed) properties of `LyricHyphen`.

See also

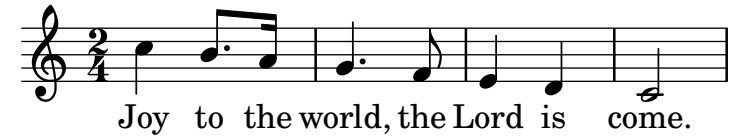
Internals Reference: Section “LyricExtender” in *Internals Reference*, Section “LyricHyphen” in *Internals Reference*.

2.1.2 Techniques specific to lyrics

Working with lyrics and variables

Variables containing lyrics can be created, but the lyrics must be entered in lyric mode:

```
musicOne = \relative c'' {
  c4 b8. a16 g4. f8 e4 d c2
}
verseOne = \lyricmode {
  Joy to the world, the Lord is come.
}
\score {
  <<
    \new Voice = "one" {
      \time 2/4
      \musicOne
    }
    \new Lyrics \lyricsto "one" {
      \verseOne
    }
  >>
}
```
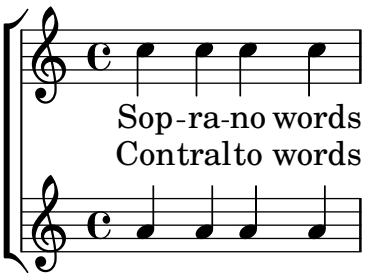


Durations do not need to be added if the variable is to be invoked with `\addlyrics` or `\lyricsto`.

For different or more complex orderings, the best way is to define the music and lyric variables first, then set up the hierarchy of staves and lyrics, omitting the lyrics themselves, and then add the lyrics using `\context` underneath. This ensures that the voices referenced by `\lyricsto` have always been defined earlier. For example:

```
sopranoMusic = \relative c'' { c4 c c c }
contraltoMusic = \relative c'' { a4 a a a }
sopranoWords = \lyricmode { Sop -- ra -- no words }
contraltoWords = \lyricmode { Con -- tral -- to words }

\score {
  \new ChoirStaff <<
    \new Staff {
      \new Voice = "sopranos" {
        \sopranoMusic
      }
    }
    \new Lyrics = "sopranos"
    \new Lyrics = "contraltos"
    \new Staff {
      \new Voice = "contraltos" {
        \contraltoMusic
      }
    }
    \context Lyrics = "sopranos" {
      \lyricsto "sopranos" {
        \sopranoWords
      }
    }
    \context Lyrics = "contraltos" {
      \lyricsto "contraltos" {
        \contraltoWords
      }
    }
  >>
}
```



See also

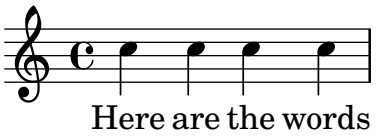
Notation Reference: [Placing lyrics vertically], page 253.

Internals Reference: Section "LyricCombineMusic" in *Internals Reference*, Section "Lyrics" in *Internals Reference*.

Placing lyrics vertically

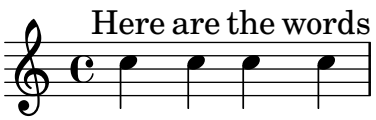
Depending on the type of music, lyrics may be positioned above the staff, below the staff, or between staves. Placing lyrics below the associated staff is the easiest, and can be achieved by simply defining the Lyrics context below the Staff context:

```
\score {
  <<
    \new Staff {
      \new Voice = "melody" {
        \relative c'' { c4 c c c }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Here are the words
      }
    }
  >>
}
```



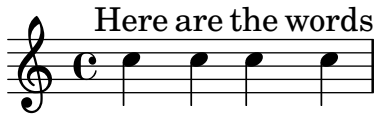
Lyrics may be positioned above the staff using one of two methods. The simplest (and preferred) method is to use the same syntax as above and explicitly specify the position of the lyrics:

```
\score {
  <<
    \new Staff = "staff" {
      \new Voice = "melody" {
        \relative c'' { c4 c c c }
      }
    }
    \new Lyrics \with { alignAboveContext = "staff" } {
      \lyricsto "melody" {
        Here are the words
      }
    }
  >>
}
```



Alternatively, a two-step process may be used. First the Lyrics context is declared (without any content) before the Staff and Voice contexts, then the `\lyricsto` command is placed after the Voice declaration it references by using `\context`, as follows:

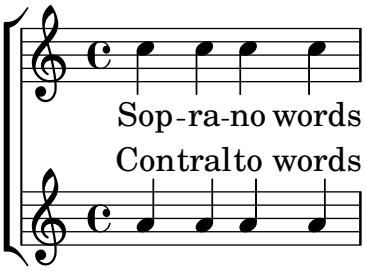
```
\score {
  <<
    \new Lyrics = "lyrics" \with {
      % lyrics above a staff should have this override
      \override VerticalAxisGroup.staff-affinity = #DOWN
    }
    \new Staff {
      \new Voice = "melody" {
        \relative c'' { c4 c c c }
      }
    }
    \context Lyrics = "lyrics" {
      \lyricsto "melody" {
        Here are the words
      }
    }
  >>
}
```



When there are two voices on separate staves the lyrics may be placed between the staves using either of these methods. Here is an example of the second method:

```
\score {
  \new ChoirStaff <<
    \new Staff {
      \new Voice = "sopranos" {
        \relative c'' { c4 c c c }
      }
    }
    \new Lyrics = "sopranos"
    \new Lyrics = "contraltos" \with {
      % lyrics above a staff should have this override
      \override VerticalAxisGroup.staff-affinity = #DOWN
    }
    \new Staff {
      \new Voice = "contraltos" {
        \relative c'' { a4 a a a }
      }
    }
    \context Lyrics = "sopranos" {
      \lyricsto "sopranos" {
        Sop -- ra -- no words
      }
    }
    \context Lyrics = "contraltos" {
      \lyricsto "contraltos" {
        Con -- tral -- to words
      }
    }
```

```
  >>
}
```



Other combinations of lyrics and staves may be generated by elaborating these examples, or by examining the templates in the Learning Manual, see Section "Vocal ensembles templates" in *Learning Manual*.

Selected Snippets

Obtaining 2.12 lyrics spacing in newer versions

The vertical spacing engine changed for version 2.14. This can cause lyrics to be spaced differently. It is possible to set properties for `Lyric` and `Staff` contexts to get the spacing engine to behave as it did in version 2.12.

```
global = {
  \key d \major
  \time 3/4
}

sopMusic = \relative c' {
  % VERSE ONE
  fis4 fis fis | \break
  fis4. e8 e4
}
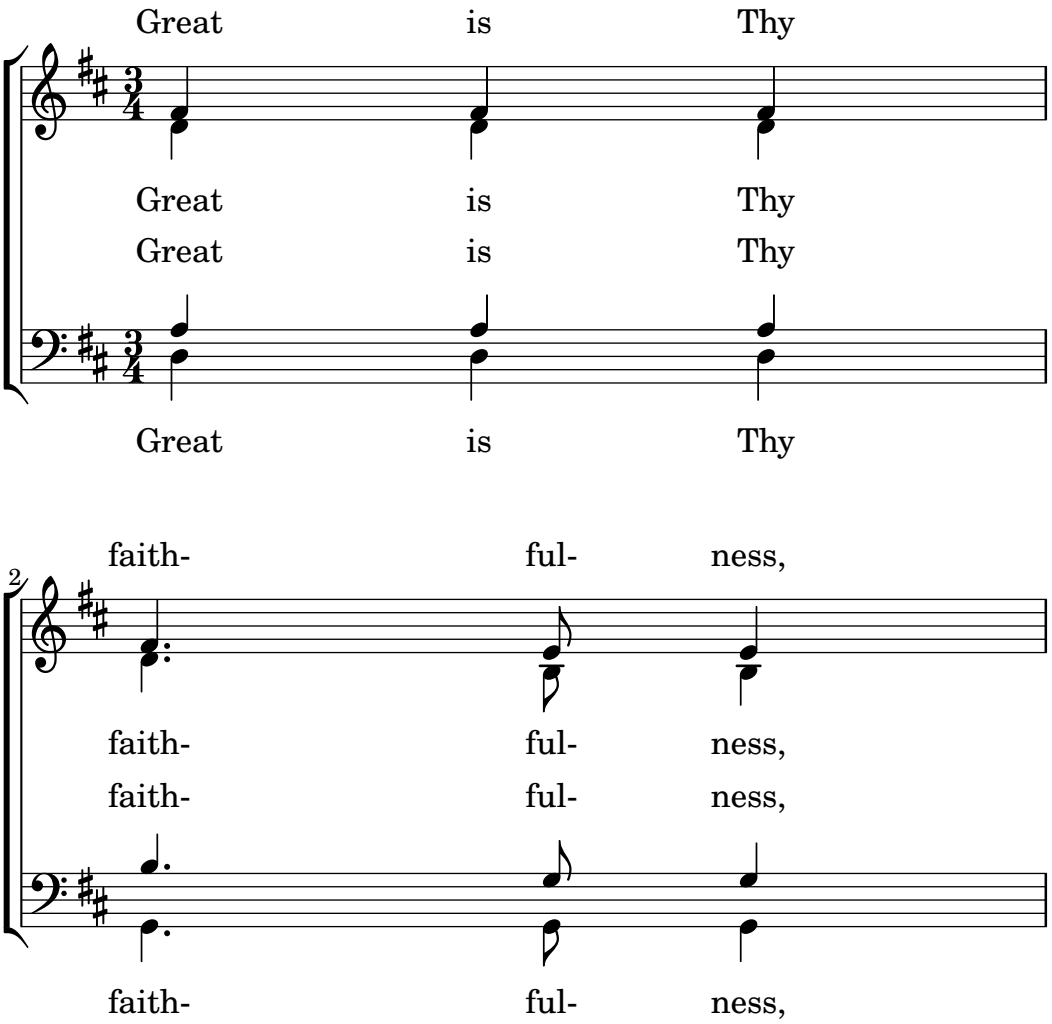
altoMusic = \relative c' {
  % VERSE ONE
  d4 d d |
  d4. b8 b4 |
}

tenorMusic = \relative c' {
  a4 a a |
  b4. g8 g4 |
}

bassMusic = \relative c {
  d4 d d |
  g,4. g8 g4 |
}

words = \lyricmode {
  Great is Thy faith- ful- ness,
}
```

```
\score {
  \new ChoirStaff <<
    \new Lyrics = sopranos
    \new Staff = women <<
      \new Voice = "sopranos" {
        \voiceOne
        \global \sopMusic
      }
      \new Voice = "altos" {
        \voiceTwo
        \global \altoMusic
      }
    >>
    \new Lyrics = "altos"
    \new Lyrics = "tenors"
    \new Staff = men <<
      \clef bass
      \new Voice = "tenors" {
        \voiceOne
        \global \tenorMusic
      }
      \new Voice = "basses" {
        \voiceTwo  \global \bassMusic
      }
    >>
    \new Lyrics = basses
    \context Lyrics = sopranos \lyricsto sopranos \words
    \context Lyrics = altos \lyricsto altos \words
    \context Lyrics = tenors \lyricsto tenors \words
    \context Lyrics = basses \lyricsto basses \words
  >>
  \layout {
    \context {
      \Lyrics
      \override VerticalAxisGroup.staff-affinity = ##f
      \override VerticalAxisGroup.staff-staff-spacing =
        #'((basic-distance . 0)
           (minimum-distance . 2)
           (padding . 2))
    }
    \context {
      \Staff
      \override VerticalAxisGroup.staff-staff-spacing =
        #'((basic-distance . 0)
           (minimum-distance . 2)
           (padding . 2))
    }
  }
}
```



See also
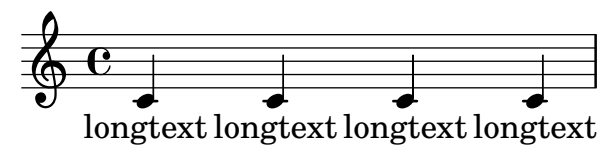
Learning Manual: Section “Vocal ensembles templates” in *Learning Manual*.
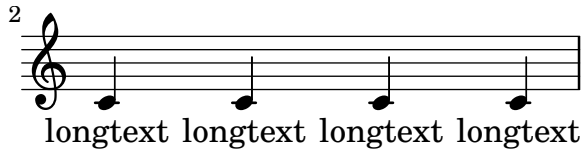
Notation Reference: Section 5.1.7 [Context layout order], page 562, Section 5.1.2 [Creating and referencing contexts], page 547.

Placing syllables horizontally

To increase the spacing between lyrics, set the `minimum-distance` property of `LyricSpace`.
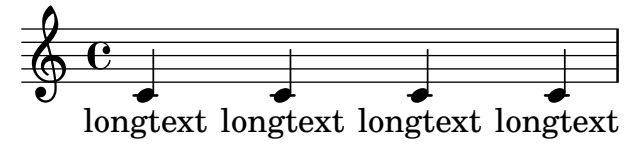
```
{
  c c c c
  \override Lyrics.LyricSpace.minimum-distance = #1.0
  c c c c
}
\addlyrics {
  longtext longtext longtext longtext
  longtext longtext longtext longtext
}
```
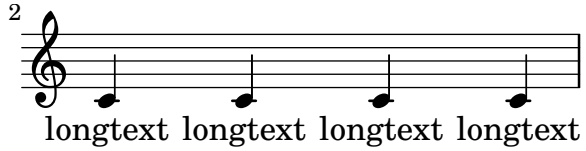




To make this change for all lyrics in the score, set the property in the `\layout` block.

```
\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
    }
  }
}
```



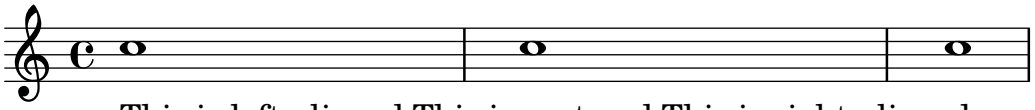


Selected Snippets

Lyrics alignment

Horizontal alignment for lyrics can be set by overriding the `self-alignment-X` property of the `LyricText` object. `#-1` is left, `#0` is center and `#1` is right; however, you can use `#LEFT`, `#CENTER` and `#RIGHT` as well.

```
\layout { ragged-right = ##f }
\relative c'' {
  c1
  c1
  c1
}
\addlyrics {
  \once \override LyricText.self-alignment-X = #LEFT
  "This is left-aligned"
  \once \override LyricText.self-alignment-X = #CENTER
  "This is centered"
  \once \override LyricText.self-alignment-X = #1
  "This is right-aligned"
}
```



Checking to make sure that text scripts and lyrics are within the margins requires additional calculations. To speed up processing slightly, this feature can be disabled:

```
\override Score.PaperColumn.keep-inside-line = ##f
```

To make lyrics avoid bar lines as well, use

```
\layout {
  \context {
    \Lyrics
      \consists "Bar_engraver"
      \consists "Separating_line_group_engraver"
      \hide BarLine
  }
}
```
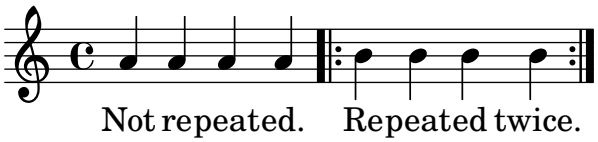
Lyrics and repeats

Simple repeats

Repeats in *music* are fully described elsewhere; see Section 1.4 [Repeats], page 137. This section explains how to add lyrics to repeated sections of music.

Lyrics to a section of music that is repeated should be surrounded by exactly the same repeat construct as the music, if the words are unchanged.
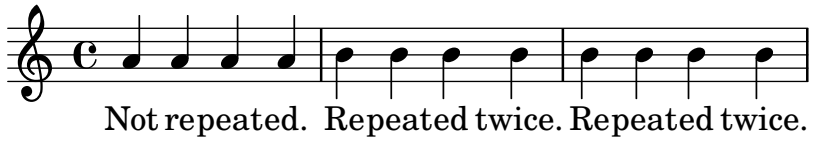
```
\score {
  <<
    \new Staff {
      \new Voice = "melody" {
        \relative c'' {
          a4 a a a
          \repeat volta 2 { b4 b b b }
        }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Not re -- peat -- ed.
        \repeat volta 2 { Re -- peat -- ed twice. }
      }
    }
  >>
}
```



The words will then be correctly expanded if the repeats are unfolded.

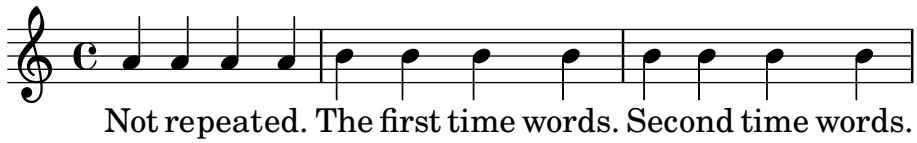
```
\score {
  \unfoldRepeats {
    <<
```

```
      \new Staff {
        \new Voice = "melody" {
          \relative c'' {
            a4 a a a
            \repeat volta 2 { b4 b b b }
          }
        }
      }
      \new Lyrics {
        \lyricsto "melody" {
          Not re -- peat -- ed.
          \repeat volta 2 { Re -- peat -- ed twice. }
        }
      }
    >>
  }
}
```
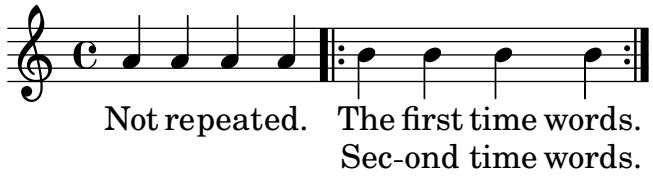


If the repeated section is to be unfolded and has different words, simply enter all the words:

```
\score {
  <<
    \new Staff {
      \new Voice = "melody" {
        \relative c'' {
          a4 a a a
          \repeat unfold 2 { b4 b b b }
        }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Not re -- peat -- ed.
        The first time words.
        Sec -- ond time words.
      }
    }
  >>
}
```



When the words to a repeated volta section are different, the words to each repeat must be entered in separate `Lyrics` contexts, correctly nested in parallel sections:

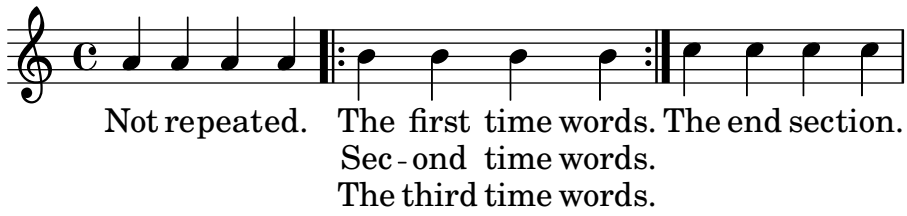
```
\score {
  <<
    \new Staff {
      \new Voice = "melody" {
        \relative c'' {
          a4 a a a
          \repeat volta 2 { b4 b b b }
        }
      }
    }
    \new Lyrics \lyricsto "melody" {
      Not re -- peat -- ed.
      <<
        { The first time words. }
        \new Lyrics {
          \set associatedVoice = "melody"
          Sec -- ond time words.
        }
      >>
    }
  >>
}
```



More verses may be added in a similar way:

```
\score {
  <<
    \new Staff {
      \new Voice = "singleVoice" {
        \relative c'' {
          a4 a a a
          \repeat volta 3 { b4 b b b }
          c4 c c c
        }
      }
    }
    \new Lyrics \lyricsto "singleVoice" {
      Not re -- peat -- ed.
      <<
        { The first time words. }
        \new Lyrics {
          \set associatedVoice = "singleVoice"
          Sec -- ond time words.
        }
        \new Lyrics {
          \set associatedVoice = "singleVoice"
          The third time words.
```

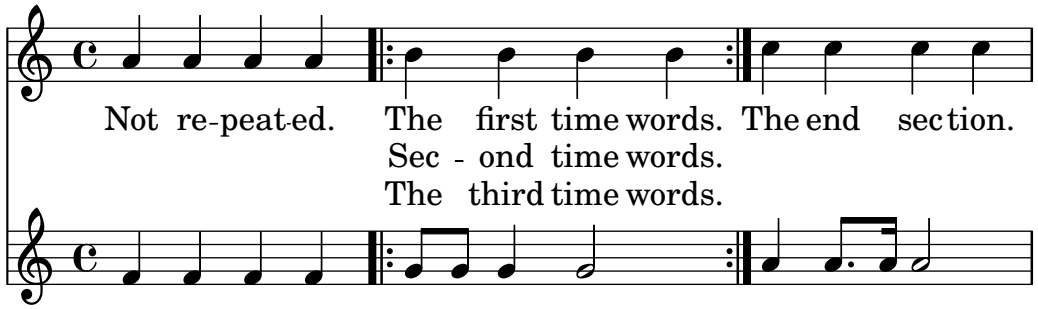
```
        }
      >>
      The end sec -- tion.
    }
  >>
}
```



However, if this construct is embedded within a multi-staved context such as a `ChoirStaff` the lyrics of the second and third verses will appear beneath the bottom staff.

To position them correctly use `alignBelowContext`:
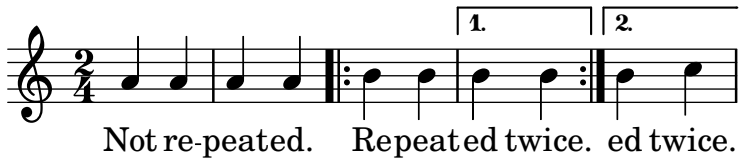
```
\score {
  <<
    \new Staff {
      \new Voice = "melody" {
        \relative c'' {
          a4 a a a
          \repeat volta 3 { b4 b b b }
          c4 c c c
        }
      }
    }
    \new Lyrics = "firstVerse" \lyricsto "melody" {
      Not re -- peat -- ed.
      <<
        { The first time words. }
        \new Lyrics = "secondVerse"
        \with { alignBelowContext = #"firstVerse" } {
          \set associatedVoice = "melody"
          Sec -- ond time words.
        }
        \new Lyrics = "thirdVerse"
        \with { alignBelowContext = #"secondVerse" } {
          \set associatedVoice = "melody"
          The third time words.
        }
      >>
      The end sec -- tion.
    }
    \new Voice = "harmony" {
      \relative c' {
        f4 f f f \repeat volta 2 { g8 g g4 g2 } a4 a8. a16 a2
      }
    }
  >>
}
```



Repeats with alternative endings

If the words of the repeated section are the same, exactly the same structure can be used for both the lyrics and music.

```
\score {
  <<
    \new Staff {
      \time 2/4
      \new Voice = "melody" {
        \relative c'' {
          a4 a a a
          \repeat volta 2 { b4 b }
          \alternative { { b b } { b c } }
        }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Not re -- peat -- ed.
        \repeat volta 2 { Re -- peat -- }
        \alternative { { ed twice. } { ed twice. } }
      }
    }
  >>
}
```



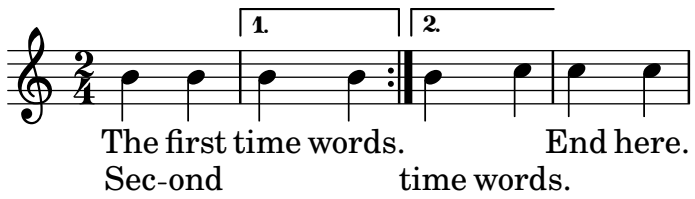
But when the repeated section has different words, a repeat construct cannot be used around the words and `\skip` commands have to be inserted manually to skip over the notes in the alternative sections which do not apply.

Note: do not use an underscore, _, to skip notes – an underscore indicates a melisma, causing the preceding syllable to be left-aligned.

Note: The `\skip` command must be followed by a number, but this number is ignored in lyrics which derive their durations from the notes in an associated melody through `\addlyrics` or `\lyricsto`. Each `\skip` skips a single note of any value, irrespective of the value of the following number.

```
\score {
  <<
    \new Staff {
```

```
      \time 2/4
      \new Voice = "melody" {
        \relative c'' {
          \repeat volta 2 { b4 b }
          \alternative { { b b } { b c } }
          c4 c
        }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        The first time words.
        \repeat unfold 2 { \skip 1 }
        End here.
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Sec -- ond
        \repeat unfold 2 { \skip 1 }
        time words.
      }
    }
  >>
}
```

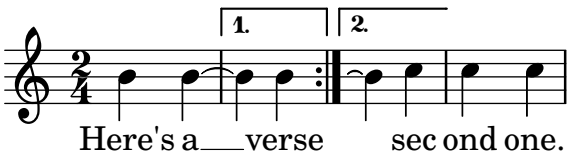


When a note is tied over into two or more alternative endings a tie is used to carry the note into the first alternative ending and a `\repeatTie` is used in the second and subsequent endings. This structure causes difficult alignment problems when lyrics are involved and increasing the length of the alternative sections so the tied notes are contained wholly within them may give a more acceptable result.

The tie creates a melisma into the first alternative, but not into the second and subsequent alternatives, so to align the lyrics correctly it is necessary to disable the automatic creation of melismata over the volta section and insert manual skips.

```
\score {
  <<
    \new Staff {
      \time 2/4
      \new Voice = "melody" {
        \relative c'' {
          \set melismaBusyProperties = #'()
          \repeat volta 2 { b4 b ~}
          \alternative { { b b } { b \repeatTie c } }
          \unset melismaBusyProperties
          c4 c
```

```
        }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        \repeat volta 2 { Here's a __ }
        \alternative {
          { \skip 1 verse }
          { \skip 1 sec }
        }
        ond one.
      }
    }
  >>
}
```

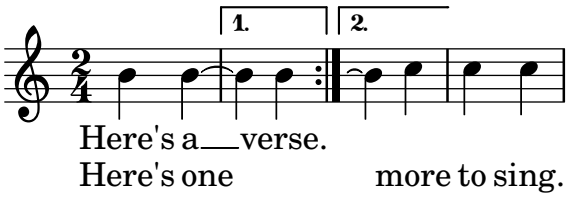


Note that if `\unfoldRepeats` is used around a section containing `\repeatTie`, the `\repeatTie` should be removed to avoid both types of tie being printed.

When the repeated section has different words a `\repeat` cannot be used around the lyrics and `\skip` commands need to be inserted manually, as before.
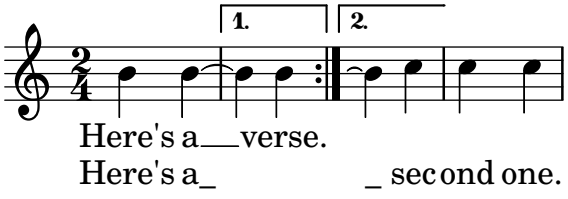
```
\score {
  <<
    \new Staff {
      \time 2/4
      \new Voice = "melody" {
        \relative c'' {
          \repeat volta 2 { b4 b ~}
          \alternative { { b b } { b \repeatTie c } }
          c4 c
        }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Here's a __ verse.
        \repeat unfold 2 { \skip 1 }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Here's one
        \repeat unfold 2 { \skip 1 }
        more to sing.
      }
    }
  >>
```

```
}
```



If you wish to show extenders and hyphens into and out of alternative sections these must be inserted manually.

```
\score {
  <<
    \new Staff {
      \time 2/4
      \new Voice = "melody" {
        \relative c'' {
          \repeat volta 2 { b4 b ~}
          \alternative { { b b } { b \repeatTie c } }
          c4 c
        }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Here's a __ verse.
        \repeat unfold 2 { \skip 1 }
      }
    }
    \new Lyrics {
      \lyricsto "melody" {
        Here's "a_"
        \skip 1
        "_" sec -- ond one.
      }
    }
  >>
}
```
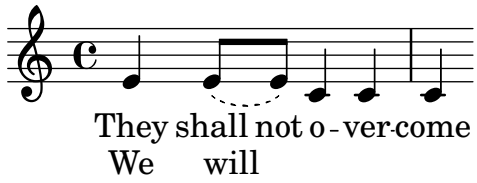


See also

Notation Reference: Section 5.1.3 [Keeping contexts alive], page 550, Section 1.4 [Repeats], page 137.

Divisi lyrics

When just the words and rhythms of the two parts differ with the pitches remaining the same, temporarily turning off the automatic detection of melismata and indicating the melisma in the lyrics may be the appropriate method to use:
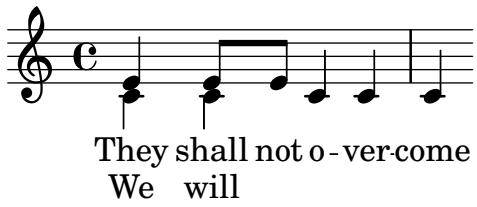
```
\score {
  <<
    \new Voice = "melody" {
      \relative c' {
        \set melismaBusyProperties = #'()
        \slurDown
        \slurDashed
        e4 e8 ( e ) c4 c |
        \unset melismaBusyProperties
        c
      }
    }
    \new Lyrics \lyricsto "melody" {
      They shall not o -- ver -- come
    }
    \new Lyrics \lyricsto "melody" {
      We will _
    }
  >>
}
```



When both music and words differ it may be better to display the differing music and lyrics by naming voice contexts and attaching lyrics to those specific contexts:

```
\score {
  <<
    \new Voice = "melody" {
      \relative c' {
        <<
          {
            \voiceOne
            e4 e8 e
          }
          \new Voice = "splitpart" {
            \voiceTwo
            c4 c
          }
        >>
        \oneVoice
        c4 c |
        c
      }
```

```
    }
    \new Lyrics \lyricsto "melody" {
      They shall not o -- ver -- come
    }
    \new Lyrics \lyricsto "splitpart" {
      We will
    }
  >>
}
```



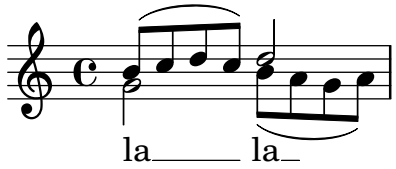
It is common in choral music to have a voice part split for several measures. The `<< {...} \\ {...} >>` construct, where the two (or more) musical expressions are separated by double backslashes, might seem the proper way to set the split voices. This construct, however, will assign **all** the expressions within it to **NEW Voice contexts** which will result in *no lyrics* being set for them since the lyrics will be set to the original voice context – not, typically, what one wants. The temporary polyphonic passage is the proper construct to use, see section *Temporary polyphonic passages* in [Single-staff polyphony], page 159.

Polyphony with shared lyrics

When two voices with different rhythms share the same lyrics, aligning the lyrics to one of the voices may lead to problems in the other voice. For example, the second lyric extender below is too short, since the lyrics are aligned only to the top voice:

```
soprano = \relative { b'8( c d c) d2 }
alto = \relative { g'2 b8( a g a) }
words = \lyricmode { la __ la __ }

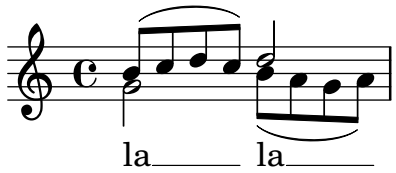
\new Staff <<
  \new Voice = "sopranoVoice" { \voiceOne \soprano }
  \new Voice { \voiceTwo \alto }
  \new Lyrics \lyricsto "sopranoVoice" \words
>>
```



To get the desired result, align the lyrics to a new `NullVoice` context containing a suitable combination of the two voices. The notes of the `NullVoice` context do not appear on the printed page, but can be used to align the lyrics appropriately:

```
soprano = \relative { b'8( c d c) d2 }
alto = \relative { g'2 b8( a g a) }
aligner = \relative { b'8( c d c) b( a g a) }
words = \lyricmode { la __ la __ }
```

```
\new Staff <<
  \new Voice { \voiceOne \soprano }
  \new Voice { \voiceTwo \alto }
  \new NullVoice = "aligner" \aligner
  \new Lyrics \lyricsto "aligner" \words
>>
```

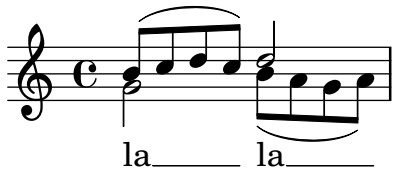


The `NullVoice` context must be placed within a `Staff` context and contain notes that are already being displayed in that staff and that are also in the same octave. Otherwise the `NullVoice` may interact with the printed voices in unexpected ways. For example, arbitrary notes in the `NullVoice` may cause accidentals to appear (or disappear) on the staff.

This method also can be used with the `\partcombine` function, which does not allow lyrics on its own:

```
soprano = \relative { b'8( c d c) d2 }
alto = \relative { g'2 b8( a g a) }
aligner = \relative { b'8( c d c) b( a g a) }
words = \lyricmode { la __ la __ }

\new Staff <<
  \new Voice \partcombine \soprano \alto
  \new NullVoice = "aligner" \aligner
  \new Lyrics \lyricsto "aligner" \words
>>
```



Known issues and warnings

The `\addLyrics` function only works with `Voice` lyrics and so cannot be used with `NullVoice`.

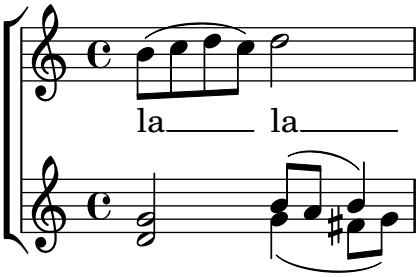
The `\partcombine` function is described in [Automatic part combining], page 167.

Lastly, this method can be used even when the voices are in different staves, and is not limited to only two voices:

```
soprano = \relative { b'8( c d c) d2 }
altoOne = \relative { g'2 b8( a b4) }
altoTwo = \relative { d'2 g4( fis8 g) }
aligner = \relative { b'8( c d c) d( d d d) }
words = \lyricmode { la __ la __ }

\new ChoirStaff <<
  \new Staff <<
    \soprano
```

```
    \new NullVoice = "aligner" \aligner
  >>
  \new Lyrics \lyricsto "aligner" \words
  \new Staff \partcombine \altoOne \altoTwo
>>
```



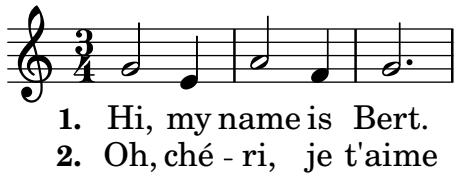
However, note that in the second half of the measure above, the notes in the `NullVoice` context reflect the rhythm of the lower staff, but they do not deviate from the single pitch being displayed in the staff to which the `NullVoice` belongs. While not actually required in this particular example, it is a good idea in general to enter the notes in this way.

2.1.3 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
}
```
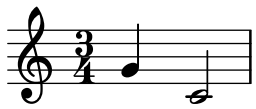


These numbers are put just before the start of the first syllable.

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
>>
```
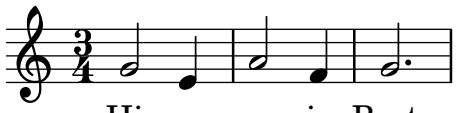


ff **1.** Big bang

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
}
```



Bert Hi, my name is Bert.
Ernie Oh, ché - ri, je t'aime

Stanzas with different rhythms

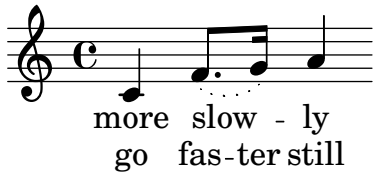
Often, different stanzas of one song are put to one melody in slightly differing ways. Such variations can still be captured with `\lyricsto`.

Ignoring melismata

One possibility is that the text has a melisma in one stanza, but multiple syllables in another. One solution is to make the faster voice ignore the melisma. This is done by setting `ignoreMelismata` in the Lyrics context.

```
<<
  \relative 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
  }
>>
```
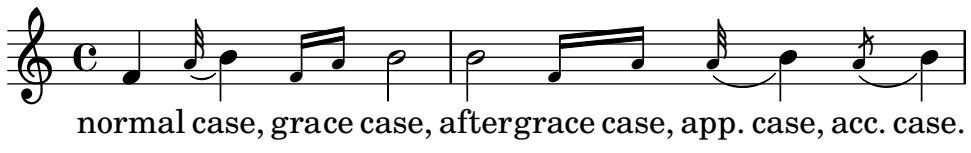


Known issues and warnings

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.

Adding syllables to grace notes

By default, grace notes (e.g. via `\grace`) do not get assigned syllables when using `\lyricsto`, but this behavior can be changed:
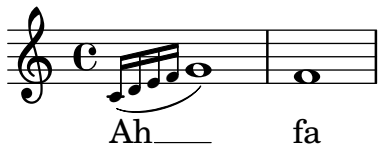
```
<<
  \new Voice = melody \relative c' {
    f4 \appoggiatura a32 b4
    \grace { f16 a16 } b2
    \afterGrace b2 { f16[ a16] }
    \appoggiatura a32 b4
    \acciaccatura a8 b4
  }
  \new Lyrics
  \lyricsto melody {
    normal
    \set includeGraceNotes = ##t
    case,
    gra -- ce case,
    after -- grace case,
    \set ignoreMelismata = ##t
    app. case,
    acc. case.
  }
>>
```



Known issues and warnings

Like `associatedVoice`, `includeGraceNotes` needs to be set at latest one syllable before the one which is to be put under a grace note. For the case of a grace note at the very beginning of a piece of music, consider using a `\with` or `\context` block:

```
<<
  \new Voice = melody \relative c' {
    \grace { c16( d e f }
    g1) f
  }
  \new Lyrics \with { includeGraceNotes = ##t }
  \lyricsto melody {
    Ah __ fa
  }
>>
```

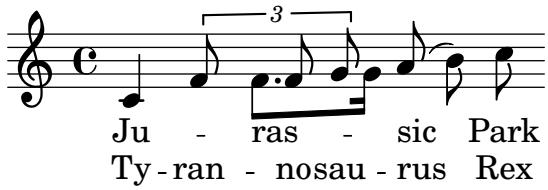


Switching to an alternative melody

More complex variations in setting lyrics to music are possible. The melody to which the lyrics are being set can be changed from within the lyrics by setting the `associatedVoice` property:

```
<<
  \relative c' \new Voice = "lahlah" {
    \set Staff.autoBeaming = ##f
    c4
    <<
      \new Voice = "alternative" {
        \voiceOne
        \tuplet 3/2 {
          % show associations clearly.
          \override NoteColumn.force-hshift = #-3
          f8 f g
        }
      }
      {
        \voiceTwo
        f8.[ g16]
        \oneVoice
      } >>
    a8( b) c
  }
  \new Lyrics \lyricsto "lahlah" {
    Ju -- ras -- sic Park
  }
  \new Lyrics \lyricsto "lahlah" {
    % Tricky: need to set associatedVoice
    % one syllable too soon!
    \set associatedVoice = "alternative" % applies to "ran"
    Ty --
```

```
    ran --
    no --
    \set associatedVoice = "lahlah" % applies to "rus"
    sau -- rus Rex
  } >>
```



The text for the first stanza is set to the melody called 'lahlah' in the usual way, but the second stanza is set initally to the `lahlah` context and is then switched to the `alternative` melody for the syllables 'ran' to 'sau' by the lines:

```
\set associatedVoice = "alternative" % applies to "ran"
Ty --
ran --
no --
\set associatedVoice = "lahlah" % applies to "rus"
sau -- rus Rex
```

Here, `alternative` is the name of the `Voice` context containing the triplet.

Note the placement of the `\set associatedVoice` command – it appears to be one syllable too early, but this is correct.

Note: The `\set associatedVoice` command must be placed one syllable *before* the one at which the switch to the new voice is to occur. In other words, changing the associated Voice happens one syllable later than expected. This is for technical reasons, and it is not a bug.

Printing stanzas at the end

Sometimes it is appropriate to have one stanza set to the music, and the rest added in verse form at the end of the piece. This can be accomplished by adding the extra verses into a `\markup` section outside of the main score block. Notice that there are 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 |
}
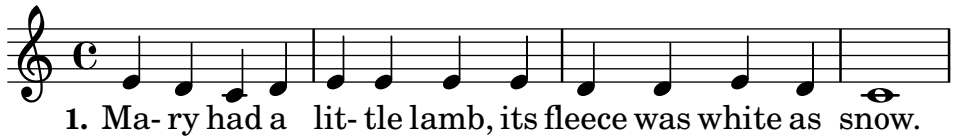
text = \lyricmode {
\set stanza = #"1." Ma- ry had a lit- tle lamb,
its fleece was white as snow.
}

\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."
}
```



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.
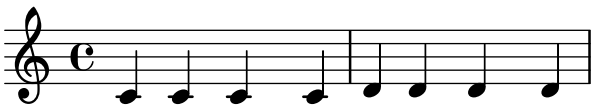
```
melody = \relative c' {
  c4 c c c | d d d d
}

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."
        }
      }
      \combine \null \vspace #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;
    \column {
      \line { \bold "4."
        \column {
          "This is verse four."
          "It has two lines."
        }
      }
      \combine \null \vspace #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
  }
}
```



1. This is verse one. It has two lines.

2. This is verse two.
It has two lines.

3. This is verse three.
It has two lines.

4. This is verse four.
It has two lines.

5. This is verse five.
It has two lines.

See also

Internals Reference: Section “LyricText” in *Internals Reference*, Section “StanzaNumber” in *Internals Reference*.

2.1.4 Songs

References for songs

Songs are usually written on three staves with the melody for the singer on the top staff and two staves of piano accompaniment at the bottom. The lyrics of the first stanza are printed immediately underneath the top staff. If there are just a small number of further stanzas these can be printed immediately under the first one, but if there are more stanzas than can be easily accommodated there the second and subsequent stanzas are printed after the music as stand-alone text.

All the notational elements needed to write songs are fully described elsewhere:

- For constructing the staff layout, see Section 1.6.1 [Displaying staves], page 175.
- For writing piano music, see Section 2.2 [Keyboard and other multi-staff instruments], page 301.
- For writing the lyrics to a melody line, see Section 2.1.1 [Common notation for vocal music], page 239.
- For placing the lyrics, see [Placing lyrics vertically], page 253.
- For entering stanzas, see Section 2.1.3 [Stanzas], page 270.
- Songs are frequently printed with the chording indicated by chord names above the staves. This is described in Section 2.7.2 [Displaying chords], page 389.
- To print fret diagrams of the chords for guitar accompaniment or accompaniment by other fretted instruments, see “Fret diagram markups” in Section 2.4.1 [Common notation for fretted strings], page 316.

See also

Learning Manual: Section “Songs” in *Learning Manual*.

Notation Reference: Section 2.1.1 [Common notation for vocal music], page 239, Section 2.7.2 [Displaying chords], page 389, Section 1.6.1 [Displaying staves], page 175, Section 2.2 [Keyboard and other multi-staff instruments], page 301, [Placing lyrics vertically], page 253, Section 2.1.3 [Stanzas], page 270.

Snippets: Section “Vocal music” in *Snippets*.

Lead sheets

Lead sheets may be printed by combining vocal parts and ‘chord mode’; this syntax is explained in Section 2.7 [Chord notation], page 384.

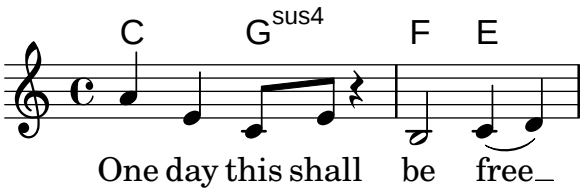
Selected Snippets

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 384.

2.1.5 Choral

This section discusses notation issues that relate most directly to choral music. This includes anthems, part songs, oratorio, etc.

References for choral

Choral music is usually notated on two, three or four staves within a `ChoirStaff` group. Accompaniment, if required, is placed beneath in a `PianoStaff` group, which is usually reduced in size for rehearsal of *a cappella* choral works. The notes for each vocal part are placed in a `Voice` context, with each staff being given either a single vocal part (i.e., one `Voice`) or a pair of vocal parts (i.e., two `Voice`s).

Words are placed in `Lyrics` contexts, either underneath each corresponding music staff, or one above and one below the music staff if this contains the music for two parts.

Several common topics in choral music are described fully elsewhere:

- An introduction to creating an SATB vocal score can be found in the Learning Manual, see Section "Four-part SATB vocal score" in *Learning Manual*.
- Several templates suitable for various styles of choral music can also be found in the Learning Manual, see Section "Vocal ensembles templates" in *Learning Manual*.
- For information about `ChoirStaff` and `PianoStaff` see [Grouping staves], page 176.
- Shape note heads, as used in Sacred Harp and similar notation, are described in [Shape note heads], page 37.
- When two vocal parts share a staff the stems, ties, slurs, etc., of the higher part will be directed up and those of the lower part down. To do this, use `\voiceOne` and `\voiceTwo`. See [Single-staff polyphony], page 159.
- When a vocal part temporarily splits, you should use *Temporary polyphonic passages* (see [Single-staff polyphony], page 159).

Predefined commands

`\oneVoice`, `\voiceOne`, `\voiceTwo`.

See also

Learning Manual: Section "Four-part SATB vocal score" in *Learning Manual*, Section "Vocal ensembles templates" in *Learning Manual*.

Notation Reference: Section 5.1.7 [Context layout order], page 562, [Grouping staves], page 176, [Shape note heads], page 37, [Single-staff polyphony], page 159.

Snippets: Section "Vocal music" in *Snippets*.

Internals Reference: Section "ChoirStaff" in *Internals Reference*, Section "Lyrics" in *Internals Reference*, Section "PianoStaff" in *Internals Reference*.

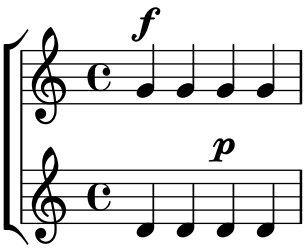
Score layouts for choral

Choral music containing four staves, with or without piano accompaniment, is usually laid out with two systems per page. Depending on the page size, achieving this may require changes to several default settings. The following settings should be considered:

- The global staff size can be modified to change the overall size of the elements of the score. See Section 4.2.2 [Setting the staff size], page 506.
- The distances between the systems, the staves and the lyrics can all be adjusted independently. See Section 4.4 [Vertical spacing], page 515.
- The dimensions of the vertical layout variables can be displayed as an aid to adjusting the vertical spacing. This and other possibilities for fitting the music onto fewer pages are described in Section 4.6 [Fitting music onto fewer pages], page 541.
- If the number of systems per page changes from one to two it is customary to indicate this with a system separator mark between the two systems. See [Separating systems], page 181.
- For details of other page formatting properties, see Section 4.1 [Page layout], page 494.

Dynamic markings by default are placed below the staff, but in choral music they are usually placed above the staff in order to avoid the lyrics. The predefined command `\dynamicUp` does this for the dynamic markings in a single `Voice` context. If there are many `Voice` contexts this predefined command would have to be placed in every one. Alternatively its expanded form can be used to place all dynamic markings in the entire score above their respective staves, as shown here:

```
\score {
  \new ChoirStaff <<
    \new Staff {
      \new Voice {
        \relative c'' { g4\f g g g }
      }
    }
    \new Staff {
      \new Voice {
        \relative c' { d4 d d\p d }
      }
    }
  >>
  \layout {
    \context {
      \Score
      \override DynamicText.direction = #UP
      \override DynamicLineSpanner.direction = #UP
    }
  }
}
```



Predefined commands

`\dynamicUp`, `\dynamicDown`, `\dynamicNeutral`.

See also

Notation Reference: Section 4.6.2 [Changing spacing], page 542, Section 4.6.1 [Displaying spacing], page 541, Section 4.6 [Fitting music onto fewer pages], page 541, Section 4.1 [Page layout], page 494, Section 4.2 [Score layout], page 504, [Separating systems], page 181, Section 4.2.2 [Setting the staff size], page 506, Section 4.3.8 [Using an extra voice for breaks], page 513, Section 4.4 [Vertical spacing], page 515.

Internals Reference: Section "VerticalAxisGroup" in *Internals Reference*, Section "StaffGrouper" in *Internals Reference*.

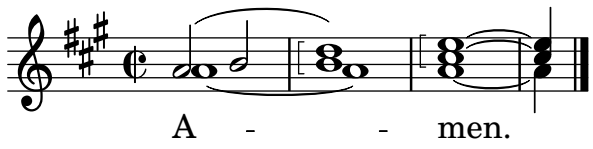
Divided voices

Using arpeggioBracket to make divisi more visible

The `arpeggioBracket` can be used to indicate the division of voices where there are no stems to provide the information. This is often seen in choral music.

```
\include "english.ly"

\score {
  \relative c'' {
    \key a \major
    \time 2/2
    <<
      \new Voice = "upper"
      <<
        { \voiceOne \arpeggioBracket
          a2( b2
          <b d>1\arpeggio)
          <cs e>\arpeggio ~
          <cs e>4
        }
        \addlyrics { \lyricmode { A -- men. } }
      >>
      \new Voice = "lower"
      { \voiceTwo
        a1 ~
        a
        a ~
        a4 \bar "|."
      }
    >>
  }
  \layout { ragged-right = ##t }
}
```



See also

Notation Reference: Section 1.3.3 [Expressive marks as lines], page 128.

2.1.6 Opera and stage musicals

The music, lyrics and dialogue to opera and stage musicals are usually set out in one or more of the following forms:

- A *Conductors' Score* containing the full orchestral and vocal parts, together with libretto cues if there are spoken passages.
- *Orchestral Parts* containing the music for the individual instruments of the orchestra or band.
- A *Vocal Score* containing all vocal parts with piano accompaniment. The accompaniment is usually an orchestral reduction, and if so the name of the original orchestral instrument is often indicated. Vocal scores sometimes includes stage directions and libretto cues.
- A *Vocal Book* containing just the vocal parts (no accompaniment), sometimes combined with the libretto.
- A *Libretto* containing the extended passages of spoken dialogue usually found in musicals, together with the words to the sung parts. Stage directions are usually included. LilyPond can be used to typeset libretti but as they contain no music alternative methods may be preferable.

The sections in the LilyPond documentation which cover the topics needed to create scores in the styles commonly found in opera and musicals are indicated in the References below. This is followed by sections covering those techniques which are peculiar to typesetting opera and musical scores.

References for opera and stage musicals

- A conductors' score contains many grouped staves and lyrics. Ways of grouping staves is shown in [Grouping staves], page 176. To nest groups of staves see [Nested staff groups], page 179.
- The printing of empty staves in conductors' scores and vocal scores is often suppressed. To create such a "Frenched score" see [Hiding staves], page 189.
- Writing orchestral parts is covered in Section 1.6.3 [Writing parts], page 192. Other sections in the Specialist notation chapter may be relevant, depending on the orchestration used. Many instruments are transposing instruments, see [Instrument transpositions], page 24.
- If the number of systems per page changes from page to page it is customary to separate the systems with a system separator mark. See [Separating systems], page 181.
- For details of other page formatting properties, see Section 4.1 [Page layout], page 494.
- Dialogue cues, stage directions and footnotes can be inserted, see Section 3.2.3 [Creating footnotes], page 460 and Section 1.8 [Text], page 215. Extensive stage directions can also be added with a section of stand-alone markups between two `\score` blocks, see [Separate text], page 221.

See also

Musical Glossary: Section "Frenched score" in *Music Glossary*, Section "Frenched staves" in *Music Glossary*, Section "transposing instrument" in *Music Glossary*.
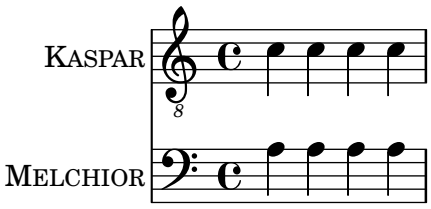
Notation Reference: Section 3.2.3 [Creating footnotes], page 460, [Grouping staves], page 176, [Hiding staves], page 189, [Instrument transpositions], page 24, [Nested staff groups], page 179, Section 4.1 [Page layout], page 494, [Separating systems], page 181, [Transpose], page 10, Section 1.6.3 [Writing parts], page 192, Section 1.8.1 [Writing text], page 216.

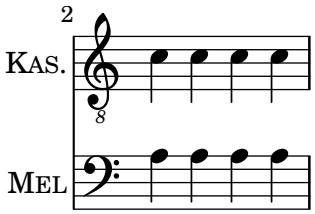
Snippets: Section "Vocal music" in *Snippets*.

Character names

Character names are usually shown to the left of the staff when the staff is dedicated to that character alone:

```
\score {
  <<
    \new Staff {
      \set Staff.vocalName = \markup \smallCaps Kaspar
      \set Staff.shortVocalName = \markup \smallCaps Kas.
      \relative c' {
        \clef "G_8"
        c4 c c c
        \break
        c4 c c c
      }
    }
    \new Staff {
      \set Staff.vocalName = \markup \smallCaps Melchior
      \set Staff.shortVocalName = \markup \smallCaps Mel
      \clef "bass"
      \relative c' {
        a4 a a a
        a4 a a a
      }
    }
  >>
}
```
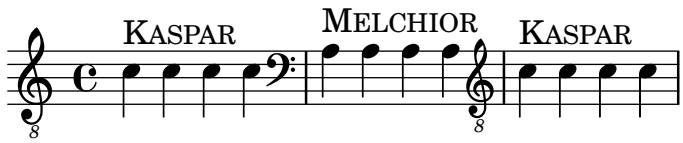




When two or more characters share a staff the character's name is usually printed above the staff at the start of every section applying to that character. This can be done with markup. Often a specific font is used for this purpose.

```
\clef "G_8"
c4^\markup \fontsize #1 \smallCaps Kaspar
c c c
\clef "bass"
a4^\markup \fontsize #1 \smallCaps Melchior
a a a
\clef "G_8"
```

```
c4^\markup \fontsize #1 \smallCaps Kaspar
c c c
```
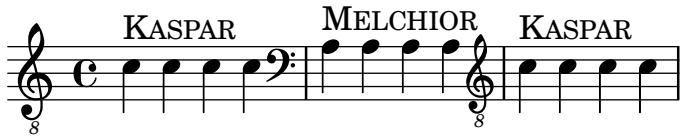


Alternatively, if there are many character changes, it may be easier to set up "instrument" definitions for each character at the top level so that `\instrumentSwitch` can be used to indicate each change.

```
\addInstrumentDefinition #"kaspar"
  #`((instrumentTransposition . ,(ly:make-pitch -1 0 0))
     (shortInstrumentName . "Kas.")
     (clefGlyph . "clefs.G")
     (clefTransposition . -7)
     (middleCPosition . 1)
     (clefPosition . -2)
     (instrumentCueName . ,(markup #:fontsize 1 #:smallCaps "Kaspar"))
     (midiInstrument . "voice oohs"))

\addInstrumentDefinition #"melchior"
  #`((instrumentTransposition . ,(ly:make-pitch 0 0 0))
     (shortInstrumentName . "Mel.")
     (clefGlyph . "clefs.F")
     (clefTransposition . 0)
     (middleCPosition . 6)
     (clefPosition . 2)
     (instrumentCueName . ,(markup #:fontsize 1 #:smallCaps "Melchior"))
     (midiInstrument . "choir aahs"))

\relative c' {
  \instrumentSwitch "kaspar"
  c4 c c c
  \instrumentSwitch "melchior"
  a4 a a a
  \instrumentSwitch "kaspar"
  c4 c c c
}
```



See also

Notation Reference: [Instrument names], page 192, Section A.21 [Scheme functions], page 747, Section 1.8 [Text], page 215, Section A.10 [Text markup commands], page 645.

Extending LilyPond: Section "Markup construction in Scheme" in *Extending*.

Musical cues

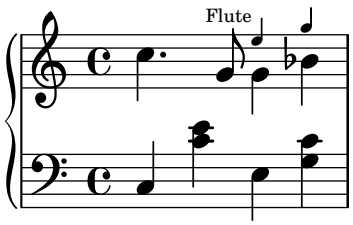
Musical cues can be inserted in Vocal Scores, Vocal Books and Orchestral Parts to indicate what music in another part immediately precedes an entry. Also, cues are often inserted in the piano reduction in Vocal Scores to indicate what each orchestral instrument is playing. This aids the conductor when a full Conductors' Score is not available.

The basic mechanism for inserting cues is fully explained in the main text, see [Quoting other voices], page 195 and [Formatting cue notes], page 198. But when many cues have to be inserted, for example, as an aid to a conductor in a vocal score, the instrument name must be positioned carefully just before and close to the start of the cue notes. The following example shows how this is done.

```
flute = \relative c'' {
  s4 s4 e g
}
\addQuote "flute" { \flute }

pianoRH = \relative c'' {
  c4. g8
  % position name of cue-ing instrument just before the cue notes,
  % and above the staff
  \new CueVoice {
    \override InstrumentSwitch.self-alignment-X = #RIGHT
    \set instrumentCueName = "Flute"
  }
  \cueDuring "flute" #UP { g4 bes4 }
}
pianoLH = \relative c { c4 <c' e> e, <g c> }

\score {
  \new PianoStaff <<
    \new Staff {
      \pianoRH
    }
    \new Staff {
      \clef "bass"
      \pianoLH
    }
  >>
}
```



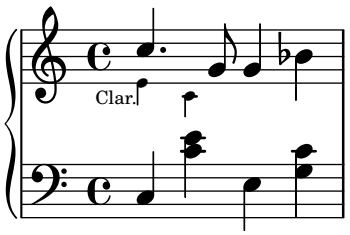
If a transposing instrument is being quoted the instrument part should specify its key so the conversion of its cue notes will be done automatically. The example below shows this transposition for a B-flat clarinet. The notes in this example are low on the staff so `DOWN` is specified in `\cueDuring` (so the stems are down) and the instrument name is positioned below the staff. Note also that the piano right-hand voice is explicitly declared. This is because the

cue notes in this example begin at the start of the first bar and this would otherwise cause the entire piano right-hand notes to be placed in a `CueVoice` context.

```
clarinet = \relative c' {
  \transposition bes
  fis4 d d c
}
\addQuote "clarinet" { \clarinet }

pianoRH = \relative c'' {
  \transposition c'
  % position name of cue-ing instrument below the staff
  \new CueVoice {
    \override InstrumentSwitch.self-alignment-X = #RIGHT
    \override InstrumentSwitch.direction = #DOWN
    \set instrumentCueName = "Clar."
  }
  \cueDuring "clarinet" #DOWN { c4. g8 }
  g4 bes4
}
pianoLH = \relative c { c4 <c' e> e, <g c> }

\score {
  <<
    \new PianoStaff <<
      \new Staff {
        \new Voice {
          \pianoRH
        }
      }
      \new Staff {
        \clef "bass"
        \pianoLH
      }
    >>
  >>
}
```



From these two examples it is clear that inserting many cues in a Vocal Score would be tedious, and the notes of the piano part would become obscured. However, as the following snippet shows, it is possible to define a music function to reduce the amount of typing and to make the piano notes clearer.

Selected Snippets

Adding orchestral cues to a vocal score

This shows one approach to simplify adding many orchestral cues to the piano reduction in a vocal score. The music function `\cueWhile` takes four arguments: the music from which the cue is to be taken, as defined by `\addQuote`, the name to be inserted before the cue notes, then either `#UP` or `#DOWN` to specify either `\voiceOne` with the name above the staff or `\voiceTwo` with the name below the staff, and finally the piano music in parallel with which the cue notes are to appear. The name of the cued instrument is positioned to the left of the cued notes. Many passages can be cued, but they cannot overlap each other in time.

```
cueWhile =
#(define-music-function
   (parser location instrument name dir music)
   (string? string? ly:dir? ly:music?)
   #{
     \cueDuring $instrument #dir {
       \once \override TextScript.self-alignment-X = #RIGHT
       \once \override TextScript.direction = $dir
       <>-\markup { \tiny #name }
       $music
     }
   #})

flute = \relative c'' {
  \transposition c'
  s4 s4 e g
}
\addQuote "flute" { \flute }
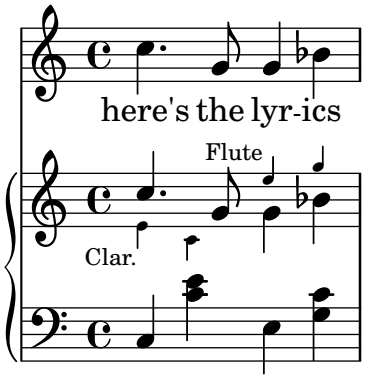
clarinet = \relative c' {
  \transposition bes
  fis4 d d c
}
\addQuote "clarinet" { \clarinet }

singer = \relative c'' { c4. g8 g4 bes4 }
words = \lyricmode { here's the lyr -- ics }

pianoRH = \relative c'' {
  \transposition c'
  \cueWhile "clarinet" "Clar." #DOWN { c4. g8 }
  \cueWhile "flute" "Flute" #UP { g4 bes4 }
}
pianoLH = \relative c { c4 <c' e> e, <g c> }

\score {
  <<
    \new Staff {
      \new Voice = "singer" {
        \singer
      }
    }
```

```
    \new Lyrics {
      \lyricsto "singer"
      \words
    }
    \new PianoStaff <<
      \new Staff {
        \new Voice {
          \pianoRH
        }
      }
      \new Staff {
        \clef "bass"
        \pianoLH
      }
    >>
  >>
}
```



See also

Musical Glossary: Section “cue-notes” in *Music Glossary*.

Notation Reference: Section 5.5.1 [Aligning objects], page 591, Section 5.4.2 [Direction and placement], page 577, [Formatting cue notes], page 198, [Quoting other voices], page 195, Section 5.6 [Using music functions], page 604.

Snippets: Section “Vocal music” in *Snippets*.

Internals Reference: Section “InstrumentSwitch” in *Internals Reference*, Section “CueVoice” in *Internals Reference*.

Known issues and warnings

`\cueDuring` automatically inserts a `CueVoice` context and all cue notes are placed in that context. This means it is not possible to have two overlapping sequences of cue notes by this technique. Overlapping sequences could be entered by explicitly declaring separate `CueVoice` contexts and using `\quoteDuring` to extract and insert the cue notes.

Spoken music
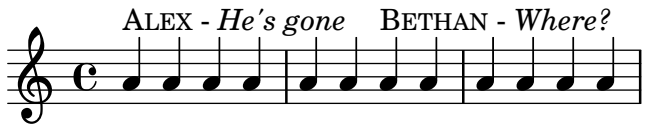
Such effects as ‘parlato’ or ‘Sprechgesang’ require performers to speak without pitch but still with rhythm; these are notated by cross note heads, as demonstrated in [Special note heads], page 34.

Dialogue over music

Dialogue over music is usually printed over the staves in an italic font, with the start of each phrase keyed in to a particular music moment.

For short interjections a simple markup suffices.

```
a4^\markup { \smallCaps { Alex - } \italic { He's gone } } a a a
a4 a a^\markup { \smallCaps { Bethan - } \italic Where? } a
a4 a a a
```



For longer phrases it may be necessary to expand the music to make the words fit neatly. There is no provision in LilyPond to do this fully automatically, and some manual intervention to layout the page will be necessary.

For long phrases or for passages with a lot of closely packed dialogue, using a Lyrics context will give better results. The Lyrics context should not be associated with a music Voice; instead each section of dialogue should be given an explicit duration. If there is a gap in the dialogue, the final word should be separated from the rest and the duration split between them so that the underlying music spaces out smoothly.

If the dialogue extends for more than one line it will be necessary to manually insert `\break`s and adjust the placing of the dialogue to avoid running into the right margin. The final word of the last measure on a line should also be separated out, as above.

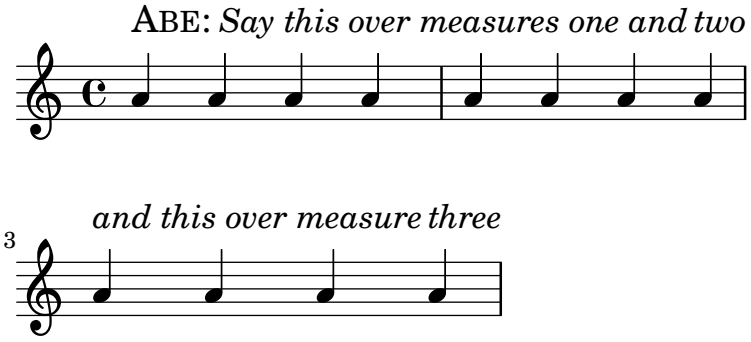
Here is an example illustrating how this might be done.

```
music = \relative c'' {
  \repeat unfold 3 { a4 a a a }
}

dialogue = \lyricmode {
  \markup {
    \fontsize #1 \upright \smallCaps Abe:
    "Say this over measures one and"
  }4*7
  "two"4 |
  \break
  "and this over measure"4*3
  "three"4 |
}

\score {
  <<
    \new Lyrics \with {
      \override LyricText.font-shape = #'italic
      \override LyricText.self-alignment-X = #LEFT
    }
    { \dialogue }
    \new Staff {
      \new Voice { \music }
    }
  >>
```

```
}
```



See also

Notation Reference: [Manual syllable durations], page 245, Section 1.8 [Text], page 215.

Internal Reference: Section "LyricText" in *Internals Reference*.

2.1.7 Chants psalms and hymns

The music and words for chants, psalms and hymns usually follow a well-established format in any particular church. Although the formats may differ from church to church the type-setting problems which arise are broadly similar, and are covered in this section.

References for chants and psalms

Typesetting Gregorian chant in various styles of ancient notation is described in Section 2.9 [Ancient notation], page 404.

See also

Notation reference: Section 2.9 [Ancient notation], page 404.

Snippets: Section "Vocal music" in *Snippets*.
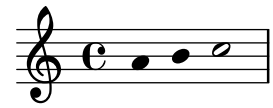
Setting a chant

Modern chant settings use modern notation with varying numbers of elements taken from ancient notation. Some of the elements and methods to consider are shown here.

Chants often use quarter notes without stems to indicate the pitch, with the rhythm being taken from the spoken rhythm of the words.
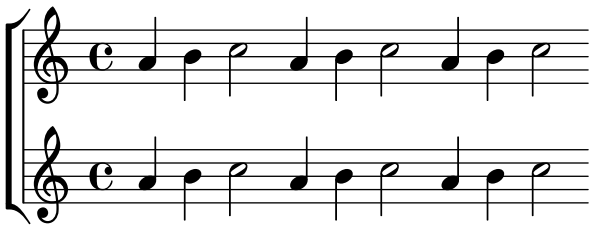
```
stemOff = { \hide Staff.Stem }

\relative c' {
  \stemOff
  a'4 b c2 |
}
```



Chants often omit the bar lines or use shortened or dotted bar lines to indicate pauses in the music. To omit all bar lines from all staves remove the bar line engraver completely:

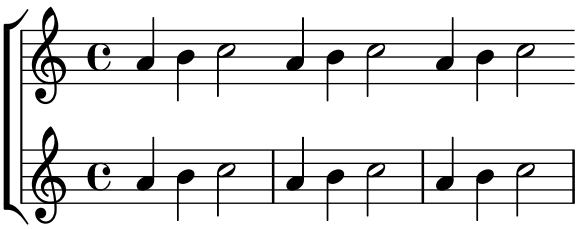
```
\score {
  \new StaffGroup <<
    \new Staff {
      \relative c'' {
        a4 b c2 |
        a4 b c2 |
        a4 b c2 |
      }
    }
    \new Staff {
      \relative c'' {
        a4 b c2 |
        a4 b c2 |
        a4 b c2 |
      }
    }
  >>
  \layout {
    \context {
      \Staff
      \remove "Bar_engraver"
    }
  }
}
```



Bar lines can also be removed on a staff-by-staff basis:
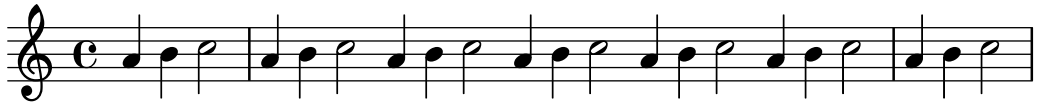
```
\score {
  \new ChoirStaff <<
    \new Staff
    \with { \remove "Bar_engraver" } {
      \relative c'' {
        a4 b c2 |
        a4 b c2 |
        a4 b c2 |
      }
    }
    \new Staff {
      \relative c'' {
        a4 b c2 |
        a4 b c2 |
        a4 b c2 |
      }
    }
  >>
```
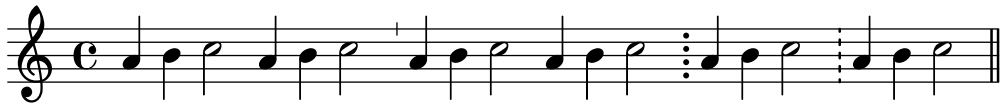
```
}
```



To remove bar lines from just a section of music treat it as a cadenza. If the section is long you may need to insert dummy bar lines with `\bar ""` to show where the line should break.

```
a4 b c2 |
\cadenzaOn
a4 b c2
a4 b c2
\bar ""
a4 b c2
a4 b c2
\cadenzaOff
a4 b c2 |
a4 b c2 |
```



Rests or pauses in chants can be indicated by modified bar lines.

```
a4
\cadenzaOn
b c2
a4 b c2
\bar "'"
a4 b c2
a4 b c2
\bar ";"
a4 b c2
\bar "!"
a4 b c2
\bar "||"
```
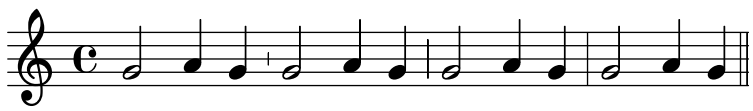


Alternatively, the notation used in Gregorian chant for pauses or rests is sometimes used even though the rest of the notation is modern. This uses a modified `\breathe` mark:

```
divisioMinima = {
  \once \override BreathingSign.stencil = #ly:breathing-sign::divisio-minima
  \once \override BreathingSign.Y-offset = #0
  \breathe
}
```

```
divisioMaior = {
  \once \override BreathingSign.stencil = #ly:breathing-sign::divisio-maior
  \once \override BreathingSign.Y-offset = #0
  \breathe
}
divisioMaxima = {
  \once \override BreathingSign.stencil = #ly:breathing-sign::divisio-maxima
  \once \override BreathingSign.Y-offset = #0
  \breathe
}
finalis = {
  \once \override BreathingSign.stencil = #ly:breathing-sign::finalis
  \once \override BreathingSign.Y-offset = #0
  \breathe
}
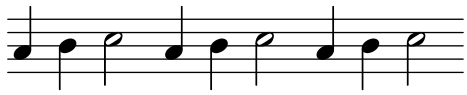
\score {
  \relative c'' {
    g2 a4 g
    \divisioMinima
    g2 a4 g
    \divisioMaior
    g2 a4 g
    \divisioMaxima
    g2 a4 g
    \finalis
  }
  \layout {
    \context {
      \Staff
      \remove "Bar_engraver"
    }
  }
}
```



Chants usually omit the time signature and often omit the clef too.

```
\score {
  \new Staff {
    \relative c'' {
      a4 b c2 |
      a4 b c2 |
      a4 b c2 |
    }
  }
  \layout {
    \context {
      \Staff
      \remove "Bar_engraver"
```

```
      \remove "Time_signature_engraver"
      \remove "Clef_engraver"
    }
  }
}
```



Chants for psalms in the Anglican tradition are usually either *single*, with 7 bars of music, or *double*, with two lots of 7 bars. Each group of 7 bars is divided into two halves, corresponding to the two halves of each verse, usually separated by a double bar line. Only whole and half notes are used. The 1st bar in each half always contains a single chord of whole notes. This is the "reciting note". Chants are usually centered on the page.

```
SopranoMusic = \relative g' {
  g1 | c2 b | a1 | \bar "||"
  a1 | d2 c | c b | c1 | \bar "||"
}

AltoMusic = \relative c' {
  e1 | g2 g | f1 |
  f1 | f2 e | d d | e1 |
}

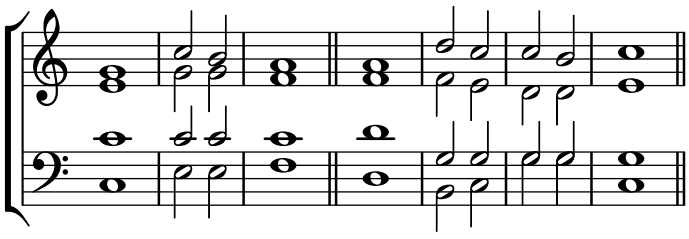
TenorMusic = \relative a {
  c1 | c2 c | c1 |
  d1 | g,2 g | g g | g1 |
}

BassMusic =  \relative c {
  c1 | e2 e | f1 |
  d1 | b2 c | g' g | c,1 |
}

global = {
  \time 2/2
}

% Use markup to center the chant on the page
\markup {
  \fill-line {
    \score {  % centered
      <<
        \new ChoirStaff <<
          \new Staff <<
            \global
            \clef "treble"
            \new Voice = "Soprano" <<
              \voiceOne
              \SopranoMusic
            >>
```

```
            \new Voice = "Alto" <<
              \voiceTwo
              \AltoMusic
            >>
          >>
          \new Staff <<
            \clef "bass"
            \global
            \new Voice = "Tenor" <<
              \voiceOne
              \TenorMusic
            >>
            \new Voice = "Bass" <<
              \voiceTwo
              \BassMusic
            >>
          >>
        >>
      >>
      \layout {
        \context {
          \Score
          \override SpacingSpanner.base-shortest-duration = #(ly:make-moment 1/2)
        }
        \context {
          \Staff
          \remove "Time_signature_engraver"
        }
      }
    }  % End score
  }
}  % End markup
```



Some other approaches to setting such a chant are shown in the first of the following snippets.

Selected Snippets

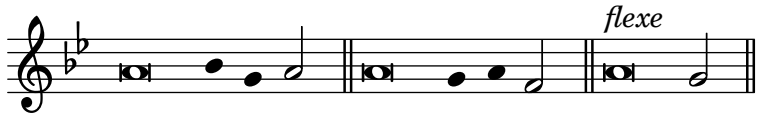
Chant or psalms notation

This form of notation is used for the chant of the Psalms, where verses aren't always the same length.

```
stemOff = \hide Staff.Stem
stemOn  = \undo \stemOff

\score {
  \new Staff \with { \remove "Time_signature_engraver" }
```

```
  {
    \key g \minor
    \cadenzaOn
    \stemOff a'\breve bes'4 g'4
    \stemOn a'2 \bar "||"
    \stemOff a'\breve g'4 a'4
    \stemOn f'2 \bar "||"
    \stemOff a'\breve^\markup { \italic flexe }
    \stemOn g'2 \bar "||"
  }
}
```



Canticles and other liturgical texts may be set more freely, and may use notational elements from ancient music. Often the words are shown underneath and aligned with the notes. If so, the notes are spaced in accordance with the syllables rather than the notes' durations.

Ancient notation template – modern transcription of gregorian music

This example demonstrates how to do modern transcription of Gregorian music. Gregorian music has no measure, no stems; it uses only half and quarter note heads, and special marks, indicating rests of different length.
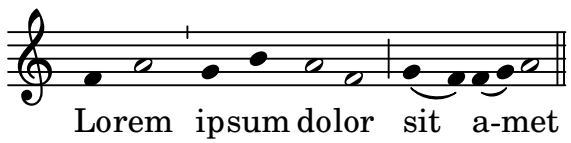
```
\include "gregorian.ly"

chant = \relative c' {
  \set Score.timing = ##f
  f4 a2 \divisioMinima
  g4 b a2 f2 \divisioMaior
  g4( f) f( g) a2 \finalis
}

verba = \lyricmode {
  Lo -- rem ip -- sum do -- lor sit a -- met
}

\score {
  \new Staff <<
    \new Voice = "melody" \chant
    \new Lyrics = "one" \lyricsto melody \verba
  >>
  \layout {
    \context {
      \Staff
      \remove "Time_signature_engraver"
      \remove "Bar_engraver"
      \hide Stem
    }
    \context {
      \Voice
      \override Stem.length = #0
```

```
    }
    \context {
      \Score
      barAlways = ##t
    }
  }
}
```



See also

Learning Manual: Section "Visibility and color of objects" in *Learning Manual*, Section "Vocal ensembles templates" in *Learning Manual*.

Notation Reference: Section 2.9 [Ancient notation], page 404, [Bar lines], page 90, Section 5.1.4 [Modifying context plug-ins], page 553, Section 2.9.4 [Typesetting Gregorian chant], page 416, [Unmetered music], page 68, Section 5.4.6 [Visibility of objects], page 584.

Pointing a psalm

The words to an Anglican psalm are usually printed in separate verses centered underneath the chant.

Single chants (with 7 bars) are repeated for every verse. Double chants (with 14 bars) are repeated for every pair of verses. Marks are inserted in the words to show how they should be fitted to the chant. Each verse is divided into two halves. A colon is usually used to indicate this division. This corresponds to the double bar line in the music. The words before the colon are sung to the first three bars of music; the words after the colon are sung to the last four bars.

Single bar lines (or in some psalters an inverted comma or similar symbol) are inserted between words to indicate where the bar lines in the music fall. In markup mode a single bar line can be entered with the bar check symbol, `|`.

```
\markup {
  \fill-line {
    \column {
      \left-align {
        \line { O come let us sing | unto the | Lord : let }
        \line { us heartily rejoice in the | strength of | our }
        \line { sal- | -vation. }
      }
    }
  }
}
```

O come let us sing | unto the | Lord : let
us heartily rejoice in the | strength of | our
sal- | -vation.

Other symbols may require glyphs from the `fetaMusic` fonts. For details, see Section 1.8.3 [Fonts], page 236.

```
tick = \markup {
  \raise #1 \fontsize #-5 \musicglyph #"scripts.rvarcomma"
}
\markup {
  \fill-line {
    \column {
      \left-align {
        \line { O come let us sing \tick unto the \tick Lord : let }
        \line {
          us heartily rejoice in the \tick strength of \tick our
        }
        \line { sal \tick vation. }
      }
    }
  }
}
```

O come let us sing ' unto the ' Lord : let
us heartily rejoice in the ' strength of ' our
sal ' vation.

Where there is one whole note in a bar all the words corresponding to that bar are recited on that one note in speech rhythm. Where there are two notes in a bar there will usually be only one or two corresponding syllables. If there are more that two syllables a dot is usually inserted to indicate where the change in note occurs.

```
dot = \markup {
  \raise #0.7 \musicglyph #"dots.dot"
}
tick = \markup {
  \raise #1 \fontsize #-5 \musicglyph #"scripts.rvarcomma"
}
\markup {
  \fill-line {
    \column {
      \left-align {
        \line {
          O come let us sing \tick unto \dot the \tick Lord : let
        }
        \line {
          us heartily rejoice in the \tick strength of \tick our
        }
        \line { sal \tick vation. }
      }
    }
  }
}
```

O come let us sing ' unto • the ' Lord : let
us heartily rejoice in the ' strength of ' our
sal ' vation.

In some psalters an asterisk is used to indicate a break in a recited section instead of a comma, and stressed or slightly lengthened syllables are indicated in bold text.

```
dot = \markup {
  \raise #0.7 \musicglyph #"dots.dot"
}
tick = \markup {
  \raise #1 \fontsize #-5 \musicglyph #"scripts.rvarcomma"
}
\markup {
  \fill-line {
    \column {
      \left-align {
        \line { Today if ye will hear his voice * }
        \line {
          \concat { \bold hard en }
          | not your | hearts : as in the pro-
        }
        \line { vocation * and as in the \bold day of tempt- | }
        \line { -ation | in the | wilderness. }
      }
    }
  }
}
```

Today if ye will hear his voice *
harden | not your | hearts : as in the pro-
vocation * and as in the **day** of tempt- |
-ation | in the | wilderness.

In other psalters an accent is placed over the syllable to indicate stress.

```
tick = \markup {
  \raise #2 \fontsize #-5 \musicglyph #"scripts.rvarcomma"
}
\markup {
  \fill-line {
    \column {
      \left-align {
        \line {
          O come let us \concat {
            si \combine \tick ng
          }
          | unto the | Lord : let
        }
        \line {
          us heartily \concat {
            rejo \combine \tick ice
          }
          in the | strength of | our
        }
        \line { sal- | -vation. }
      }
    }
  }
}
```

O come let us sing | unto the | Lord : let
us heartily rejoice in the | strength of | our
sal- | -vation.

The use of markup to center text, and arrange lines in columns is described in Section 1.8.2 [Formatting text], page 223.

Most of these elements are shown in one or other of the two verses in the template, see Section "Psalms" in *Learning Manual*.

See also

Learning Manual: Section "Psalms" in *Learning Manual*, Section "Vocal ensembles templates" in *Learning Manual*.

Notation Reference: Section 1.8.3 [Fonts], page 236, Section 1.8.2 [Formatting text], page 223.

Partial measures in hymn tunes

Hymn tunes frequently start and end every line of music with partial measures so that each line of music corresponds exactly with a line of text. This requires a `\partial` command at the start of the music and `\bar "|"` or `\bar "||"` commands at the end of each line.

Hymn template

This code shows one way of setting out a hymn tune when each line starts and ends with a partial measure. It also shows how to add the verses as stand-alone text under the music.

```
Timeline = {
  \time 4/4
  \tempo 4=96
  \partial 2
  s2 | s1 | s2 \breathe s2 | s1 | s2 \bar "||" \break
  s2 | s1 | s2 \breathe s2 | s1 | s2 \bar "||"
}

SopranoMusic = \relative g' {
  g4 g | g g g g | g g g g | g g g g | g2
  g4 g | g g g g | g g g g | g g g g | g2
}

AltoMusic = \relative c' {
  d4 d | d d d d | d d d d | d d d d | d2
  d4 d | d d d d | d d d d | d d d d | d2
}

TenorMusic = \relative a {
  b4 b | b b b b | b b b b | b b b b | b2
  b4 b | b b b b | b b b b | b b b b | b2
}

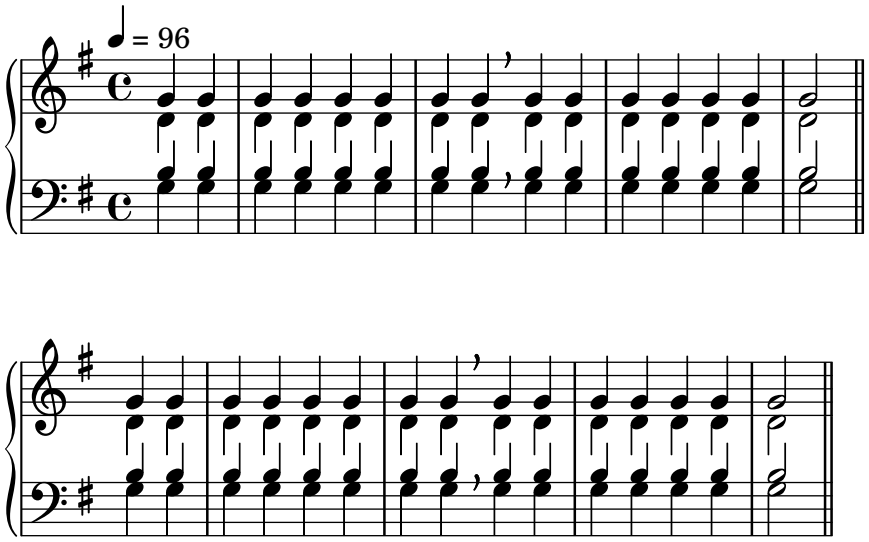
BassMusic =  \relative g {
  g4 g | g g g g | g g g g | g g g g | g2
  g4 g | g g g g | g g g g | g g g g | g2
}

global = {
 \key g \major
}
```

```
\score {  % Start score
  <<
    \new PianoStaff <<  % Start pianostaff
      \new Staff <<  % Start Staff = RH
        \global
        \clef "treble"
        \new Voice = "Soprano" <<  % Start Voice = "Soprano"
          \Timeline
          \voiceOne
          \SopranoMusic
        >>  % End Voice = "Soprano"
        \new Voice = "Alto" <<  % Start Voice = "Alto"
          \Timeline
          \voiceTwo
          \AltoMusic
        >>  % End Voice = "Alto"
      >>  % End Staff = RH
      \new Staff <<  % Start Staff = LH
        \global
        \clef "bass"
        \new Voice = "Tenor" <<  % Start Voice = "Tenor"
          \Timeline
          \voiceOne
          \TenorMusic
        >>  % End Voice = "Tenor"
        \new Voice = "Bass" <<  % Start Voice = "Bass"
          \Timeline
          \voiceTwo
          \BassMusic
        >>  % End Voice = "Bass"
      >>  % End Staff = LH
    >>  % End pianostaff
  >>
}  % End score

\markup {
  \fill-line {
    ""
    {
      \column {
        \left-align {
          "This is line one of the first verse"
          "This is line two of the same"
          "And here's line three of the first verse"
          "And the last line of the same"
        }
      }
    }
    ""
  }
}
```

```
\paper {  % Start paper block
  indent = 0     % don't indent first system
  line-width = 130   % shorten line length to suit music
}  % End paper block
```



This is line one of the first verse
This is line two of the same
And here's line three of the first verse
And the last line of the same

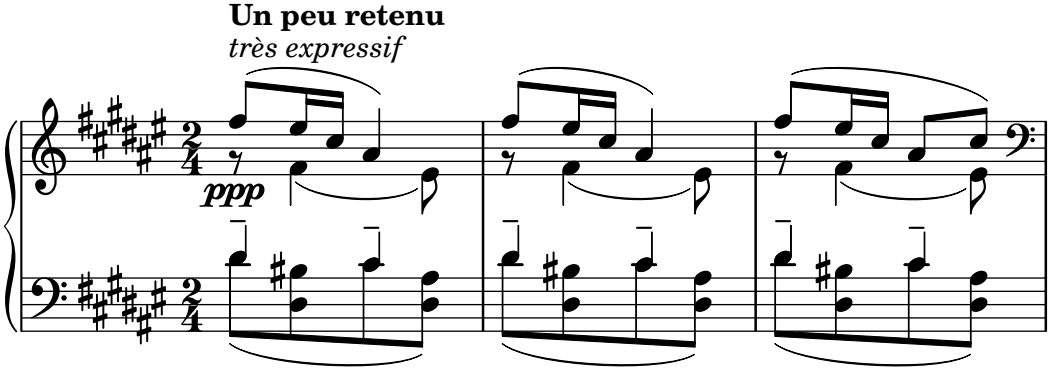
2.1.8 Ancient vocal music
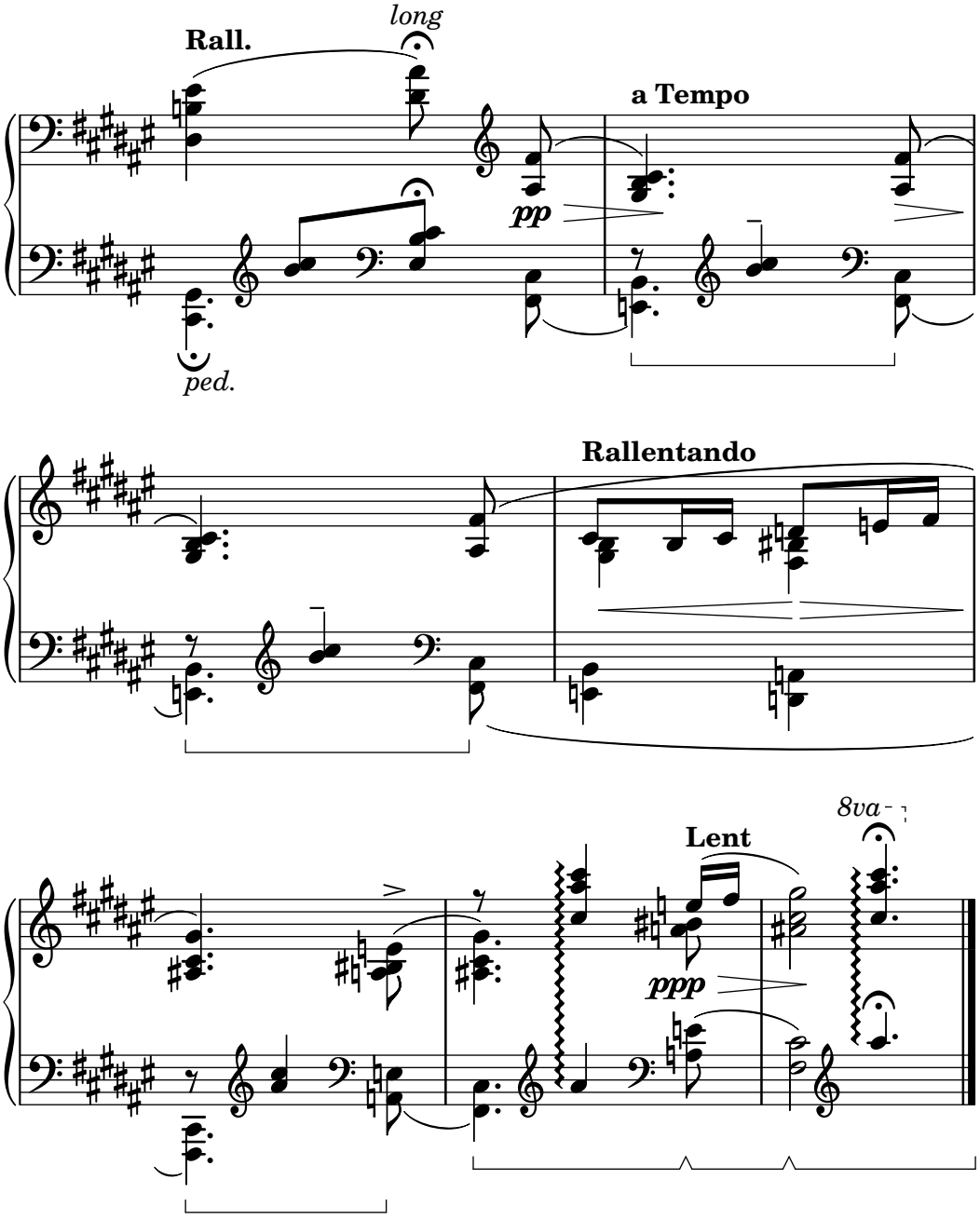
Ancient vocal music is supported, as explained in Section 2.9 [Ancient notation], page 404.

See also

Notation Reference: Section 2.9 [Ancient notation], page 404.

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 162.
- Keyboard music can be written in parallel, as described in [Writing music in parallel], page 172.
- Dynamics may be placed in a `Dynamics` context, between the two `Staff` contexts to align the dynamic marks on a horizontal line centered between the staves; see [Dynamics], page 114.
- Fingerings are indicated with [Fingering instructions], page 205.
- Organ pedal indications are inserted as articulations, see Section A.13 [List of articulations], page 699.
- Vertical grid lines can be shown with [Grid lines], page 212.
- Keyboard music often contains *Laissez vibrer* ties as well as ties on arpeggios and tremolos, described in [Ties], page 49.
- Placing arpeggios across multiple voices and staves is covered in [Arpeggio], page 133.
- Tremolo marks are described in [Tremolo repeats], page 152.
- 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 176, [Instrument names], page 192, [Collision resolution], page 162, [Writing music in parallel], page 172, [Fingering instructions], page 205, Section A.13 [List of articulations], page 699, [Grid lines], page 212, [Ties], page 49, [Arpeggio], page 133, [Tremolo repeats], page 152.

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

Snippets: Section "Keyboards" in *Snippets*.

Changing staff manually

Voices can be switched between staves manually, using the command

`\change Staff = staffname`
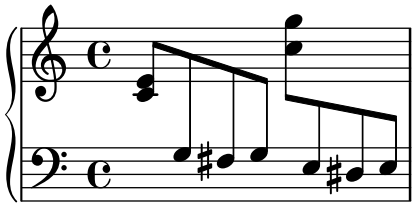
The string *staffname* is the name of the staff. It switches the current voice from its current staff to the staff called *staffname*. Typical values for *staffname* are `"up"` and `"down"`, or `"RH"` and `"LH"`.

The staff to which the voice is being switched must exist at the time of the switch. If necessary, staves should be "kept alive", see Section 5.1.3 [Keeping contexts alive], page 550.

Cross-staff notes are beamed automatically:

```
\new PianoStaff <<
  \new Staff = "up" {
    <e' c'>8
    \change Staff = "down"
    g8 fis g
    \change Staff = "up"
    <g'' c''>8
    \change Staff = "down"
    e8 dis e
```

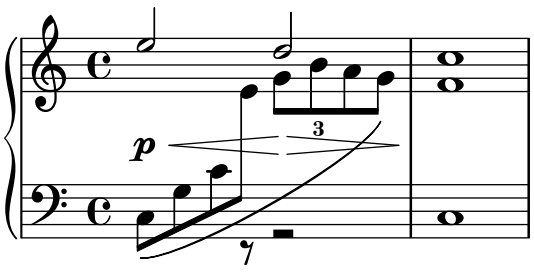
```
    \change Staff = "up"
  }
  \new Staff = "down" {
    \clef bass
    % keep staff alive
    s1
  }
>>
```



If the beaming needs to be tweaked, make any changes to the stem directions first. The beam positions are then measured from the center of the staff that is closest to the beam. For a simple example of beam tweaking, see Section "Fixing overlapping notation" in *Learning Manual*.

Overlapping notation can result when voices cross staves:

```
\new PianoStaff <<
  \new Staff = "up" {
    \voiceOne
    % Make space for fingering in the cross-staff voice
    \once\override DynamicLineSpanner.staff-padding = #4
    e''2\p\< d''\>
    c''1\!
  }
  \new Staff = "down" <<
    {
      \clef bass
      s4. e,8\rest g,2\rest
      c1
    } \\ {
      c8\( g c'
      \change Staff = "up"
      e' g' b'-3 a' g'\)
      f'1
    }
  >>
>>
```



The stem and slur overlap the intervening line of dynamics because automatic collision resolution is suspended for beams, slurs and other spanners that connect notes on different staves,

as well as for stems and articulations if their placement is affected by a cross-staff spanner. The resulting collisions must be resolved manually, where necessary, using the methods in Section "Fixing overlapping notation" in *Learning Manual*.

See also

Learning Manual: Section "Fixing overlapping notation" in *Learning Manual*.

Notation Reference: [Stems], page 210, [Automatic beams], page 76, Section 5.1.3 [Keeping contexts alive], page 550.

Snippets: Section "Keyboards" in *Snippets*.

Internals Reference: Section "Beam" in *Internals Reference*, Section "ContextChange" in *Internals Reference*.

Known issues and warnings

Beam collision avoidance does not work for automatic beams that end right before a change in staff. In this case use manual beams.
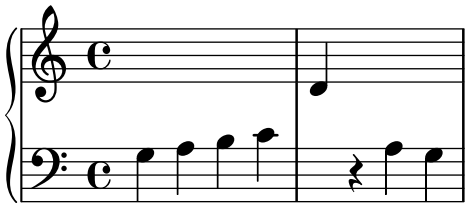
Changing staff automatically

Voices can be made to switch automatically between the top and the bottom staff. The syntax for this is

`\autochange ...music...`

This will create two staves inside the current staff group (usually a `PianoStaff`), called `"up"` and `"down"`. The lower staff will be in the bass clef by default. The 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`.

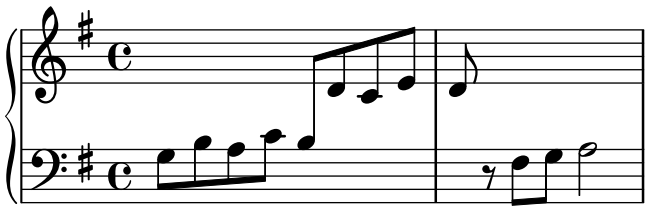
If additional control is needed over the individual staves, they can be created manually with the names `"up"` and `"down"`. The `\autochange` command will then switch its voice between the existing staves.

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 303.

Snippets: Section “Keyboards” in *Snippets*.

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

Known issues and warnings

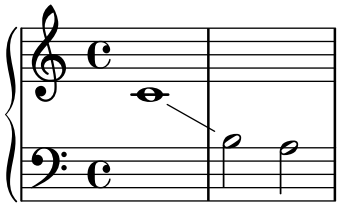
The staff switches may not end up in optimal places. For high quality output, staff switches should be specified manually.

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*.

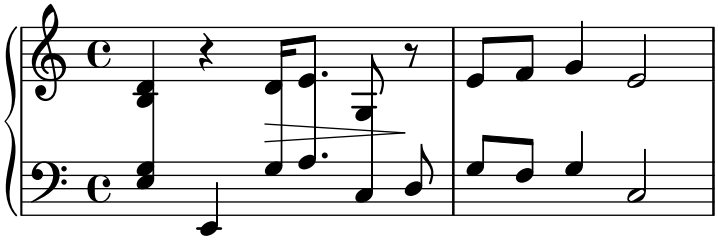
Internals Reference: Section "Note_head_line_engraver" in *Internals Reference*, Section "VoiceFollower" in *Internals Reference*.

Cross-staff stems

Chords that cross staves may be produced using the `Span_stem_engraver`. Care must be taken to ensure that automatic beams do not beam the notes on one staff when it's not required on the other.

```
\layout {
  \context {
    \PianoStaff
    \consists #Span_stem_engraver
  }
}

{
  \new PianoStaff <<
    \new Staff {
      <b d'>4 r d'16\> e'8. g8 r\!
      e'8 f' g'4 e'2
    }
    \new Staff {
      \clef bass
      \voiceOne
      \autoBeamOff
      \crossStaff { <e g>4 e, g16 a8. c8} d
      \autoBeamOn
      g8 f g4 c2
    }
  >>
}
```



For the time being, this engraver can not be specified by its name in double quotes, but rather prefixing its name with a hash symbol `#`, due to the way it is implemented.

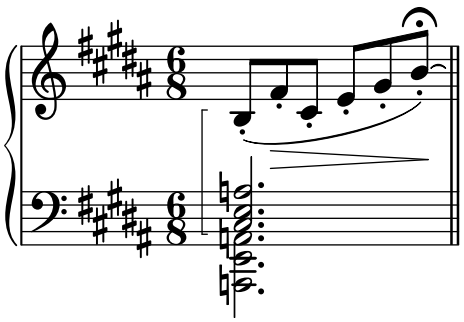
Selected Snippets

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*.
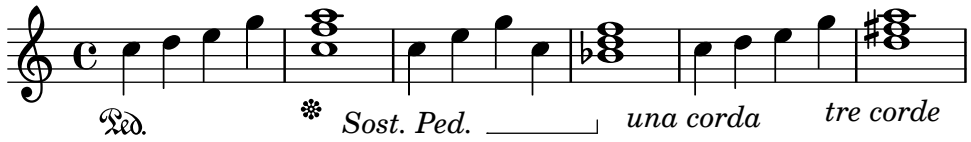
2.2.2 Piano

This section discusses notation issues that relate most directly to the piano.

Piano pedals
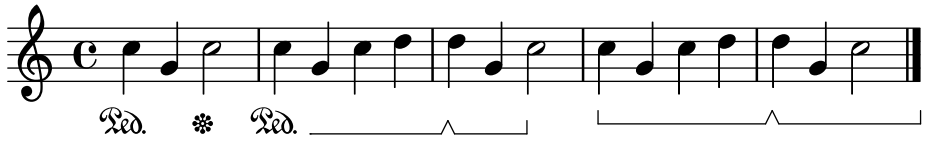
Pianos generally have three pedals that alter the way sound is produced: *sustain*, *sostenuto* (*sos.*), and *una corda* (*U.C.*). Sustain pedals are also found on vibraphones and celestas.

```
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 off command.

Pedal indications may be placed in a `Dynamics` context, which aligns them on a horizontal line.

See also

Notation Reference: [Ties], page 49.

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
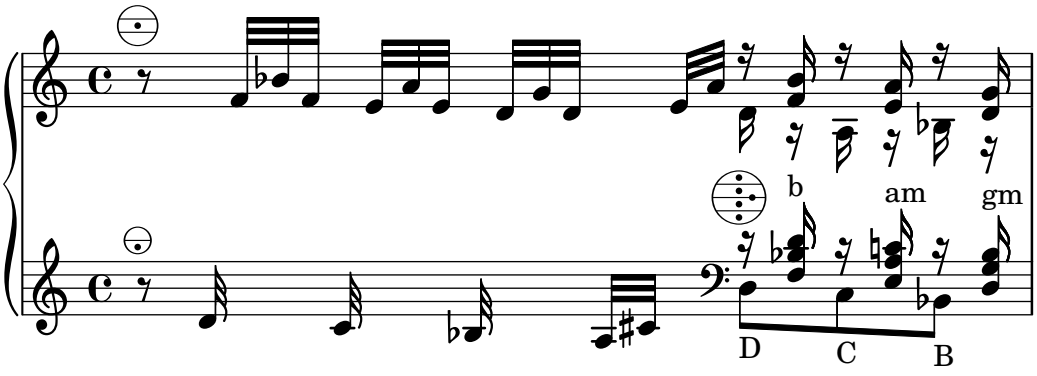
Accordion register symbols

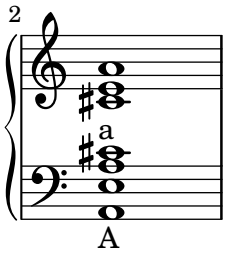
Accordion register symbols are available as `\markup` as well as as standalone music events (as register changes tend to occur between actual music events. Bass registers are not overly standardized. The available commands can be found in Section "Accordion Registers" in *Notation Reference*.

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

#(use-modules (scm accreg))

\new PianoStaff
<<
  \new Staff \relative
  { \clef treble \discant "10" r8 s32 f'[ bes f] s e[ a e] s d[ g d] s16 e32[ a]
    << { r16 <f bes> r <e a> r <d g> } \\ { d r a r bes r } >> | <cis e a>1 }
  \new Staff \relative
  { \clef treble \freeBass "1" r8 d'32 s16. c32 s16. bes32 s16. a32[ cis] s16
    \clef bass \stdBass "Master"
    << { r16 <f, bes d>^"b" r <e a c>^"am" r <d g bes>^"gm" |
         <e a cis>1^"a" } \\
       { d8_"D" c_"C" bes_"B" | a1_"A" }
     >>
  }
>>
```





See also

Snippets: Section “Keyboards” in *Snippets*.

2.2.4 Harp

This section discusses notation issues that are unique to the harp.

References for harps

Some common characteristics of harp music are covered elsewhere:

- The glissando is the most characteristic harp technique, [Glissando], page 128.
- A *bisbigliando* is written as a tremelo [Tremolo repeats], page 152.
- Natural harmonics are covered under [Harmonics], page 313.
- For directional arpeggios and non-arpeggios, see [Arpeggio], page 133.
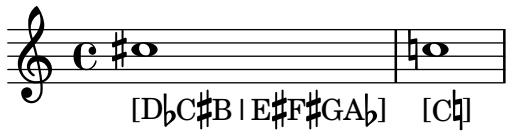
See also

Notation Reference: [Tremolo repeats], page 152, [Glissando], page 128, [Arpeggio], page 133, [Harmonics], page 313.

Harp pedals

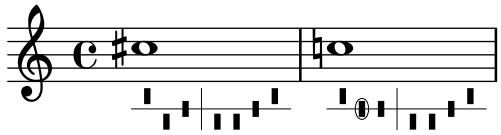
Harps have seven strings per octave that may be sounded at the natural, flattened, or sharpened pitch. In lever harps, each string is adjusted individually, but in pedal harps every string with the same pitch name is controlled by a single pedal. From the player’s left to right, the pedals are D, C, 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-^" }
```
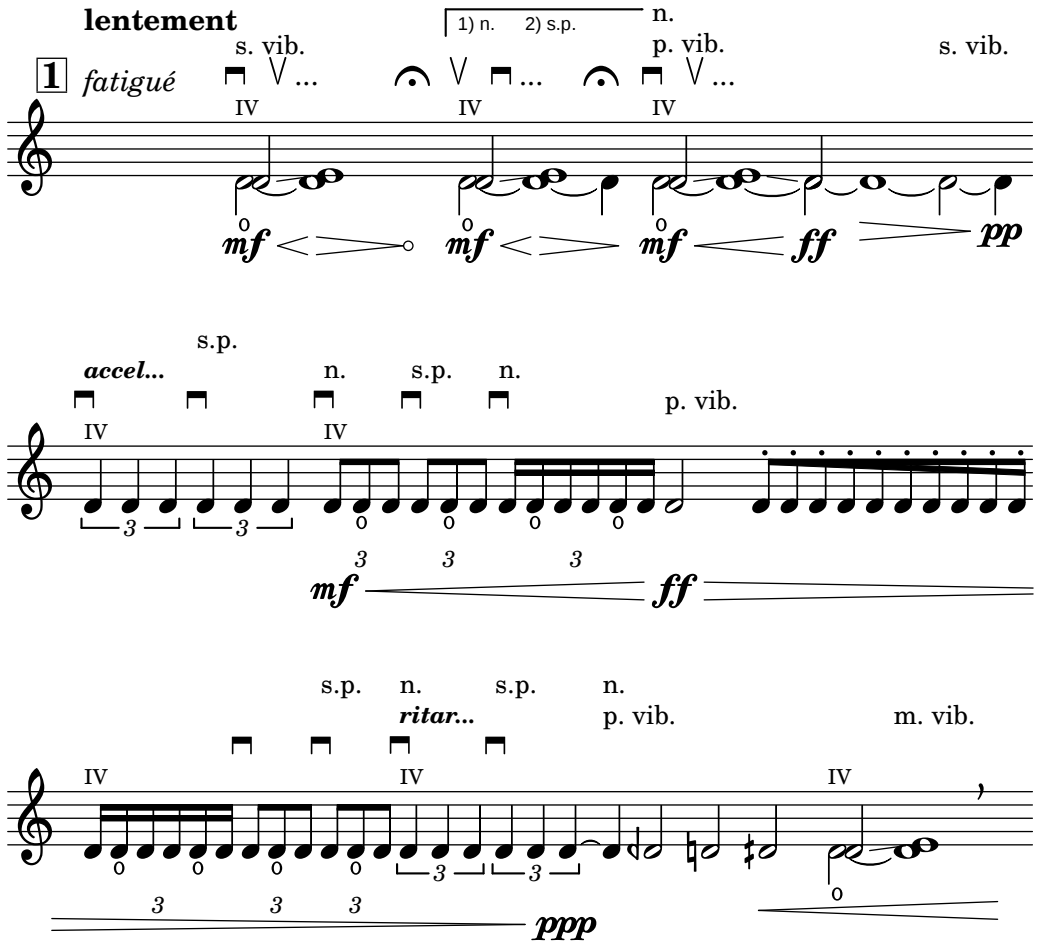


The `\harp-pedal` command accepts a string of characters, where `^` is the highest pedal position (flattened pitch), `-` is the middle pedal position (natural pitch), `v` is the lowest pedal position (sharpened pitch), and `|` is the divider. A prefixed `o` will circle the following pedal symbol.

See also

Notation Reference: [Text scripts], page 216, Section A.10.5 [Instrument Specific Markup], page 682.

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 216.
- Fingerings, including the thumb indication, are described in [Fingering instructions], page 205.
- Double stopping is normally indicated by writing a chord, see [Chorded notes], page 154. Directives for playing chords may be added, see [Arpeggio], page 133.
- Templates for string quartets can be found in Section “String quartet templates” in *Learning Manual*. Others are shown in the snippets.

See also

Learning Manual: Section “String quartet templates” in *Learning Manual*.

Notation Reference: [Text scripts], page 216, [Fingering instructions], page 205, [Chorded notes], page 154, [Arpeggio], page 133.
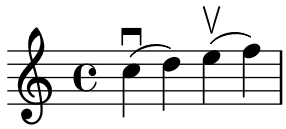
Snippets: Section “Unfretted strings” in *Snippets*.

Bowing indications

Bowing indications are created as articulations, which are described in [Articulations and ornamentations], page 111.
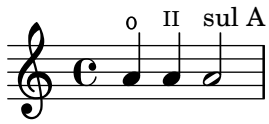
The bowing commands, `\upbow` and `\downbow`, are used with slurs as follows:

```
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
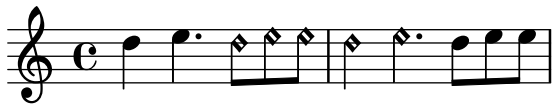
Notation Reference: [Articulations and ornamentations], page 111, [Slurs], page 122.

Harmonics

Natural harmonics

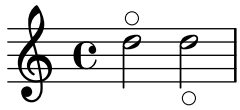
Natural harmonics can be notated in several ways. A diamond-shaped note head generally means to touch the string where you would stop the note if it were not a diamond.

```
d4 e4.
\harmonicsOn
d8 e e
d4 e4.
\harmonicsOff
d8 e e
```



Alternatively a normal note head is shown at the pitch to be sounded together with a small circle to indicate it should be played as a harmonic:

```
d2^\flageolet d_\flageolet
```
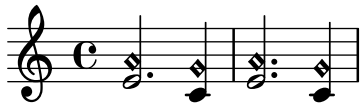


A smaller circle may be created, see the snippet list in [References for unfretted strings], page 312.

Artificial harmonics

Artificial harmonics are notated with two notes, one with a normal note head indicating the stopped position and one with an open diamond note head to indicate the harmonic position.

Artificial harmonics indicated with `\harmonic` do not show the dots. The context property `harmonicDots` should be set if dots are required.

```
<e a\harmonic>2.  <c g'\harmonic>4
\set harmonicDots = ##t
<e a\harmonic>2.  <c g'\harmonic>4
```



Note: `\harmonic` **must** be placed inside a chord construct even if there is only a single note. Normally `\harmonicsOn` would be used in this situation.

See also

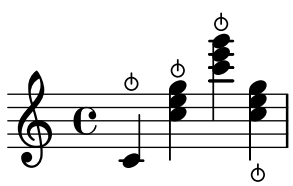
Music Glossary: Section "harmonics" in *Music Glossary*.

Notation Reference: [Special note heads], page 34, [References for unfretted strings], page 312.
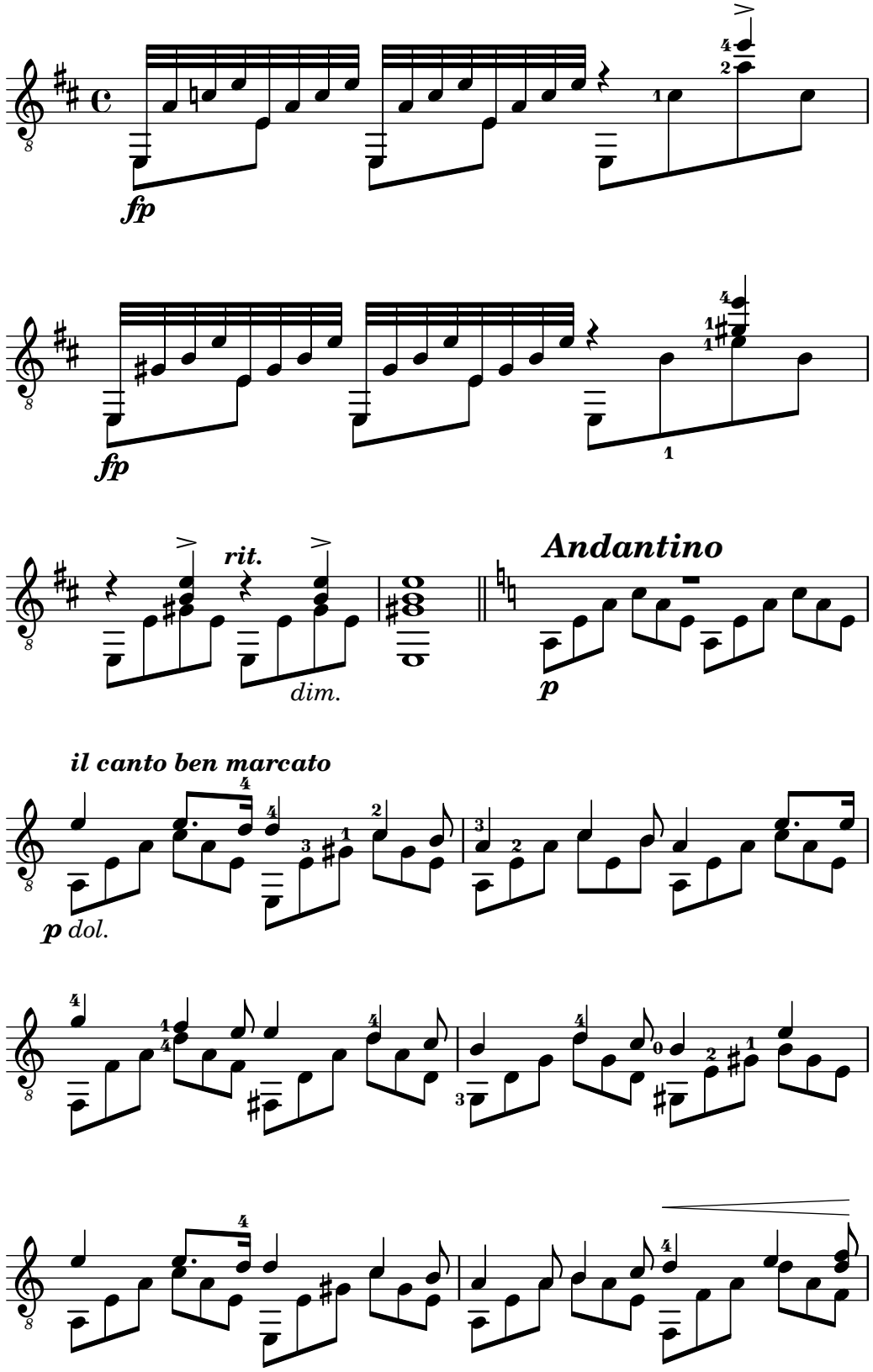
Snap (Bartók) pizzicato

A *snap pizzicato* (also known as "Bartok pizz") is a type of pizzicato where the string is deliberately plucked upwards (rather than sideways) such that it hits the fingerboard.

```
c4\snappizzicato
<c' e g>4\snappizzicato
<c' e g>4^\snappizzicato
<c, e g>4_\snappizzicato
```



2.4 Fretted string instruments



This section discusses several aspects of music notation that are unique to fretted string instruments.

2.4.1 Common notation for fretted strings

This section discusses common notation that is unique to fretted string instruments.

References for fretted strings

Music for fretted string instruments is normally notated on a single staff, either in traditional music notation or in tablature. Sometimes the two types are combined, and it is especially common in popular music to use chord diagrams above a staff of traditional notation. The guitar and the banjo are transposing instruments, sounding an octave lower than written. Scores for these instruments should use the `"treble_8"` clef (or `\transposition c` to get correct MIDI output). Some other elements pertinent to fretted string instruments are covered elsewhere:

- Fingerings are indicated as shown in [Fingering instructions], page 205.
- Instructions for *Laissez vibrer* ties as well as ties on arpeggios and tremolos can be found in [Ties], page 49.
- Instructions for handling multiple voices can be found in [Collision resolution], page 162.
- Instructions for indicating harmonics can be found in [Harmonics], page 313.

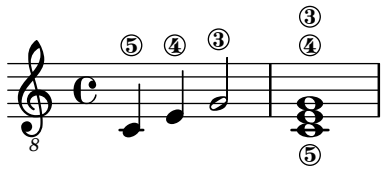
See also

Notation Reference: [Fingering instructions], page 205, [Ties], page 49, [Collision resolution], page 162, [Instrument names], page 192, [Writing music in parallel], page 172, [Arpeggio], page 133, Section A.13 [List of articulations], page 699, [Clef], page 16, [Instrument transpositions], page 24.

String number indications

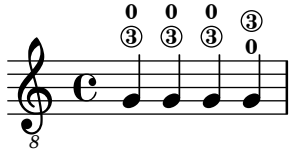
The string on which a note should be played may be indicated by appending `\number` to a note.

```
\clef "treble_8"
c4\5 e\4 g2\3
<c,\5 e\4 g\3>1
```



When fingerings and string indications are used together, their placement can be controlled by the order in which the two items appear in the code *only* if they appear inside of an explicit chord: applied to whole chords or single notes *outside* of chords, fingerings are placed using a different mechanism.

```
\clef "treble_8"
g4\3-0
g-0\3
<g\3-0>
<g-0\3>
```

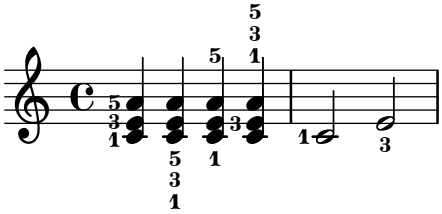


Selected Snippets

Controlling the placement of chord fingerings

The placement of fingering numbers can be controlled precisely. For fingering orientation to apply, you must use a chord construct <> even if it is a single note.

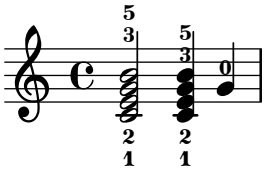
```
\relative c' {
  \set fingeringOrientations = #'(left)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(down)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(down right up)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(up)
  <c-1 e-3 a-5>4
  \set fingeringOrientations = #'(left)
  <c-1>2
  \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. Note: you must use a chord construct <>, even if it is only a single note.

```
\relative c' {
  <c-1 e-2 g-3 b-5>2
  \override Fingering.staff-padding = #'()
  <c-1 e-2 g-3 b-5>4 <g'-0>
}
```



See also

Notation Reference: [Fingering instructions], page 205.

Snippets: Section “Fretted strings” in *Snippets*.

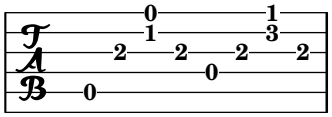
Internals Reference: Section “StringNumber” in *Internals Reference*, Section “Fingering” in *Internals Reference*.

Default tablatures

Music for plucked string instruments is frequently notated using a finger/touch notation or tablature. In contrast to traditional notation pitches are not denoted with note heads, but by numbers (or letter-like symbols in historical intavolatura). The staff lines in tablature indicate the string on which the note is to be played, and a number placed on a staff line indicated the fret at which the corresponding string is to be pressed. Notes that are to be played simultaneously are vertically aligned.

By default, string 1 is the highest string, and corresponds to the top line on the `TabStaff`. The tuning of the `TabStaff` strings defaults to the standard guitar tuning (with 6 strings). The notes are printed as tablature, by using `TabStaff` and `TabVoice` contexts. A calligraphic tablature clef is added automatically.

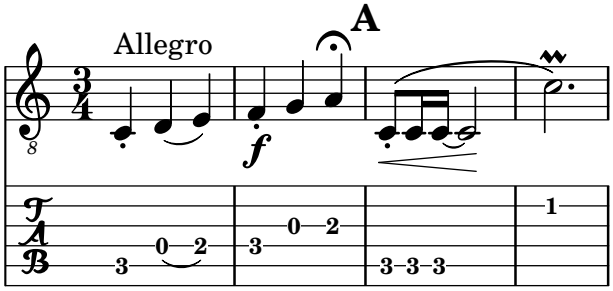
```
\new TabStaff \relative c' {
  a,8 a' <c e> a
  d,8 a' <d f> a
}
```



Default tablatures do not contain any symbols for tone duration nor any other musical symbols such as e.g. expressive marks.

```
symbols = {
  \time 3/4
  c4-.^"Allegro" d( e)
  f4-.\f g a^\fermata
  \mark \default
  c8_.\<\( c16 c~ c2\!
  c'2.\prall\)
}

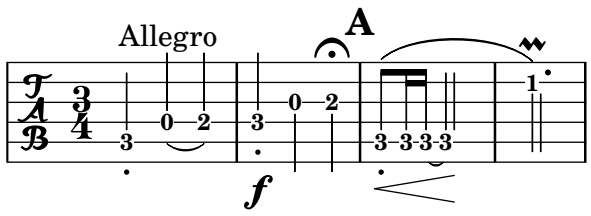
\score {
  <<
    \new Staff { \clef "G_8" \symbols }
    \new TabStaff { \symbols }
  >>
}
```



If all musical symbols used in traditional notation should also show up in tablature one has to apply the command `\tabFullNotation` in a `TabStaff`-context. Please bear in mind that half notes are double-stemmed in tablature in order to distinguish them from quarter notes.

```
symbols = {
  \time 3/4
  c4-.^"Allegro" d( e)
  f4-.\f g a^\fermata
  \mark \default
  c8_.\<\( c16 c~ c2\!
  c'2.\prall\)
}

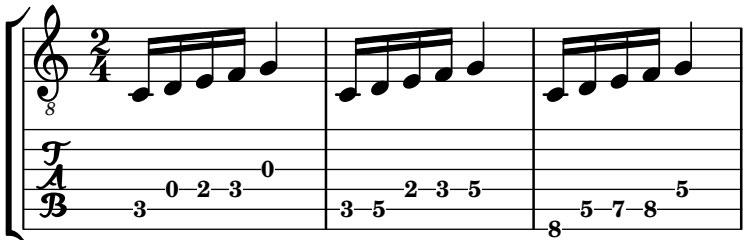
\score {
  \new TabStaff {
    \tabFullNotation
    \symbols
  }
}
```



By default pitches are assigned to the lowest playing position on the fret-board (first position). Open strings are automatically preferred. If you would like a certain pitch to be played on a specific string you can add a string number indication to the pitch name. If you don't want to have string number indications appear in traditional notation, you can override the respective stencil. Usually it will be more comfortable to define the playing position by using the value of `minimumFret`. The default value for minimumFret is 0.

Even when `minimumFret` is set, open strings are used whenever possible. This behaviour can be changed by setting `restrainOpenStrings` to `#t`.

```
\layout { \omit Voice.StringNumber }
\new StaffGroup <<
   \new Staff \relative c {
     \clef "treble_8"
     \time 2/4
     c16 d e f g4
     c,16\5 d\5 e\4 f\4 g4\4
     c,16 d e f g4
   }
   \new TabStaff \relative c {
     c16 d e f g4
     c,16\5 d\5 e\4 f\4 g4\4
     \set TabStaff.minimumFret = #5
     \set TabStaff.restrainOpenStrings = ##t
     c,16 d e f g4
   }
>>
```



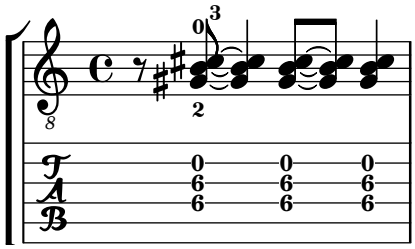
Chord constructs can be repeated by the chord repetition symbol `q`. In combination with tabulatures, its behavior of removing string and finger numbers alongside with other events is cumbersome, so you'll want to run

```
\chordRepeats #'(string-number-event fingering-event)
```

explicitly on music expressions in tabulature using [Chord repetition], page 156. This particular command is so common that it is available as `\tabChordRepeats`.

```
guitar = \relative c' {
  r8 <gis-2 cis-3 b-0>~ q4 q8~ q q4
}

\new StaffGroup <<
  \new Staff {
    \clef "treble_8"
    \guitar
  }
  \new TabStaff {
    \tabChordRepeats \guitar
  }
>>
```

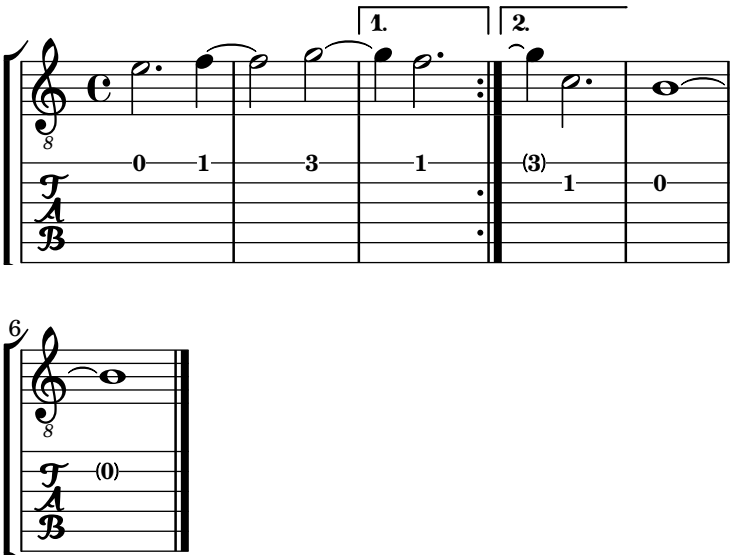


Ties over a line break are parenthesized by default. The same holds for the second alternative of a repeat.

```
ties = \relative c' {
  \repeat volta 2 {
    e2. f4~
    f2 g2~
  }
  \alternative {
     { g4 f2. }
     { g4\repeatTie c,2. }
  }
  b1~
  \break
  b1
  \bar "|."
}

\score {
```

```
  <<
    \new StaffGroup  <<
      \new Staff {
        \clef "treble_8"
        \ties
      }
      \new TabStaff {
        \ties
      }
    >>
  >>
  \layout {
  indent = #0
  ragged-right = ##t
  }
}
```

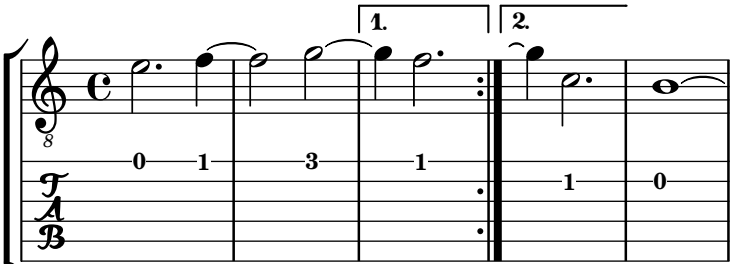


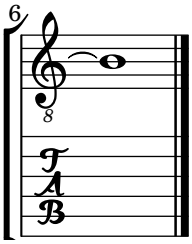
The command `\hideSplitTiedTabNotes` cancels the behavior of engraving fret numbers in parentheses:

```
ties = \relative c' {
  \repeat volta 2 {
    e2. f4~
    f2 g2~ }
  \alternative {
    { g4 f2. }
    { g4\repeatTie c,2. }
  }
  b1~
  \break
  b1
  \bar "|."
}

\score {
  <<
```

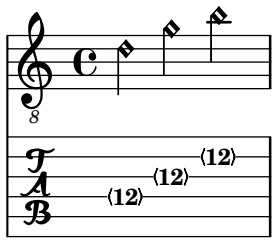
```
    \new StaffGroup  <<
      \new Staff {
        \clef "treble_8"
        \ties
      }
      \new TabStaff {
      \hideSplitTiedTabNotes
        \ties
      }
    >>
  >>
  \layout {
  indent = #0
  ragged-right = ##t
  }
}
```





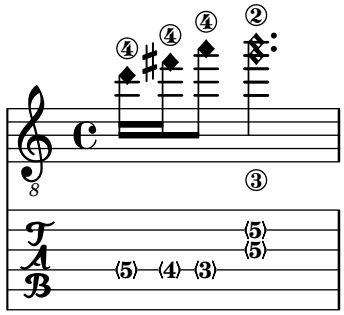
Harmonic indications can be added to tablature notation as sounding pitches:

```
\layout { \omit Voice.StringNumber }
firstHarmonic = {
  d'4\4\harmonic
  g'4\3\harmonic
  b'2\2\harmonic
}
\score {
  <<
    \new Staff {
      \clef "treble_8"
      \firstHarmonic
    }
    \new TabStaff { \firstHarmonic }
  >>
}
```



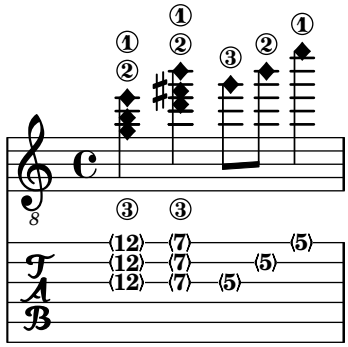
Note that the command `\harmonic` must always be attached to single notes (possibly inside of a chord) instead of whole chords. It only makes sense for open-string harmonics in the 12th fret. All other harmonics should be calculated by LilyPond. This can be achieved by indicating the fret where a finger of the fretting hand should touch a string.

```
fretHarmonics = {
  \harmonicByFret #5 d16\4
  \harmonicByFret #4 d16\4
  \harmonicByFret #3 d8\4
  \harmonicByFret #5 <g\3 b\2>2.
}
\score {
  <<
    \new Staff {
      \clef "treble_8"
      \fretHarmonics
    }
    \new TabStaff { \fretHarmonics }
  >>
}
```



Alternatively, harmonics can be computed by defining the ratio of string lengths above and below the harmonic fingering.

```
ratioHarmonics = {
  \harmonicByRatio #1/2 <g\3 b\2 e'\1>4
  \harmonicByRatio #1/3 <g\3 b\2 e'\1>4
  \harmonicByRatio #1/4 { g8\3 b8\2 e'4\1 }
}
\score {
  <<
    \new Staff {
      \clef "treble_8"
      \ratioHarmonics
    }
    \new TabStaff { \ratioHarmonics }
  >>
}
```

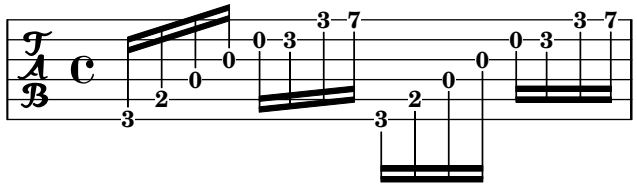


Selected Snippets

Stem and beam behavior in tablature

The direction of stems is controlled the same way in tablature as in traditional notation. Beams can be made horizontal, as shown in this example.

```
\new TabStaff {
  \relative c {
    \tabFullNotation
    g16 b d g b d g b
    \stemDown
    \override Beam.concaveness = #10000
    g,,16 b d g b d g b
  }
}
```



Polyphony in tablature

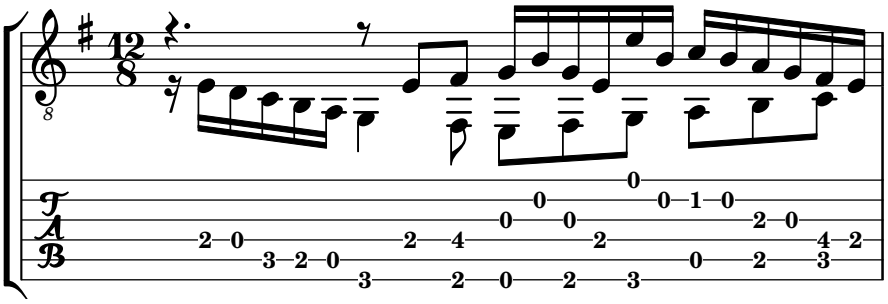
Polyphony is created the same way in a `TabStaff` as in a regular staff.

```
upper = \relative c' {
  \time 12/8
  \key e \minor
  \voiceOne
  r4. r8 e, fis g16 b g e e' b c b a g fis e
}

lower = \relative c {
  \key e \minor
  \voiceTwo
  r16 e d c b a g4 fis8 e fis g a b c
}

\score {
  <<
    \new StaffGroup = "tab with traditional" <<
      \new Staff = "guitar traditional" <<
        \clef "treble_8"
        \context Voice = "upper" \upper
        \context Voice = "lower" \lower
```

```
      >>
      \new TabStaff = "guitar tab" <<
        \context TabVoice = "upper" \upper
        \context TabVoice = "lower" \lower
      >>
    >>
  >>
}
```



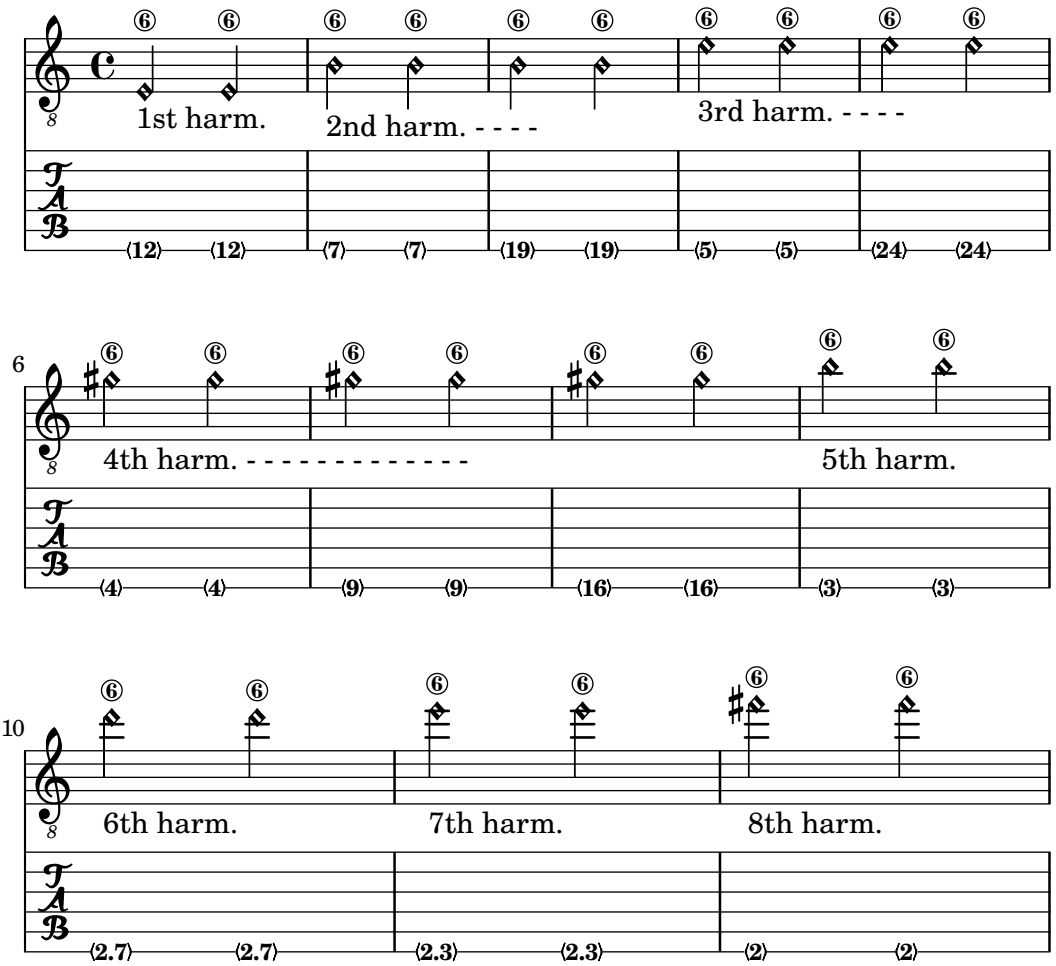
Open string harmonics in tablature

This snippet demonstrates open-string harmonics

```
openStringHarmonics = {
  %first harmonic
  \harmonicByFret #12 e,2\6_\markup{"1st harm."}
  \harmonicByRatio #1/2 e,\6
  %second harmonic
  \harmonicByFret #7 e,\6_\markup{"2nd harm. - - - -"}
  \harmonicByRatio #1/3 e,\6
  \harmonicByFret #19 e,\6
  \harmonicByRatio #2/3 e,\6
  %\harmonicByFret #19 < e,\6 a,\5 d\4 >
  %\harmonicByRatio #2/3 < e,\6 a,\5 d\4 >
  %third harmonic
  \harmonicByFret #5 e,\6_\markup{"3rd harm. - - - -"}
  \harmonicByRatio #1/4 e,\6
  \harmonicByFret #24 e,\6
  \harmonicByRatio #3/4 e,\6
  \break
  %fourth harmonic
  \harmonicByFret #4 e,\6_\markup{"4th harm. - - - - - - - - - - - - -"}
  \harmonicByRatio #1/5 e,\6
  \harmonicByFret #9 e,\6
  \harmonicByRatio #2/5 e,\6
  \harmonicByFret #16 e,\6
  \harmonicByRatio #3/5 e,\6
  %fifth harmonic
  \harmonicByFret #3 e,\6_\markup{"5th harm."}
  \harmonicByRatio #1/6 e,\6
  \break
  %sixth harmonic
  \harmonicByFret #2.7 e,\6_\markup{"6th harm."}
  \harmonicByRatio #1/7 e,\6
```

```
  %seventh harmonic
  \harmonicByFret #2.3 e,\6_\markup{"7th harm."}
  \harmonicByRatio #1/8 e,\6
  %eighth harmonic
  \harmonicByFret #2 e,\6_\markup{"8th harm."}
  \harmonicByRatio #1/9 e,\6
}

\score {
  <<
    \new Staff {
      \new Voice {
        \clef "treble_8"
        \openStringHarmonics
      }
    }
    \new TabStaff {
      \new TabVoice {
        \openStringHarmonics
      }
    }
  >>
}
```



Fretted-string harmonics in tablature

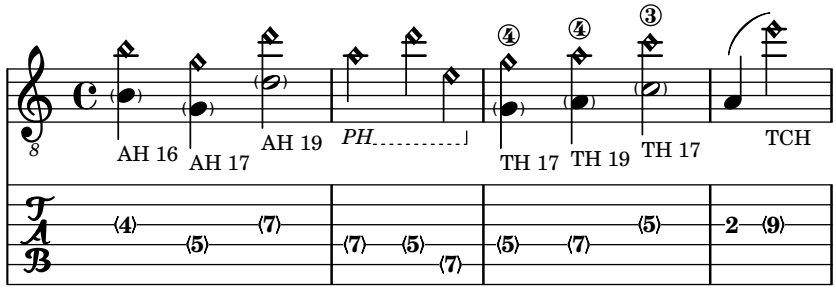
Demonstrates fretted-string harmonics in tablature

```
pinchedHarmonics = {
   \textSpannerDown
   \override TextSpanner.bound-details.left.text =
      \markup {\halign #-0.5 \teeny "PH" }
      \override TextSpanner.style =
         #'dashed-line
   \override TextSpanner.dash-period = #0.6
   \override TextSpanner.bound-details.right.attach-dir = #1
   \override TextSpanner.bound-details.right.text =
      \markup { \draw-line #'(0 . 1) }
   \override TextSpanner.bound-details.right.padding = #-0.5
}

harmonics = {
  %artificial harmonics (AH)
  \textLengthOn
  <\parenthesize b b'\harmonic>4_\markup{ \teeny "AH 16" }
  <\parenthesize g g'\harmonic>4_\markup{ \teeny "AH 17" }
  <\parenthesize d' d''\harmonic>2_\markup{ \teeny "AH 19" }
  %pinched harmonics (PH)
  \pinchedHarmonics
  <a'\harmonic>2\startTextSpan
  <d''\harmonic>4
  <e'\harmonic>4\stopTextSpan
  %tapped harmonics (TH)
  <\parenthesize g\4 g'\harmonic>4_\markup{ \teeny "TH 17" }
  <\parenthesize a\4 a'\harmonic>4_\markup{ \teeny "TH 19" }
  <\parenthesize c'\3 c''\harmonic>2_\markup{ \teeny "TH 17" }
  %touch harmonics (TCH)
  a4( <e''\harmonic>2. )_\markup{ \teeny "TCH" }
}

frettedStrings = {
  %artificial harmonics (AH)
  \harmonicByFret #4 g4\3
  \harmonicByFret #5 d4\4
  \harmonicByFret #7 g2\3
  %pinched harmonics (PH)
  \harmonicByFret #7 d2\4
  \harmonicByFret #5 d4\4
  \harmonicByFret #7 a4\5
  %tapped harmonics (TH)
  \harmonicByFret #5 d4\4
  \harmonicByFret #7 d4\4
  \harmonicByFret #5 g2\3
  %touch harmonics (TCH)
  a4 \harmonicByFret #9 g2.\3
}
```

```
\score {
  <<
    \new Staff {
      \new Voice {
        \clef "treble_8"
        \harmonics
      }
    }
    \new TabStaff {
      \new TabVoice {
        \frettedStrings
      }
    }
  >>
}
```



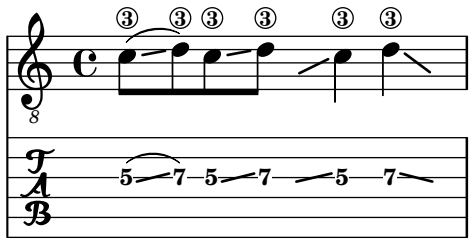
Slides in tablature

Slides can be typeset in both `Staff` and `TabStaff` contexts:

```
slides = {
  c'8\3(\glissando d'8\3)
  c'8\3\glissando d'8\3
  \hideNotes
  \grace { g16\glissando }
  \unHideNotes
  c'4\3
  \afterGrace d'4\3\glissando {
  \stemDown \hideNotes
  g16 }
  \unHideNotes
}

\score {
  <<
    \new Staff { \clef "treble_8" \slides }
    \new TabStaff { \slides }
  >>
  \layout {
    \context {
      \Score
      \override Glissando.minimum-length = #4
      \override Glissando.springs-and-rods =
                          #ly:spanner::set-spacing-rods
```

```
      \override Glissando.thickness = #2
    }
  }
}
```

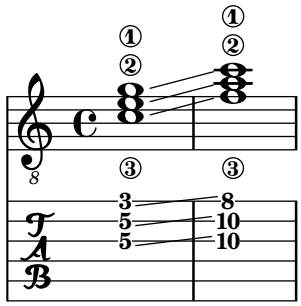


Chord glissando in tablature

Slides for chords can be indicated in both `Staff` and `TabStaff`. String numbers are necessary for `TabStaff` because automatic string calculations are different for chords and for single notes.

```
myMusic = \relative c' {
  <c\3 e\2 g\1>1 \glissando <f\3 a\2 c\1>
}

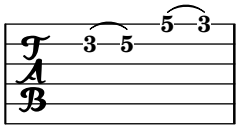
\score {
  <<
    \new Staff {
      \clef "treble_8"
      \myMusic
    }
    \new TabStaff {
      \myMusic
    }
  >>
}
```



Hammer on and pull off

Hammer-on and pull-off can be obtained using slurs.

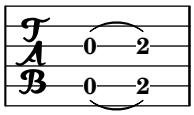
```
\new TabStaff {
  \relative c' {
    d4( e\2)
    a( g)
  }
}
```



Hammer on and pull off using voices

The arc of hammer-on and pull-off is upwards in voices one and three and downwards in voices two and four:

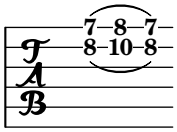
```
\new TabStaff {
  \relative c' {
    << { \voiceOne g2( a) }
    \\ { \voiceTwo a,( b) }
    >> \oneVoice
  }
}
```



Hammer on and pull off using chords

When using hammer-on or pull-off with chorded notes, only a single arc is drawn. However 'double arcs' are possible by setting the `doubleSlurs` property to `#t`.

```
\new TabStaff {
  \relative c' {
    % chord hammer-on and pull-off
    \set doubleSlurs = ##t
    <g' b>8( <a c> <g b>)
  }
}
```



See also

Notation Reference: [Chord repetition], page 156, [Glissando], page 128, [Harmonics], page 313, [Stems], page 210, [Written-out repeats], page 148.

Snippets: Section "Fretted strings" in *Snippets*.

Internals Reference: Section "TabNoteHead" in *Internals Reference*, Section "TabStaff" in *Internals Reference*, Section "TabVoice" in *Internals Reference*, Section "Beam" in *Internals Reference*.

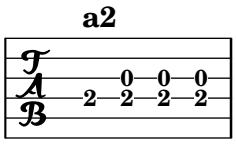
Known issues and warnings

Chords are not handled in a special way, and hence the automatic string selector may easily select the same string for two notes in a chord.

In order to handle `\partcombine`, a `TabStaff` must use specially-created voices:

```
melodia = \partcombine { e4 g g g } { e4 e e e }
<<
  \new TabStaff <<
    \new TabVoice = "one" s1
    \new TabVoice = "two" s1
```

```
    \new TabVoice = "shared" s1
    \new TabVoice = "solo" s1
    { \melodia }
  >>
>>
```



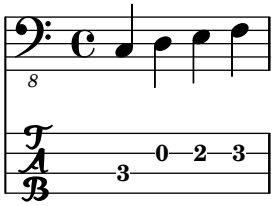
Guitar special effects are limited to harmonics and slides.

Custom tablatures

LilyPond tablature automatically calculates the fret for a note based on the string to which the note is assigned. In order to do this, the tuning of the strings must be specified. The tuning of the strings is given in the `stringTunings` property.

LilyPond comes with predefined string tunings for banjo, mandolin, guitar, bass guitar, ukulele, violin, viola, cello, and double bass. LilyPond automatically sets the correct transposition for predefined tunings. The following example is for bass guitar, which sounds an octave lower than written.

```
<<
  \new Voice \with {
    \omit StringNumber
  } {
    \clef "bass_8"
    \relative c, {
      c4 d e f
    }
  }
  \new TabStaff \with {
    stringTunings = #bass-tuning
  } {
    \relative c, {
      c4 d e f
    }
  }
>>
```



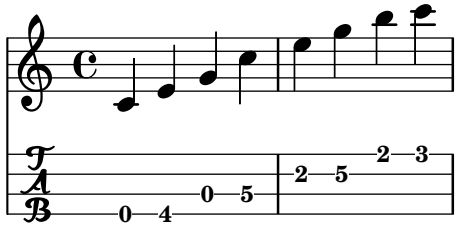
The default string tuning is `guitar-tuning`, which is the standard EADGBE tuning. Some other predefined tunings are `guitar-open-g-tuning`, `mandolin-tuning` and `banjo-open-g-tuning`. The predefined string tunings are found in '`ly/string-tunings-init.ly`'.

Any desired string tuning can be created. The `\stringTuning` function can be used to define a string tuning which can be used to set `stringTunings` for the current context.

Its argument is a chord construct defining the pitches of each string in the tuning. The chord construct must be in absolute octave mode, see [Absolute octave entry], page 1. The string with the highest number (generally the lowest string) must come first in the chord. For example, we can define a string tuning for a four-string instrument with pitches of `a''`, `d''`, `g'`, and `c'`:

```
mynotes = {
  c'4 e' g' c'' |
  e''4 g'' b'' c'''
}

<<
  \new Staff {
    \clef treble
    \mynotes
  }
  \new TabStaff {
    \set Staff.stringTunings = \stringTuning <c' g' d'' a''>
    \mynotes
  }
>>
```



The `stringTunings` property is also used by `FretBoards` to calculate automatic fret diagrams.

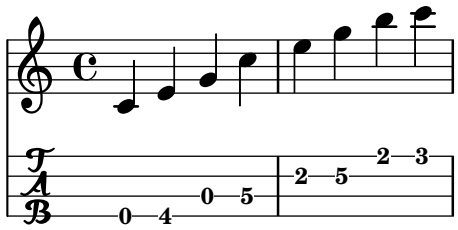
String tunings are used as part of the hash key for predefined fret diagrams (see [Predefined fret diagrams], page 343).

The previous example could also be written as follows:

```
custom-tuning = \stringTuning <c' g' d'' a''>

mynotes = {
  c'4 e' g' c'' |
  e''4 g'' b'' c'''
}

<<
  \new Staff {
    \clef treble
    \mynotes
  }
  \new TabStaff {
    \set TabStaff.stringTunings = #custom-tuning
    \mynotes
  }
>>
```



Internally, a string tuning is a Scheme list of string pitches, one for each string, ordered by string number from 1 to N, where string 1 is at the top of the tablature staff and string N is at the bottom. This ordinarily results in ordering from highest pitch to lowest pitch, but some instruments (e.g. ukulele) do not have strings ordered by pitch.

A string pitch in a string tuning list is a LilyPond pitch object. Pitch objects are created with the Scheme function `ly:make-pitch` (see Section A.21 [Scheme functions], page 747).

`\stringTuning` creates such an object from chord input.

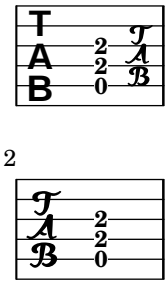
LilyPond automatically calculates the number of lines in the `TabStaff` and the number of strings in an automatically calculated `FretBoard` as the number of elements in `stringTunings`.

To let all TabStaff contexts use the same custom tuning by default, you can use

```
\layout {
  \context {
    \TabStaff
    stringTunings = \stringTuning <c' g' d'' a''>
  }
}
```

A modern tab clef can also be used.

```
\new TabStaff {
  \clef moderntab
  <a, e a>1
  \break
  \clef tab
  <a, e a>1
}
```



The modern tab clef supports tablatures from 4 to 7 strings.

See also

Notation Reference: [Absolute octave entry], page 1, [Predefined fret diagrams], page 343, Section A.21 [Scheme functions], page 747.

Installed Files: ‘`ly/string-tunings-init.ly`’, ‘`scm/tablature.scm`’.

Snippets: Section “Fretted strings” in *Snippets*.

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

Known issues and warnings

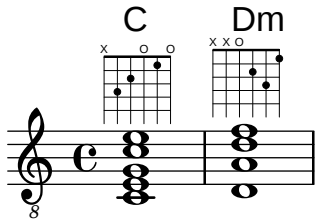
Automatic tablature calculations do not work properly in most cases for instruments where string pitches do not vary monotonically with string number, such as ukuleles.

Fret diagram markups

Fret diagrams can be added to music as a markup to the desired note. The markup contains information about the desired fret diagram. There are three different fret-diagram markup interfaces: standard, terse, and verbose. The three interfaces produce equivalent markups, but have varying amounts of information in the markup string. Details about the syntax of the different markup strings used to define fret diagrams are found at Section A.10.5 [Instrument Specific Markup], page 682.

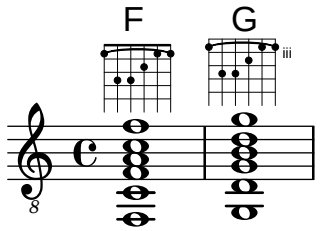
The standard fret diagram markup string indicates the string number and the fret number for each dot to be placed on the string. In addition, open and unplayed (muted) strings can be indicated.

```
<<
  \new ChordNames {
    \chordmode {
      c1 d:m
    }
  }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1^\markup {
      \fret-diagram #"6-x;5-3;4-2;3-o;2-1;1-o;"
    }
    <d a d' f'>1^\markup {
      \fret-diagram #"6-x;5-x;4-o;3-2;2-3;1-1;"
    }
  }
>>
```



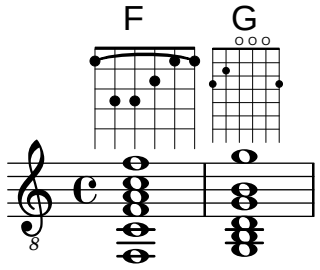
Barre indications can be added to the diagram from the fret-diagram markup string.

```
<<
  \new ChordNames {
     \chordmode {
       f1 g
     }
  }
  \new Staff {
    \clef "treble_8"
    <f, c f a c' f'>1^\markup {
      \fret-diagram #"c:6-1-1;6-1;5-3;4-3;3-2;2-1;1-1;"
    }
    <g, d g b d' g'>1^\markup {
      \fret-diagram #"c:6-1-3;6-3;5-5;4-5;3-4;2-3;1-3;"
    }
  }
>>
```



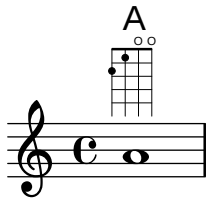
The size of the fret diagram, and the number of frets in the diagram can be changed in the fret-diagram markup string.

```
<<
  \new ChordNames {
     \chordmode {
       f1 g
     }
  }
  \new Staff {
    \clef "treble_8"
    <f, c f a c' f'>1^\markup {
      \fret-diagram #"s:1.5;c:6-1-1;6-1;5-3;4-3;3-2;2-1;1-1;"
    }
    <g, b, d g b g'>1^\markup {
      \fret-diagram #"h:6;6-3;5-2;4-o;3-o;2-o;1-3;"
    }
  }
>>
```



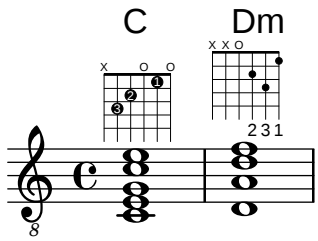
The number of strings in a fret diagram can be changed to accommodate different instruments such as banjos and ukuleles with the fret-diagram markup string.

```
<<
  \new ChordNames {
    \chordmode {
      a1
    }
  }
  \new Staff {
    % An 'A' chord for ukulele
    a'1^\markup {
      \fret-diagram #"w:4;4-2-2;3-1-1;2-o;1-o;"
    }
  }
>>
```



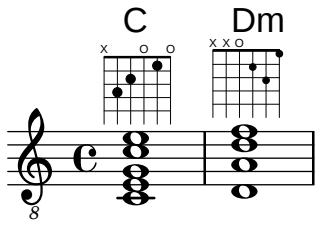
Fingering indications can be added, and the location of fingering labels can be controlled by the fret-diagram markup string.

```
<<
  \new ChordNames {
    \chordmode {
      c1 d:m
    }
  }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1^\markup {
      \fret-diagram #"f:1;6-x;5-3-3;4-2-2;3-o;2-1-1;1-o;"
    }
    <d a d' f'>1^\markup {
      \fret-diagram #"f:2;6-x;5-x;4-o;3-2-2;2-3-3;1-1-1;"
    }
  }
>>
```



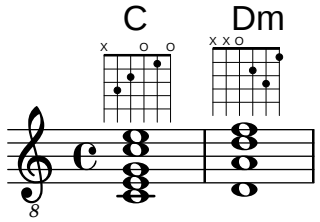
Dot radius and dot position can be controlled with the fret-diagram markup string.

```
<<
  \new ChordNames {
    \chordmode {
      c1 d:m
    }
  }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1^\markup {
      \fret-diagram #"d:0.35;6-x;5-3;4-2;3-o;2-1;1-o;"
    }
    <d a d' f'>1^\markup {
      \fret-diagram #"p:0.2;6-x;5-x;4-o;3-2;2-3;1-1;"
    }
  }
>>
```



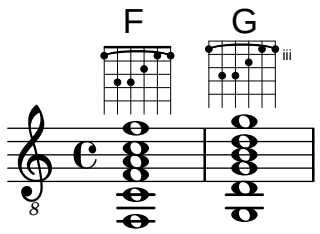
The fret-diagram-terse markup string omits string numbers; the string number is implied by the presence of semicolons. There is one semicolon for each string in the diagram. The first semicolon corresponds to the highest string number and the last semicolon corresponds to the first string. Mute strings, open strings, and fret numbers can be indicated.

```
<<
  \new ChordNames {
    \chordmode {
      c1 d:m
    }
  }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1^\markup {
      \fret-diagram-terse #"x;3;2;o;1;o;"
    }
    <d a d' f'>1^\markup {
      \fret-diagram-terse #"x;x;o;2;3;1;"
    }
  }
>>
```



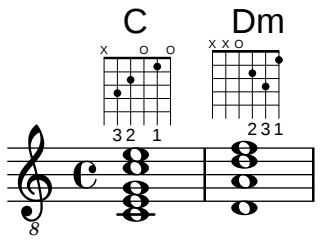
Barre indicators can be included in the fret-diagram-terse markup string.

```
<<
  \new ChordNames {
    \chordmode {
      f1 g
    }
  }
  \new Staff {
    \clef "treble_8"
    <f, c f a c' f'>1^\markup {
      \fret-diagram-terse #"1-(;3;3;2;1;1-);"
    }
    <g, d g b d' g'>1^\markup {
      \fret-diagram-terse #"3-(;5;5;4;3;3-);"
    }
  }
>>
```



Fingering indications can be included in the fret-diagram-terse markup string.

```
<<
  \new ChordNames {
    \chordmode {
      c1 d:m
    }
  }
  \new Staff {
    \override Voice.TextScript.fret-diagram-details.finger-code = #'below-string
    \clef "treble_8"
    <c e g c' e'>1^\markup {
      \fret-diagram-terse #"x;3-3;2-2;o;1-1;o;"
    }
    <d a d' f'>1^\markup {
      \fret-diagram-terse #"x;x;o;2-2;3-3;1-1;"
    }
  }
>>
```

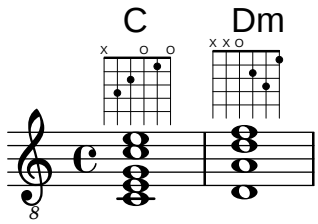


Other fret diagram properties must be adjusted using `\override` when using the fret-diagram-terse markup.

The fret-diagram-verbose markup string is in the format of a Scheme list. Each element of the list indicates an item to be placed on the fret diagram.

```
<<
    \new ChordNames {
      \chordmode {
        c1 d:m
      }
    }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1^\markup {
      \fret-diagram-verbose #'(
        (mute 6)
        (place-fret 5 3)
        (place-fret 4 2)
        (open 3)
        (place-fret 2 1)
        (open 1)
```

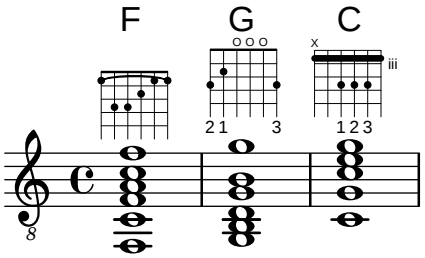
```
      )
    }
    <d a d' f'>1^\markup {
      \fret-diagram-verbose #'(
        (mute 6)
        (mute 5)
        (open 4)
        (place-fret 3 2)
        (place-fret 2 3)
        (place-fret 1 1)
      )
    }
  }
>>
```



Fingering indications and barres can be included in a fret-diagram-verbose markup string. Unique to the fret-diagram-verbose interface is a capo indication that can be placed on the fret diagram. The capo indication is a thick bar that covers all strings. The fret with the capo will be the lowest fret in the fret diagram.

```
<<
    \new ChordNames {
      \chordmode {
        f1 g c
      }
    }
  \new Staff {
    \clef "treble_8"
    \override Voice.TextScript.fret-diagram-details.finger-code = #'below-string
    <f, c f a c' f'>1^\markup {
      \fret-diagram-verbose #'(
        (place-fret 6 1)
        (place-fret 5 3)
        (place-fret 4 3)
        (place-fret 3 2)
        (place-fret 2 1)
        (place-fret 1 1)
        (barre 6 1 1)
      )
    }
    <g, b, d g b g'>1^\markup {
      \fret-diagram-verbose #'(
        (place-fret 6 3 2)
        (place-fret 5 2 1)
        (open 4)
        (open 3)
```

```
        (open 2)
        (place-fret 1 3 3)
      )
    }
    <c g c' e' g'>1^\markup {
      \fret-diagram-verbose #'(
        (capo 3)
        (mute 6)
        (place-fret 4 5 1)
        (place-fret 3 5 2)
        (place-fret 2 5 3)
      )
    }
  }
>>
```



All other fret diagram properties must be adjusted using `\override` when using the fret-diagram-verbose markup.

The graphical layout of a fret diagram can be customized according to user preference through the properties of the `fret-diagram-interface`. Details are found at Section "fret-diagram-interface" in *Internals Reference*. For a fret diagram markup, the interface properties belong to `Voice.TextScript`.

Selected Snippets

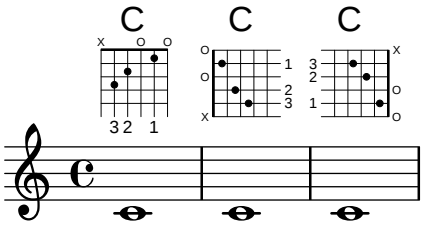
Changing fret orientations

Fret diagrams can be oriented in three ways. By default the top string or fret in the different orientations will be aligned.

```
\include "predefined-guitar-fretboards.ly"

<<
  \chords {
    c1
    c1
    c1
  }
  \new FretBoards {
    \chordmode {
      c1
      \override FretBoard.fret-diagram-details.orientation =
        #'landscape
      c1
      \override FretBoard.fret-diagram-details.orientation =
        #'opposing-landscape
```

```
      c1
    }
  }
  \new Voice {
    c'1
    c'1
    c'
  }
>>
```



Customizing markup fret diagrams

Fret diagram properties can be set through `'fret-diagram-details`. For markup fret diagrams, overrides can be applied to the `Voice.TextScript` object or directly to the markup.

```
<<
  \chords { c1 | c | c | d }

  \new Voice = "mel" {
    \textLengthOn
    % Set global properties of fret diagram
    \override TextScript.size = #'1.2
    \override TextScript.fret-diagram-details.finger-code = #'in-dot
    \override TextScript.fret-diagram-details.dot-color = #'white

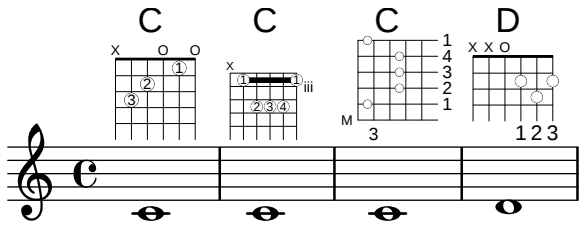
    %% C major for guitar, no barre, using defaults
       % terse style
    c'1^\markup { \fret-diagram-terse #"x;3-3;2-2;o;1-1;o;" }

    %% C major for guitar, barred on third fret
       % verbose style
       % size 1.0
       % roman fret label, finger labels below string, straight barre
    c'1^\markup {
      % standard size
      \override #'(size . 1.0) {
        \override #'(fret-diagram-details . (
                     (number-type . roman-lower)
                     (finger-code . in-dot)
                     (barre-type . straight))) {
          \fret-diagram-verbose #'((mute 6)
                                   (place-fret 5 3 1)
                                   (place-fret 4 5 2)
                                   (place-fret 3 5 3)
                                   (place-fret 2 5 4)
                                   (place-fret 1 3 1)
```

```
                                    (barre 5 1 3))
        }
      }
    }

    %% C major for guitar, barred on third fret
       % verbose style
       % landscape orientation, arabic numbers, M for mute string
       % no barre, fret label down or left, small mute label font
    c'1^\markup {
      \override #'(fret-diagram-details . (
                  (finger-code . below-string)
                  (number-type . arabic)
                  (label-dir . -1)
                  (mute-string . "M")
                  (orientation . landscape)
                  (barre-type . none)
                  (xo-font-magnification . 0.4)
                  (xo-padding . 0.3))) {
        \fret-diagram-verbose #'((mute 6)
                                 (place-fret 5 3 1)
                                 (place-fret 4 5 2)
                                 (place-fret 3 5 3)
                                 (place-fret 2 5 4)
                                 (place-fret 1 3 1)
                                 (barre 5 1 3))
      }
    }

    %% simple D chord
       % terse style
       % larger dots, centered dots, fewer frets
       % label below string
    d'1^\markup {
      \override #'(fret-diagram-details . (
                  (finger-code . below-string)
                  (dot-radius . 0.35)
                  (dot-position . 0.5)
                  (fret-count . 3))) {
        \fret-diagram-terse #"x;x;o;2-1;3-2;2-3;"
      }
    }
  }
>>
```



See also

Notation Reference: Section A.10.5 [Instrument Specific Markup], page 682.

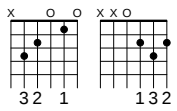
Snippets: Section “Fretted strings” in *Snippets*.

Internals Reference: Section “fret-diagram-interface” in *Internals Reference*.

Predefined fret diagrams

Fret diagrams can be displayed using the `FretBoards` context. By default, the `FretBoards` context will display fret diagrams that are stored in a lookup table:

```
\include "predefined-guitar-fretboards.ly"
\new FretBoards {
  \chordmode {
    c1 d
  }
}
```



The default predefined fret diagrams are contained in the file ‘`predefined-guitar-fretboards.ly`’. Fret diagrams are stored based on the pitches of a chord and the value of `stringTunings` that is currently in use. ‘`predefined-guitar-fretboards.ly`’ contains predefined fret diagrams only for `guitar-tuning`. Predefined fret diagrams can be added for other instruments or other tunings by following the examples found in ‘`predefined-guitar-fretboards.ly`’.

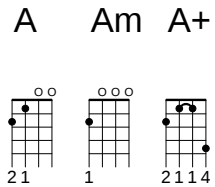
Fret diagrams for the ukulele are contained in the file ‘`predefined-ukulele-fretboards.ly`’.

```
\include "predefined-ukulele-fretboards.ly"

myChords = \chordmode { a1 a:m a:aug }

\new ChordNames {
  \myChords
}

\new FretBoards {
  \set Staff.stringTunings = #ukulele-tuning
  \myChords
}
```



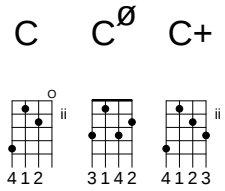
Fret diagrams for the mandolin are contained in the file ‘`predefined-mandolin-fretboards.ly`’.

```
\include "predefined-mandolin-fretboards.ly"
```

```
myChords = \chordmode { c1 c:m7.5- c:aug }

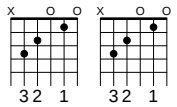
\new ChordNames {
  \myChords
}

\new FretBoards {
  \set Staff.stringTunings = #mandolin-tuning
  \myChords
}
```



Chord pitches can be entered either as simultaneous music or using chord mode (see [Chord mode overview], page 384).

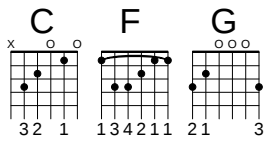
```
\include "predefined-guitar-fretboards.ly"
\new FretBoards {
  \chordmode { c1 }
  <c' e' g'>1
}
```



It is common that both chord names and fret diagrams are displayed together. This is achieved by putting a `ChordNames` context in parallel with a `FretBoards` context and giving both contexts the same music.

```
\include "predefined-guitar-fretboards.ly"
mychords = \chordmode{
  c1 f g
}

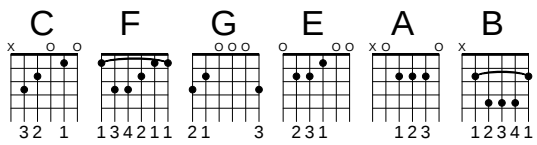
<<
  \new ChordNames {
    \mychords
  }
  \new FretBoards {
    \mychords
  }
>>
```



Predefined fret diagrams are transposable, as long as a diagram for the transposed chord is stored in the fret diagram table.

```
\include "predefined-guitar-fretboards.ly"
mychords = \chordmode{
  c1 f g
}

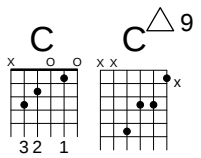
mychordlist = {
  \mychords
  \transpose c e { \mychords }
}
<<
  \new ChordNames {
    \mychordlist
  }
  \new FretBoards {
    \mychordlist
  }
>>
```



The predefined fret diagram table for guitar contains eight chords (major, minor, augmented, diminished, dominant seventh, major seventh, minor seventh, dominant ninth) for each of 17 keys. The predefined fret diagram table for ukulele contains these chords plus an additional three chords (major sixth, suspended second, and suspended fourth). A complete list of the predefined fret diagrams is shown in Section A.4 [Predefined fretboard diagrams], page 613. 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 353.

```
\include "predefined-guitar-fretboards.ly"
mychords = \chordmode{
  c1 c:maj9
}

<<
  \new ChordNames {
    \mychords
  }
  \new FretBoards {
    \mychords
  }
>>
```



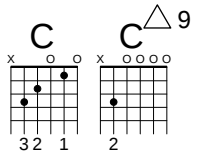
Fret diagrams can be added to the fret diagram table. To add a diagram, you must specify the hash table for the diagram, the chord for the diagram, the tuning to be used, and a definition for the diagram. Normally, the hash table will be *default-fret-table*. The diagram definition can be either a fret-diagram-terse definition string or a fret-diagram-verbose marking list.

```
\include "predefined-guitar-fretboards.ly"

\storePredefinedDiagram #default-fret-table
                        \chordmode { c:maj9 }
                        #guitar-tuning
                        #"x;3-2;o;o;o;o;"

mychords = \chordmode {
  c1 c:maj9
}

<<
  \new ChordNames {
    \mychords
  }
  \new FretBoards {
    \mychords
  }
>>
```



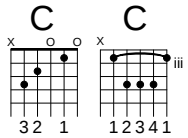
Different fret diagrams for the same chord name can be stored using different octaves of pitches. The different octave should be at least two octaves above or below the default octave, because the octaves above and below the default octave are used for transposing fretboards.

```
\include "predefined-guitar-fretboards.ly"

\storePredefinedDiagram #default-fret-table
                        \chordmode { c'' }
                        #guitar-tuning
                        #(offset-fret 2 (chord-shape 'bes guitar-tuning))

mychords = \chordmode {
  c1 c''
}

<<
  \new ChordNames {
    \mychords
  }
  \new FretBoards {
    \mychords
  }
>>
```



In addition to fret diagrams, LilyPond stores an internal list of chord shapes. The chord shapes are fret diagrams that can be shifted along the neck to different positions to provide different chords. Chord shapes can be added to the internal list and then used to define predefined fret diagrams. Because they can be moved to various positions on the neck, chord shapes will normally not contain any open strings. Like fret diagrams, chord shapes can be entered as either fret-diagram-terse strings or fret-diagram-verbose marking lists.

```
\include "predefined-guitar-fretboards.ly"

% Add a new chord shape

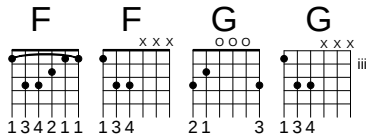
\addChordShape #'powerf #guitar-tuning #"1-1;3-3;3-4;x;x;x;"

% add some new chords based on the power chord shape

\storePredefinedDiagram #default-fret-table
                        \chordmode { f'' }
                        #guitar-tuning
                        #(chord-shape 'powerf guitar-tuning)
\storePredefinedDiagram #default-fret-table
                        \chordmode { g'' }
                        #guitar-tuning
                        #(offset-fret 2 (chord-shape 'powerf guitar-tuning))

mychords = \chordmode{
  f1 f'' g g''
}

<<
  \new ChordNames {
    \mychords
  }
  \new FretBoards {
    \mychords
  }
>>
```



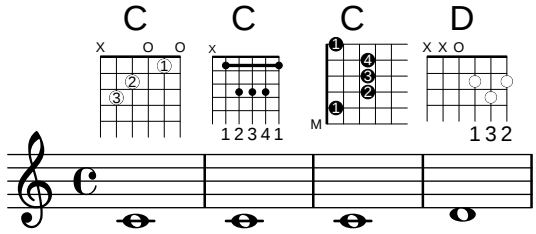
The graphical layout of a fret diagram can be customized according to user preference through the properties of the `fret-diagram-interface`. Details are found at Section "fret-diagram-interface" in *Internals Reference*. For a predefined fret diagram, the interface properties belong to `FretBoards.FretBoard`.

Selected Snippets

Customizing fretboard fret diagrams

Fret diagram properties can be set through `'fret-diagram-details`. For FretBoard fret diagrams, overrides are applied to the `FretBoards.FretBoard` object. Like `Voice`, `FretBoards` is a bottom level context, therefore can be omitted in property overrides.

```
\include "predefined-guitar-fretboards.ly"
\storePredefinedDiagram #default-fret-table \chordmode { c' }
                        #guitar-tuning
                        #"x;1-1-(;3-2;3-3;3-4;1-1-);"
<<
  \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 = #`(,(ly:make-pitch 0 6 0)
                  ,(ly:make-pitch 1 3 SHARP)
                  ,(ly:make-pitch 1 1 0)
                  ,(ly:make-pitch 0 5 0))

dSix = { <a\4 b\1 d\3 fis\2> }
dMajor = { <a\4 d\1 d\3 fis \2> }
aMajSeven = { <a\4 cis\1 e\3 g\2> }
dMajSeven = { <a\4 c\1 d\3 fis\2> }
gMajor = { <b\4 b\1 d\3 g\2> }

\storePredefinedDiagram #default-fret-table \dSix
                        #cuatroTuning
                        #"o;o;o;o;"
\storePredefinedDiagram #default-fret-table \dMajor
                        #cuatroTuning
                        #"o;o;o;3-3;"
\storePredefinedDiagram #default-fret-table \aMajSeven
                        #cuatroTuning
                        #"o;2-2;1-1;2-3;"
\storePredefinedDiagram #default-fret-table \dMajSeven
                        #cuatroTuning
                        #"o;o;o;1-1;"
\storePredefinedDiagram #default-fret-table \gMajor
                        #cuatroTuning
                        #"2-2;o;1-1;o;"

% end of potential include file /predefined-cuatro-fretboards.ly


#(set-global-staff-size 16)

primerosNames = \chordmode {
  d:6 d a:maj7 d:maj7
  g
}
primeros = {
  \dSix \dMajor \aMajSeven \dMajSeven
  \gMajor
}

\score {
```

```
  <<
    \new ChordNames {
      \set chordChanges = ##t
      \primerosNames
    }

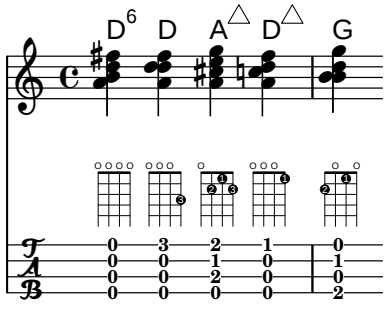
    \new Staff {
      \new Voice \with {
        \remove "New_fingering_engraver"
      }
      \relative c'' {
        \primeros
      }
    }

    \new FretBoards {
      \set Staff.stringTunings = #cuatroTuning
%      \override FretBoard
%        #'(fret-diagram-details string-count) = #'4
      \override FretBoard.fret-diagram-details.finger-code = #'in-dot
      \primeros
    }

    \new TabStaff \relative c'' {
      \set TabStaff.stringTunings = #cuatroTuning
      \primeros
    }

  >>

  \layout {
    \context {
      \Score
      \override SpacingSpanner.base-shortest-duration = #(ly:make-moment 1/16)
    }
  }
  \midi { }
}
```



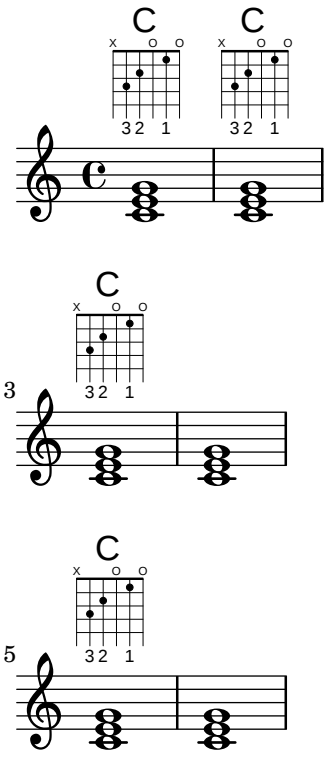
ChordChanges for FretBoards

FretBoards can be set to display only when the chord changes or at the beginning of a new line.

```
\include "predefined-guitar-fretboards.ly"

myChords = \chordmode {
  c1 c1 \break
  \set chordChanges = ##t
  c1 c1 \break
  c1 c1
}

<<
  \new ChordNames { \myChords }
  \new FretBoards { \myChords }
  \new Staff { \myChords }
>>
```



Fretboards alternate tables

Alternate fretboard tables can be created. These would be used in order to have alternate fretboards for a given chord.

In order to use an alternate fretboard table, the table must first be created. Fretboards are then added to the table.

The created fretboard table can be blank, or it can be copied from an existing table.

The table to be used in displaying predefined fretboards is selected by the property `\predefinedDiagramTable`.

```
\include "predefined-guitar-fretboards.ly"

% Make a blank new fretboard table
#(define custom-fretboard-table-one (make-fretboard-table))

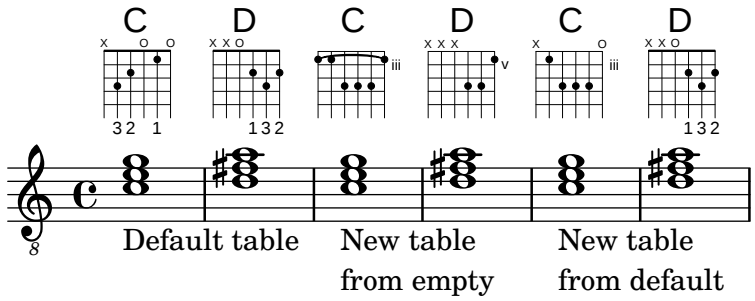
% Make a new fretboard table as a copy of default-fret-table
```

```
#(define custom-fretboard-table-two (make-fretboard-table default-fret-table))

% Add a chord to custom-fretboard-table-one
\storePredefinedDiagram #custom-fretboard-table-one
                        \chordmode{c}
                        #guitar-tuning
                        "3-(;3;5;5;5;3-);"

% Add a chord to custom-fretboard-table-two
\storePredefinedDiagram #custom-fretboard-table-two
                        \chordmode{c}
                        #guitar-tuning
                        "x;3;5;5;5;o;"

<<
  \chords {
    c1 | d1 |
    c1 | d1 |
    c1 | d1 |
  }
  \new FretBoards {
    \chordmode {
      \set predefinedDiagramTable = #default-fret-table
      c1 | d1 |
      \set predefinedDiagramTable = #custom-fretboard-table-one
      c1 | d1 |
      \set predefinedDiagramTable = #custom-fretboard-table-two
      c1 | d1 |
    }
  }
  \new Staff {
    \clef "treble_8"
    <<
      \chordmode {
        c1 | d1 |
        c1 | d1 |
        c1 | d1 |
      }
      {
        s1_\markup "Default table" | s1 |
        s1_\markup \column {"New table" "from empty"} | s1 |
        s1_\markup \column {"New table" "from default"} | s1 |
      }
    >>
  }
>>
```



See also

Notation Reference: [Custom tablatures], page 331, [Automatic fret diagrams], page 353, [Chord mode overview], page 384, Section A.4 [Predefined fretboard diagrams], page 613.

Installed Files: ‘ly/predefined-guitar-fretboards.ly’,
‘ly/predefined-guitar-ninth-fretboards.ly’,
‘ly/predefined-ukulele-fretboards.ly’,
‘ly/predefined-mandolin-fretboards.ly’.

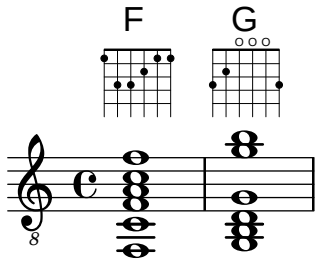
Snippets: Section “Fretted strings” in *Snippets*.

Internals Reference: Section “fret-diagram-interface” in *Internals Reference*.

Automatic fret diagrams

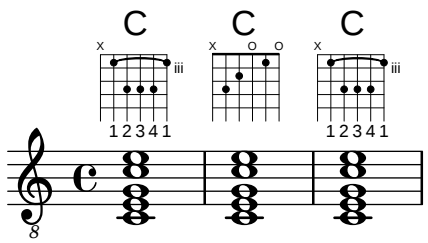
Fret diagrams can be automatically created from entered notes using the `FretBoards` context. If no predefined diagram is available for the entered notes in the active `stringTunings`, this context calculates strings and frets that can be used to play the notes.

```
<<
  \new ChordNames {
    \chordmode {
      f1 g
    }
  }
  \new FretBoards {
    <f, c f a c' f'>1
    <g,\6 b, d g b g'>1
  }
  \new Staff {
    \clef "treble_8"
    <f, c f a c' f'>1
    <g, b, d g b' g'>1
  }
>>
```



As no predefined diagrams are loaded by default, automatic calculation of fret diagrams is the default behavior. Once default diagrams are loaded, automatic calculation can be enabled and disabled with predefined commands:

```
\storePredefinedDiagram #default-fret-table
                        <c e g c' e'>
                        #guitar-tuning
                        #"x;3-1-(;5-2;5-3;5-4;3-1-1-);"
<<
  \new ChordNames {
    \chordmode {
      c1 c c
    }
  }
  \new FretBoards {
    <c e g c' e'>1
    \predefinedFretboardsOff
    <c e g c' e'>1
    \predefinedFretboardsOn
    <c e g c' e'>1
  }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1
    <c e g c' e'>1
    <c e g c' e'>1
  }
>>
```

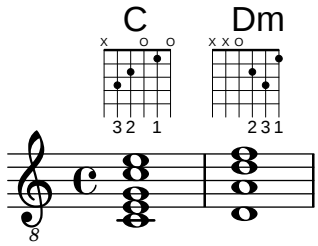


Sometimes the fretboard calculator will be unable to find an acceptable diagram. This can often be remedied by manually assigning a note to a string. In many cases, only one note need be manually placed on a string; the rest of the notes will then be placed appropriately by the `FretBoards` context.

Fingerings can be added to FretBoard fret diagrams.

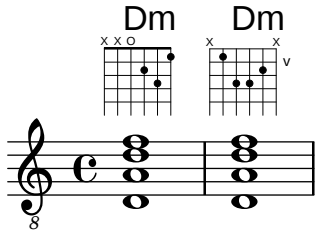
```
<<
  \new ChordNames {
    \chordmode {
      c1 d:m
    }
  }
  \new FretBoards {
    <c-3 e-2 g c'-1 e'>1
    <d a-2 d'-3 f'-1>1
  }
  \new Staff {
    \clef "treble_8"
    <c e g c' e'>1
```

```
    <d a d' f'>1
  }
>>
```



The minimum fret to be used in calculating strings and frets for the FretBoard context can be set with the `minimumFret` property.

```
<<
  \new ChordNames {
    \chordmode {
      d1:m d:m
    }
  }
  \new FretBoards {
    <d a d' f'>1
    \set FretBoards.minimumFret = #5
    <d a d' f'>1
  }
  \new Staff {
    \clef "treble_8"
    <d a d' f'>1
    <d a d' f'>1
  }
>>
```



The strings and frets for the `FretBoards` context depend on the `stringTunings` property, which has the same meaning as in the TabStaff context. See [Custom tablatures], page 331 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 331.

Snippets: Section “Fretted strings” in *Snippets*.

Internals Reference: Section “fret-diagram-interface” in *Internals Reference*.

Known issues and warnings
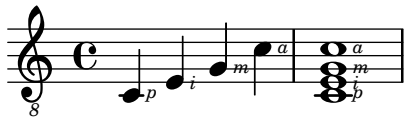
Automatic fretboard calculations do not work properly for instruments with non-monotonic tunings.

Right-hand fingerings

Right-hand fingerings *p-i-m-a* must be entered using `\rightHandFinger` followed by a number.

> **Note:** If the number is entered in Scheme notation, remember to append a space before following it with a closing `>` or similar.

```
\clef "treble_8"
c4\rightHandFinger #1
e\rightHandFinger #2
g\rightHandFinger #3
c\rightHandFinger #4
<c,\rightHandFinger #1 e\rightHandFinger #2
 g\rightHandFinger #3 c\rightHandFinger #4 >1
```



For convenience, you can abbreviate `\rightHandFinger` to something short, for example `RH`,

```
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. Note: you must use a chord construct

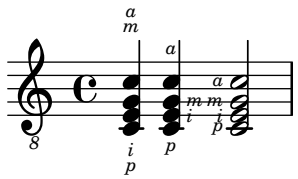
```
#(define RH rightHandFinger)

\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
}
```

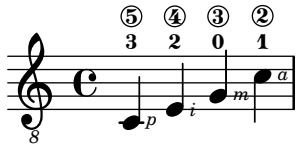


Fingerings string indications and right-hand fingerings

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*.
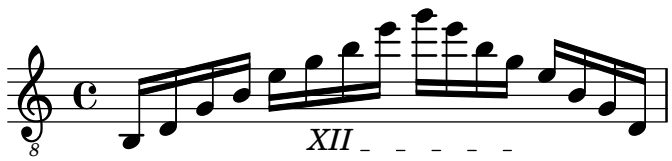
2.4.2 Guitar

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

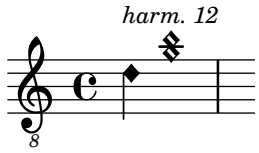
Notation Reference: [Text spanners], page 217.

Snippets: Section "Fretted strings" in *Snippets*, Section "Expressive marks" in *Snippets*.

Indicating harmonics and dampened notes

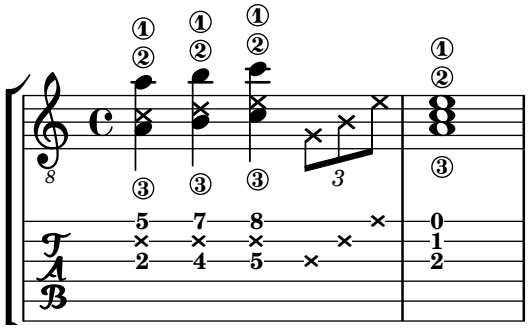
Special note heads can be used to indicate dampened notes or harmonics. Harmonics are normally further explained with a text markup.

```
\relative c' {
  \clef "treble_8"
  \override Staff.NoteHead.style = #'harmonic-mixed
  d^\markup { \italic { \fontsize #-2 { "harm. 12" }}} <g b>1
}
```



Dampened notes (also called *dead notes*) are supported within normal and tablature staves:

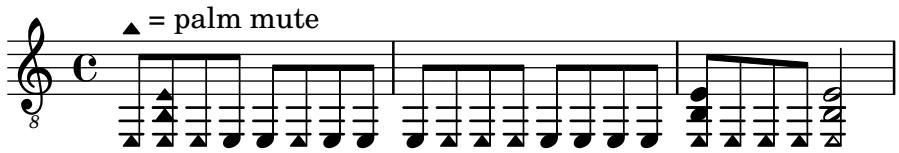
```
music = \relative c' {
  < a\3 \deadNote c\2 a'\1 >4
  < b\3 \deadNote d\2 b'\1 >
  < c\3 \deadNote e\2 c'\1 >
  \deadNotesOn
  \tuplet 3/2 { g8 b e }
  \deadNotesOff
  < a,\3 c\2 e\1 >1
}
\new StaffGroup <<
  \new Staff {
    \clef "treble_8"
    \music
  }
  \new TabStaff {
    \music
  }
>>
```



Another playing technique (especially used on electric guitars) is called *palm mute*. The string is hereby partly muted by the palm of the striking hand (hence the name). Lilypond supports the notation of palm mute-style notes by changing the note head to a triangle shape.

```
\new Voice { % Warning: explicit Voice instantiation is
             %    required to have palmMuteOff work properly
             %    when palmMuteOn comes at the beginning of
             %    the piece.
```

```
  \relative c, {
    \clef "G_8"
    \palmMuteOn
    e8^\markup { \musicglyph #"noteheads.u2do"  = palm mute }
    < e b' e > e
    \palmMuteOff
    e e  \palmMute e e e |
    e8 \palmMute { e e e } e e e e |
    < \palmMute e b' e >8 \palmMute { e e e } < \palmMute e b' e >2
  }
}
```



See also

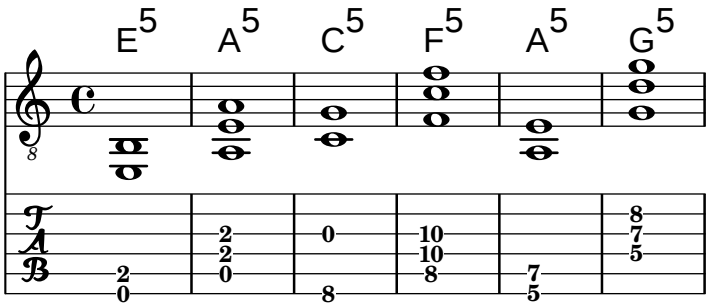
Snippets: Section “Fretted strings” in *Snippets*.

Notation Reference: [Special note heads], page 34, Section A.9 [Note head styles], page 645.

Indicating power chords

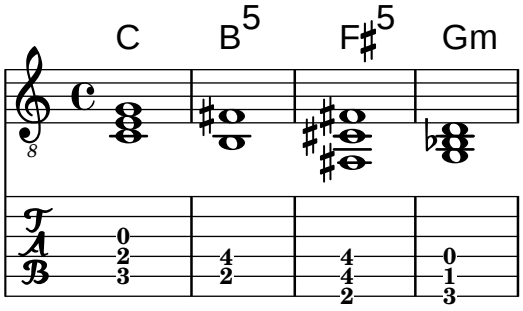
Power chords and their symbols can be engraved in chord mode or as chord constructs:

```
ChordsAndSymbols = {
  \chordmode {
    \powerChords
    e,,1:1.5
    a,,1:1.5.8
    \set minimumFret = #8
    c,1:1.5
    f,1:1.5.8
  }
  \set minimumFret = #5
  <a, e>1
  <g d' g'>1
}
\score {
  <<
    \new ChordNames {
    \ChordsAndSymbols
    }
    \new Staff {
      \clef "treble_8"
      \ChordsAndSymbols
    }
    \new TabStaff {
      \ChordsAndSymbols
    }
  >>
}
```



Power chord symbols are automatically switched off as soon as one of the other common chord modifier is used:

```
mixedChords = \chordmode {
  c,1
  \powerChords
  b,,1:1.5
  fis,,1:1.5.8
  g,,1:m
}
\score {
  <<
    \new ChordNames {
      \mixedChords
    }
    \new Staff {
      \clef "treble_8"
      \mixedChords
    }
    \new TabStaff {
      \mixedChords
    }
  >>
}
```



See also

Music Glossary: Section “power chord” in *Music Glossary*.

Notation Reference: [Extended and altered chords], page 387, [Printing chord names], page 389.

Snippets: Section “Fretted strings” in *Snippets*.

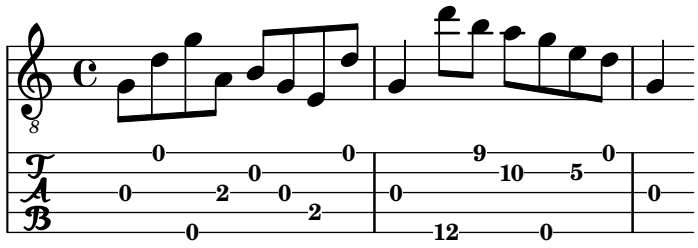
2.4.3 Banjo

Banjo tablatures

LilyPond has basic support for the five-string banjo. When making tablatures for five-string banjo, use the banjo tablature format function to get correct fret numbers for the fifth string:

```
music = {
  g8 d' g'\5 a b g e d' |
  g4 d''8\5 b' a'\2 g'\5 e'\2 d' |
  g4
}

<<
  \new Staff \with { \omit StringNumber }
  { \clef "treble_8"  \music }
  \new TabStaff \with {
    tablatureFormat = #fret-number-tablature-format-banjo
    stringTunings = #banjo-open-g-tuning
  }
  { \music }
>>
```



A number of common tunings for the five-string banjo are predefined: `banjo-c-tuning` (gCGBD), `banjo-modal-tuning` (gDGCD), `banjo-open-d-tuning` (aDF#AD) and `banjo-open-dm-tuning` (aDFAD).

These may be converted to four-string tunings using the `four-string-banjo` function:

```
\set TabStaff.stringTunings = #(four-string-banjo banjo-c-tuning)
```

See also

Installed Files: '`ly/string-tunings-init.ly`'.

Snippets: Section "Fretted strings" in *Snippets*.

2.5 Percussion

2.5.1 Common notation for percussion

Rhythmic music is primarily used for percussion and drum notation, but it can also be used to show the rhythms of melodies.

References for percussion

- Some percussion may be notated on a rhythmic staff; this is discussed in [Showing melody rhythms], page 73, and [Instantiating new staves], page 175.
- MIDI output is discussed in a separate section; please see Section 3.5.6 [Percussion in MIDI], page 491.

See also

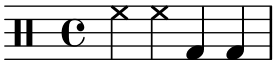
Notation Reference: [Showing melody rhythms], page 73, [Instantiating new staves], page 175. Section 3.5.6 [Percussion in MIDI], page 491.

Snippets: Section "Percussion" in *Snippets*.

Basic percussion notation

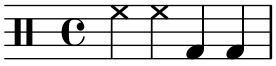
Percussion notes may be entered in `\drummode` mode, which is similar to the standard mode for entering notes. The simplest way to enter percussion notes is to use the `\drums` command, which creates the correct context and entry mode for percussion:

```
\drums {
  hihat4 hh bassdrum bd
}
```



This is shorthand for:
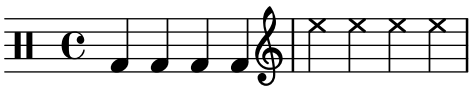
```
\new DrumStaff {
  \drummode {
    hihat4 hh bassdrum bd
  }
}
```



Each piece of percussion has a full name and an abbreviated name, and both can be used in input files. The full list of percussion note names may be found in Section A.14 [Percussion notes], page 700.

Note that the normal notation of pitches (such as `cis4`) in a `DrumStaff` context will cause an error message. Percussion clefs are added automatically to a `DrumStaff` context but they can also be set explicitly. Other clefs may be used as well.

```
\drums {
  \clef percussion
  bd4 bd bd bd
  \clef treble
  hh4 hh hh hh
}
```



There are a few issues concerning MIDI support for percussion instruments; for details please see Section 3.5.6 [Percussion in MIDI], page 491.

See also

Notation Reference: Section 3.5.6 [Percussion in MIDI], page 491, Section A.14 [Percussion notes], page 700.
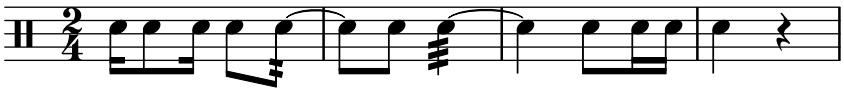
Installed Files: '`ly/drumpitch-init.ly`'.

Snippets: Section "Percussion" in *Snippets*.

Drum rolls
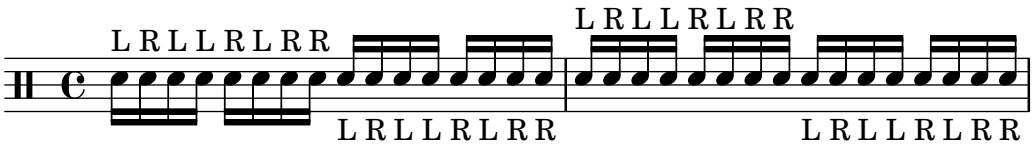
Drum rolls are indicated with three slashes across the stem. For quarter notes or longer the three slashes are shown explicitly, eighth notes are shown with two slashes (the beam being the third), and drum rolls shorter than eighths have one stem slash to supplement the beams. This is achieved with the tremolo notation, as described in [Tremolo repeats], page 152.

```
\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 a markup for `"R"` or `"L"` above or below notes, as discussed in Section 5.4.2 [Direction and placement], page 577. 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"
    \stemUp
    sn16_"L" sn_"R" sn_"L" sn_"L" sn_"R" sn_"L" sn_"R" sn_"R"
  }
}
```



See also

Notation Reference: [Tremolo repeats], page 152.

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

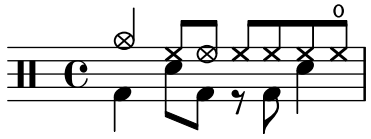
Notation Reference: Section 3.5.6 [Percussion in MIDI], page 491.

Snippets: Section “Percussion” in *Snippets*.

Percussion staves

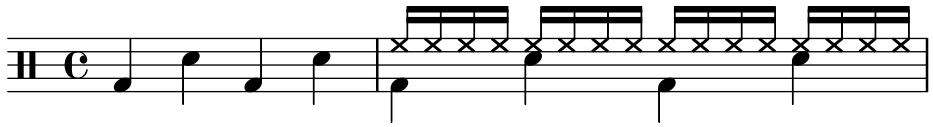
A percussion part for more than one instrument typically uses a multiline staff where each position in the staff refers to one piece of percussion. To typeset the music, the notes must be interpreted in `DrumStaff` and `DrumVoice` context.

```
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. For example,

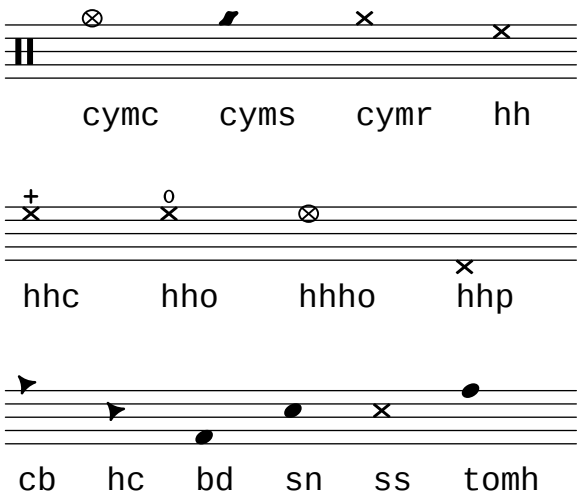
```
\new DrumStaff <<
  \drummode {
    bd4 sn4 bd4 sn4
    << {
      \repeat unfold 16 hh16
    } \\ {
      bd4 sn4 bd4 sn4
    } >>
  }
>>
```

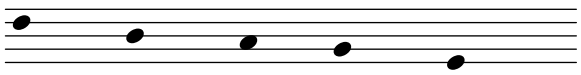


There are also other layout possibilities. To use these, set the property `drumStyleTable` in context `DrumVoice`. The following variables have been predefined:

`drums-style`

This is the default. It typesets a typical drum kit on a five-line staff:



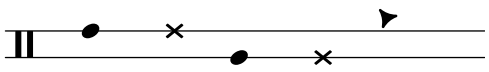


tommh tomml toml tomfh tomfl

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`

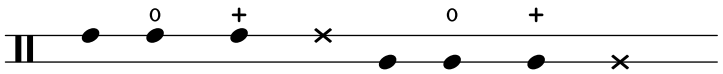
This typesets timbales on a two line staff:



timh ssh timl ssl cb

`congas-style`

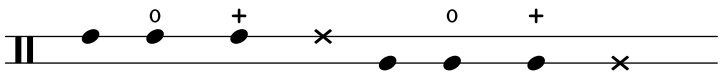
This typesets congas on a two line staff:



cgh cgho cghm ssh cgl cglo cglm ssl

`bongos-style`

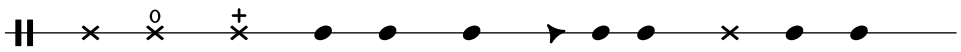
This typesets bongos on a two line staff:



boh boho bohm ssh bol bolo bolm ssl

`percussion-style`

To typeset all kinds of simple percussion on one line staves:



tri trio trim gui guis guil cb cl tamb cab mar hc

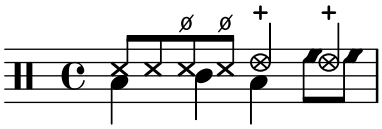
Custom percussion staves

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)
         (halfopenhihat   cross     "halfopen"   1)
         (pedalhihat      xcircle   "stopped"    2)
         (lowtom          diamond   #f           3)))
up = \drummode { hh8 hh hhho hhho hhp4 hhp }
down = \drummode { bd4 sn bd toml8 toml }

\new DrumStaff <<
  \set DrumStaff.drumStyleTable = #(alist->hash-table mydrums)
  \new DrumVoice { \voiceOne \up }
  \new DrumVoice { \voiceTwo \down }
```

>>



Selected Snippets

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)))

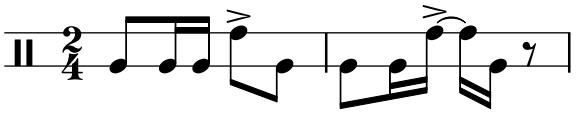
woodstaff = {
  % This defines a staff with only two lines.
  % It also defines the positions of the two lines.
  \override Staff.StaffSymbol.line-positions = #'(-2 3)

  % This is necessary; if not entered, the barline would be too short!
  \override Staff.BarLine.bar-extent = #'(-1.5 . 1.5)
}

\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-extent #'(from . to)`. 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 182.

A tambourine, entered with ‘tamb’:

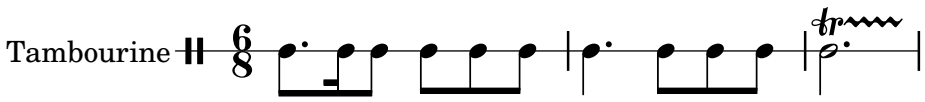
```
#(define mydrums '((tambourine default #t 0)))

tambustaff = {
  \override Staff.StaffSymbol.line-positions = #'( 0 )
```

```
  \override Staff.BarLine.bar-extent = #'(-1.5 . 1.5)
  \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 |
  }
}
```



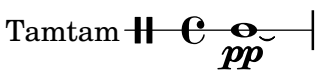
Music for Tam-Tam (entered with ‘tt’):

```
#(define mydrums '((tamtam default #t 0)))

tamtamstaff = {
  \override Staff.StaffSymbol.line-positions = #'( 0 )
  \override Staff.BarLine.bar-extent = #'(-1.5 . 1.5)
  \set DrumStaff.instrumentName = #"Tamtam"
}

\new DrumStaff {
  \tamtamstaff
  \set DrumStaff.drumStyleTable = #(alist->hash-table mydrums)

  \drummode {
    tt 1 \pp \laissezVibrer
  }
}
```



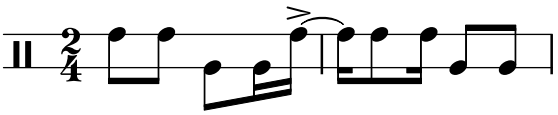
Two different bells, entered with ‘cb’ (cowbell) and ‘rb’ (ridebell)

```
#(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-extent = #'(-1.5 . 1.5)
  \set DrumStaff.instrumentName = #"Different Bells"
```

```
}

\new DrumStaff {
  \bellstaff
  \drummode {
    \time 2/4
    rb8 rb cb cb16 rb-> ~ |
    rb16 rb8 rb16 cb8 cb |
  }
}
```

Different Bells 

Here a short example taken from Stravinsky's '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
}
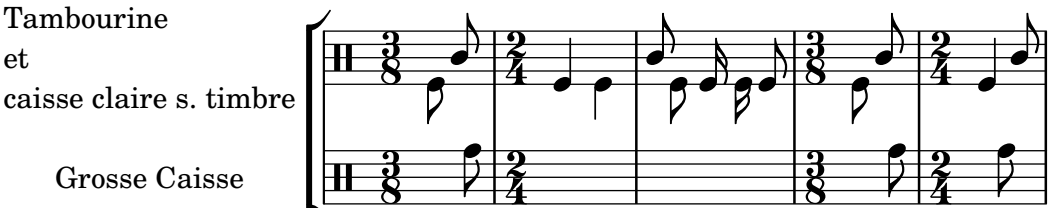
drumsA = {
  \context DrumVoice <<
    { \global }
    { \drummode {
        \autoBeamOff
        \stemDown sn8 \stemUp tamb s8 |
        sn4 \stemDown sn4 |
        \stemUp tamb8 \stemDown sn8 \stemUp sn16 \stemDown sn \stemUp sn8 |
        \stemDown sn8 \stemUp tamb s8 |
        \stemUp sn4 s8 \stemUp 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*.

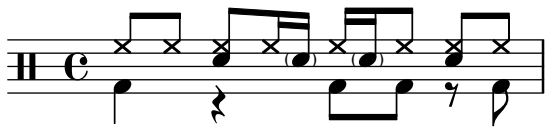
Internals Reference: Section “DrumStaff” in *Internals Reference*, Section “DrumVoice” in *Internals Reference*.

Ghost notes

Ghost notes for drums and percussion may be created using the `\parenthesize` command detailed in [Parentheses], page 209.

```
\new DrumStaff
<<
  \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
      }
    >>
```
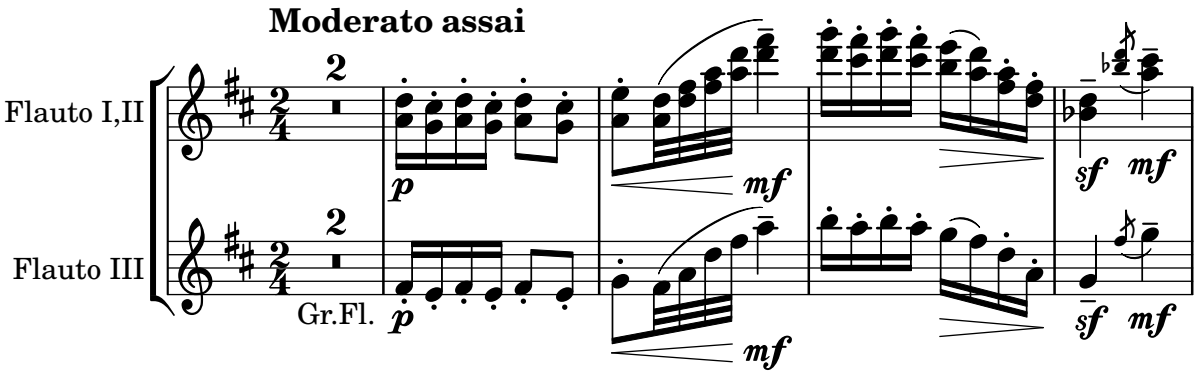
```
  }
>>
```



See also

Snippets: Section “Percussion” in *Snippets*.

2.6 Wind instruments



This section includes elements of music notation that arise when writing specifically for wind instruments.

2.6.1 Common notation for wind instruments

This section discusses notation common to most wind instruments.

References for wind instruments

Many notation issues for wind instruments pertain to breathing and tonguing:

- Breathing can be specified by rests or [Breath marks], page 126.
- Legato playing is indicated by [Slurs], page 122.
- Different types of tonguings, ranging from legato to non-legato to staccato are usually shown by articulation marks, sometimes combined with slurs, see [Articulations and ornamentations], page 111 and Section A.13 [List of articulations], page 699.
- Flutter tonguing is usually indicated by placing a tremolo mark and a text markup on the note. See [Tremolo repeats], page 152.

Other aspects of musical notation that can apply to wind instruments:

- Many wind instruments are transposing instruments, see [Instrument transpositions], page 24.
- Slide glissandi are characteristic of the trombone, but other winds may perform keyed or valved glissandi. See [Glissando], page 128.
- Harmonic series glissandi, which are possible on all brass instruments but common for French Horns, are usually written out as [Grace notes], page 104.
- Pitch inflections at the end of a note are discussed in [Falls and doits], page 127.
- Key slaps or valve slaps are often shown by the `cross` style of [Special note heads], page 34.

- Woodwinds can overblow low notes to sound harmonics. These are shown by the `flageolet` articulation. See Section A.13 [List of articulations], page 699.
- 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 111 and Section A.13 [List of articulations], page 699.
- Stopped horns are indicated by the `stopped` articulation. See [Articulations and ornamentations], page 111.

Selected Snippets

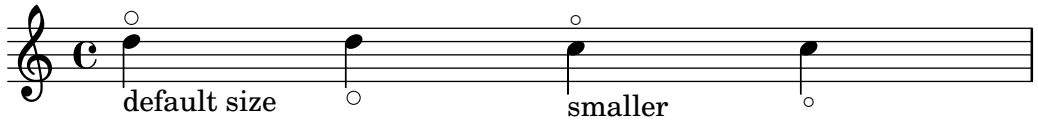
Changing \flageolet mark size

To make the `\flageolet` circle smaller use the following Scheme function.

```
smallFlageolet =
#(let ((m (make-articulation "flageolet")))
   (set! (ly:music-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 126, [Slurs], page 122, [Articulations and ornamentations], page 111, Section A.13 [List of articulations], page 699, [Tremolo repeats], page 152, [Instrument transpositions], page 24, [Glissando], page 128, [Grace notes], page 104, [Falls and doits], page 127, [Special note heads], page 34,

Snippets: Section "Winds" in *Snippets*.

Fingerings

All wind instruments other than the trombone require the use of several fingers to produce each pitch. Some fingering examples are shown in the snippets below.

Woodwind diagrams can be produced and are described in Section 2.6.3.1 [Woodwind diagrams], page 375.

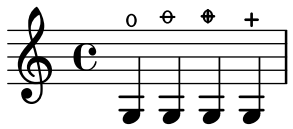
Selected Snippets

Fingering symbols for wind instruments

Special symbols can be achieved by combining existing glyphs, which is useful for wind instruments.

```
centermarkup = {
  \once \override TextScript.self-alignment-X = #CENTER
```

```
  \once \override TextScript.X-offset =#(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))))
}
\score
{\relative c'
  {
    g\open
    \once \override TextScript.staff-padding = #-1.0 \centermarkup
    g^\markup{\combine \musicglyph #"scripts.open" \musicglyph
    #"scripts.tenuto"}
    \centermarkup g^\markup{\combine \musicglyph #"scripts.open"
    \musicglyph #"scripts.stopped"}
    g\stopped
  }
}
```



Recorder fingering chart

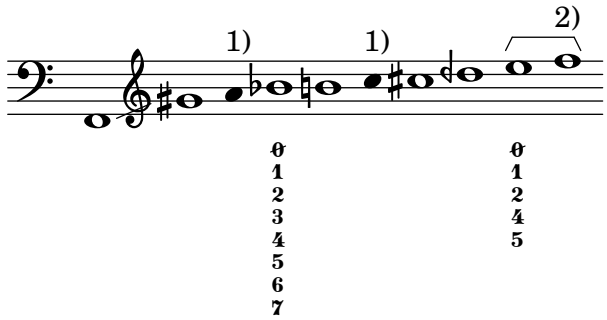
The following example demonstrates how fingering charts for wind instruments can be realized.

```
% range chart for paetzold contrabass recorder

centermarkup = {
  \once \override TextScript.self-alignment-X = #CENTER
  \once \override TextScript.X-offset =#(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))))
}

\score {
  \new Staff \with {
    \remove "Time_signature_engraver"
    \omit Stem
    \omit Flag
    \consists "Horizontal_bracket_engraver"
  }
  {
    \clef bass
    \set Score.timing = ##f
    f,1*1/4 \glissando
    \clef violin
```

```
    gis'1*1/4
    \stemDown a'4^\markup{1)}
    \centermarkup
    \once \override TextScript.padding = #2
    bes'1*1/4_\markup{\override #'(baseline-skip . 1.7) \column
      { \fontsize #-5 \slashed-digit #0 \finger 1 \finger 2 \finger 3 \finger 4
    \finger 5 \finger 6 \finger 7} }
    b'1*1/4
    c''4^\markup{1)}
    \centermarkup
    \once \override TextScript.padding = #2
    cis''1*1/4
    deh''1*1/4
    \centermarkup
    \once \override TextScript.padding = #2
    \once \override Staff.HorizontalBracket.direction = #UP
    e''1*1/4_\markup{\override #'(baseline-skip . 1.7) \column
      { \fontsize #-5 \slashed-digit #0 \finger 1 \finger 2 \finger 4
    \finger 5} }\startGroup
    f''1*1/4^\markup{2)}\stopGroup
  }
}
```



See also

Notation Reference: Section 2.6.3.1 [Woodwind diagrams], page 375.

Snippets: Section "Winds" in *Snippets*.

2.6.2 Bagpipes

This section discusses notation common bagpipes.

Bagpipe definitions

LilyPond contains special definitions for Scottish, Highland Bagpipe music; to use them, add

```
\include "bagpipe.ly"
```
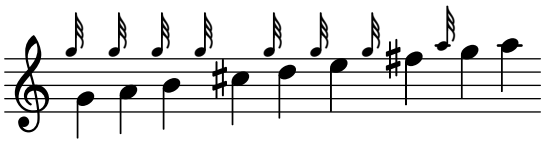
to the top of your input file. This lets you add the special grace notes common to bagpipe music with short commands. For example, you could write `\taor` instead of

```
\grace { \small G32[ d G e] }
```

'`bagpipe.ly`' also contains pitch definitions for the bagpipe notes in the appropriate octaves, so you do not need to worry about `\relative` or `\transpose`.

```
\include "bagpipe.ly"
```

```
{ \grg G4 \grg a \grg b \grg c \grg d \grg e \grg f \grA g A }
```



Bagpipe music nominally uses the key of D Major (even though that isn't really true). However, since that is the only key that can be used, the key signature is normally not written out. To set this up correctly, always start your music with `\hideKeySignature`. If you for some reason want to show the key signature, you can use `\showKeySignature` instead.

Some modern music use cross fingering on c and f to flatten those notes. This can be indicated by `cflat` or `fflat`. Similarly, the piobaireachd high g can be written `gflat` when it occurs in light music.

See also

Snippets: Section "Winds" in *Snippets*.

Bagpipe example
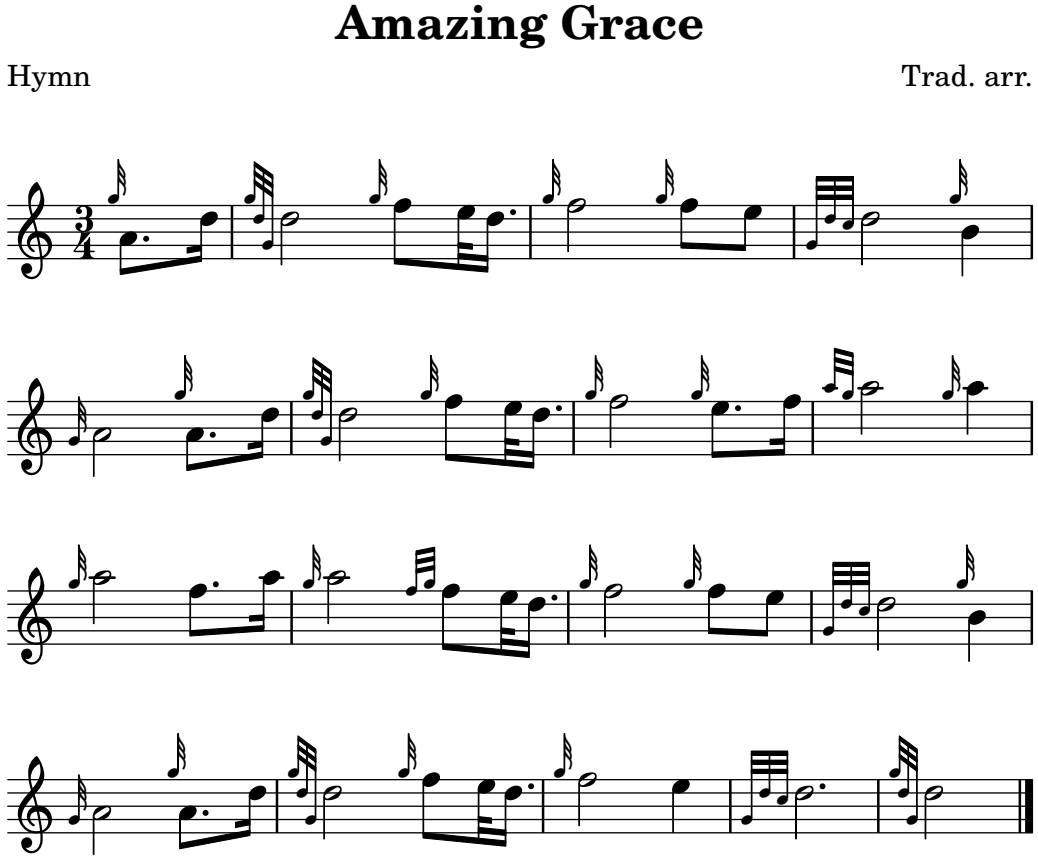
This is what the well known tune Amazing Grace looks like in bagpipe notation.

```
\include "bagpipe.ly"
\layout {
  indent = 0.0\cm
  \context { \Score \remove "Bar_number_engraver" }
}

\header {
  title = "Amazing Grace"
  meter = "Hymn"
  arranger = "Trad. arr."
}

{
  \hideKeySignature
  \time 3/4
  \grg \partial 4 a8. d16
  \slurd d2 \grg f8[ e32 d16.]
  \grg f2 \grg f8 e
  \thrwd d2 \grg b4
  \grG a2 \grg a8. d16
  \slurd d2 \grg f8[ e32 d16.]
  \grg f2 \grg e8. f16
  \dblA A2 \grg A4
  \grg A2 f8. A16
  \grg A2 \hdblf f8[ e32 d16.]
  \grg f2 \grg f8 e
  \thrwd d2 \grg b4
  \grG a2 \grg a8. d16
  \slurd d2 \grg f8[ e32 d16.]
  \grg f2 e4
  \thrwd d2.
```

```
  \slurd d2
  \bar "|."
}
```



See also

Snippets: Section “Winds” in *Snippets*.

2.6.3 Woodwinds

This section discusses notation specifically for woodwind instruments.

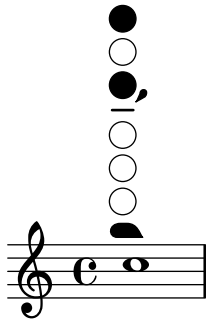
2.6.3.1 Woodwind diagrams

Woodwind diagrams can be used to indicate the fingering to be used for specific notes and are available for the following instruments:

- piccolo
- flute
- oboe
- clarinet
- bass clarinet
- saxophone
- bassoon
- contrabassoon

Woodwind diagrams are created as markups:

```
c1^\markup {
  \woodwind-diagram #'piccolo #'((lh . (gis))
                                 (cc . (one three))
                                 (rh . (ees)))
}
```



Keys can be open, partially-covered, ring-depressed, or fully covered:

```
\textLengthOn
c1^\markup {
  \center-column {
    "one quarter"
    \woodwind-diagram #'flute #'((cc . (one1q))
                                 (lh . ())
                                 (rh . ()))
  }
}

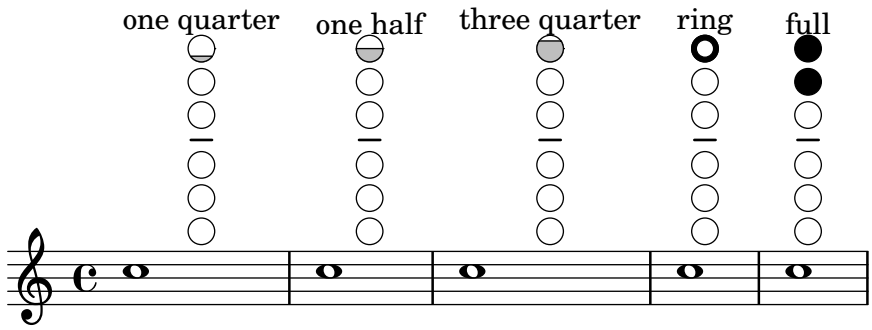
c1^\markup {
  \center-column {
    "one half"
    \woodwind-diagram #'flute #'((cc . (one1h))
                                 (lh . ())
                                 (rh . ()))
  }
}

c1^\markup {
  \center-column {
    "three quarter"
    \woodwind-diagram #'flute #'((cc . (one3q))
                                 (lh . ())
                                 (rh . ()))
  }
}

c1^\markup {
  \center-column {
    "ring"
    \woodwind-diagram #'flute #'((cc . (oneR))
                                 (lh . ())
                                 (rh . ()))
  }
```

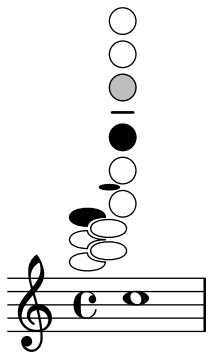
```
}

c1^\markup {
  \center-column {
    "full"
    \woodwind-diagram #'flute #'((cc . (oneF two))
                                 (lh . ())
                                 (rh . ()))
  }
}
```



Trills are indicated as shaded keys:

```
c1^\markup {
  \woodwind-diagram #'bass-clarinet
                    #'((cc . (threeT four))
                       (lh . ())
                       (rh . (b fis)))
}
```



A variety of trills can be displayed:

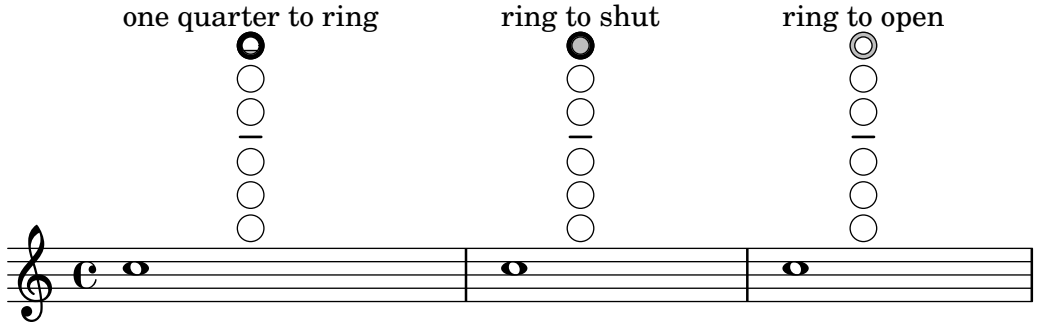
```
\textLengthOn
c1^\markup {
  \center-column {
    "one quarter to ring"
    \woodwind-diagram #'flute #'((cc . (one1qTR))
                                 (lh . ())
                                 (rh . ()))
  }
}
```

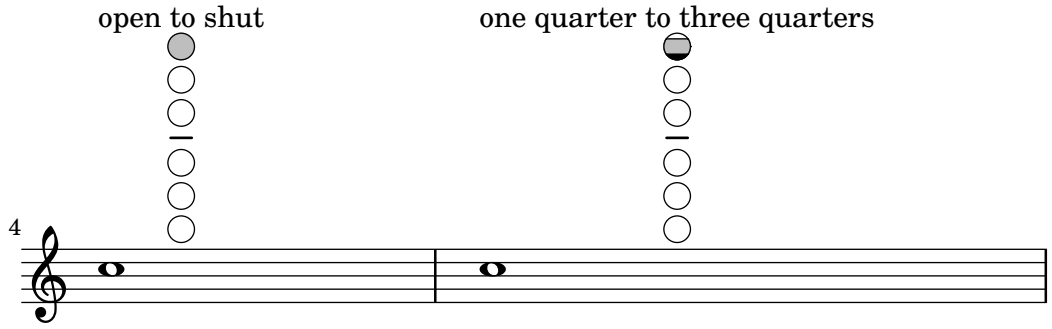
```
c1^\markup {
  \center-column {
    "ring to shut"
    \woodwind-diagram #'flute #'((cc . (oneTR))
                                 (lh . ())
                                 (rh . ()))
  }
}

c1^\markup {
  \center-column {
    "ring to open"
    \woodwind-diagram #'flute #'((cc . (oneRT))
                                 (lh . ())
                                 (rh . ()))
  }
}

c1^\markup {
  \center-column {
    "open to shut"
    \woodwind-diagram #'flute #'((cc . (oneT))
                                 (lh . ())
                                 (rh . ()))
  }
}

c1^\markup {
  \center-column {
    "one quarter to three quarters"
    \woodwind-diagram #'flute #'((cc . (one1qT3q))
                                 (lh . ())
                                 (rh . ()))
  }
}
```





The list of all possible keys and settings for a given instrument can be displayed on the console using `#(print-keys-verbose 'flute)` or in the log file using `#(print-keys-verbose 'flute (current-error-port))`, although they will not show up in the music output.

Creating new diagrams is possible, although this will require Scheme ability and may not be accessible to all users. The patterns for the diagrams are in '`scm/define-woodwind-diagrams.scm`' and '`scm/display-woodwind-diagrams.scm`'.

Predefined commands

Selected Snippets

Woodwind diagrams listing

The following music shows all of the woodwind diagrams currently defined in LilyPond.

```
\relative c' {
  \textLengthOn
  c1^
  \markup {
    \center-column {
      'tin-whistle
      " "
       \woodwind-diagram
                  #'tin-whistle
                  #'()
    }
  }

  c1^
  \markup {
    \center-column {
      'piccolo
      " "
       \woodwind-diagram
                  #'piccolo
                  #'()
    }
  }

  c1^
  \markup {
    \center-column {
       'flute
       " "
       \woodwind-diagram
          #'flute
          #'()
```

```
  }
}
c1^\markup {
  \center-column {
    'oboe
    " "
    \woodwind-diagram
      #'oboe
      #'()
  }
}

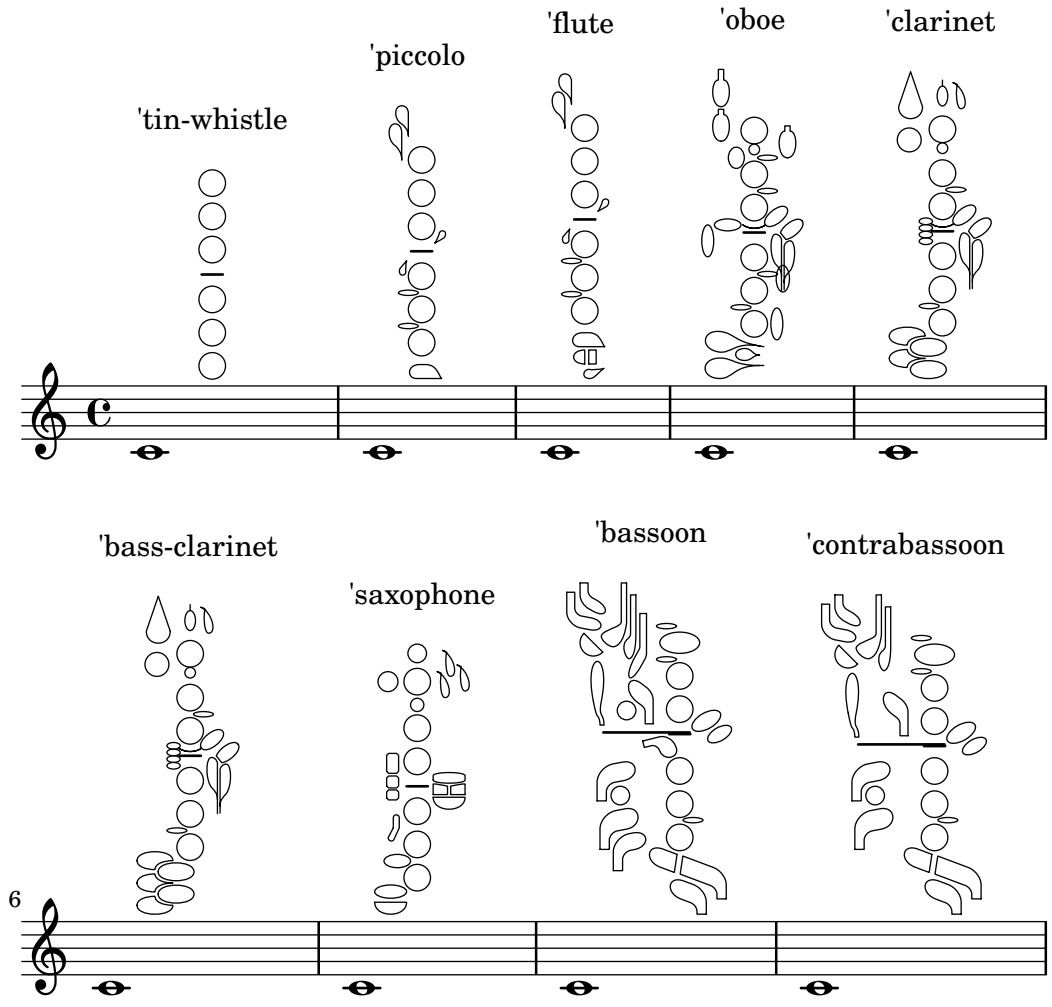
c1^\markup {
  \center-column {
    'clarinet
    " "
    \woodwind-diagram
      #'clarinet
      #'()
  }
}

c1^\markup {
  \center-column {
    'bass-clarinet
    " "
    \woodwind-diagram
      #'bass-clarinet
      #'()
  }
}

c1^\markup {
  \center-column {
    'saxophone
    " "
    \woodwind-diagram
      #'saxophone
      #'()
  }
}

c1^\markup {
  \center-column {
    'bassoon
    " "
    \woodwind-diagram
      #'bassoon
      #'()
  }
}
```

```
  c1^\markup {
    \center-column {
      'contrabassoon
      " "
      \woodwind-diagram
        #'contrabassoon
        #'()
    }
  }
}
```

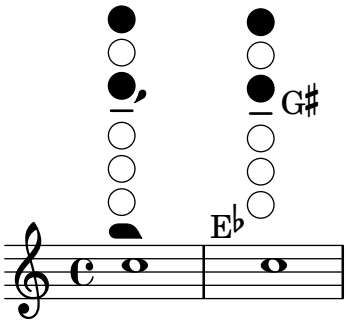


Graphical and text woodwind diagrams

In many cases, the keys other than the central column can be displayed by key name as well as by graphical means.

```
\relative c'' {
  \textLengthOn
  c1^\markup
    \woodwind-diagram
      #'piccolo
      #'((cc . (one three))
         (lh . (gis))
         (rh . (ees)))
```

```
  c^\markup
    \override #'(graphical . #f) {
      \woodwind-diagram
        #'piccolo
        #'((cc . (one three))
           (lh . (gis))
           (rh . (ees)))
    }
}
```

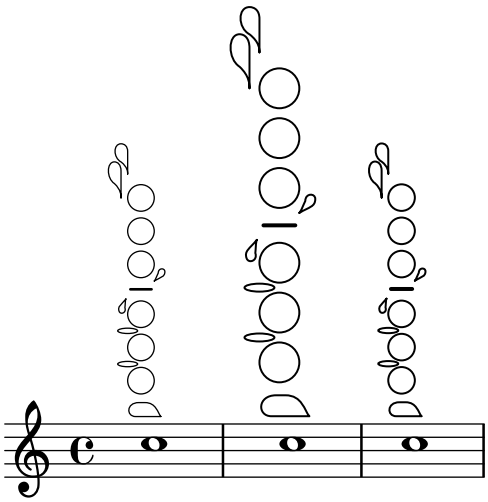


Changing the size of woodwind diagrams

The size and thickness of woodwind diagrams can be changed.

```
\relative c'' {
  \textLengthOn
  c1^\markup
    \woodwind-diagram
      #'piccolo
      #'()

  c^\markup
    \override #'(size . 1.5) {
      \woodwind-diagram
        #'piccolo
        #'()
    }
  c^\markup
    \override #'(thickness . 0.15) {
      \woodwind-diagram
        #'piccolo
        #'()
    }
}
```



Woodwind diagrams key lists

The snippet below produces a list of all possible keys and key settings for woodwind diagrams as defined in '`scm/define-woodwind-diagrams.scm`'. The list will be displayed in the log file, but not in the music. If output to the console is wanted, omit the `(current-error-port)` from the commands.

```
#(print-keys-verbose 'piccolo (current-error-port))
#(print-keys-verbose 'flute (current-error-port))
#(print-keys-verbose 'flute-b-extension (current-error-port))
#(print-keys-verbose 'tin-whistle (current-error-port))
#(print-keys-verbose 'oboe (current-error-port))
#(print-keys-verbose 'clarinet (current-error-port))
#(print-keys-verbose 'bass-clarinet (current-error-port))
#(print-keys-verbose 'low-bass-clarinet (current-error-port))
#(print-keys-verbose 'saxophone (current-error-port))
#(print-keys-verbose 'soprano-saxophone (current-error-port))
#(print-keys-verbose 'alto-saxophone (current-error-port))
#(print-keys-verbose 'tenor-saxophone (current-error-port))
#(print-keys-verbose 'baritone-saxophone (current-error-port))
#(print-keys-verbose 'bassoon (current-error-port))
#(print-keys-verbose 'contrabassoon (current-error-port))
```

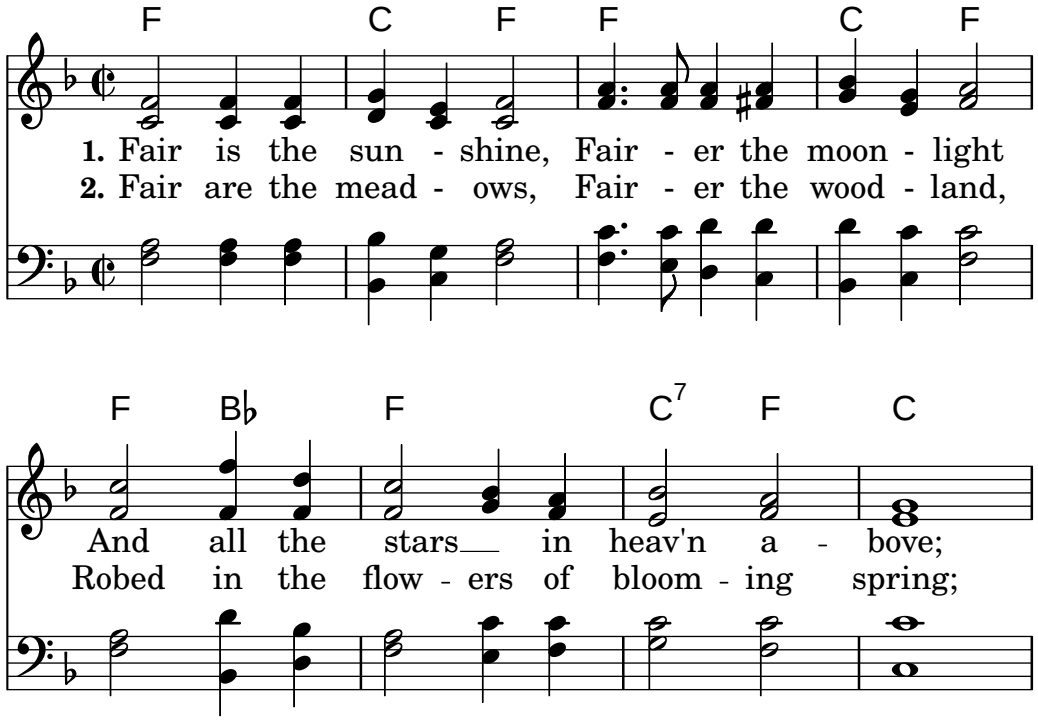
See also

Installed Files: '`scm/define-woodwind-diagrams.scm`', '`scm/display-woodwind-diagrams.scm`'.

Snippets: Section "Winds" in *Snippets*.

Internals Reference: Section "TextScript" in *Internals Reference*, Section "instrument-specific-markup-interface" in *Internals Reference*.

2.7 Chord notation



Chords can be entered either as normal notes or in chord mode and displayed using a variety of traditional European chord naming conventions. Chord names and figured bass notation can also be displayed.

2.7.1 Chord mode

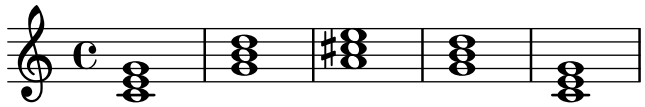
Chord mode is used to enter chords using an indicator of the chord structure, rather than the chord pitches.

Chord mode overview

Chords can be entered as simultaneous music, as discussed in [Chorded notes], page 154.

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 575.

```
\chordmode { c1 g a g c }
```
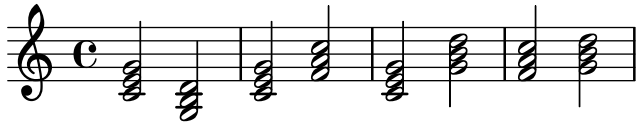


Chords entered using chord mode are music elements, and can be transposed just like chords entered using simultaneous music. `\chordmode` is absolute, as `\relative` has no effect on `chordmode` blocks. However, in `\chordmode` the absolute pitches are one octave higher than in note mode.

Chord mode and note mode can be mixed in sequential music:

```
<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 154, Section 5.4.1 [Input modes], page 575.
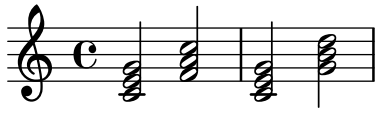
Snippets: Section “Chords” in *Snippets*.

Known issues and warnings

Predefined shorthands for articulations and ornaments cannot be used on notes in chord mode, see [Articulations and ornamentations], page 111.
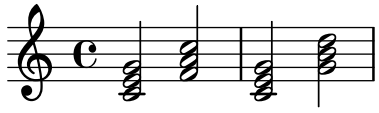
When chord mode and note mode are mixed in sequential music, and chord mode comes first, the note mode will create a new `Staff` context:

```
\chordmode { c2 f }
<c e g>2 <g' b d>
```



To avoid this behavior, explicitly create the `Staff` context:
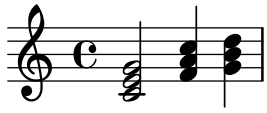
```
\new Staff {
  \chordmode { c2 f }
  <c e g>2  <g' b d>
}
```



Common chords
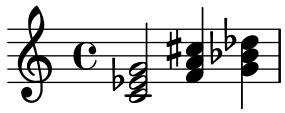
Major triads are entered by including the root and an optional duration:

```
\chordmode { c2 f4 g }
```



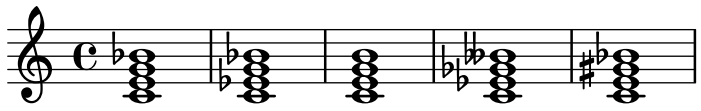
Minor, augmented, and diminished triads are entered by placing `:` and a quality modifier string after the duration:

```
\chordmode { c2:m f4:aug g:dim }
```

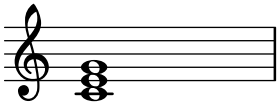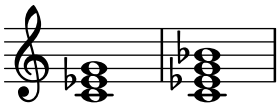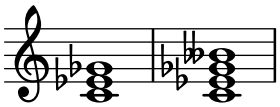
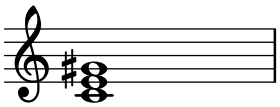
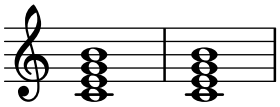


Seventh chords can be created:

```
\chordmode { c1:7 c:m7 c:maj7 c:dim7 c:aug7 }
```



The table below shows the actions of the quality modifiers on triads and seventh chords. The default seventh step added to chords is a minor or flatted seventh, which makes the dominant seventh the basic seventh chord. All alterations are relative to the dominant seventh. A more complete table of modifier usage is found at Section A.2 [Common chord modifiers], page 608.

Modifier	Action	Example
None	The default action; produces a major triad.	
m, m7	The minor chord. This modifier lowers the 3rd.	
dim, dim7	The diminished chord. This modifier lowers the 3rd, 5th and (if present) the 7th step.	
aug	The augmented chord. This modifier raises the 5th step.	
maj, maj7	The major 7th chord. This modifier adds a raised 7th step. The `7` following `maj` is optional. Do NOT use this modifier to create a major triad.	

See also

Notation Reference: Section A.2 [Common chord modifiers], page 608, [Extended and altered chords], page 387.

Snippets: Section “Chords” in *Snippets*.

Known issues and warnings

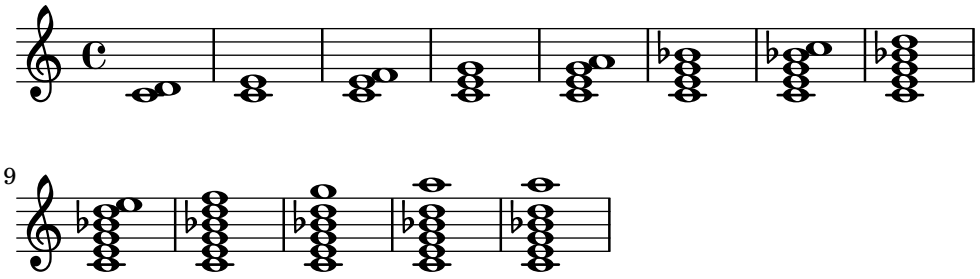
Only one quality modifier should be used per chord, typically on the highest step present in the chord. Chords with more than quality modifier will be parsed without an error or warning, but the results are unpredictable. Chords that cannot be achieved with a single quality modifier should be altered by individual pitches, as described in [Extended and altered chords], page 387.

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.

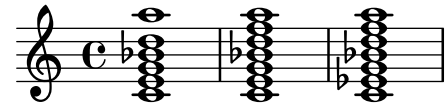
```
\chordmode {
  c1:2 c:3 c:4 c:5
  c1:6 c:7 c:8 c:9
  c1:10 c:11 c:12 c:13
  c1:14
}
```



Note that both `c:5` and `c` produce a C major triad.
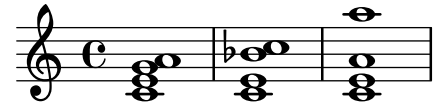
Since an unaltered 11 does not sound good when combined with an unaltered 13, the 11 is removed from a `:13` chord (unless it is added explicitly).

```
\chordmode {
  c1:13 c:13.11 c:m13
}
```



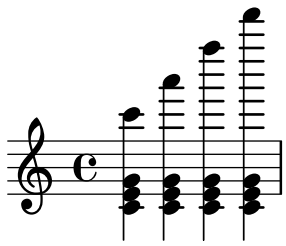
Individual steps can be added to a chord. Additions follow the extent and are prefixed by a dot (`.`). The basic seventh step added to a chord is the minor or flatted seventh, rather than the major seventh.

```
\chordmode {
  c1:5.6 c:3.7.8 c:3.6.13
}
```
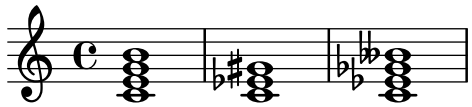


Added steps can be as high as desired.

```
\chordmode {
  c4:5.15 c:5.20 c:5.25 c:5.30
}
```



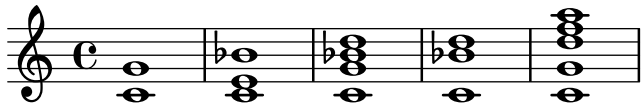
Added chord steps can be altered by suffixing a `-` or `+` sign to the number. To alter a step that is automatically included as part of the basic chord structure, add it as an altered step.

```
\chordmode {
  c1:7+ c:5+.3- c:3-.5-.7-
}
```



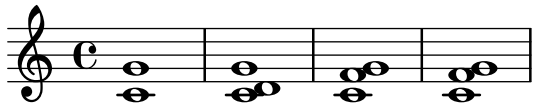
Following any steps to be added, a series of steps to be removed is introduced in a modifier string with a prefix of `^`. If more than one step is to be removed, the steps to be removed are separated by `.` following the initial `^`.

```
\chordmode {
  c1^3 c:7^5 c:9^3 c:9^3.5 c:13.11^3.7
}
```



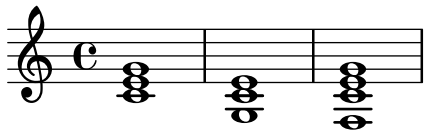
The modifier `sus` can be added to the modifier string to create suspended chords. This removes the 3rd step from the chord. Append either `2` or `4` to add the 2nd or 4th step to the chord. `sus` is equivalent to `^3`; `sus4` is equivalent to `.4^3`.

```
\chordmode {
  c1:sus c:sus2 c:sus4 c:5.4^3
}
```



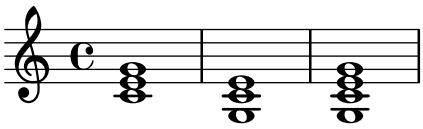
Inversions (putting a pitch other than the root on the bottom of the chord) and added bass notes can be specified by appending */pitch* to the chord.

```
\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 A.2 [Common chord modifiers], page 608.

See also
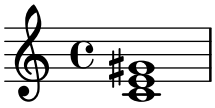
Notation Reference: Section A.2 [Common chord modifiers], page 608.

Snippets: Section “Chords” in *Snippets*.

Known issues and warnings

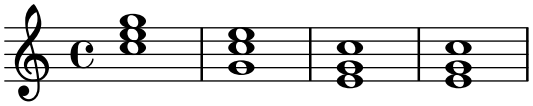
Each step can only be present in a chord once. The following simply produces the augmented chord, since `5+` is interpreted last.

```
\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

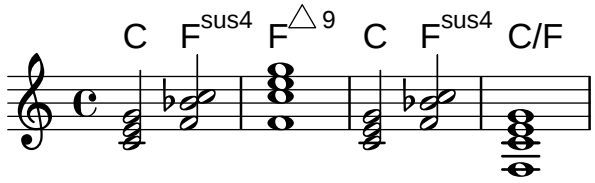
Chord names are printed in the `ChordNames` context:

```
\new ChordNames {
  \chordmode {
    c2 f4. g8
  }
}
```
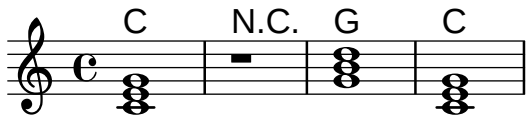


Chords can be entered as simultaneous notes or through the use of chord mode. The displayed chord name will be the same, regardless of the mode of entry, unless there are inversions or added bass notes:

```
chordmusic = \relative c' {
  <c e g>2 <f bes c>
  <f c' e g>1
  \chordmode {
    c2 f:sus4 c1:/f
  }
}
<<
  \new ChordNames {
    \chordmusic
  }
  {
    \chordmusic
  }
>>
```



Rests passed to a `ChordNames` context will cause the `noChordSymbol` markup to be displayed.

```
<<
  \new ChordNames \chordmode {
    c1
    r1
    g1
    c1
  }
  \chordmode {
    c1
    r1
    g1
    c1
  }
>>
```



`\chords { ... }` is a shortcut notation for `\new ChordNames { \chordmode { ... } }`.

```
\chords {
  c2 f4.:m g8:maj7
}
```




```
\new ChordNames {
  \chordmode {
    c2 f4.:m g8:maj7
```

```
  }
}
```

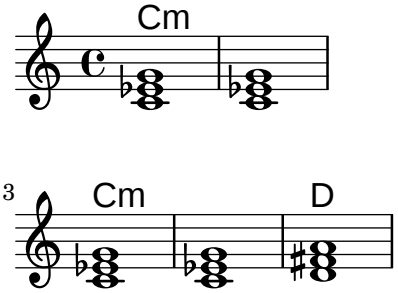


Selected Snippets

Showing chords at changes

Chord names can be displayed only at the start of lines and when the chord changes.
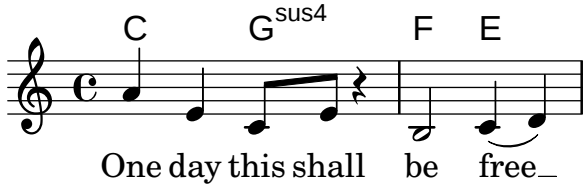
```
harmonies = \chordmode {
  c1:m c:m \break c:m c:m d
}
<<
  \new ChordNames {
    \set chordChanges = ##t
    \harmonies
  }
  \new Staff {
    \relative c' { \harmonies }
  }
>>
```



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 172.

Snippets: Section “Chords” in *Snippets*.

Internals Reference: Section “ChordNames” in *Internals Reference*, Section “ChordName” in *Internals Reference*, Section “Chord_name_engraver” in *Internals Reference*, Section “Volta_engraver” in *Internals Reference*, Section “Bar_engraver” in *Internals Reference*.

Known issues and warnings
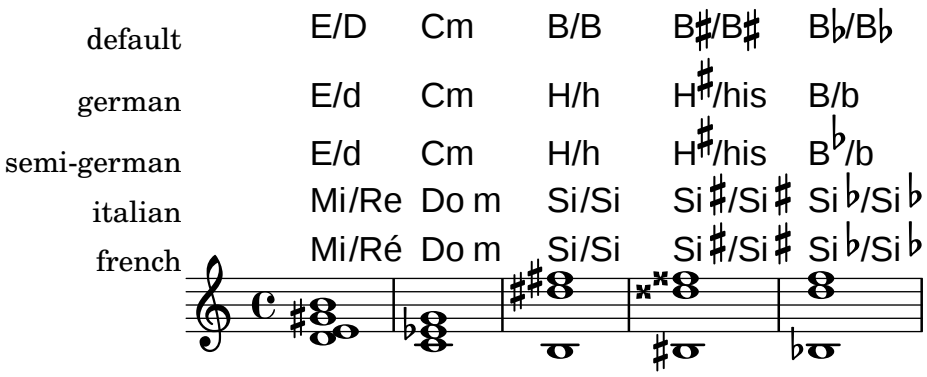
Chords containing inversions or altered bass notes are not named properly if entered using simultaneous music.

Customizing chord names

There is no unique system for naming chords. Different musical traditions use different names for the same set of chords. There are also different symbols displayed for a given chord name. The names and symbols displayed for chord names are customizable.

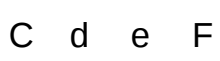
The basic chord name layout is a system for Jazz music, proposed by Klaus Ignatzek (see Section “Literature list” in *Essay*). The chord naming system can be modified as described below. An alternate jazz chord system has been developed using these modifications. The Ignatzek and alternate Jazz notation are shown on the chart in Section A.1 [Chord name chart], page 607.

In addition to the different naming systems, different note names are used for the root in different languages. The predefined commands `\germanChords`, `\semiGermanChords`, `\italianChords` and `\frenchChords` set these variables. The effect is demonstrated here:



German songbooks may indicate minor chords as lowercase letters, without any *m* suffix. This can be obtained by setting the `chordNameLowercaseMinor` property:

```
\chords {
  \set chordNameLowercaseMinor = ##t
  c2 d:m e:m f
}
```



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`.

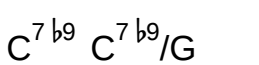
`additionalPitchPrefix`
: When the chord name contains additional pitches, they can optionally be prefixed with some text. The default is no prefix, in order to avoid too much visual clutter, but for small numbers of additional pitches this can be visually effective.

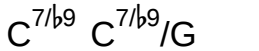
```
\new ChordNames {
  <c e g d'>    % add9
  \set additionalPitchPrefix = #"add"
  <c e g d'>    % add9
}
```


`chordNoteNamer`
: When the chord name contains additional pitches other than the root (e.g., an added bass note), this function is used to print the additional pitch. By default the pitch is printed using `chordRootNamer`. The `chordNoteNamer` property can be set to a specialized function to change this behavior. For example, the bass note can be printed in lower case.

`chordNameSeparator`
: Different parts of a chord name are normally separated by a small amount of horizontal space. By setting `chordNameSeparator`, you can use any desired markup for a separator. This does not affect the separator between a chord and its bass note; to customize that, use `slashChordSeparator`.

```
\chords {
  c4:7.9- c:7.9-/g
  \set chordNameSeparator = \markup { "/" }
  \break
  c4:7.9- c:7.9-/g
}
```

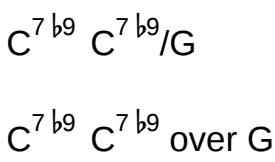




`slashChordSeparator`
: Chords can be played over a bass note other than the conventional root of the chord. These are known as "inversions" or "slash chords", because the default way of notating them is with a forward slash between the main chord and the bass note. Therefore the value of `slashChordSeparator` defaults to a forward slash, but you can change it to any markup you choose.

```
\chords {
  c4:7.9- c:7.9-/g
  \set slashChordSeparator = \markup { " over " }
```

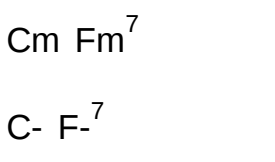
```
  \break
  c4:7.9- c:7.9-/g
}
```



`chordNameExceptions`
: This property is a list of pairs. The first item in each pair is a set of pitches used to identify the steps present in the chord. The second item is a markup that will follow the `chordRootNamer` output to create the chord name.

`minorChordModifier`
: Minor chords are often denoted via a 'm' suffix to the right of the root of the chord. However some idioms prefer other suffices, such as a minus sign.

```
\chords {
  c4:min f:min7
  \set minorChordModifier = \markup { "-" }
  \break
  c4:min f:min7
}
```



`chordPrefixSpacer`
: The modifier for minor chords as determined by `minorChordModifier` is usually printed immediately to the right of the root of the chord. A spacer can be placed between the root and the modifier by setting `chordPrefixSpacer`. The spacer is not used when the root is altered.

Predefined commands

`\whiteTriangleMarkup`, `\blackTriangleMarkup`, `\germanChords`, `\semiGermanChords`, `\italianChords`, `\frenchChords`.

Selected Snippets

Chord name exceptions

The property `chordNameExceptions` can be used to store a list of special notations for specific chords.

```
% modify maj9 and 6(add9)
% Exception music is chords with markups
chExceptionMusic = {
  <c e g b d'>1-\markup { \super "maj9" }
  <c e g a d'>1-\markup { \super "6(add9)" }
}

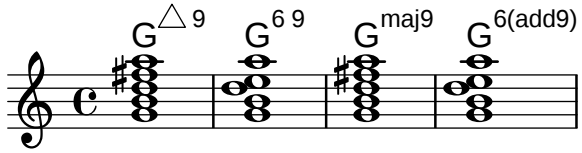
% Convert music to list and prepend to existing exceptions.
chExceptions = #( append
```

```
  ( sequential-music-to-chord-exceptions chExceptionMusic #t)
  ignatzekExceptions)

theMusic = \chordmode {
  g1:maj9 g1:6.9
  \set chordNameExceptions = #chExceptions
  g1:maj9 g1:6.9
}

\layout {
  ragged-right = ##t
}

<< \context ChordNames \theMusic
   \context Voice \theMusic
>>
```



chord name major7

The layout of the major 7 can be tuned with `majorSevenSymbol`.

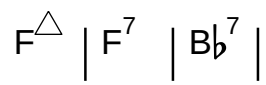
```
\chords {
  c:7+
  \set majorSevenSymbol = \markup { j7 }
  c:7+
}
```



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-extent = #'(-2 . 2)
  \consists "Bar_engraver"
}
\chordmode {
  f1:maj7 f:7 bes:7
}
```

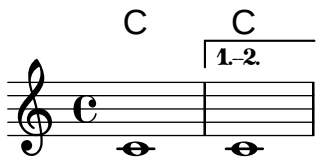


Volta below chords

By adding the `Volta_engraver` to the relevant staff, volte can be put under chords.

```
\score {
  <<
    \chords {
```

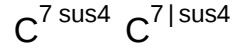
```
      c1
      c1
    }
    \new Staff \with {
      \consists "Volta_engraver"
    }
    {
      \repeat volta 2 { c'1 }
      \alternative { c' }
    }
  >>
  \layout {
    \context {
      \Score
      \remove "Volta_engraver"
    }
  }
}
```



Changing chord separator

The separator between different parts of a chord name can be set to any markup.

```
\chords {
  c:7sus4
  \set chordNameSeparator
    = \markup { \typewriter | }
  c:7sus4
}
```



See also

Notation Reference: Section A.1 [Chord name chart], page 607, Section A.2 [Common chord modifiers], page 608.

Essay on automated music engraving: Section "Literature list" in *Essay*.

Installed Files: 'scm/chords-ignatzek.scm', 'scm/chord-entry.scm', 'ly/chord-modifier-init.ly'.

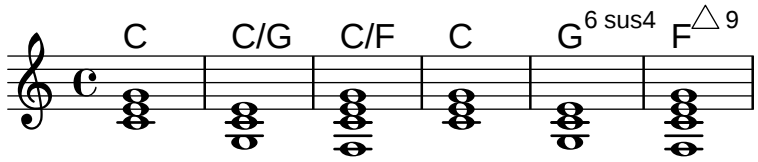
Snippets: Section "Chords" in *Snippets*.

Known issues and warnings
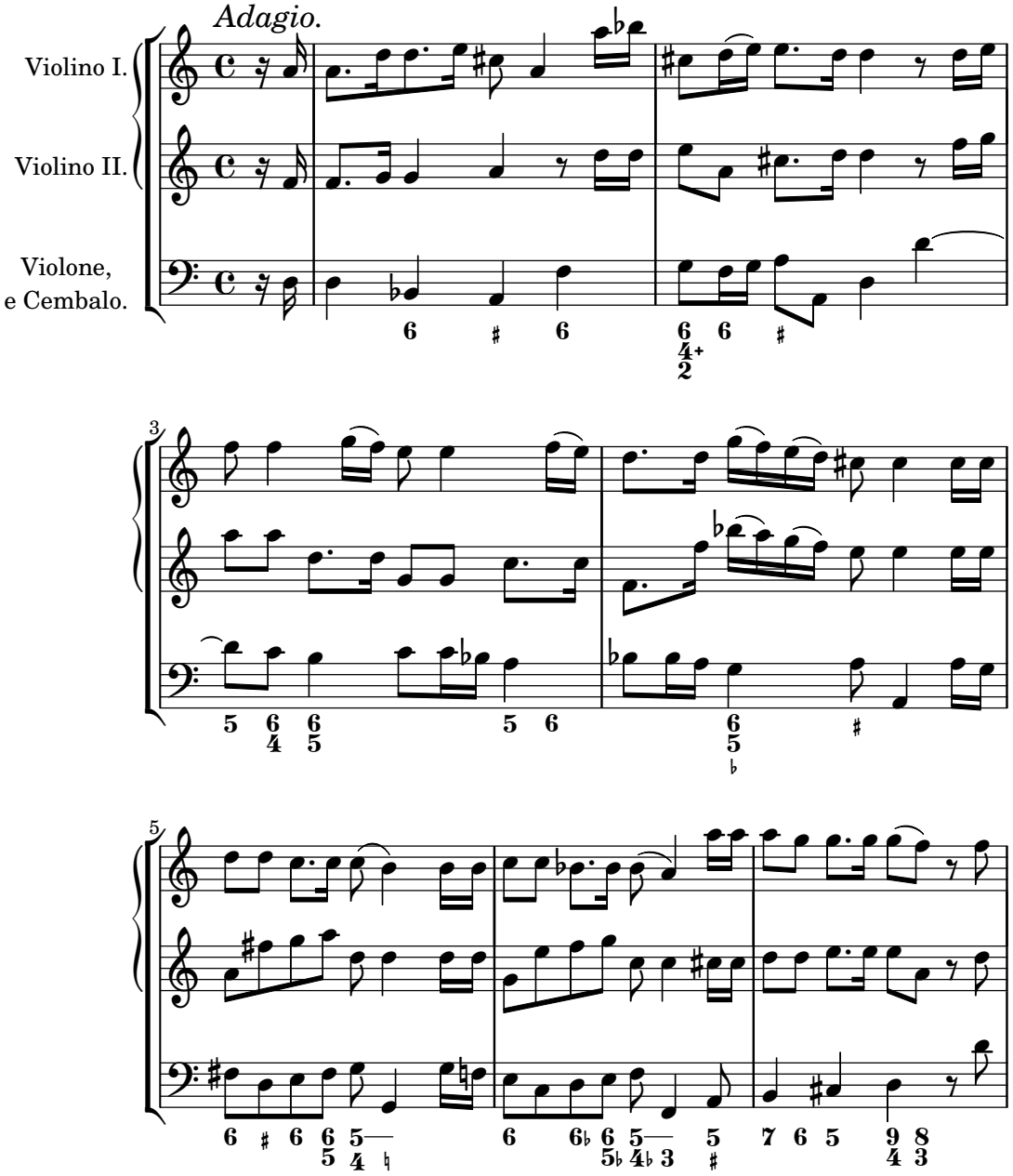
Chord names are determined from both the pitches that are present in the chord and the information on the chord structure that may have been entered in `\chordmode`. If the simultaneous pitches method of entering chords is used, undesired names result from inversions or bass notes.

```
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

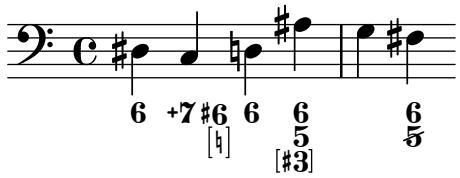


Figured bass notation can be displayed.

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 575.

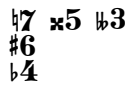
In figure mode, a group of bass figures is delimited by `<` and `>`. The duration is entered after the `>`.

```
\new FiguredBass {
  \figuremode {
    <6 4>2
  }
}
```



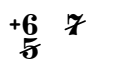
Accidentals (including naturals) can be added to figures:

```
\figures {
  <7! 6+ 4-> <5++> <3-->
}
```



Augmented and diminished steps can be indicated:

```
\figures {
  <6\+ 5/> <7/>
}
```



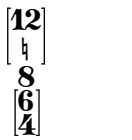
A backward slash through a figure (typically used for raised sixth steps) can be created:

```
\figures {
  <6> <6\\>
}
```



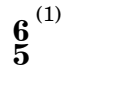
Vertical spaces and brackets can be included in figures:

```
\figures {
  <[12 _!] 8 [6  4]>
}
```



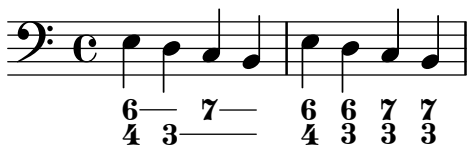
Any text markup can be inserted as a figure:

```
\figures {
  <\markup { \tiny \number 6 \super (1) } 5>
}
```



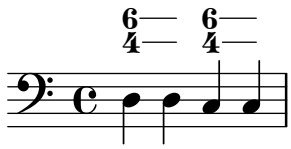
Continuation lines can be used to indicate repeated figures:

```
<<
  {
    \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>
  }
>>
```

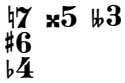
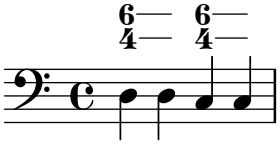


In this case, the extender lines replace existing figures, unless the continuation lines have been explicitly terminated.

```
<<
  \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`.

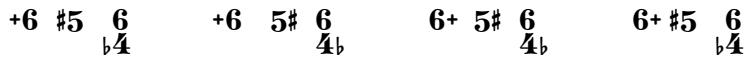
Selected Snippets

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*.

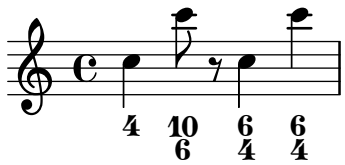
Internals Reference: Section “BassFigure” in *Internals Reference*, Section “BassFigureAlignment” in *Internals Reference*, Section “BassFigureLine” in *Internals Reference*, Section “BassFigureBracket” in *Internals Reference*, Section “BassFigureContinuation” in *Internals Reference*, Section “FiguredBass” 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>
    }
  }
>>
```

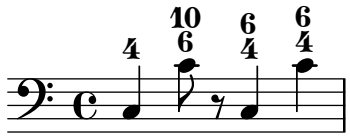


In the example above, the `FiguredBass` context must be explicitly instantiated to avoid creating a second (empty) staff.

Figured bass can also be added to `Staff` contexts directly. In this case, the vertical position of the figures is adjusted automatically.

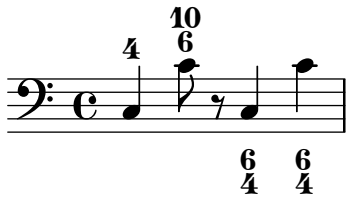
```
<<
  \new Staff = "myStaff"
  \figuremode {
    <4>4 <10 6>8 s8
    <6 4>4 <6 4>
  }
  %% Put notes on same Staff as figures
  \context Staff = "myStaff"
  {
```

```
    \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*.

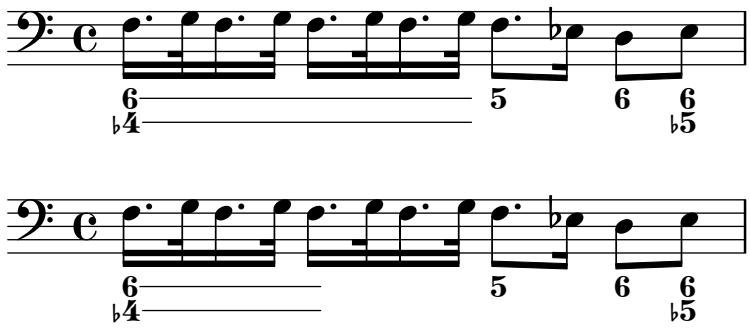
Internals Reference: Section "BassFigure" in *Internals Reference*, Section "BassFigureAlignment" in *Internals Reference*, Section "BassFigureLine" in *Internals Reference*, Section "BassFigureBracket" in *Internals Reference*, Section "BassFigureContinuation" in *Internals Reference*, Section "FiguredBass" 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->
  }
>>
```



2.8 Contemporary music

From the beginning of the 20th Century there has been a massive expansion of compositional style and technique. New harmonic and rhythmic developments, an expansion of the pitch spectrum and the development of a wide range of new instrumental techniques have been accompanied by a parallel evolution and expansion of musical notation. The purpose of this section is to provide references and information relevant to working with these new notational techniques.

2.8.1 Pitch and harmony in contemporary music

This section highlights issues that are relevant to notating pitch and harmony in contemporary music.

References for pitch and harmony in contemporary music

- Standard quarter-tone notation is addressed in [Note names in other languages], page 7.
- Non-standard key signatures are addressed in [Key signature], page 20.
- Contemporary practises in displaying accidentals are addressed in [Automatic accidentals], page 25.

Microtonal notation

Contemporary key signatures and harmony

2.8.2 Contemporary approaches to rhythm

This section highlights issues that are relevant to the notation of rhythm in contemporary music.

References for contemporary approaches to rhythm

- Compound time signatures are addressed in [Time signature], page 59.
- Basic polymetric notation is addressed in [Polymetric notation], page 69.
- Feathered beams are addressed in [Feathered beams], page 89.
- Mensurstriche bar lines (bar lines between staves only) are addressed in [Grouping staves], page 176.

Tuplets in contemporary music

Contemporary time signatures

Extended polymetric notation

Beams in contemporary music

Bar lines in contemporary music

2.8.3 Graphical notation

2.8.4 Contemporary scoring techniques

2.8.5 New instrumental techniques

2.8.6 Further reading and scores of interest
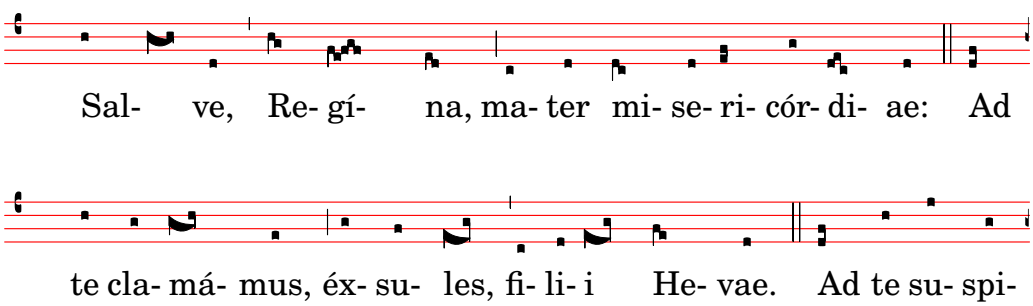
This section suggests books, musical examples and other resources useful in studying contemporary musical notation.

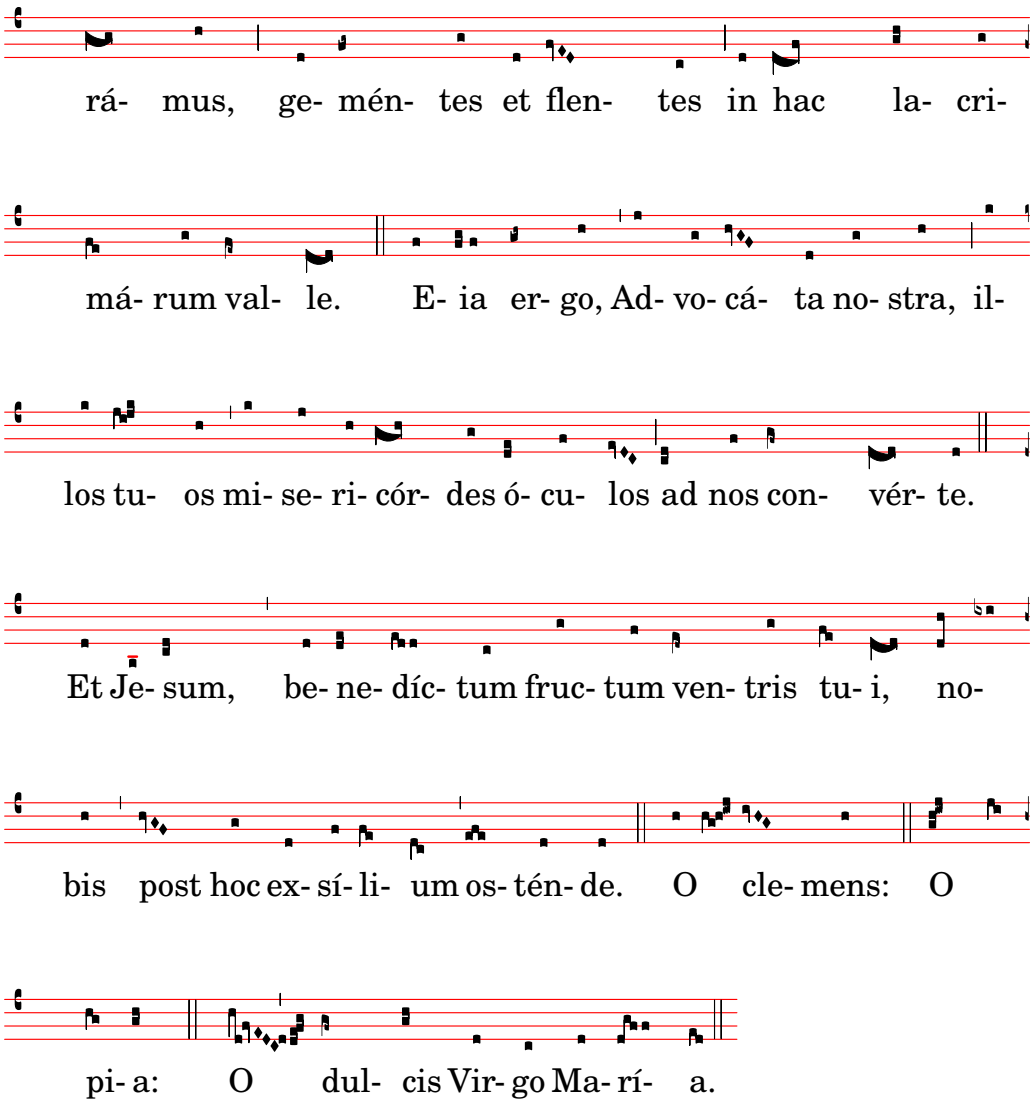
Books and articles on contemporary musical notation

- *Music Notation in the Twentieth Century: A Practical Guidebook* by Kurt Stone [W. W. Norton, 1980]
- *Music Notation: A Manual of Modern Practice* by Gardner Read [Taplinger, 1979]
- *Instrumentation and Orchestration* by Alfred Blatter [Schirmer, 2nd ed. 1997]

Scores and musical examples

2.9 Ancient notation





Support for ancient notation includes features for mensural notation, Gregorian chant notation, and Kievan square notation. These features can be accessed either by modifying style properties of graphical objects such as note heads and rests, or by using one of the pre-defined contexts for these styles.

Many graphical objects, such as note heads and flags, accidentals, time signatures, and rests, provide a `style` property, which can be changed to emulate several different styles of ancient notation. See

- [Mensural note heads], page 411,
- [Mensural accidentals and key signatures], page 413,
- [Mensural rests], page 412,
- [Mensural clefs], page 409,
- [Gregorian clefs], page 417,
- [Mensural flags], page 412,
- [Mensural time signatures], page 410.

Some notational concepts are introduced specifically for ancient notation,

- [Custodes], page 408,
- [Divisiones], page 418,
- [Ligatures], page 407.

See also

Music Glossary: Section "custos" in *Music Glossary*, Section "ligature" in *Music Glossary*, Section "mensural notation" in *Music Glossary*.

Notation Reference: [Mensural note heads], page 411, [Mensural accidentals and key signatures], page 413, [Mensural rests], page 412, [Gregorian clefs], page 417, [Mensural flags], page 412, [Mensural time signatures], page 410, [Custodes], page 408, [Divisiones], page 418, [Ligatures], page 407.

2.9.1 Overview of the supported styles

Three styles are available for typesetting Gregorian chant:

- *Editio Vaticana* is a complete style for Gregorian chant, following the appearance of the Solesmes editions, the official chant books of the Vatican since 1904. LilyPond has support for all the notational signs used in this style, including ligatures, *custodes*, and special signs such as the quilisma and the oriscus.
- The *Editio Medicaea* style offers certain features used in the Medicaea (or Ratisbona) editions which were used prior to the Solesmes editions. The most significant differences from the *Vaticana* style are the clefs, which have downward-slanted strokes, and the note heads, which are square and regular.
- The *Hufnagel* ("horseshoe nail") or *Gothic* style mimics the writing style in chant manuscripts from Germany and Central Europe during the middle ages. It is named after the basic note shape (the *virga*), which looks like a small nail.

Three styles emulate the appearance of late-medieval and renaissance manuscripts and prints of mensural music:

- The *Mensural* style most closely resembles the writing style used in late-medieval and early renaissance manuscripts, with its small and narrow, diamond-shaped note heads and its rests which approach a hand-drawn style.
- The *Neomensural* style is a modernized and stylized version of the former: the note heads are broader and the rests are made up of straight lines. This style is particularly suited, e.g., for incipits of transcribed pieces of mensural music.
- The *Petrucci* style is named after Ottaviano Petrucci (1466-1539), the first printer to use movable type for music (in his *Harmonice musices odhecaton*, 1501). The style uses larger note heads than the other mensural styles.

Baroque and *Classical* are not complete styles but differ from the default style only in some details: certain note heads (Baroque) and the quarter rest (Classical).

Only the mensural style has alternatives for all aspects of the notation. Thus, there are no rests or flags in the Gregorian styles, since these signs are not used in plainchant notation, and the Petrucci style has no flags or accidentals of its own.

Each element of the notation can be changed independently of the others, so that one can use mensural flags, petrucci note heads, classical rests and vaticana clefs in the same piece, if one wishes.

See also

Music Glossary: Section "mensural notation" in *Music Glossary*, Section "flag" in *Music Glossary*.

2.9.2 Ancient notation—common features

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 416,
- [Mensural contexts], page 408.

See also

Music Glossary: Section "mensural notation" in *Music Glossary*.
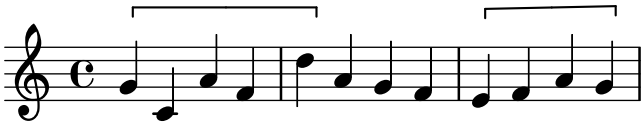
Notation Reference: [Gregorian chant contexts], page 416, [Mensural contexts], page 408.

Ligatures

A ligature is a graphical symbol that represents at least two distinct notes. Ligatures originally appeared in the manuscripts of Gregorian chant notation to denote ascending or descending sequences of notes on the same syllable. They are also used in mensural notation.

Ligatures are entered by *enclosing* them in `\[` and `\]`. Some ligature styles may need additional input syntax specific for this particular type of ligature. By default, the `LigatureBracket` engraver just puts a square bracket above the ligature.

```
\relative 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 `Voice` context, as explained in [White mensural ligatures], page 414 and [Gregorian square neume ligatures], page 420.

See also

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

Notation Reference: [White mensural ligatures], page 414, [Gregorian square neume ligatures], page 420.

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.

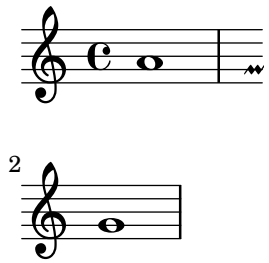
The syntax still uses the deprecated infix style `\[ music expr \]`. For consistency reasons, it will eventually be changed to postfix style `note\[ ... note\]`.

Custodes

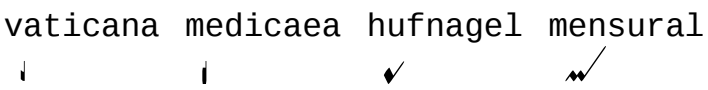
A *custos* (plural: *custodes*; Latin word for "guard") is a symbol that appears at the end of a staff. It anticipates the pitch of the first note of the following line, thus helping the performer to manage line breaks during performance.

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 `Custos_engraver` into the `Staff` context when declaring the `\layout` block, and change the style of the custos with an `\override` if desired, as shown in the following example:



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

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

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

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

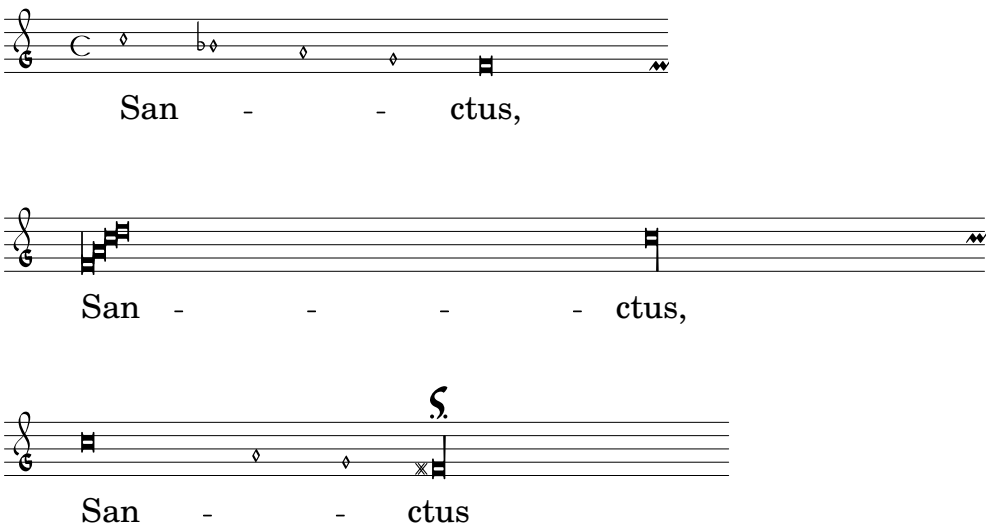
2.9.3 Typesetting mensural music

Mensural contexts

The predefined `MensuralVoice` and `MensuralStaff` contexts can be used to engrave a piece in mensural style. These contexts initialize all relevant context properties and grob properties to proper values, so you can immediately go ahead entering the chant, as the following excerpt demonstrates:

```
\score {
  <<
    \new MensuralVoice = "discantus" \relative c'' {
      \hide Score.BarNumber {
        c1\melisma bes a g\melismaEnd
        f\breve
        \[ f1\melisma a c\breve d\melismaEnd \]
        c\longa
        c\breve\melisma a1 g1\melismaEnd
        fis\longa^\signumcongruentiae
      }
```

```
    }
    \new Lyrics \lyricsto "discantus" {
      San -- ctus, San -- ctus, San -- ctus
    }
  >>
}
```
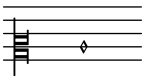


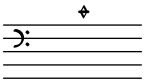
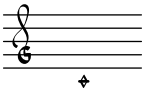
See also
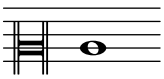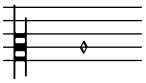
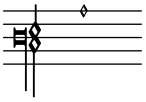
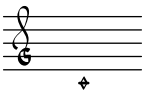
Music Glossary: Section “mensural notation” in *Music Glossary*.

Mensural clefs

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. You can manually force a clef glyph to be typeset on an arbitrary line, as described in [Clef], page 16. 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-c5`	
mensural F clef	`mensural-f`	
mensural G clef	`mensural-g`	

black mensural C clef	`blackmensural-c1`, `blackmensural-c2`, `blackmensural-c3`, `blackmensural-c4`, `blackmensural-c5`	
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 clefs, for use on different staff lines (the example shows the 3rd staff line F clef)	`petrucci-f3`, `petrucci-f4`, `petrucci-f5`	
petrucci style G clef	`petrucci-g`	

See also

Music Glossary: Section “mensural notation” in *Music Glossary*, Section “clef” in *Music Glossary*.

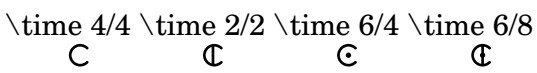
Notation Reference: [Clef], page 16.

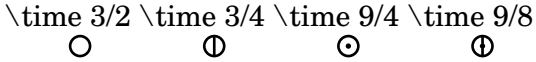
Known issues and warnings

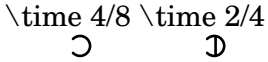
The mensural g clef is mapped to the Petrucci g clef.

Mensural time signatures

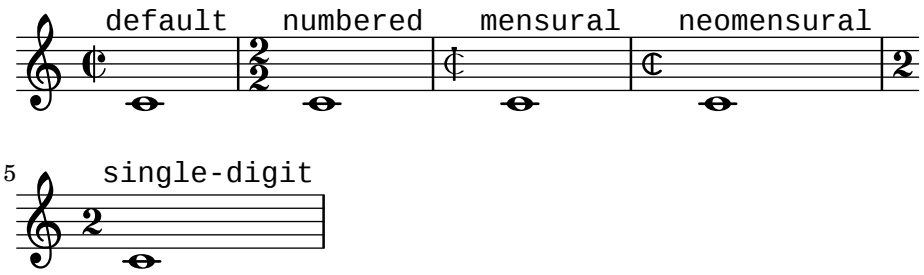
There is limited support for mensuration signs (which are similar to, but not exactly the same as time signatures). The glyphs are hard-wired to particular time fractions. In other words, to get a particular mensuration sign with the `\time n/m` command, `n` and `m` have to be chosen according to the following table







Use the `style` property of grob `TimeSignature` to select ancient time signatures. Supported styles are `neomensural` and `mensural`. The above table uses the `neomensural` style. The following examples show the differences in style:



[Time signature], page 59, gives a general introduction to the use of time signatures.

See also

Music Glossary: Section "mensural notation" in *Music Glossary*.

Notation Reference: [Time signature], page 59.

Known issues and warnings

Ratios of note durations cannot change with the time signature, as those are not constant. For example, the ratio of 1 breve = 3 semibreves (*tempus perfectum*) can be made by hand, by setting

```
breveTP = #(ly:make-duration -1 0 3/2)
...
{ c\breveTP f1 }
```

This sets `breveTP` to 3/2 times 2 = 3 times a whole note.

The `mensural68alt` and `neomensural68alt` symbols (alternate symbols for 6/8) are not addressable with `\time`. Use `\markup {\musicglyph #"timesig.mensural68alt" }` instead.

Mensural note heads

For ancient notation, a note head style other than the `default` style may be chosen. This is accomplished by setting the `style` property of the `NoteHead` object to `baroque`, `neomensural`, `mensural`, `petrucci`, `blackpetrucci` or `semipetrucci`.

The `baroque` style differs from the `default` style by:

- Providing a `maxima` note head, and
- Using a square shape for `\breve` note heads.

The `neomensural`, `mensural`, and `petrucci` styles differ from the `baroque` style by:

- Using rhomboidal heads for semibreves and all smaller durations, and
- Centering the stems on the note heads.

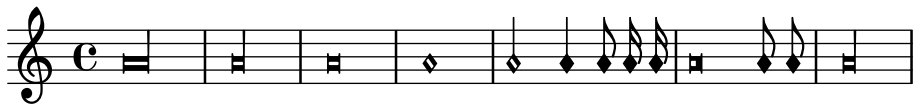
The `blackpetrucci` style produces note heads usable in black mensural notation or coloratio sections in white mensural notation. Because note head style does not influence flag count, in this style a semiminima should be notated as `a8*2`, not `a4`, otherwise it will look like a minima. The multiplyer can be different if coloratio is used e.g. to notate triplets.

Use `semipetrucci` style to draw half-colored note heads (breves, longas and maximas).

The following example demonstrates the `petrucci` style:

```
\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'
\override NoteHead.style = #'semipetrucci
a'\breve*5/6
\override NoteHead.style = #'blackpetrucci
a'8*4/3 a'
\override NoteHead.style = #'petrucci
```

```
a'\longa
```



Section A.9 [Note head styles], page 645, gives an overview of all available note head styles.

See also

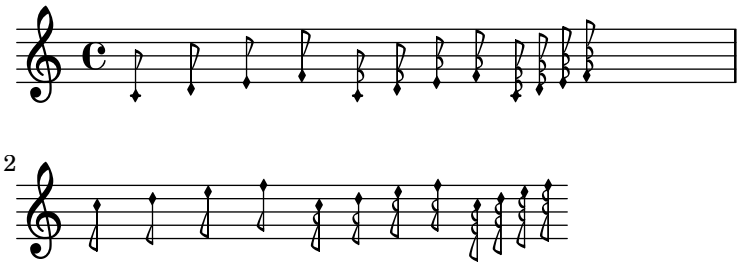
Music Glossary: Section "mensural notation" in *Music Glossary*, Section "note head" in *Music Glossary*.

Notation Reference: Section A.9 [Note head styles], page 645.

Mensural flags

Use the `flag-style` property of grob `Stem` to select ancient flags. Besides the `default` flag style, only the `mensural` style is supported.

```
\override Flag.style = #'mensural
\override Stem.thickness = #1.0
\override NoteHead.style = #'mensural
\autoBeamOff
c8 d e f c16 d e f c32 d e f s8
c'8 d e f c16 d e f c32 d e f
```



Note that the innermost flare of each mensural flag is vertically aligned with a staff line.

There is no particular flag style for neo-mensural or Petrucci notation. There are no flags in Gregorian chant notation.

See also

Music Glossary: Section "mensural notation" in *Music Glossary*, Section "flag" in *Music Glossary*.

Known issues and warnings

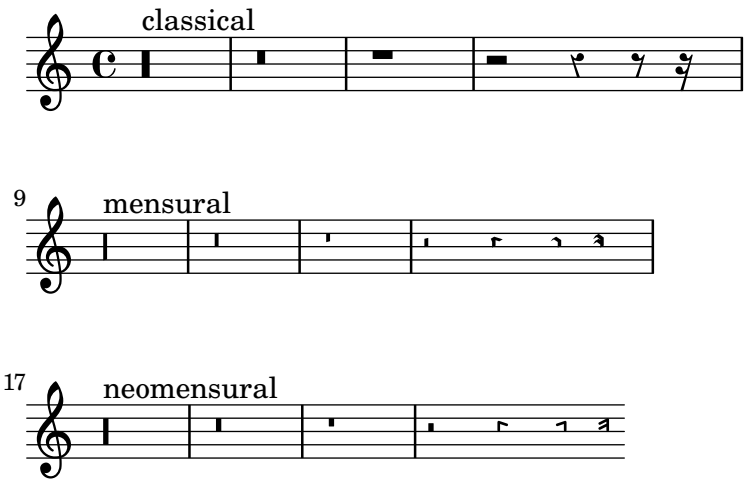
Vertically aligning each flag with a staff line assumes that stems always end either exactly on or exactly in the middle of two staff lines. This may not always be true when using advanced layout features of classical notation (which however are typically out of scope for mensural notation).

Mensural rests

Use the `style` property of grob `Rest` to select ancient rests. Supported 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 also

Music Glossary: Section “mensural notation” in *Music Glossary*.

Notation Reference: [Rests], page 52.

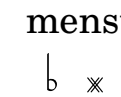
Snippets: Section “Ancient notation” in *Snippets*.

Known issues and warnings

The glyph for the maxima rest in mensural style is actually a perfect longa rest; use two (or three) longa rests to print a maxima rest. Longa rests are not grouped automatically, so have to be done manually by using pitched rests.

Mensural accidentals and key signatures

The `mensural` style provides a sharp and a flat sign different from the default style. If called for, the natural sign will be taken from the `vaticana` style.



The style for accidentals and key signatures is controlled by the `glyph-name-alist` property of the grobs `Accidental` and `KeySignature`, respectively; e.g.:

```
\override Staff.Accidental.glyph-name-alist =
  #alteration-mensural-glyph-name-alist
```

See also

Music Glossary: Section “mensural notation” in *Music Glossary*, Section “Pitch names” in *Music Glossary*, Section “accidental” in *Music Glossary*, Section “key signature” in *Music Glossary*.

Notation Reference: Section 1.1 [Pitches], page 1, [Accidentals], page 5, [Automatic accidentals], page 25, [Key signature], page 20.
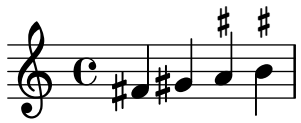
Internals Reference: Section “KeySignature” in *Internals Reference*.

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.
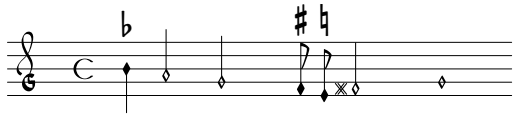
Support for such suggested accidentals is included, and can be switched on by setting `suggestAccidentals` to true.

```
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*, Section “AccidentalSuggestion” in *Internals Reference*.

White mensural ligatures

There is limited support for white mensural ligatures.

To engrave white mensural ligatures, in the layout block, replace the `Ligature_bracket_engraver` with the `Mensural_ligature_engraver` in the `Voice` context:

```
\layout {
  \context {
    \Voice
```

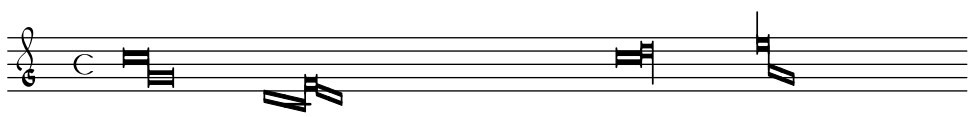
```
    \remove "Ligature_bracket_engraver"
    \consists "Mensural_ligature_engraver"
  }
}
```

There is no additional input language to describe the shape of a white mensural ligature. The shape is rather determined solely from the pitch and duration of the enclosed notes. While this approach may take a new user a while to get accustomed to, it has the great advantage that the full musical information of the ligature is known internally. This is not only required for correct MIDI output, but also allows for automatic transcription of the ligatures.
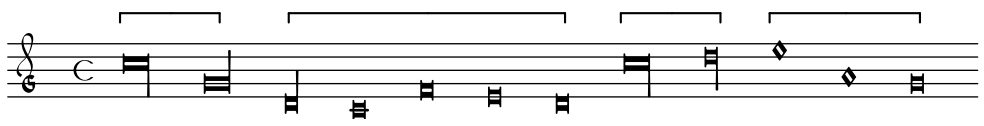
At certain places two consecutive notes can be represented either as two squares or as an oblique parallelogram (flexa shape). In such cases the default is the two squares, but a flexa can be required by setting the `ligature-flexa` property of the *second* note head. The length of a flexa can be set by the note head property `flexa-width`.

For example,

```
\score {
  \relative c' {
    \set Score.timing = ##f
    \set Score.defaultBarType = "-"
    \override NoteHead.style = #'petrucci
    \override Staff.TimeSignature.style = #'mensural
    \clef "petrucci-g"
    \[ c'\maxima g \]
    \[ d\longa
       \override NoteHead.ligature-flexa = ##t
       \once \override NoteHead.flexa-width = #3.2
       c\breve f e d \]
    \[ c'\maxima d\longa \]
    \[ e1 a, g\breve \]
  }
  \layout {
    \context {
      \Voice
      \remove "Ligature_bracket_engraver"
      \consists "Mensural_ligature_engraver"
    }
  }
}
```



Without replacing `Ligature_bracket_engraver` with `Mensural_ligature_engraver`, the same music transcribes to the following



See also

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

Notation Reference: [Gregorian square neume ligatures], page 420, [Ligatures], page 407.

Known issues and warnings

Horizontal spacing of ligatures is poor. Accidentals may collide with previous notes.

2.9.4 Typesetting Gregorian chant

When typesetting a piece in Gregorian chant notation, the `Vaticana_ligature_engraver` automatically selects the proper note heads, so there is no need to explicitly set the note head style. Still, the note head style can be set, e.g., to `vaticana_punctum` to produce punctum neumes. Similarly, the `Mensural_ligature_engraver` automatically assembles mensural ligatures.

See also

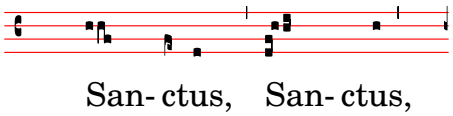
Music Glossary: Section “ligature” in *Music Glossary*.
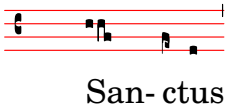
Notation Reference: [White mensural ligatures], page 414, [Ligatures], page 407.

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:

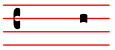
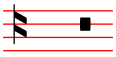
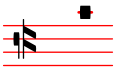
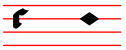
```
\include "gregorian.ly"
\score {
  <<
    \new VaticanaVoice = "cantus" {
      \[ c'\melisma c' \flexa a \]
      \[ a \flexa \deminutum g\melismaEnd \]
      f \divisioMinima
      \[ f\melisma \pes a c' c' \pes d'\melismaEnd \]
      c' \divisioMinima \break
      \[ c'\melisma c' \flexa a \]
      \[ a \flexa \deminutum g\melismaEnd \] f \divisioMinima
    }
    \new Lyrics \lyricsto "cantus" {
      San- ctus, San- ctus, San- ctus
    }
  >>
}
```





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 16. The note printed to the right side of each clef in the example column denotes the `c'` with respect to that clef.

Description	Supported Clefs	Example
Editio Vaticana style do clef	`vaticana-do1`, `vaticana-do2`, `vaticana-do3`	
Editio Vaticana style fa clef	`vaticana-fa1`, `vaticana-fa2`	
Editio Medicaea style do clef	`medicaea-do1`, `medicaea-do2`, `medicaea-do3`	
Editio Medicaea style fa clef	`medicaea-fa1`, `medicaea-fa2`	
hufnagel style do clef	`hufnagel-do1`, `hufnagel-do2`, `hufnagel-do3`	
hufnagel style fa clef	`hufnagel-fa1`, `hufnagel-fa2`	
hufnagel style combined do/fa clef	`hufnagel-do-fa`	

See also

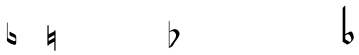
Music Glossary: Section “clef” in *Music Glossary*.

Notation Reference: [Clef], page 16.

Gregorian accidentals and key signatures

Accidentals for the three different Gregorian styles are available:

vaticana medicaea hufnagel



As shown, not all accidentals are supported by each style. When trying to access an unsupported accidental, LilyPond will switch to a different style.

The style for accidentals and key signatures is controlled by the `glyph-name-alist` property of the grobs `Accidental` and `KeySignature`, respectively; e.g.:

```
\override Staff.Accidental.glyph-name-alist =
  #alteration-mensural-glyph-name-alist
```

See also

Music Glossary: Section "accidental" in *Music Glossary*, Section "key signature" in *Music Glossary*.

Notation Reference: Section 1.1 [Pitches], page 1, [Accidentals], page 5, [Automatic accidentals], page 25, [Key signature], page 20.

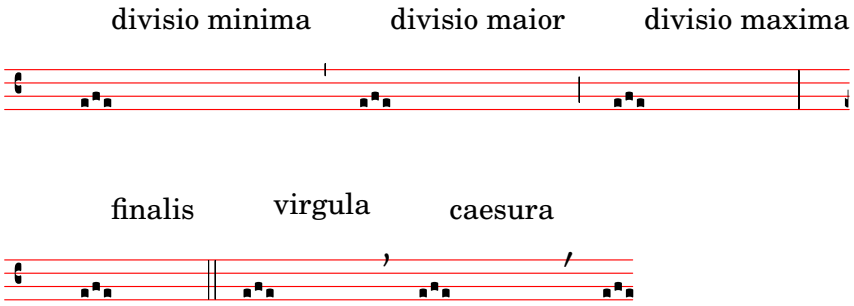
Internals Reference: Section "KeySignature" in *Internals Reference*.

Divisiones

There are no rests in Gregorian chant notation; instead, it uses [Divisiones], page 418.

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 breath marks from [Breath marks], page 126. 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`.

See also

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

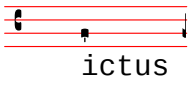
Notation Reference: [Breath marks], page 126.

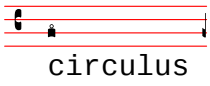
Installed Files: '`ly/gregorian.ly`'.

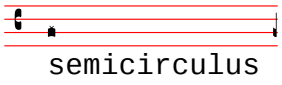
Gregorian articulation signs

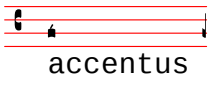
In addition to the standard articulation signs described in section [Articulations and ornamentations], page 111, articulation signs specifically designed for use with notation in *Editio Vaticana* style are provided.

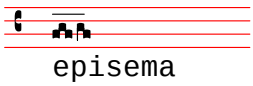
```
\include "gregorian.ly"
\score {
  \new VaticanaVoice {
    \override TextScript.font-family = #'typewriter
    \override TextScript.font-shape = #'upright
    \override Script.padding = #-0.1
    a\ictus_"ictus " \bar "" \break
    a\circulus_"circulus " \bar "" \break
    a\semicirculus_"semicirculus " \bar "" \break
    a\accentus_"accentus " \bar "" \break
    \[ a_"episema" \episemInitium \pes b \flexa a b \episemFinis \flexa a \]
  }
}
```











See also

Notation Reference: [Articulations and ornamentations], page 111.

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

Internals Reference: Section “Episema” in *Internals Reference*, Section “EpisemaEvent” in *Internals Reference*, Section “Episema_engraver” in *Internals Reference*, Section “Script” in *Internals Reference*, Section “ScriptEvent” in *Internals Reference*, Section “Script_engraver” in *Internals Reference*.
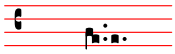
Known issues and warnings

Some articulations are vertically placed too closely to the corresponding note heads.

Augmentum dots (*morae*)

Augmentum dots, also called *morae*, are added with the music function `\augmentum`. Note that `\augmentum` is implemented as a unary music function rather than as head prefix. It applies to the immediately following music expression only. That is, `\augmentum \virga c` will have no visible effect. Instead, say `\virga \augmentum c` or `\augmentum {\virga c}`. Also note that you can say `\augmentum {a g}` as a shortcut for `\augmentum a \augmentum g`.

```
\include "gregorian.ly"
\score {
  \new VaticanaVoice {
    \[ \augmentum a \flexa \augmentum g \]
    \augmentum g
  }
}
```



See also

Notation Reference: [Breath marks], page 126.

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

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

Gregorian square neume ligatures

There is limited support for Gregorian square neumes notation (following the style of the Editio Vaticana). Core ligatures can already be typeset, but essential issues for serious typesetting are still lacking, such as (among others) horizontal alignment of multiple ligatures, lyrics alignment, and proper handling of accidentals.

The support for Gregorian neumes is enabled by `\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 diphthong equivalents). Thus, the liquescent neumes are never used alone (although some of them can be produced), and they always fall at the end of a ligature.

Liquescent neumes are represented graphically in two different, more or less interchangeable ways: with a smaller note or by 'twisting' the main note upwards or downwards. The first is produced by making a regular `pes` or `flexa` and modifying the shape of the second note: `\[ a \pes \deminutum b \]` , the second by modifying the shape of a single-note neume with `\auctum` and one of the direction markers `\descendens` or `\ascendens`, e.g., `\[ \auctum \descendens a \]` .

Special signs

A third category of signs is made up of a small number of signs with a special meaning (which, incidentally, in most cases is only vaguely known): the *quilisma*, the *oriscus*, and the *strophicus*. These are all produced by prefixing a note name with the corresponding modifier, `\quilisma`, `\oriscus`, or `\stropha`.

Virtually, within the ligature delimiters `\[` and `\]`, any number of heads may be accumulated to form a single ligature, and head prefixes like `\pes`, `\flexa`, `\virga`, `\inclinatum`, etc. may be mixed in as desired. The use of the set of rules that underlies the construction of the ligatures in the above table is accordingly extrapolated. This way, infinitely many different ligatures can be created.

Note that the use of these signs in the music itself follows certain rules, which are not checked by LilyPond. E.g., the *quilisma* is always the middle note of an ascending ligature, and usually falls on a half-tone step, but it is perfectly possible, although incorrect, to make a single-note quilisma.

In addition to the note signs, '`gregorian.ly`' also defines the commands `\versus`, `\responsum`, `\ij`, `\iij`, `\IJ`, and `\IIJ`, that will produce the corresponding characters, e.g., for use in lyrics, as section markers, etc. These commands use special Unicode characters and will only work if a font is used which supports them.

The following table shows a limited, but still representative pool of Gregorian ligatures, together with the code fragments that produce the ligatures. The table is based on the extended neumes table of the 2nd volume of the Antiphonale Romanum (*Liber Hymnarius*), published 1983 by the monks of Solesmes. The first column gives the name of the ligature, with the main form in boldface and the liquescent forms in italics. The third column shows the code fragment that produces this ligature, using `g`, `a`, and `b` as example pitches.

Single-note 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

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

Notation Reference: [Gregorian square neume ligatures], page 420, [White mensural ligatures], page 414, [Ligatures], page 407.

Known issues and warnings

When an `\augmentum` dot appears at the end of the last staff within a ligature, it is sometimes vertically placed wrong. As a workaround, add an additional skip note (e.g., `s8`) as last note of the staff.
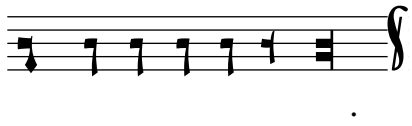
`\augmentum` should be implemented as a head prefix rather than a unary music function, such that `\augmentum` can be intermixed with head prefixes in arbitrary order.

2.9.5 Typesetting Kievan square notation

Kievan contexts

As with Mensural and Gregorian notation, the predefined `KievanVoice` and `KievanStaff` contexts can be used to engrave a piece in square notation. These contexts initialize all relevant context properties and grob properties to proper values, so you can immediately go ahead entering the chant:

```
\score {
  <<
    \new KievanVoice = "melody" \relative c' {
      \cadenzaOn
        c4 c c c c2 b\longa
        \bar "k"
    }
    \new Lyrics \lyricsto "melody" {
      Го -- спо -- ди по -- ми -- луй.
    }
  >>
}
```



See also

Music Glossary: Section “kievan notation” in *Music Glossary*.
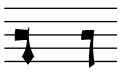
Known issues and warnings

LilyPond supports Kievan notation of the Synodal style, as used in the corpus of chantbooks printed by the Russian Holy Synod in the 1910’s and recently reprinted by the Moscow Patriarchate Publishing House. LilyPond does not support the older (less common) forms of Kievan notation that were used in Galicia to notate Rusyn plainchant.

Kievan clefs

There is only one clef used in Kievan notation (the Tse-fa-ut Clef). It is used to indicate the position of `c`:

```
\clef "kievan-do"
\kievanOn
c
```



See also

Music Glossary: Section “kievan notation” in *Music Glossary*, Section “clef” in *Music Glossary*.
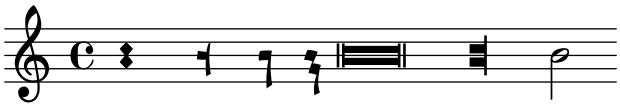
Notation Reference: [Clef], page 16.

Kievan notes

For Kievan square notation, the appropriate note head style needs to be chosen and the flags and stems need to be turned off. This is accomplished by calling the `\kievanOn` function, which sets the appropriate properties of the note head, stems, and flags. Once Kievan note heads are not needed, these properties can be reverted by calling the `\kievanOff` function.

The Kievan final note, which usually comes at the end of a piece of music, may be selected by setting the duration to `\longa`. The Kievan recitative mark, used to indicate the chanting of several syllables on one note, may be selected by setting the duration to `\breve`. The following example demonstrates the various Kievan note heads:

```
\autoBeamOff
\cadenzaOn
\kievanOn
b'1 b'2 b'4 b'8 b'\breve b'\longa
\kievanOff
b'2
```



See also

Music Glossary: Section “kievan notation” in *Music Glossary*, Section “note head” in *Music Glossary*.

Notation Reference: Section A.9 [Note head styles], page 645.
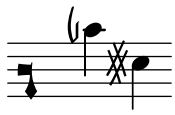
Known issues and warnings

LilyPond automatically determines if the stem up or stem down form of a note is drawn. When setting chant in square notation, however, it is customary to have the stems point in the same direction within a single melisma. This can be done manually by setting the `direction` property of the `Stem` object.

Kievan accidentals

The `kievan` style for accidentals is selected with the `glyph-name-alist` property of the grob `Accidental`. The `kievan` style provides a sharp and a flat sign different from the default style. There is no natural sign in Kievan notation. The sharp sign is not used in Synodal music but may occur in earlier manuscripts. It has been included primarily for the sake of compatibility.

```
\clef "kievan-do"
\override Accidental.glyph-name-alist =
 #alteration-kievan-glyph-name-alist
bes' dis,
```



See also
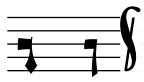
Music Glossary: Section “kievan notation” in *Music Glossary*, Section “accidental” in *Music Glossary*.

Notation Reference: [Accidentals], page 5, [Automatic accidentals], page 25, Section A.8 [The Feta font], page 624

Kievan bar line

A decorative figure is commonly placed at the end of a piece of Kievan notation, which may be called the Kievan final bar line. It can be invoked as `\bar "k"`.

```
\kievanOn
\clef "kievan-do"
c \bar "k"
```



See also

Section 1.2.5 [Bars], page 90, Section A.8 [The Feta font], page 624

Kievan melismata

Notes within a Kievan melisma are usually placed close to each other and the melismata separated by whitespace. This is done to allow the chanter to quickly identify the melodic structures of Znamenny chant. In LilyPond, melismata are treated as ligatures and the spacing is implemented by the `Kievan_ligature_engraver`.
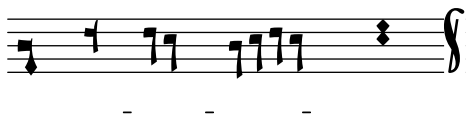
When the `KievanVoice` and `KievanStaff` contexts are used, the `Kievan_ligature_engraver` is enabled by default. In other contexts, it can be invoked by replacing the `Ligature_bracket_engraver` with the `Kievan_ligature_engraver` in the layout block:

```
\layout {
  \context {
    \Voice
    \remove "Ligature_bracket_engraver"
    \consists "Kievan_ligature_engraver"
  }
}
```

The spacing between the notes within a Kievan ligature can be controlled by setting the `padding` property of the `KievanLigature`.

The following example demonstrates the use of Kievan ligatures:

```
\score {
  <<
    \new KievanVoice = "melody" \relative c' {
      \cadenzaOn
        e2 \[ e4( d4 ) \] \[ c4( d e  d ) \] e1 \bar "k"
    }
    \new Lyrics \lyricsto "melody" {
      Га -- вpi -- и -- лу
    }
  >>
}
```



See also

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

Notation Reference: [White mensural ligatures], page 414, [Gregorian square neume ligatures], page 420, [Ligatures], page 407.

Known issues and warnings

Horizontal spacing of ligatures is poor.

2.9.6 Working with ancient music—scenarios and solutions

Working with ancient music frequently involves particular tasks which differ considerably from the modern notation for which LilyPond is designed. In the rest of this section, a number of typical scenarios are outlined, with suggestions of solutions. These involve:

- how to make incipits (i.e. prefatory material to indicate what the original has looked like) to modern transcriptions of mensural music;
- how to achieve the *Mensurstriche* layout frequently used for modern transcriptions of polyphonic music;
- how to transcribe Gregorian chant in modern notation;
- how to generate both ancient and modern notation from the same source.

Incipits

TBC

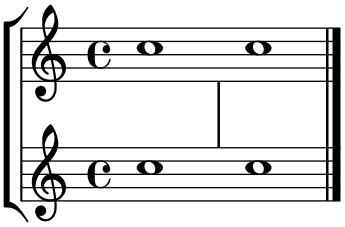
Mensurstriche layout

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 = {
  \hide Staff.BarLine
```

```
  s1 s
  % the final bar line is not interrupted
  \undo \hide Staff.BarLine
  \bar "|."
}
\new StaffGroup \relative c'' {
  <<
    \new Staff { << \global { c1 c } >> }
    \new Staff { << \global { c c } >> }
  >>
}
```



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 `\hide Stem` 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`.

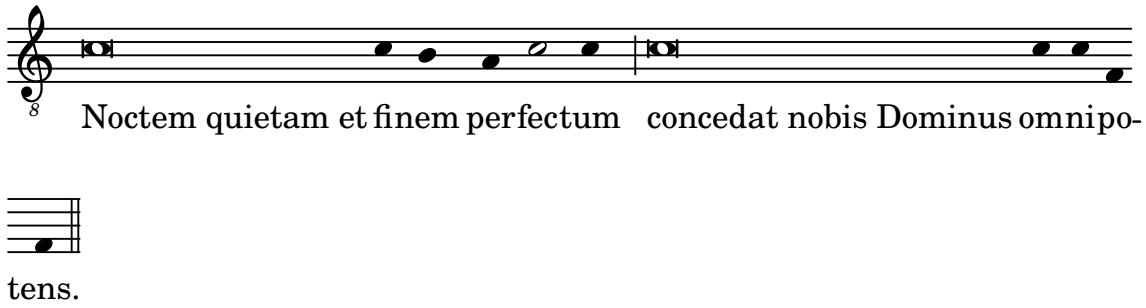
To remove the bar lines, the radical approach is to `\remove` the Bar_engraver from the Staff context. Again, one may want to use `\hide BarLine` instead, if an occasional barline is wanted.

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"
      \hide Stem
    }
  }
}
```

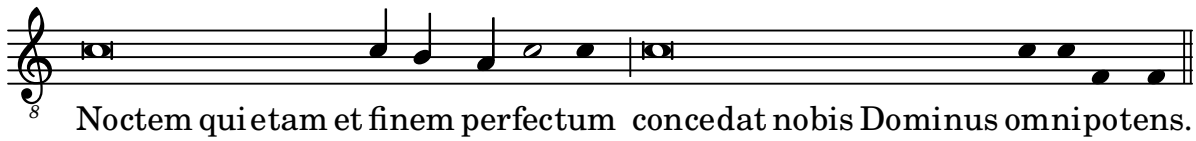


This works fine, as long as the text doesn't span a line break. If that is the case, an alternative is to add hidden notes to the score, here in combination with changing stem visibility:

```
\include "gregorian.ly"
chant = \relative c' {
  \clef "G_8"
  \set Score.timing = ##f
  c\breve \hide NoteHead  c c c c c
  \undo \hide NoteHead
  \override Stem.transparent = ##f \stemUp c4 b4 a
  \hide Stem c2 c4  \divisioMaior
  c\breve \hide NoteHead c c c c c c c
  \undo \hide NoteHead c4 c f, f \finalis
}

verba = \lyricmode {
  No -- ctem qui -- e -- tam et fi -- nem per -- fec -- tum
  con -- ce -- dat no -- bis Do -- mi -- nus om -- ni -- po -- tens.
}
```

```
\score {
  \new Staff <<
    \new Voice = "melody" \chant
    \new Lyrics \lyricsto "melody" \verba
  >>
  \layout {
    \context {
      \Staff
      \remove "Time_signature_engraver"
      \hide BarLine
      \hide Stem
    }
  }
}
```
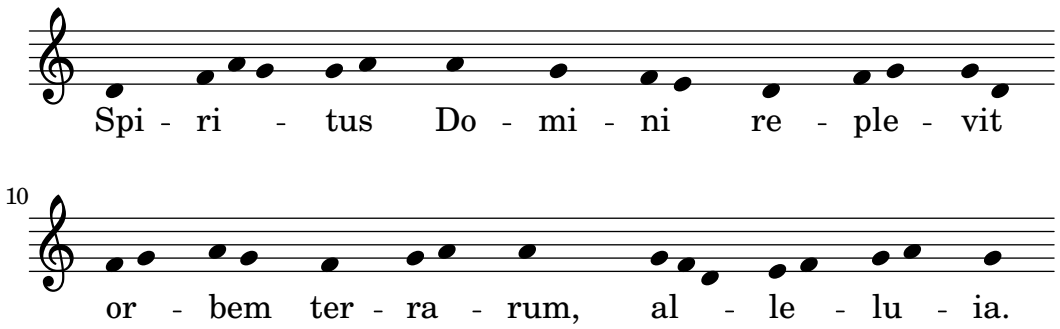


Another common situation is transcription of neumatic or melismatic chants, i.e. chants with a varying number of notes to each syllable. In this case, one would want to set the syllable groups clearly apart, usually also the subdivisions of a longer melisma. One way to achieve this is to use a fixed `\time`, e.g., 1/4, and let each syllable or note group fill one of these measures, with the help of tuplets or shorter durations. If the bar lines and all other rhythmical indications are made transparent, and the space around the bar lines is increased, this will give a fairly good representation in modern notation of the original.

To avoid that syllables of different width (such as "-ri" and "-rum") spread the syllable note groups unevenly apart, the `'X-extent` property of the `LyricText` object may be set to a fixed value. Another, more cumbersome way would be to add the syllables as `\markup` elements. If further adjustments are necessary, this can be easily done with `s` 'notes'.

```
spiritus = \relative c' {
  \time 1/4
  \override Lyrics.LyricText.X-extent  = #'(0 . 3)
  d4 \tuplet 3/2 { f8 a g } g a a4 g f8 e
  d4 f8 g g8 d f g a g f4 g8 a a4  s
  \tuplet 3/2 { g8 f d } e f g a g4
}

spirLyr = \lyricmode {
  Spi -- ri -- _ _ tus  _ Do -- mi -- ni  _ re -- ple -- _ vit _
  or -- _ bem _  ter -- ra -- _ rum, al -- _ _ le -- _ lu
  -- _ ia.
}
\score {
  \new Staff <<
    \new Voice = "chant" \spiritus
    \new Lyrics = "one" \lyricsto "chant" \spirLyr
  >>
  \layout {
    \context {
```

```
      \Staff
      \remove "Time_signature_engraver"
      \override BarLine.X-extent = #'(-1 . 1)
      \hide Stem
      \hide Beam
      \hide BarLine
      \hide TupletNumber
    }
  }
}
```



Ancient and modern from one source

TBC

Editorial markings

2.10 World music

The purpose of this section is to highlight musical notation issues that are relevant to traditions outside the Western tradition.

2.10.1 Common notation for non-Western music

This section discusses how to enter and print music scores that do not belong to the Western classical tradition, also referred to as *Common Practice Period*.

Extending notation and tuning systems

Standard classical notation (also known as *Common Practice Period* notation) is commonly used in all sorts of music, not limited to 'classical' Western music. This notation is discussed in Section 1.1.1 [Writing pitches], page 1, and the various note names that may be used are explained in [Note names in other languages], page 7.

However, many types of non-Western music (and some types of Western folk and traditional music) employ alternative or extended tuning systems that do not fit readily into standard classical notation.

In some cases standard notation is still used, with the pitch differences being implicit. For example, *Arabic music* is notated with standard semitone and quarter-tone accidentals, with the precise pitch alterations being determined by context. Italian note names are typically used, while the init file '`arabic.ly`' provides a suitable set of macros and definitions extending the standard notation. For more details, see Section 2.10.2 [Arabic music], page 435.

Other types of music require extended or unique notations. *Turkish classical music* or Ottoman music, for example, employs melodic forms known as *makamlar*, whose intervals are based on 1/9 divisions of the whole tone. Standard Western staff notes are still used, but with

special accidentals unique to Turkish music, that are defined in the file '`makam.ly`'. For further information on Turkish classical music and makamlar, see Section 2.10.3 [Turkish classical music], page 440.

To locate init files such as '`arabic.ly`' or '`makam.ly`' on your system, see Section "Other sources of information" in *Learning Manual*.
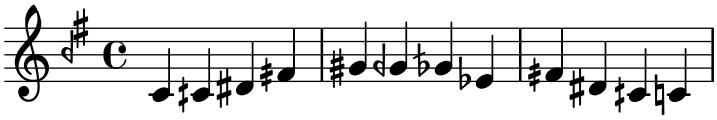
Selected Snippets

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 = #`((6 . ,(- KOMA)) (3 . ,BAKIYE))
  c4 cc db fk
  gbm4 gfc gfb efk
  fk4 db cc c
}
```



See also

Music Glossary: Section "Common Practice Period" in *Music Glossary*, Section "makamlar" in *Music Glossary*.

Learning Manual: Section "Other sources of information" in *Learning Manual*.

Notation Reference: Section 1.1.1 [Writing pitches], page 1, [Note names in other languages], page 7, Section 2.10.2 [Arabic music], page 435, Section 2.10.3 [Turkish classical music], page 440.

2.10.2 Arabic music

This section highlights issues that are relevant to notating Arabic music.

References for Arabic music

Arabic music so far has been mainly an oral tradition. When music is transcribed, it is usually in a sketch format, on which performers are expected to improvise significantly. Increasingly, Western notation, with a few variations, is adopted in order to communicate and preserve Arabic music.

Some elements of Western musical notation such as the transcription of chords or independent parts, are not required to typeset the more traditional Arabic pieces. There are however some different issues, such as the need to indicate medium intervals that are somewhere between a semi-tone and a tone, in addition to the minor and major intervals that are used in Western music. There is also the need to group and indicate a large number of different maqams (modes) that are part of Arabic music.

In general, Arabic music notation does not attempt to precisely indicate microtonal elements that are present in musical practice.

Several issues that are relevant to Arabic music are covered elsewhere:

- Note names and accidentals (including quarter tones) can be tailored as discussed in Section 2.10.1 [Common notation for non-Western music], page 434.
- Additional key signatures can also be tailored as described in [Key signature], page 20.
- Complex time signatures may require that notes be grouped manually as described in [Manual beams], page 86.
- *Takasim* which are rhythmically free improvisations may be written down omitting bar lines as described in [Unmetered music], page 68.

See also

Notation Reference: Section 2.10.1 [Common notation for non-Western music], page 434, [Key signature], page 20, [Manual beams], page 86.
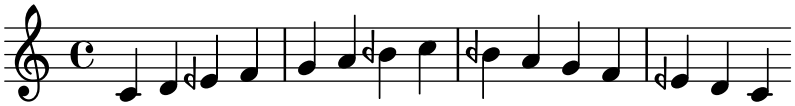
Snippets: Section "World music" in *Snippets*.

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. Italian note names and accidentals are explained in [Note names in other languages], page 7; the use of standard Western notation to notate non-Western music is discussed in Section 2.10.1 [Common notation for non-Western music], page 434.
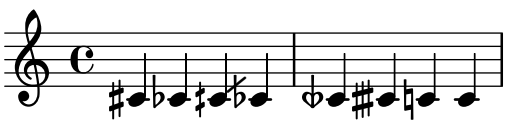
For example, this is how the Arabic *rast* scale can be notated:

```
\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 7, Section 2.10.1 [Common notation for non-Western music], page 434.

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:
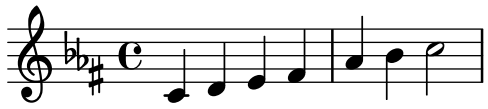
`\set Staff.keySignature = #`(((octave . step) . alter) ((octave . step) . alter) ...)` where, for each element in the list, `octave` specifies the octave (0 being the octave from middle C to the B above), `step` specifies the note within the octave (0 means C and 6 means B), and `alter` is `,SHARP ,FLAT ,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 . 6) . ,FLAT)
                              ((0 . 5) . ,FLAT)
                              ((0 . 3) . ,SHARP))
  c4 d e fis
  aes4 bes c2
}
```



See also

Music Glossary: Section "maqam" in *Music Glossary*, Section "bayati" in *Music Glossary*, Section "rast" in *Music Glossary*, Section "sikah" in *Music Glossary*, Section "iraq" in *Music Glossary*, Section "kurd" in *Music Glossary*.

Notation Reference: [Key signature], page 20.

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. The alternative is to switch off automatic beaming and beam the notes manually. Even if a match to existing typeset music is not required, it may still be desirable to adjust the automatic beaming behaviour and/or use compound time signatures.

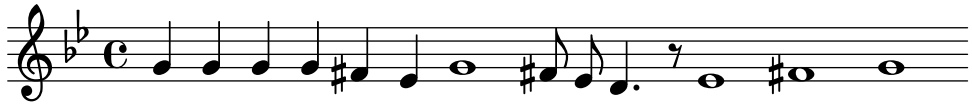
Selected Snippets

Arabic improvisation

For improvisations or taqasim which are temporarily free, the time signature can be omitted and `\cadenzaOn` can be used. Adjusting the accidental style might be required, since the absence of bar lines will cause the accidental to be marked only once. Here is an example of what could be the start of a hijaz improvisation:

```
\include "arabic.ly"

\relative sol' {
  \key re \kurd
  \accidentalStyle forget
  \cadenzaOn
  sol4 sol sol sol fad mib sol1 fad8 mib re4. r8 mib1 fad sol
}
```



See also

Music Glossary: Section “semai” in *Music Glossary*, Section “taqasim” in *Music Glossary*.

Notation Reference: [Manual beams], page 86, [Automatic beams], page 76, [Unmetered music], page 68, [Automatic accidentals], page 25, [Setting automatic beam behavior], page 78, [Time signature], page 59.
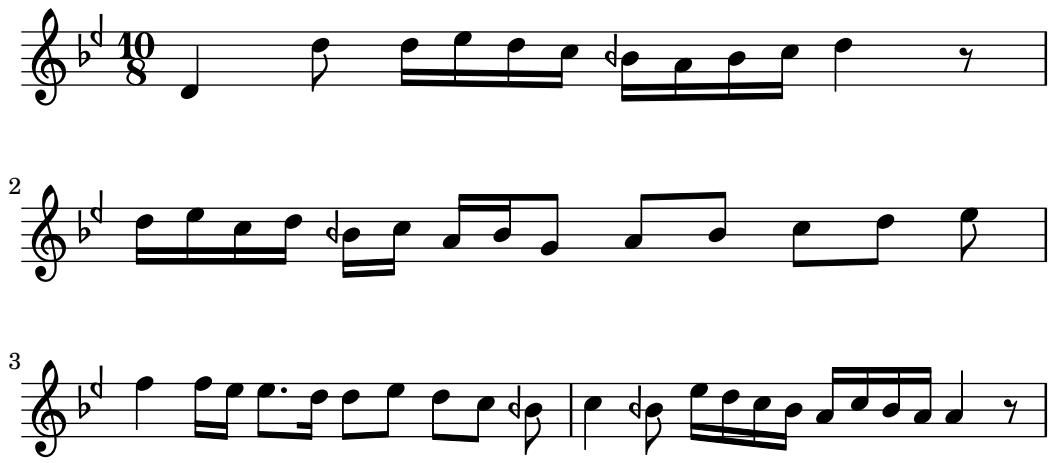
Snippets: Section “World music” in *Snippets*.

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 for Arabic music

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.

   Method books by the following authors for the *Oud*, the Arabic lute, contain examples of mainly Turkish and Arabic compositions.

   - Charbel Rouhana
   - George Farah
   - Ibrahim Ali Darwish Al-masri

2.10.3 Turkish classical music

This section highlights issues that are relevant to notating Turkish classical music.

References for Turkish classical music

Turkish classical music developed in the Ottoman Empire in a period roughly contemporaneous with classical music in Europe, and has continued on into the 20th and 21st centuries as a vibrant and distinct tradition with its own compositional forms, theory and performance styles. Among its striking features is the use of microtonal intervals based on 'commas' of 1/9 of a tone, from which are constructed the melodic forms known as *makam* (plural *makamlar*).

Some issues relevant to Turkish classical music are covered elsewhere:

- Special note names and accidentals are explained in Section 2.10.1 [Common notation for non-Western music], page 434.

Turkish note names

Pitches in Turkish classical music traditionally have unique names, and the basis of pitch on 1/9-tone divisions means makamlar employ a completely different set of intervals from Western scales and modes: *koma* (1/9 of a tone), *eksik bakiye* (3/9), *bakiye* (4/9), *kücük mücenneb* (5/9), *büyük mücenneb* (8/9), *tanîni* (a whole tone) and *artık ikili* (12/9 or 13/9 of a tone).

From a modern notational point of view it is convenient to use the standard Western staff notes (c, d, e, ...) with special accidentals that raise or lower notes by intervals of 1/9, 4/9, 5/9 and 8/9 of a tone. These accidentals are defined in the file '`makam.ly`'.

The following table lists:

- the name of these special accidentals,
- the accidental suffix that must be added to notes,
- and their pitch alteration as a fraction of one whole tone.

Accidental name	suffix	pitch alteration

büyük mücenneb (sharp)	-bm	+8/9
kücük mücenneb (sharp)	-k	+5/9
bakiye (sharp)	-b	+4/9
koma (sharp)	-c	+1/9
koma (flat)	-fc	-1/9
bakiye (flat)	-fb	-4/9
kücük mücenneb (flat)	-fk	-5/9
büyük mücenneb (flat)	-fbm	-8/9

For a more general explanation of non-Western music notation, see Section 2.10.1 [Common notation for non-Western music], page 434.

See also

Music Glossary: Section “makam” in *Music Glossary*, Section “makamlar” in *Music Glossary*.

Notation Reference: Section 2.10.1 [Common notation for non-Western music], page 434.

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:
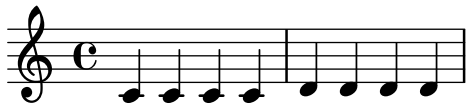
```
\score {
  ...
}
```

> **Note:** There must be **only one** outer music expression in a `\score` block, and it **must** be surrounded by curly brackets.

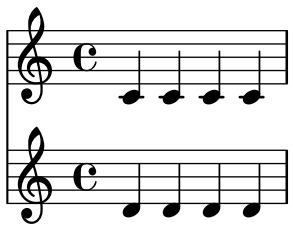
This single music expression may be of any size, and may contain other music expressions to any complexity. All of these examples are music expressions:

```
{ 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 3.1.5 [File structure], page 446.) Both single-line comments and comments delimited by `%{ ... %}` may be placed anywhere within an input file. They may be placed inside or outside a `\score` block, and inside or outside the single music expression within a `\score` block.

Remember that even in a file containing only a `\score` block, it is implicitly enclosed in a \book block. A \book block in a source file produces at least one output file, and by default the name of the output file produced is derived from the name of the input file, so '`fandangoforelephants.ly`' will produce '`fandangoforelephants.pdf`'.

(For more details about `\book` blocks, see Section 3.1.2 [Multiple scores in a book], page 443, Section 3.1.3 [Multiple output files from one input file], page 444 Section 3.1.5 [File structure], page 446.)

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 {
  ...
}
```

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 Multiple output files from one input file

If you want multiple output files from the same '`.ly`' file, then you can add multiple `\book` blocks, where each such \book block will result in a separate output file. If you do not specify any `\book` block in the input file, LilyPond will implicitly treat the whole file as a single \book block, see Section 3.1.5 [File structure], page 446.

When producing multiple files from a single source file, Lilypond ensures that none of the output files from any `\book` block overwrites the output file produced by a preceding `\book` from the same input file.

It does this by adding a suffix to the output name for each `\book` which uses the default output file name derived from the input source file.

The default behaviour is to append a version-number suffix for each name which may clash, so

```
\book {
  \score { ... }
  \paper { ... }
}
\book {
```

```
  \score { ... }
  \paper { ... }
}
\book {
  \score { ... }
  \paper { ... }
}
```

in source file ‘`eightminiatures.ly`’ will produce

- ‘`eightminiatures.pdf`’,
- ‘`eightminiatures-1.pdf`’ and
- ‘`eightminiatures-2.pdf`’.

3.1.4 Output file names

Lilypond provides facilities to allow you to control what file names are used by the various back-ends when producing output files.

In the previous section, we saw how Lilypond prevents name-clashes when producing several ouputs from a single source file. You also have the ability to specify your own suffixes for each `\book` block, so for example you can produce files called ‘`eightminiatures-Romanze.pdf`’, ‘`eightminiatures-Menuetto.pdf`’ and ‘`eightminiatures-Nocturne.pdf`’ by adding a `\bookOutputSuffix` declaration inside each `\book` block.

```
\book {
  \bookOutputSuffix "Romanze"
  \score { ... }
  \paper { ... }
}
\book {
  \bookOutputSuffix "Menuetto"
  \score { ... }
  \paper { ... }
}
\book {
  \bookOutputSuffix "Nocturne"
  \score { ... }
  \paper { ... }
}
```

You can also specify a different output filename for `book` block, by using `\bookOutputName` declarations

```
\book {
  \bookOutputName "Romanze"
  \score { ... }
  \paper { ... }
}
\book {
  \bookOutputName "Menuetto"
  \score { ... }
  \paper { ... }
}
\book {
  \bookOutputName "Nocturne"
  \score { ... }
```

```
  \paper { ... }
}
```

The file above will produce these output files:

- ‘Romanze.pdf’,
- ‘Menuetto.pdf’ and
- ‘Nocturne.pdf’.

3.1.5 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 the definitions are combined, but in conflicting situations the later definitions take precedence. For details of how this affects the \layout block see Section 4.2.1 [The \layout block], page 504.
- A direct scheme expression, such as `#(set-default-paper-size "a7" 'landscape)` or `#(ly:set-option 'point-and-click #f)`.
- A \header block. This sets the global (i.e. the top of file) header block. This is the block containing the default settings of titling fields like composer, title, etc. for all books within the file (see [Titles explained], page 448).
- 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 \scores, one output file will be created for each \book block, in which all corresponding movements are concatenated. The only reason to explicitly specify \book blocks in a ‘.ly’ file is if you wish to create multiple output files from a single input file. One exception is within lilypond-book documents, where you explicitly have to add a \book block if you want more than a single \score or \markup in the same example. This behavior can be changed by setting the variable toplevel-book-handler at 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 \scores and music expressions. In other words, a file containing only the above music expression will be translated into

  ```
  \book {
    \score {
      \new Staff {
        \new Voice {
          { c'4 d' e'2 }
        }
      }
      \layout { }
    }
    \paper { }
  ```

```
  \header { }
}
```

This behavior can be changed by setting the variable `toplevel-music-handler` at 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 `%{ ... %}`.

Whitespace between items in the input stream is generally ignored, and may be freely omitted or extended to enhance readability. However, whitespace should always be used in the following circumstances to avoid errors:

- Around every opening and closing curly bracket.
- After every command or variable, i.e. every item that begins with a `\` sign.
- After every item that is to be interpreted as a Scheme expression, i.e. every item that begins with a `#` sign.
- To separate all elements of a Scheme expression.
- In `lyricmode` before and after `\set` and `\override` commands.

See also

Learning Manual: Section "How LilyPond input files work" in *Learning Manual*.

Notation Reference: [Titles explained], page 448, Section 4.2.1 [The `\layout` block], page 504.

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 headers and footers

Titles explained

Each `\book` block in a single input file produces a separate output file, see Section 3.1.5 [File structure], page 446. Within each output file three types of titling areas are provided: *Book Titles* at the beginning of each book, *Bookpart Titles* at the beginning of each bookpart and *Score Titles* at the beginning of each score.

Values of titling fields such as `title` and `composer` are set in `\header` blocks. (For the syntax of `\header` blocks and a complete list of the fields available by default see [Default layout of bookpart and score titles], page 451). Book Titles, Bookpart Titles and Score Titles can all contain the same fields, although by default the fields in Score Titles are limited to `piece` and `opus`.

`\header` blocks may be placed in four different places to form a descending hierarchy of `\header` blocks:

- At the top of the input file, before all `\book`, `\bookpart`, and `\score` blocks.
- Within a `\book` block but outside all the `\bookpart` and `\score` blocks within that book.
- Within a `\bookpart` block but outside all `\score` blocks within that bookpart.
- After the music expression in a `\score` block.

The values of the fields filter down this hierarchy, with the values set higher in the hierarchy persisting unless they are over-ridden by a value set lower in the hierarchy, so:

- A Book Title is derived from fields set at the top of the input file, modified by fields set in the `\book` block. The resulting fields are used to print the Book Title for that book, providing that there is other material which generates a page at the start of the book, before the first bookpart. A single `\pageBreak` will suffice.
- A Bookpart Title is derived from fields set at the top of the input file, modified by fields set in the `\book` block, and further modified by fields set in the `\bookpart` block. The resulting values are used to print the Bookpart Title for that bookpart.
- A Score Title is derived from fields set at the top of the input file, modified by fields set in the `\book` block, further modified by fields set in the `\bookpart` block and finally modified by fields set in the `\score` block. The resulting values are used to print the Score Title for that score. Note, though, that only `piece` and `opus` fields are printed by default in Score Titles unless the `\paper` variable, `print-all-headers`, is set to `#t`.

Note: Remember when placing a `\header` block inside a `\score` block, that the music expression must come before the `\header` block.

It is not necessary to provide `\header` blocks in all four places: any or even all of them may be omitted. Similarly, simple input files may omit the `\book` and `\bookpart` blocks, leaving them to be created implicitly.

If the book has only a single score, the `\header` block should normally be placed at the top of the file so that just a Bookpart Title is produced, making all the titling fields available for use.

If the book has multiple scores a number of different arrangements of `\header` blocks are possible, corresponding to the various types of musical publications. For example, if the publication contains several pieces by the same composer a `\header` block placed at the top of the file

specifying the book title and the composer with `\header` blocks in each `\score` block specifying the `piece` and/or `opus` would be most suitable, as here:

```
\header {
  title = "SUITE I."
  composer = "J. S. Bach."
}
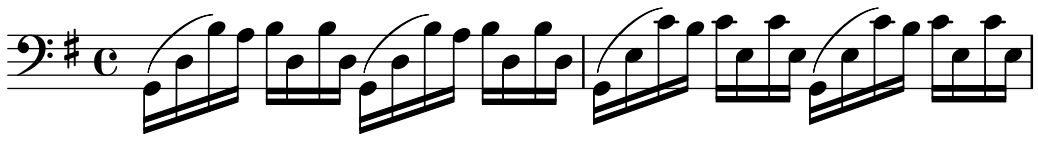
\score {
  \new Staff \relative g, {
    \clef bass
    \key g \major
    \repeat unfold 2 { g16( d' b') a b d, b' d, } |
    \repeat unfold 2 { g,16( e' c') b c e, c' e, } |
  }
  \header {
    piece = "Prélude."
  }
}

\score {
  \new Staff \relative b {
    \clef bass
    \key g \major
    \partial 16 b16 |
    <g, d' b'~>4 b'16 a( g fis) g( d e fis) g( a b c) |
    d16( b g fis) g( e d c) b(c d e) fis( g a b) |
  }
  \header {
    piece = "Allemande."
  }
}
```
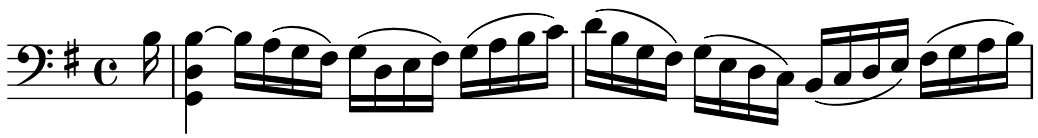
SUITE I.

J. S. Bach.

Prélude.



Allemande.



More complicated arrangements are possible. For example, text fields from the `\header` block in a book can be displayed in all Score Titles, with some fields over-ridden and some manually suppressed:

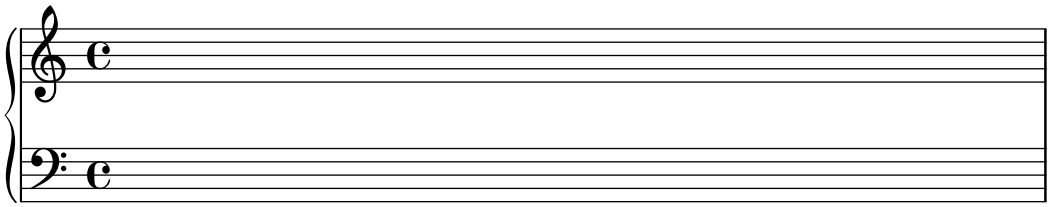
```
\book {
  \paper {
    print-all-headers = ##t
  }
  \header {
    title = "DAS WOHLTEMPERIRTE CLAVIER"
    subtitle = "TEIL I"
    % Do not display the tagline for this book
    tagline = ##f
  }
  \markup { \vspace #1 }
  \score {
    \new PianoStaff <<
      \new Staff { s1 }
      \new Staff { \clef "bass" s1 }
    >>
    \header {
      title = "PRAELUDIUM I"
      opus = "BWV 846"
      % Do not display the subtitle for this score
      subtitle = ##f
    }
  }
  \score {
    \new PianoStaff <<
      \new Staff { s1 }
      \new Staff { \clef "bass" s1 }
    >>
    \header {
      title = "FUGA I"
      subsubtitle = "A 4 VOCI"
      opus = "BWV 846"
      % Do not display the subtitle for this score
      subtitle = ##f
    }
  }
}
```

DAS WOHLTEMPERIRTE CLAVIER

TEIL I

PRAELUDIUM I

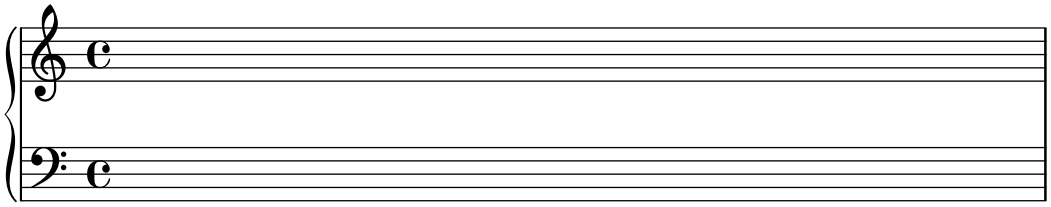
BWV 846



FUGA I

A 4 VOCI

BWV 846



See also

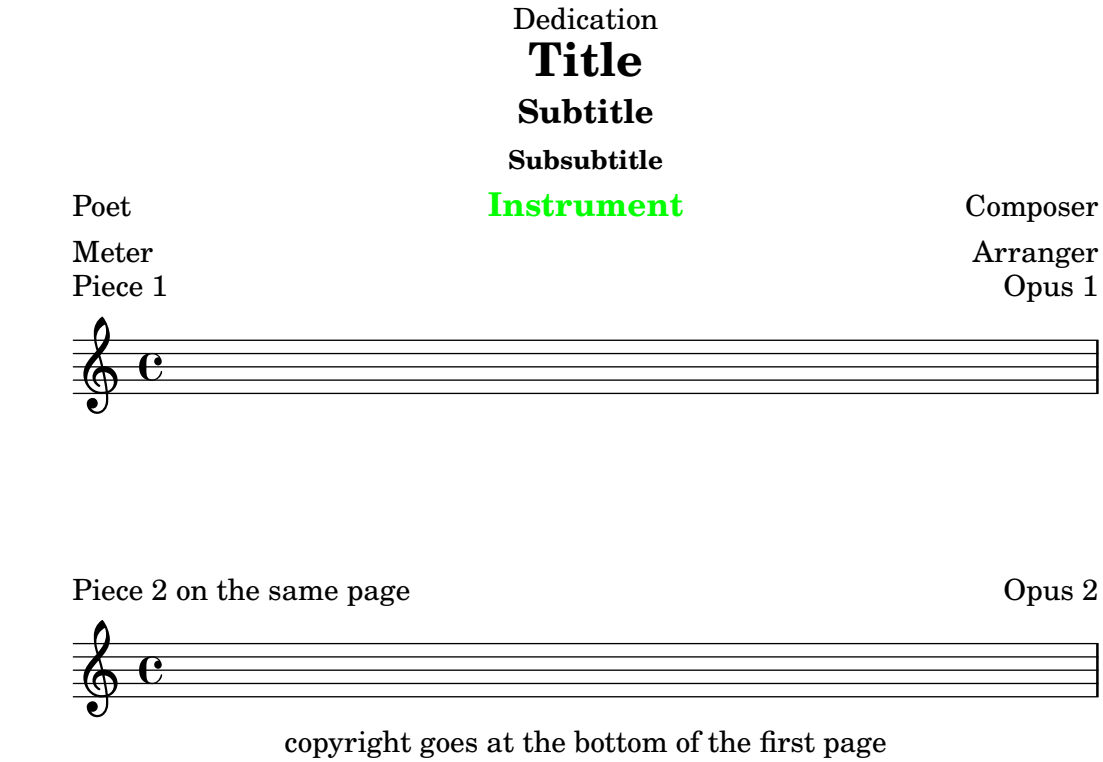
Notation Reference: Section 3.1.5 [File structure], page 446, [Default layout of bookpart and score titles], page 451, [Custom layout for titles], page 456.

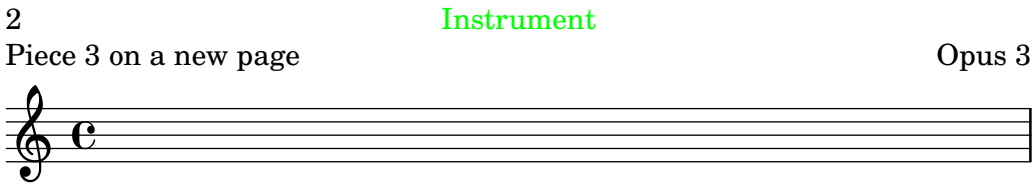
Default layout of bookpart and score titles

This example demonstrates all `\header` variables:

```
\book {
  \header {
      % The following fields are centered
    dedication = "Dedication"
    title = "Title"
    subtitle = "Subtitle"
    subsubtitle = "Subsubtitle"
      % The following fields are evenly spread on one line
      % the field "instrument" also appears on following pages
    instrument = \markup \with-color #green "Instrument"
    poet = "Poet"
    composer = "Composer"
      % The following fields are placed at opposite ends of the same line
    meter = "Meter"
    arranger = "Arranger"
      % The following fields are centered at the bottom
    tagline = "tagline goes at the bottom of the last page"
    copyright = "copyright goes at the bottom of the first page"
  }
  \score {
```

```
    { s1 }
    \header {
        % The following fields are placed at opposite ends of the same line
      piece = "Piece 1"
      opus = "Opus 1"
    }
  }
  \score {
    { s1 }
    \header {
        % The following fields are placed at opposite ends of the same line
      piece = "Piece 2 on the same page"
      opus = "Opus 2"
    }
  }
  \pageBreak
  \score {
    { s1 }
    \header {
        % The following fields are placed at opposite ends of the same line
      piece = "Piece 3 on a new page"
      opus = "Opus 3"
    }
  }
}
```





tagline goes at the bottom of the last page

Note that

- The instrument name will be repeated on every page.
- Only `piece` and `opus` are printed in a `\score` when the paper variable `print-all-headers` is set to `##f` (the default).
- Text fields left unset in a `\header` block are replaced with `\null` markups so that the space is not wasted.
- The default settings for `scoreTitleMarkup` place the `piece` and `opus` text fields at opposite ends of the same line.

To change the default layout see [Custom layout for titles], page 456.

If a `\book` block starts immediately with a `\bookpart` block, no Book Title will be printed, as there is no page on which to print it. If a Book Title is required, begin the `\book` block with some markup material or a `\pageBreak` command.

Use the `breakbefore` variable inside a `\header` block that is itself in a `\score` block, to make the higher-level `\header` block titles appear on the first page on their own, with the music (defined in the `\score` block) starting on the next.
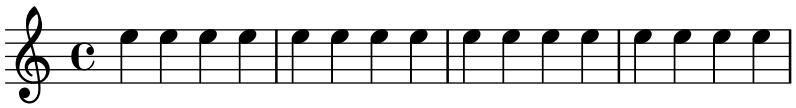
```
\book {
  \header {
    title = "This is my Title"
    subtitle = "This is my Subtitle"
    copyright = "This is the bottom of the first page"
  }
  \score {
    \repeat unfold 4 { e'' e'' e'' e'' }
    \header {
      piece = "This is the Music"
      breakbefore = ##t
    }
  }
}
```

This is my Title

This is my Subtitle

This is the bottom of the first page

2
This is the Music



Music engraving by LilyPond 2.18.2—www.lilypond.org

See also

Learning Manual: Section "How LilyPond input files work" in *Learning Manual*,

Notation Reference: [Custom layout for titles], page 456, Section 3.1.5 [File structure], page 446.

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

Default layout of headers and footers

Headers and *footers* are lines of text appearing at the top and bottom of pages, separate from the main text of a book. They are controlled by the following `\paper` variables:
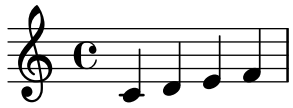
- `oddHeaderMarkup`
- `evenHeaderMarkup`
- `oddFooterMarkup`
- `evenFooterMarkup`

These markup variables can only access text fields from top-level `\header` blocks (which apply to all scores in the book) and are defined in '`ly/titling-init.ly`'. By default:

- page numbers are automatically placed on the top far left (if even) or top far right (if odd), starting from the second page.
- the `instrument` text field is placed in the center of every page, starting from the second page.
- the `copyright` text is centered on the bottom of the first page.
- the `tagline` is centered on the bottom of the last page, and below the `copyright` text if there is only a single page.

The default tagline can be changed by adding a `tagline` in the top-level `\header` block.

```
\book {
  \header {
    tagline = "... music notation for Everyone"
  }
  \score {
    \relative c' {
      c4 d e f
    }
  }
}
```



... music notation for Everyone

To remove the `tagline` set the value to `##f`.

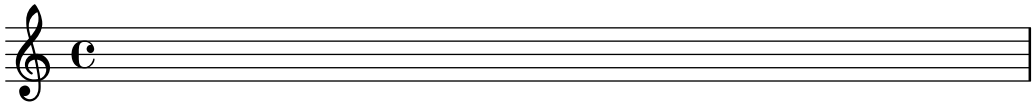
3.2.2 Custom titles headers and footers

Custom text formatting for titles

Standard `\markup` commands can be used to customize any header, footer and title text within the `\header` block.

```
\score {
  { s1 }
  \header {
    piece = \markup { \fontsize #4 \bold "PRAELUDIUM I" }
    opus = \markup { \italic "BWV 846" }
  }
}
```

PRAELUDIUM I *BWV 846*



See also

Notation Reference: Section 1.8.2 [Formatting text], page 223.

Custom layout for titles

`\markup` commands in the `\header` block are useful for simple text formatting, but they do not allow precise control over the placement of titles. To customize the placement of the text fields, change either or both of the following `\paper` variables:

- `bookTitleMarkup`
- `scoreTitleMarkup`

The placement of titles when using the default values of these `\markup` variables is shown in the examples in [Default layout of bookpart and score titles], page 451.

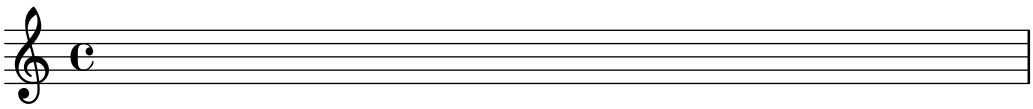
The default settings for `scoreTitleMarkup` as defined in '`ly/titling-init.ly`' are:

```
scoreTitleMarkup = \markup { \column {
  \on-the-fly \print-all-headers { \bookTitleMarkup \hspace #1 }
  \fill-line {
    \fromproperty #'header:piece
    \fromproperty #'header:opus
  }
}
}
```

This places the `piece` and `opus` text fields at opposite ends of the same line:

```
\score {
  { s1 }
  \header {
    piece = "PRAELUDIUM I"
    opus = "BWV 846"
  }
}
```

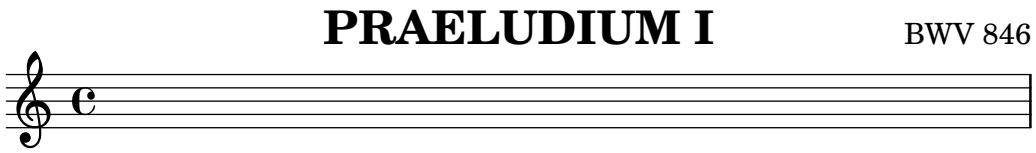
PRAELUDIUM I BWV 846



This example redefines `scoreTitleMarkup` so that the `piece` text field is centered and in a large, bold font.

```
\book {
  \paper {
    indent = 0\mm
    scoreTitleMarkup = \markup {
      \fill-line {
        \null
        \fontsize #4 \bold \fromproperty #'header:piece
        \fromproperty #'header:opus
      }
    }
  }
  \header { tagline = ##f }
```

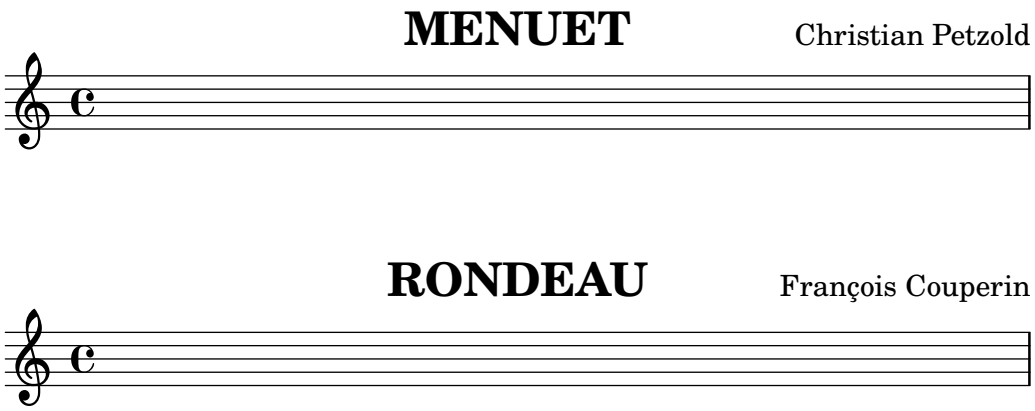
```
  \score {
    { s1 }
    \header {
      piece = "PRAELUDIUM I"
      opus = "BWV 846"
    }
  }
}
```



Text fields not normally effective in score `\header` blocks can be printed in the Score Title area if `print-all-headers` is placed inside the `\paper` block. A disadvantage of using this method is that text fields that are intended specifically for the Bookpart Title area need to be manually suppressed in every `\score` block. See [Titles explained], page 448.
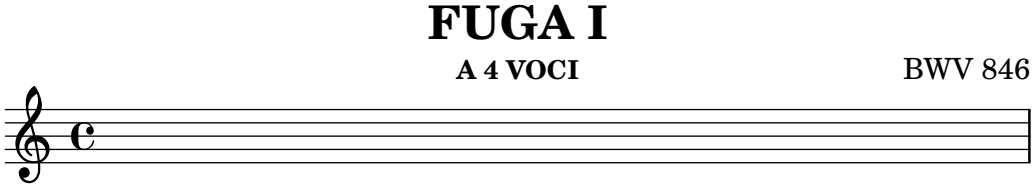
To avoid this, add the desired text field to the `scoreTitleMarkup` definition. In the following example, the `composer` text field (normally associated with `bookTitleMarkup`) is added to `scoreTitleMarkup`, allowing each score to list a different composer:

```
\book {
  \paper {
    indent = 0\mm
    scoreTitleMarkup = \markup {
      \fill-line {
        \null
        \fontsize #4 \bold \fromproperty #'header:piece
        \fromproperty #'header:composer
      }
    }
  }
  \header { tagline = ##f }
  \score {
    { s1 }
    \header {
      piece = "MENUET"
      composer = "Christian Petzold"
    }
  }
  \score {
    { s1 }
    \header {
      piece = "RONDEAU"
      composer = "François Couperin"
    }
  }
}
```



It is also possible to create your own custom text fields, and refer to them in the markup definition.

```
\book {
  \paper {
    indent = 0\mm
    scoreTitleMarkup = \markup {
      \fill-line {
        \null
        \override #`(direction . ,UP) {
          \dir-column {
            \center-align \fontsize #-1 \bold
              \fromproperty #'header:mycustomtext %% User-defined field
            \center-align \fontsize #4 \bold
              \fromproperty #'header:piece
          }
        }
        \fromproperty #'header:opus
      }
    }
  }
  \header { tagline = ##f }
  \score {
    { s1 }
    \header {
      piece = "FUGA I"
      mycustomtext = "A 4 VOCI" %% User-defined field
      opus = "BWV 846"
    }
  }
}
```



See also

Notation Reference: [Titles explained], page 448.

Custom layout for headers and footers

`\markup` commands in the `\header` block are useful for simple text formatting, but they do not allow precise control over the placement of headers and footers. To customize the placement of the text fields, use either or both of the following `\paper` variables:

- `oddHeaderMarkup`
- `evenHeaderMarkup`
- `oddFooterMarkup`
- `evenFooterMarkup`

The `\markup` command `\on-the-fly` can be used to add markup conditionally to header and footer text defined within the `\paper` block, using the following syntax:

```
variable = \markup {
  ...
  \on-the-fly  \procedure  markup
  ...
}
```

The *procedure* is called each time the `\markup` command in which it appears is evaluated. The *procedure* should test for a particular condition and interpret (i.e. print) the *markup* argument if and only if the condition is true.

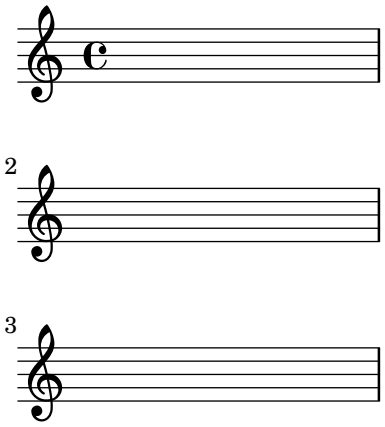
A number of ready-made procedures for testing various conditions are provided:

Procedure name	**Condition tested**
print-page-number-check-first	should this page number be printed?
create-page-number-stencil	print-page-numbers true?
print-all-headers	print-all-headers true?
first-page	first page in the book?
(on-page nmbr)	page number = nmbr?
last-page	last page in the book?
not-first-page	not first page in the book?
part-first-page	first page in the book part?
part-last-page	last page in the book part?
not-single-page	pages in book part > 1?

The following example centers page numbers at the bottom of every page. First, the default settings for `oddHeaderMarkup` and `evenHeaderMarkup` are removed by defining each as a *null* markup. Then, `oddFooterMarkup` is redefined with the page number centered. Finally, `evenFooterMarkup` is given the same layout by defining it as `\oddFooterMarkup`:

```
\book {
  \paper {
    print-page-number = ##t
    print-first-page-number = ##t
    oddHeaderMarkup = \markup \null
    evenHeaderMarkup = \markup \null
    oddFooterMarkup = \markup {
      \fill-line {
        \on-the-fly \print-page-number-check-first
        \fromproperty #'page:page-number-string
      }
```

```
    }
    evenFooterMarkup = \oddFooterMarkup
  }
  \score {
    \new Staff { s1 \break s1 \break s1 }
  }
}
```



1

Several `\on-the-fly` conditions can be combined with an 'and' operation, for example,

```
\on-the-fly \first-page
\on-the-fly \last-page
{ \markup ... \fromproperty #'header: ... }
```

determines if the output is a single page.

See also

Notation Reference: [Titles explained], page 448, [Default layout of bookpart and score titles], page 451.

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

3.2.3 Creating footnotes

Footnotes may be used in many different situations. In all cases, a 'footnote mark' is placed as a reference in text or music, and the corresponding 'footnote text' appears at the bottom of the same page.

Footnotes within music expressions and footnotes in stand-alone text outside music expressions are created in different ways.

Footnotes in music expressions

Music footnotes overview

Footnotes in music expressions fall into two categories:

Event-based footnotes
: are attached to a particular event. Examples for such events are single notes, articulations (like fingering indications, accents, dynamics), and post-events (like slurs and manual beams). The general form for event-based footnotes is as follows:

```
[direction] \footnote [mark] offset footnote music
```

Time-based footnotes
: are bound to a particular point of time in a musical context. Some commands like `\time` and `\clef` don't actually use events for creating objects like time signatures and clefs. Neither does a chord create an event of its own: its stem or flag is created at the end of a time step (nominally through one of the note events inside). Exactly which of a chord's multiple note events will be deemed the root cause of a stem or flag is undefined. So for annotating those, time-based footnotes are preferable as well.

  A time-based footnote allows such layout objects to be annotated without referring to an event. The general form for Time-based footnotes is:

```
\footnote [mark] offset footnote [Context].GrobName
```

The elements for both forms are:

direction If (and only if) the `\footnote` is being applied to a post-event or articulation, it must be preceded with a direction indicator (`-`, `_`, `^`) in order to attach *music* (with a footnote mark) to the preceding note or rest.

mark is a markup or string specifying the footnote mark which is used for marking both the reference point and the footnote itself at the bottom of the page. It may be omitted (or equivalently replaced with `\default`) in which case a number in sequence will be generated automatically. Such numerical sequences restart on each page containing a footnote.

offset is a number pair such as '`#(2 . 1)`' specifying the X and Y offsets in units of staff-spaces from the boundary of the object where the mark should be placed. Positive values of the offsets are taken from the right/top edge, negative values from the left/bottom edge and zero implies the mark is centered on the edge.

Context is the context in which the grob being footnoted is created. It may be omitted if the grob is in a bottom context, e.g. a `Voice` context.

GrobName
: specifies a type of grob to mark (like '`Flag`'). If it is specified, the footnote is not attached to a music expression in particular, but rather to all grobs of the type specified which occur at that moment of musical time.

footnote is the markup or string specifying the footnote text to use at the bottom of the page.

music is the music event or post-event or articulation that is being annotated.
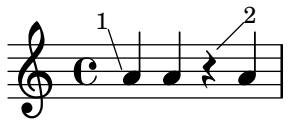
Event-based footnotes

A footnote may be attached to a layout object directly caused by the event corresponding to *music* with the syntax:

```
\footnote [mark] offset footnote music
```

```
\book {
  \header { tagline = ##f }
  \relative c'' {
    \footnote #'(-1 . 3) "A note" a4
    a4
    \footnote #'(2 . 2) "A rest" r4
    a4
  }
```

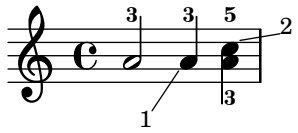
```
}
```



[1]A note
[2]A rest

Marking a *whole* chord with an event-based footnote is not possible: a chord, even one containing just a single note, does not produce an actual event of its own. However, individual notes *inside* of the chord can be marked:

```
\book {
  \header { tagline = ##f }
  \relative c'' {
    \footnote #'(2 . 3) "Does not work" <a-3>2
    <\footnote #'(-2 . -3) "Does work" a-3>4
    <a-3 \footnote #'(3 . 1/2) "Also works" c-5>4
  }
}
```



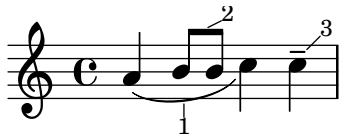
[1]Does work
[2]Also works

If the footnote is to be attached to a post-event or articulation the `\footnote` command *must* be preceded by a direction indicator, `-, _, ^`, and followed by the post-event or articulation to be annotated as the *music* argument. In this form the `\footnote` can be considered to be simply a copy of its last argument with a footnote mark attached to it. The syntax is:

direction \footnote [*mark*] *offset footnote music*

```
\book {
  \header { tagline = ##f }
  \relative c'' {
    a4_\footnote #'(0 . -1) "A slur forced down" (
    b8^\footnote #'(1 . 0.5) "A manual beam forced up" [
    b8 ]
    c4 )
    c-\footnote #'(1 . 1) "Tenuto" --
  }
```

```
}
```

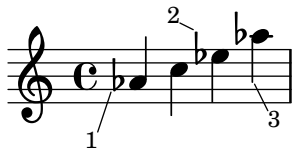


[1]A slur forced down
[2]A manual beam forced up
[3]Tenuto

Time-based footnotes

If the layout object being footmarked is *indirectly* caused by an event (like an `Accidental` or `Stem` caused by a `NoteHead` event), the *GrobName* of the layout object is required after the footnote text instead of *music*:

```
\book {
  \header { tagline = ##f }
  \relative c'' {
    \footnote #'(-1 . -3) "A flat" Accidental
    aes4 c
    \footnote #'(-1 . 0.5) "Another flat" Accidental
    ees
    \footnote #'(1 . -2) "A stem" Stem
    aes
  }
}
```

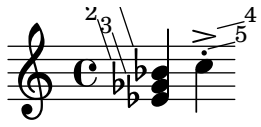


[1]A flat
[2]Another flat
[3]A stem

Note, however, that when a GrobName is specified, a footnote will be attached to all grobs of that type at the current time step:

```
\book {
  \header { tagline = ##f }
  \relative c' {
    \footnote #'(-1 . 3) "A flat" Accidental
    <ees ges bes>4
    \footnote #'(2 . 0.5) "Articulation" Script
    c'->-.
```
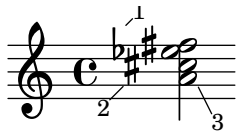
```
  }
}
```



[1]A flat
[2]A flat
[3]A flat
[4]Articulation
[5]Articulation

A note inside of a chord can be given an individual (event-based) footnote. A '`NoteHead`' is the only grob directly caused from a chord note, so an event-based footnote command is *only* suitable for adding a footnote to the '`NoteHead`' within a chord. All other chord note grobs are indirectly caused. The `\footnote` command itself offers no syntax for specifying *both* a particular grob type *as well as* a particular event to attach to. However, one can use a time-based `\footnote` command for specifying the grob type, and then prefix this command with `\single` in order to have it applied to just the following event:

```
\book {
  \header { tagline = ##f }
  \relative c'' {
    < \footnote #'(1 . -2) "An A" a
      \single \footnote #'(-1 . -1) "A sharp" Accidental
      cis
      \single \footnote #'(0.5 . 0.5) "A flat" Accidental
      ees fis
    >2
  }
}
```



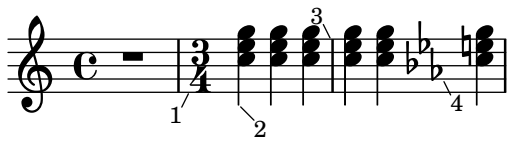
[1]A flat
[2]A sharp
[3]An A

Note: When footnotes are attached to several musical elements at the same musical moment, as they are in the example above, the footnotes are numbered from the higher to the lower elements as they appear in the printed output, not in the order in which they are written in the input stream.

Layout objects like clefs and key-change signatures are mostly caused as a consequence of changed properties rather than actual events. Others, like bar lines and bar numbers, are a direct consequence of timing. For this reason, footnotes on such objects have to be based on their musical timing. Time-based footnotes are also preferable when marking features like stems and beams on *chords*: while such per-chord features are nominally assigned to *one* event inside the chord, relying on a particular choice would be imprudent.

The layout object in question must always be explicitly specified for time-based footnotes, and the appropriate context must be specified if the grob is created in a context other than the bottom context.

```
\book {
  \header { tagline = ##f }
  \relative c'' {
    r1 |
    \footnote #'(-0.5 . -1) "Meter change" Staff.TimeSignature
    \time 3/4
    \footnote #'(1 . -1) "Chord stem" Stem
    <c e g>4 q q
    \footnote #'(-0.5 . 1) "Bar line" Staff.BarLine
    q q
    \footnote #'(0.5 . -1) "Key change" Staff.KeySignature
    \key c \minor
    q
  }
}
```

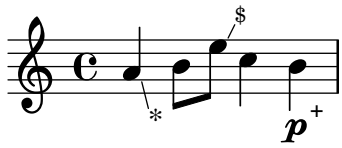


[1]Meter change
[2]Chord stem
[3]Bar line
[4]Key change

Custom marks can be used as alternatives to numerical marks, and the annotation line joining the marked object to the mark can be suppressed:

```
\book {
  \header { tagline = ##f }
  \relative c' {
    \footnote "*" #'(0.5 . -2) \markup { \italic "* The first note" } a'4
    b8
    \footnote \markup { \super "$" } #'(0.5 . 1)
      \markup { \super "$" \italic " The second note" } e
    c4
    \once \override Score.FootnoteItem.annotation-line = ##f
    b-\footnote \markup \tiny "+" #'(0.1 . 0.1)
      \markup { \super "+" \italic " Editorial" } \p
  }
```

```
}
```



* *The first note*
$ *The second note*
+ *Editorial*

More examples of custom marks are shown in [Footnotes in stand-alone text], page 466.

Footnotes in stand-alone text

These are for use in markup outside of music expressions. They do not have a line drawn to their point of reference: their marks simply follow the referenced markup. Marks can be inserted automatically, in which case they are numerical. Alternatively, custom marks can be provided manually.

Footnotes to stand-alone text with automatic and custom marks are created in different ways.

Footnotes in stand-alone text with automatic marks

The syntax of a footnote in stand-alone text with automatic marks is

```
\markup { ... \auto-footnote text footnote ... }
```

The elements are:
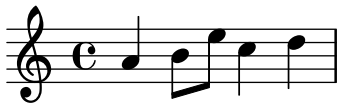
text is the markup or string to be marked.

footnote is the markup or string specifying the footnote text to use at the bottom of the page.

For example:

```
\book {
  \header { tagline = ##f }
  \markup {
    "A simple"
    \auto-footnote "tune" \italic " By me"
    "is shown below.  It is a"
    \auto-footnote "recent" \italic " Aug 2012"
    "composition."
  }
  \relative c' {
    a'4 b8 e c4 d
  }
}
```

A simple tune[1] is shown below. It is a recent[2] composition.



[1] *By me*
[2] *Aug 2012*

Footnotes in stand-alone text with custom marks

The syntax of a footnote in stand-alone text with custom marks is

```
\markup { ... \footnote mark footnote ... }
```

The elements are:
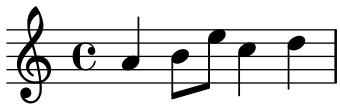
mark is a markup or string specifying the footnote mark which is used for marking the reference point. Note that this mark is *not* inserted automatically before the footnote itself.

footnote is the markup or string specifying the footnote text to use at the bottom of the page, preceded by the *mark*.

Any easy-to-type character such as * or + may be used as a mark, as shown in [Footnotes in music expressions], page 460. Alteratively, ASCII aliases may be used (see [ASCII aliases], page 480):

```
\book {
  \paper { #(include-special-characters) }
  \header { tagline = ##f }
  \markup {
    "A simple tune"
    \footnote "*" \italic "* By me"
    "is shown below.  It is a recent"
    \footnote \super &dagger; \concat {
      \super &dagger; \italic " Aug 2012"
    }
    "composition."
  }
  \relative c' {
    a'4 b8 e c4 d
  }
}
```

A simple tune * is shown below. It is a recent † composition.
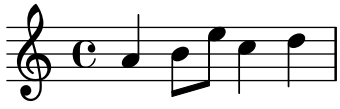


* *By me*
† *Aug 2012*

Unicode character codes may also be used to specify marks (see [Unicode], page 479):

```
\book {
  \header { tagline = ##f }
  \markup {
    "A simple tune"
    \footnote \super \char##x00a7 \concat {
      \super \char##x00a7 \italic " By me"
    }
    "is shown below.  It is a recent"
    \footnote \super \char##x00b6 \concat {
      \super \char##x00b6 \italic " Aug 2012"
    }
    "composition."
  }
  \relative c' {
    a'4 b8 e c4 d
  }
}
```

A simple tune § is shown below. It is a recent ¶ composition.



§ *By me*
¶ *Aug 2012*

See also

Learning Manual: Section “Objects and interfaces” in *Learning Manual*.

Notation Reference: [ASCII aliases], page 480, [Balloon help], page 211, Section A.12 [List of special characters], page 697, [Text marks], page 219, [Text scripts], page 216, [Unicode], page 479.

Internals Reference: Section "FootnoteEvent" in *Internals Reference*, Section "FootnoteItem" in *Internals Reference*, Section "FootnoteSpanner" in *Internals Reference*, Section "Footnote_engraver" in *Internals Reference*.

Known issues and warnings

Multiple footnotes for the same page can only be stacked, one above the other; they cannot be printed on the same line.

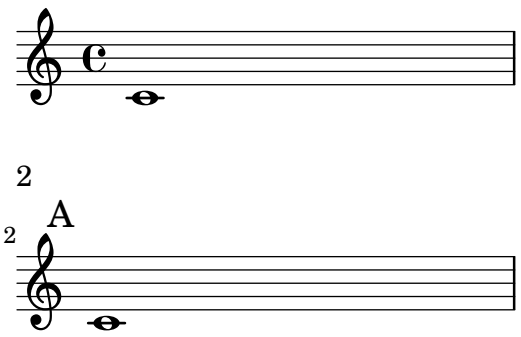
Footnotes cannot be attached to `MultiMeasureRests` or automatic beams or lyrics.

Footnote marks may collide with staves, `\markup` objects, other footnote marks and annotation lines.

3.2.4 Reference to page numbers

A particular place of a score can be marked using the `\label` command, either at top-level or inside music. This label can then be referred to in a markup, to get the number of the page where the marked point is placed, using the `\page-ref` markup command.

```
\header { tagline = ##f }
\book {
  \label #'firstScore
  \score {
    {
      c'1
      \pageBreak \mark A \label #'markA
      c'1
    }
  }
  \markup { The first score begins on page \page-ref #'firstScore "0" "?" }
  \markup { Mark A is on page \page-ref #'markA "0" "?" }
}
```



The first score begins on page 1
Mark A is on page 2

The `\page-ref` markup command takes three arguments:

1. the label, a scheme symbol, 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`.

3.2.5 Table of contents

A table of contents is included using the `\markuplist \table-of-contents` command. The elements which should appear in the table of contents are entered with the `\tocItem` command, which may be used either at top-level, or inside a music expression.

```
\markuplist \table-of-contents
\pageBreak

\tocItem \markup "First score"
\score {
  {
    c'4  % ...
    \tocItem \markup "Some particular point in the first score"
    d'4  % ...
  }
}

\tocItem \markup "Second score"
\score {
  {
    e'4 % ...
  }
}
```

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

Dots can be added to fill the line between an item and its page number:

```
\header { tagline = ##f }
\paper {
  tocItemMarkup = \tocItemWithDotsMarkup
}

\book {
  \markuplist \table-of-contents
  \tocItem \markup { Allegro }
  \tocItem \markup { Largo }
  \markup \null
}
```

Table of Contents

Allegro 1
Largo 1

See also

Installed 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 473.

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 globally 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).

When `relative-includes` is set to `#t`, 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 relative to the main directory and files relative to some other directory may both be `\included` by setting `relative-includes` to `#t` or `#f` at appropriate places in the files. For example, if a general library, libA, has been created which itself uses sub-files which are `\included` by the entry file of that library, those `\include` statements will need to be preceded by `#(ly:set-option #relative-includes #t)` so they are interpreted correctly when brought into the main `.ly` file, like this:

```
libA/
  libA.ly
  A1.ly
  A2.ly
  ...
```

then the entry file, `libA.ly`, will contain

```
#(ly:set-option 'relative-includes #t)
\include "A1.ly"
\include "A2.ly"
...
% return to default setting
#(ly:set-option 'relative-includes #f)
```

Any '`.ly`' file can then include the entire library simply with

```
\include "~/libA/libA.ly"
```

More complex file structures may be devised by switching at appropriate places.

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
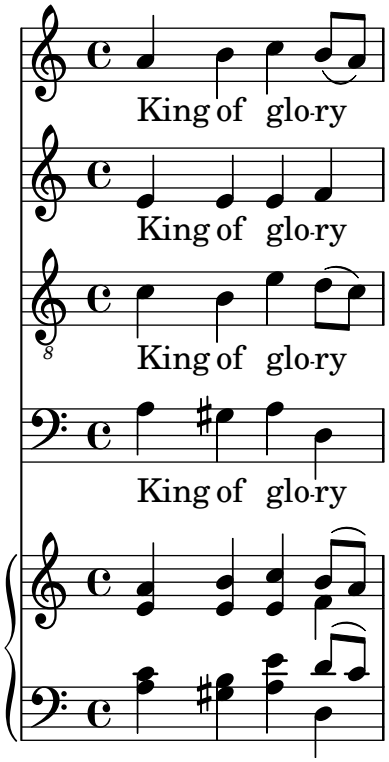
Several methods can be used to generate different versions of a score from the same music source. Variables are perhaps the most useful for combining lengthy sections of music and/or annotation. Tags are more useful for selecting one section from several alternative shorter sections of music, and can also be used for splicing pieces of music together at different points.

Whichever method is used, separating the notation from the structure of the score will make it easier to change the structure while leaving the notation untouched.

Using variables

If sections of the music are defined in variables they can be reused in different parts of the score, see Section "Organizing pieces with variables" in *Learning Manual*. For example, an *a cappella* vocal score frequently includes a piano reduction of the parts for rehearsal purposes which is identical to the vocal music, so the music need be entered only once. Music from two variables may be combined on one staff, see [Automatic part combining], page 167. 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 472.

Using tags

The `\tag #'partA` command marks a music expression with the name *partA*. Expressions tagged in this way can be selected or filtered out by name later, using either `\keepWithTag #'name` or `\removeWithTag #'name`. The result of applying these filters to tagged music is as follows:

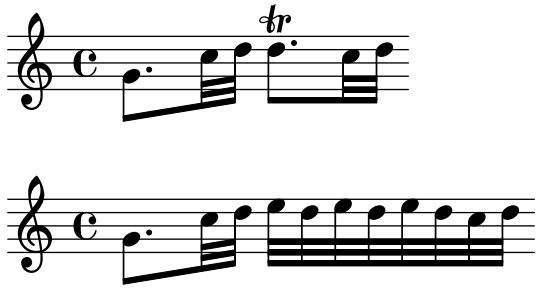
Filter	Result
Tagged music preceded by `\keepWithTag #'name` or `\keepWithTag #'(name1 name2...)`	Untagged music and music tagged with any of the given tag names is included; music tagged with any other tag name is excluded.
Tagged music preceded by `\removeWithTag #'name` or `\removeWithTag #'(name1 name2...)`	Untagged music and music not tagged with any of the given tag names is included; music tagged with any of the given tag names is excluded.
Tagged music not preceded by either `\keepWithTag` or `\removeWithTag`	All tagged and untagged music is included.

The arguments of the `\tag`, `\keepWithTag` and `\removeWithTag` commands should be a symbol (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
 }
```

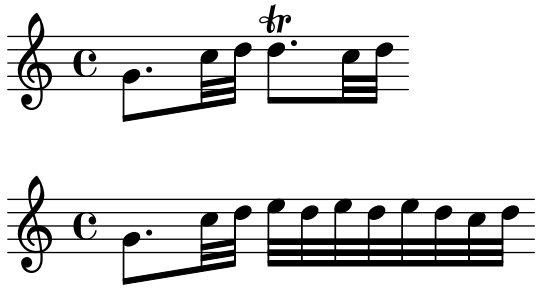
```
\score {
  \keepWithTag #'trills \music
}
\score {
  \keepWithTag #'expand \music
}
```



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

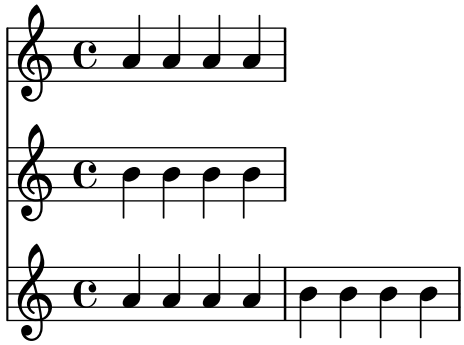
`-\tag #'`*your-tag*

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!"
```
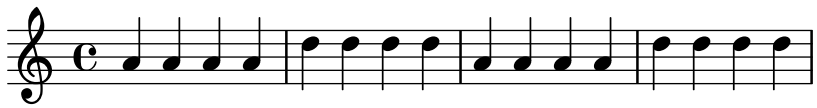
Multiple tags may be placed on expressions with multiple `\tag` entries, or by combining multiple tags into one symbol list:

```
music = \relative c'' {
  \tag #'a \tag #'both { a4 a a a }
  \tag #'(b both) { b4 b b b }
}
<<
\keepWithTag #'a \music
\keepWithTag #'b \music
\keepWithTag #'both \music
>>
```



Multiple `\removeWithTag` filters may be applied to a single music expression to remove several differently named tagged sections. Alternatively, you can use a single `\removeWithTag` with a list of tags.

```
music = \relative c'' {
  \tag #'A { a4 a a a }
  \tag #'B { b4 b b b }
  \tag #'C { c4 c c c }
  \tag #'D { d4 d d d }
}
\new Voice {
  \removeWithTag #'B
  \removeWithTag #'C
  \music
  \removeWithTag #'(B C)
  \music
}
```
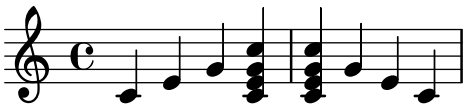


Two or more `\keepWithTag` filters applied to a single music expression will cause *all* tagged sections to be removed, as the first filter will remove all tagged sections except the one named, and the second filter will remove even that tagged section. Usually you would rather want to use a single `\keepWithTag` command with a list of multiple tags: this will only remove tagged sections not given in *any* of the tags.

Sometimes you want to splice some music at a particular place in an existing music expression. You can use `\pushToTag` and `\appendToTag` for adding material at the front or end of the `elements` of an existing music construct. Not every music construct has `elements`, but sequential and simultaneous music are safe bets:

```
test = { \tag #'here { \tag #'here <<c''>> } }

{
  \pushToTag #'here c'
  \pushToTag #'here e'
  \pushToTag #'here g' \test
  \appendToTag #'here c'
  \appendToTag #'here e'
  \appendToTag #'here g' \test
}
```



Both commands get a tag, the material to splice in at every occurence of the tag, and the tagged expression. The commands make sure to copy everything that they change so that the original `\test` retains its meaning.

See also

Learning Manual: Section "Organizing pieces with variables" in *Learning Manual*.

Notation Reference: [Automatic part combining], page 167, Section 3.3.1 [Including LilyPond files], page 472.

Known issues and warnings

Calling `\relative` on a music expression obtained by filtering music through `\keepWithTag` or `\removeWithTag` might cause the octave relations to change, as only the pitches actually remaining in the filtered expression will be considered. Applying `\relative` first, before `\keepWithTag` or `\removeWithTag`, avoids this danger as `\relative` then acts on all the pitches as-input.

Using global settings

Global settings can be included from a separate file:

```
lilypond -dinclude-settings=MY_SETTINGS.ly MY_SCORE.ly
```

Groups of settings such as page size, font or type face can be stored in separate files. This allows different editions from the same score as well as standard settings to be applied to many scores, simply by specifying the proper settings file.

This technique also works well with the use of style sheets, as discussed in Section "Style sheets" in *Learning Manual*.

See also

Learning Manual: Section "Organizing pieces with variables" in *Learning Manual*, Section "Style sheets" in *Learning Manual*.

Notation Reference: Section 3.3.1 [Including LilyPond files], page 472.

3.3.3 Special characters

Text encoding

LilyPond uses the character repertoire defined by the Unicode consortium and ISO/IEC 10646. This defines a unique name and code point for the character sets used in virtually all modern languages and many others too. Unicode can be implemented using several different encodings.

LilyPond uses the UTF-8 encoding (UTF stands for Unicode Transformation Format) which represents all common Latin characters in one byte, and represents other characters using a variable length format of up to four bytes.

The actual appearance of the characters is determined by the glyphs defined in the particular fonts available - a font defines the mapping of a subset of the Unicode code points to glyphs. LilyPond uses the Pango library to layout and render multi-lingual texts.
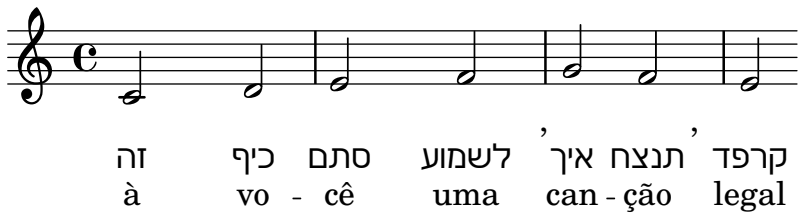
LilyPond does not perform any input-encoding conversions. This means that any text, be it title, lyric text, or musical instruction containing non-ASCII characters, must be encoded in UTF-8. The easiest way to enter such text is by using a Unicode-aware editor and saving the file with UTF-8 encoding. Most popular modern editors have UTF-8 support, for example, vim, Emacs, jEdit, and GEdit do. All MS Windows systems later than NT use Unicode as their native character encoding, so even Notepad can edit and save a file in UTF-8 format. A more functional alternative for Windows is BabelPad.

If a LilyPond input file containing a non-ASCII character is not saved in UTF-8 format the error message

```
FT_Get_Glyph_Name () error: invalid argument
```

will be generated.

Here is an example showing Cyrillic, Hebrew and Portuguese text:



Unicode

To enter a single character for which the Unicode code point is known but which is not available in the editor being used, use either `\char ##xhhhh` or `\char #dddd` within a `\markup` block, where `hhhh` is the hexadecimal code for the character required and `dddd` is the corresponding decimal value. Leading zeroes may be omitted, but it is usual to specify all four characters in the hexadecimal representation. (Note that the UTF-8 encoding of the code point should *not* be used after `\char`, as UTF-8 encodings contain extra bits indicating the number of octets.) Unicode code charts and a character name index giving the code point in hexadecimal for any character can be found on the Unicode Consortium website, http://www.unicode.org/.

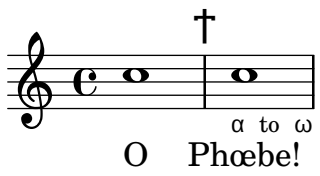
For example, `\char ##x03BE` and `\char #958` would both enter the Unicode U+03BE character, which has the Unicode name "Greek Small Letter Xi".

Any Unicode code point may be entered in this way and if all special characters are entered in this format it is not necessary to save the input file in UTF-8 format. Of course, a font containing all such encoded characters must be installed and available to LilyPond.

The following example shows Unicode hexadecimal values being entered in four places – in a 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--2012" \char ##x00A9 }
```



Copyright 2008--2012 ©

To enter the copyright sign in the copyright notice use:

```
\header {
  copyright = \markup { \char ##x00A9 "2008" }
}
```

ASCII aliases

A list of ASCII aliases for special characters can be included:

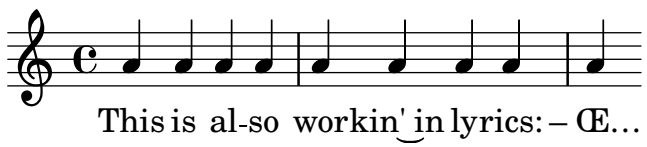
```
\paper {
  #(include-special-characters)
}

\markup "&flqq; &ndash; &OE;uvre incomplète&hellip; &frqq;"

\score {
  \new Staff { \repeat unfold 9 a'4 }
  \addlyrics {
    This is al -- so wor -- kin'~in ly -- rics: &ndash;_&OE;&hellip;
  }
}

\markup \column {
  "The replacement can be disabled:"
  "&ndash; &OE; &hellip;"
  \override #'(replacement-alist . ()) "&ndash; &OE; &hellip;"
}
```

« – Œuvre incomplète… »



The replacement can be disabled:
– Œ …
– &OE; …

You can also make your own aliases, either globally:

```
\paper {
  #(add-text-replacements!
    '(("100" . "hundred")
      ("dpi" . "dots per inch")))
}
\markup "A 100 dpi."
```

A hundred dots per inch.

or locally:

```
\markup \replace #'(("100" . "hundred")
                    ("dpi" . "dots per inch")) "A 100 dpi."
```

A hundred dots per inch.

See also

Notation Reference: Section A.12 [List of special characters], page 697.

Installed Files: ‘`ly/text-replacements.ly`’.

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

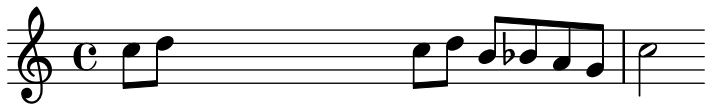
```
showLastLength = R1*5
\score { ... }
```

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.

```
c8 d
\set Score.skipTypesetting = ##t
e8 e e e e e e e
\set Score.skipTypesetting = ##f
c8 d b bes a g c2
```



In polyphonic music, `Score.skipTypesetting` will affect all voices and staves, saving even more time.

3.4.3 Alternative output formats

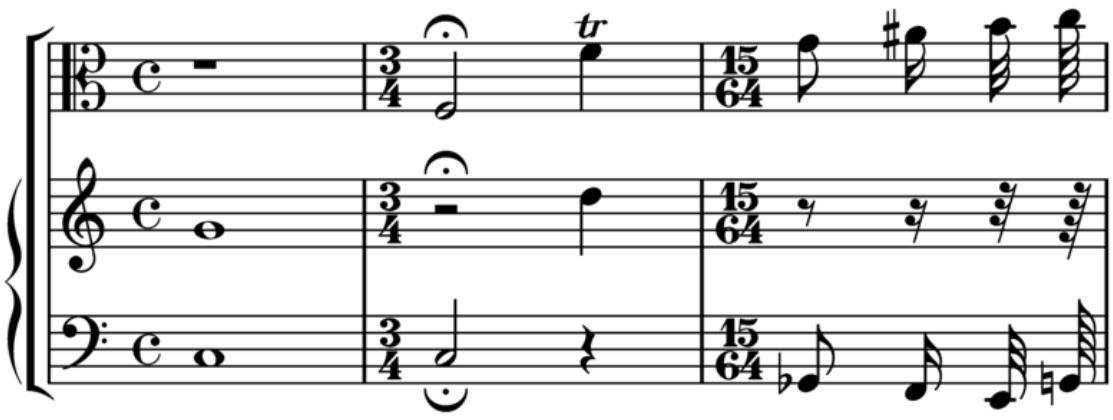
The default output formats for the printed score are Portable Document Format (PDF) and PostScript (PS). Scalable Vector Graphics (SVG), Encapsulated PostScript (EPS) and Portable Network Graphics (PNG) output formats are also available through command line options, see Section "Basic command line options for LilyPond" in *Application Usage*.

3.4.4 Replacing the notation font
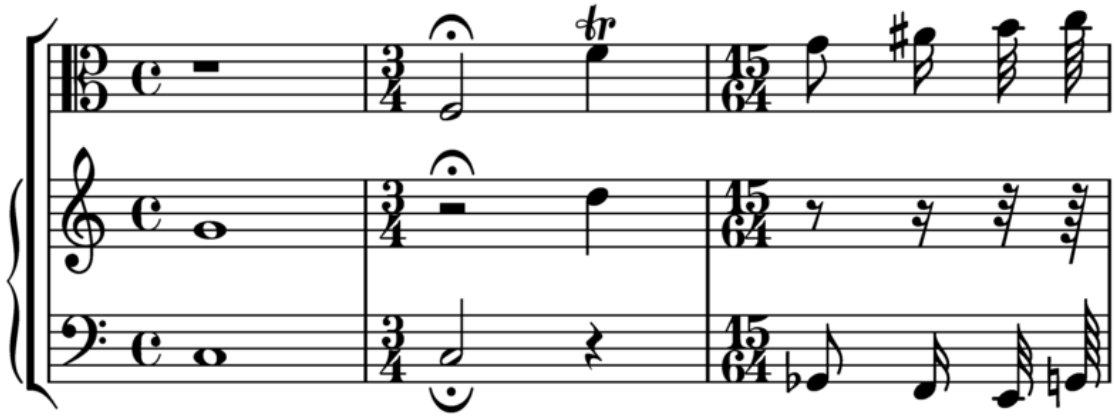
Gonville is an alternative to the Feta font used in LilyPond and can be downloaded from:

http://www.chiark.greenend.org.uk/~sgtatham/gonville/

Here are a few sample bars of music set in Gonville:



Here are a few sample bars of music set in LilyPond's Feta font:



Installation Instructions for MacOS

Download and extract the zip file. Copy the `lilyfonts` directory to '*SHARE_DIR*`/lilypond/current`'; for more information, see Section "Other sources of information" in *Learning Manual*. Rename the existing `fonts` directory to `fonts_orig` and the `lilyfonts` directory to `fonts`. To revert back to Feta, reverse the process.

See also

Learning Manual: Section "Other sources of information" in *Learning Manual*.

Known issues and warnings

Gonville cannot be used to typeset 'Ancient Music' notation and it is likely newer glyphs in later releases of LilyPond may not exist in the Gonville font family. Please refer to the author's website for more information on these and other specifics, including licensing of Gonville.

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.

Standard MIDI output is somewhat crude; optionally, an enhanced and more realistic MIDI output is available by means of Section 3.5.7 [The Articulate script], page 492.

The MIDI output allocates a channel for each staff, and reserves channel 10 for drums. There are only 16 MIDI channels per device, so if the score contains more than 15 staves, MIDI channels will be reused.

3.5.1 Creating MIDI files

To create a MIDI output file from a LilyPond file, insert a `\midi` block inside a `\score` block;

```
\score {
  ...music...
  \layout { }
  \midi { }
}
```

If there is *only* a `\midi` block in a `\score` (i.e. without any `\layout` block), then *only* MIDI output will be produced. No musical notation will be typeset.

```
\score {
  ...music...
  \midi { }
}
```

Dynamics, pitches, rhythms, tempo changes and ties are all interpreted and translated correctly. Dynamic 'marks' translate into volume levels with a 'fixed fraction' of the available MIDI volume range; crescendi and decrescendi make the volume vary linearly between their two extremes.

All `\tempo` indications, including all subsequent tempo changes, specified within the music notation will be reflected in the MIDI output.

Usually it is enough to leave the `\midi` block empty, but it can contain context rearrangements, new context definitions or code to set the values of properties. Here the tempo is set to 72 quarter-note beats per minute, but *only* for the MIDI's audio playback.

```
\score {
  ...music...
  \midi {
    \tempo 4 = 72
  }
}
```

Note that `\tempo` is actually a command for setting properties during the interpretation of the music and in the context of output definitions, like a `\midi` block, is reinterpreted as if it were a context modification.

Context definitions follow the same syntax as those in a `\layout` block;

```
\score {
  ...music...
  \midi {
    \context {
      \Voice
      \remove "Dynamic_performer"
    }
  }
}
```

removes the effect of dynamics from the MIDI output. Translation modules for sound are called 'performers'.

Selected Snippets
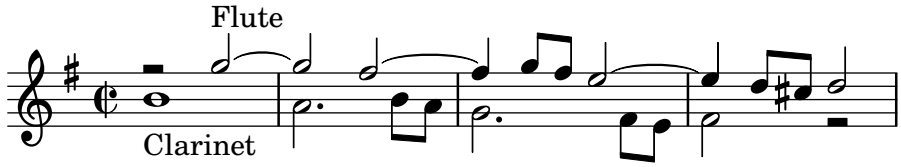
Changing MIDI output to one channel per voice

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 MIDI port, and most devices support only one port.

However, by moving the `Staff_performer` to the `Voice` context, each voice on a staff can have its own MIDI channel, as is demonstrated by the following example: despite being on the same staff, two MIDI channels are created, each with a different `midiInstrument`.

```
\score {
  \new Staff <<
    \new Voice \relative c''' {
```

```
      \set midiInstrument = #"flute"
      \voiceOne
      \key g \major
      \time 2/2
      r2 g-"Flute" ~
      g fis ~
      fis4 g8 fis e2 ~
      e4 d8 cis d2
    }
    \new Voice \relative c'' {
      \set midiInstrument = #"clarinet"
      \voiceTwo
      b1-"Clarinet"
      a2. b8 a
      g2. fis8 e
      fis2 r
    }
  >>
  \layout { }
  \midi {
    \context {
      \Staff
      \remove "Staff_performer"
    }
    \context {
      \Voice
      \consists "Staff_performer"
    }
    \tempo 2 = 72
  }
}
```



Known issues and warnings

Some operating systems require a *specific* file extension for MIDI files. If a different extension is preferred insert the following line at the top-level of the input file, before the start of any `\book`, `\bookpart` or `\score` blocks;

```
#(ly:set-option 'midi-extension "mid")
```

This will set the default extension for MIDI files to `.mid`.

Alternatively, an option can be supplied on the command line:

```
lilypond -dmidi-extension=mid MyFile.ly
```

Changes in the MIDI volume take place only on starting a note, so crescendi and decrescendi cannot affect the volume of a single note.

Some MIDI players may not always correctly handle tempo changes in the midi output.

See also

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

Learning Manual: Section "Other sources of information" in *Learning Manual*.

3.5.2 MIDI Instruments

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 A.6 [MIDI instruments], page 622.

```
\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.

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 5. 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

Using Section 3.5.7 [The Articulate script], page 492, a number of items are added to the above list:

- Articulations (slurs, staccato, etc)
- Trills, turns
- Rallentando and accelerando

Unsupported in MIDI

The following items of notation have no effect on the MIDI output, unless you use Section 3.5.7 [The Articulate script], page 492:

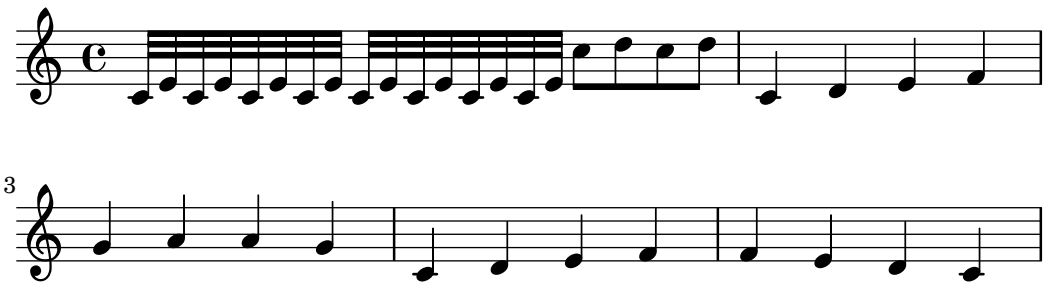
- Rhythms entered as annotations, e.g. swing
- Tempo changes entered as annotations with no tempo marking
- Staccato and other articulations and ornamentations
- Slurs and Phrasing slurs
- Crescendi, decrescendi over a single note

- 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 "|."
```



In scores containing multiple voices, unfolding of repeats in MIDI output will only occur correctly if *each* voice contains fully notated repeat indications.

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.
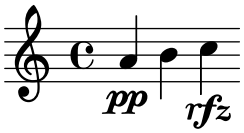
Dynamic marks

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'' {
        a4\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
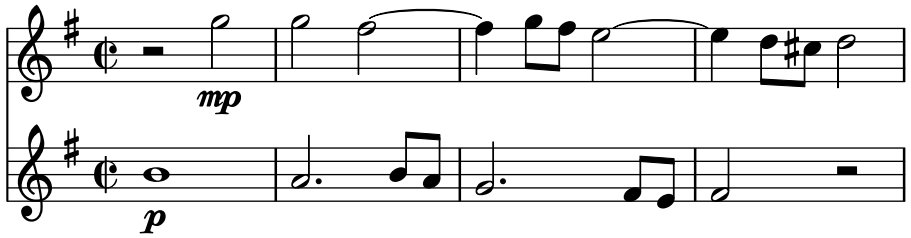
The minimum and maximum overall volume of MIDI dynamic markings is controlled by setting the properties `midiMinimumVolume` and `midiMaximumVolume` at the `Score` level. These properties have an effect only at the start of a voice and on dynamic marks. The fraction corresponding to each dynamic mark is modified with this formula

```
midiMinimumVolume + (midiMaximumVolume - midiMinimumVolume) * fraction
```

In the following example the dynamic range of the overall MIDI volume is limited to the range 0.2 - 0.5.

```
\score {
  <<
```

```
    \new Staff {
      \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 {
    \tempo 2 = 72
    \context {
      \Score
      midiMinimumVolume = #0.2
      midiMaximumVolume = #0.5
    }
  }
}
```



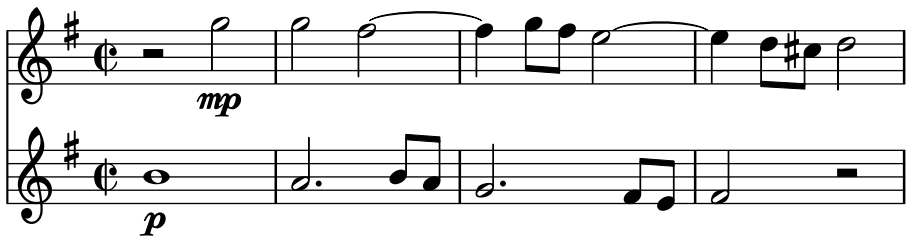
Equalizing different instruments (i)

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.

```
\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 {
    \tempo 2 = 72
  }
}
```



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.
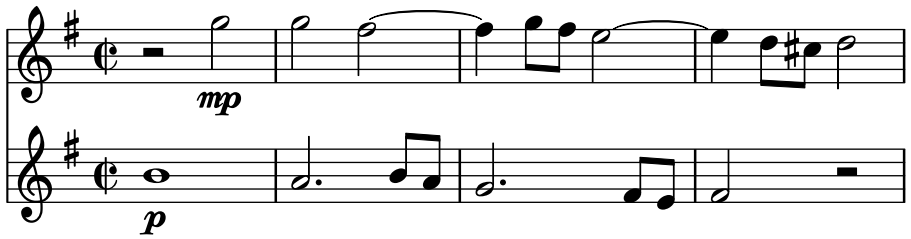
```
#(define my-instrument-equalizer-alist '())

#(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 {
    \tempo 2 = 72
  }
}
```



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.

3.5.7 The Articulate script

A more realistic MIDI output is possible when using the Articulate script. It tries to take articulations (slurs, staccato, etc) into account, by replacing notes with sequential music of suitably time-scaled note plus skip. It also tries to unfold trills turns etc., and take rallentando and accelerando into account.

To use the Articulate script, you have to include it at the top of your input file,

```
\include "articulate.ly"
```

and in the `\score` section do

```
\unfoldRepeats \articulate <<
all the rest of the score...
>>
```

After altering your input file this way, the visual output is heavily altered, but the standard `\midi` block will produce a better MIDI file.

Although not essential for the Articulate script to work, you may want to insert the `\unfoldRepeats` command as it appears in the example shown above as it enables performing abbreviatures such as *trills*.

Known issues and warnings

Articulate shortens chords and some music (esp. organ music) could sound worse.

3.6 Extracting musical information

In addition to creating graphical output and MIDI, LilyPond can display musical information as text.

3.6.1 Displaying LilyPond notation

Displaying a music expression in LilyPond notation can be done with the music function `\displayLilyMusic`. To see the output, you will typically want to call LilyPond using the command line. For example,

```
{
  \displayLilyMusic \transpose c a, { c4 e g a bes }
}
```

will display

```
{ a,4 cis e fis g }
```

By default, LilyPond will print these messages to the console along with all the other LilyPond compilation messages. To split up these messages and save the results of `\displayLilyMusic`, redirect the output to a file.

```
lilypond file.ly >display.txt
```

Note that Lilypond does not just display the music expression, but also interprets it (since `\displayLilyMusic` returns it in addition to displaying it). This is convenient since you can just insert `\displayLilyMusic` into existing music in order to get information about it. If you don't actually want Lilypond to interpret the displayed music as well as display it, use `\void` in order to have it ignored:

```
{
  \void \displayLilyMusic \transpose c a, { c4 e g a bes }
}
```

3.6.2 Displaying scheme music expressions

See Section "Displaying music expressions" in *Extending*.

3.6.3 Saving music events to a file

Music events can be saved to a file on a per-staff basis by including a file in your main score.

```
\include "event-listener.ly"
```

This will create file(s) called '`FILENAME-STAFFNAME.notes`' or '`FILENAME-unnamed-staff.notes`' for each staff. Note that if you have multiple unnamed staves, the events for all staves will be mixed together in the same file. The output looks like this:

```
0.000   note     57       4   p-c 2 12
0.000   dynamic  f
0.250   note     62       4   p-c 7 12
0.500   note     66       8   p-c 9 12
0.625   note     69       8   p-c 14 12
0.750   rest     4
0.750   breathe
```

The syntax is a tab-delimited line, with two fixed fields on each line followed by optional parameters.

`time  type  ...params...`

This information can easily be read into other programs such as python scripts, and can be very useful for researchers wishing to perform musical analysis or playback experiments with LilyPond.

Known issues and warnings

Not all lilypond music events are supported by '`event-listener.ly`'. It is intended to be a well-crafted "proof of concept". If some events that you want to see are not included, copy '`event-listener.ly`' into your lilypond directory and modify the file so that it outputs the information you want.

4 Spacing issues

The global paper layout is determined by three factors: the page layout, the line breaks, and the spacing. These all influence each other. The choice of spacing determines how densely each system of music is set. This influences where line breaks are chosen, and thus ultimately, how many pages a piece of music takes.

Globally speaking, this procedure happens in four steps: first, flexible distances ('springs') are chosen, based on durations. All possible line breaking combinations are tried, and a 'badness' score is calculated for each. Then the height of each possible system is estimated. Finally, a page breaking and line breaking combination is chosen so that neither the horizontal nor the vertical spacing is too cramped or stretched.

Two types of blocks can contain layout settings: `\paper {...}` and `\layout {...}`. The `\paper` block contains page layout settings that are expected to be the same for all scores in a book or bookpart, such as the paper height, or whether to print page numbers, etc. See Section 4.1 [Page layout], page 494. The `\layout` block contains score layout settings, such as the number of systems to use, or the space between staff-groups, etc. See Section 4.2 [Score layout], page 504.

4.1 Page layout

This section discusses page layout options for the `\paper` block.

4.1.1 The \paper block

`\paper` blocks may be placed in three different places to form a descending hierarchy of `\paper` blocks:

- At the top of the input file, before all `\book`, `\bookpart`, and `\score` blocks.
- Within a `\book` block but outside all the `\bookpart` and `\score` blocks within that book.
- Within a `\bookpart` block but outside all `\score` blocks within that bookpart.

A `\paper` block cannot be placed within a `\score` block.

The values of the fields filter down this hierarchy, with the values set higher in the hierarchy persisting unless they are over-ridden by a value set lower in the hierarchy.

Several `\paper` blocks can appear at each of the levels, for example as parts of several `\included` files. If so, the fields at each level are merged, with values encountered last taking precedence if duplicated fields appear.

Settings that can appear in a `\paper` block include:

- the `set-paper-size` scheme function,
- `\paper` variables used for customizing page layout, and
- markup definitions used for customizing the layout of headers, footers, and titles.

The `set-paper-size` function is discussed in the next section, Section 4.1.2 [Paper size and automatic scaling], page 495. The `\paper` variables that deal with page layout are discussed in later sections. The markup definitions that deal with headers, footers, and titles are discussed in Section 3.2.2 [Custom titles headers and footers], page 455.

Most `\paper` variables will only work in a `\paper` block. The few that will also work in a `\layout` block are listed in Section 4.2.1 [The `\layout` block], page 504.

Except when specified otherwise, all `\paper` variables that correspond to distances on the page are measured in millimeters, unless a different unit is specified by the user. For example, the following declaration sets `top-margin` to ten millimeters:

```
\paper {
  top-margin = 10
}
```

To set it to `0.5` inches, use the `\in` unit suffix:

```
\paper {
  top-margin = 0.5\in
}
```

The available unit suffixes are `\mm`, `\cm`, `\in`, and `\pt`. These units are simple values for converting from millimeters; they are defined in '`ly/paper-defaults-init.ly`'. For the sake of clarity, when using millimeters, the `\mm` is typically included in the code, even though it is not technically necessary.

It is also possible to define `\paper` values using Scheme. The Scheme equivalent of the above example is:

```
\paper {
  #(define top-margin (* 0.5 in))
}
```

See also

Notation Reference: Section 4.1.2 [Paper size and automatic scaling], page 495, Section 3.2.2 [Custom titles headers and footers], page 455, Section 4.2.1 [The `\layout` block], page 504.

Installed Files: '`ly/paper-defaults-init.ly`'.

4.1.2 Paper size and automatic scaling

Setting the paper size

'A4' is the default value when no explicit paper size is set. However, there are two functions that can be used to change it:

`set-default-paper-size`

```
#(set-default-paper-size "quarto")
```

which must always be placed at the toplevel scope, and

`set-paper-size`

```
\paper {
  #(set-paper-size "tabloid")
}
```

which must always be placed in a `\paper` block.

If the `set-default-paper-size` function is used in the toplevel scope, it must come before any `\paper` block. `set-default-paper-size` sets the paper size for all pages, whereas `set-paper-size` only sets the paper size for the pages that the `\paper` block applies to. For example, if the `\paper` block is at the top of the file, then it 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.

When the `set-paper-size` function is used, it must be placed *before* any other functions used within the same `\paper` block. See [Automatic scaling to paper size], page 496.

Paper sizes are defined in '`scm/paper.scm`', and while it is possible to add custom sizes, they will be overwritten on subsequent software updates. The available paper sizes are listed in Section A.5 [Predefined paper sizes], page 618.

The following command can be used in the file to add a custom paper size which can then be used with `set-default-paper-size` or `set-paper-size` as appropriate,

```
#(set! paper-alist (cons '("my size" . (cons (* 15 in) (* 3 in))) paper-alist))

\paper {
  #(set-paper-size "my size")
}
```

The units `in` (inches), `cm` (centimeters) and `mm` (millimeters) can all be used.

If the symbol `'landscape` is added to the paper size function, pages will be rotated by 90 degrees, and wider line widths will be set accordingly.

```
#(set-default-paper-size "a6" 'landscape)
```

Swapping the paper dimensions *without* having the print rotated (like when printing to postcard size, or creating graphics for inclusion rather than a standalone document) can be achieved by appending '`landscape`' to the name of the paper size itself:

```
#(set-default-paper-size "a6landscape")
```

When the paper size ends with an explicit '`landscape`' or '`portrait`', the presence of a `'landscape` symbol *only* affects print orientation, not the paper dimensions used for layout.

See also

Notation Reference: [Automatic scaling to paper size], page 496, Section A.5 [Predefined paper sizes], page 618.

Installed Files: '`scm/paper.scm`'.

Automatic scaling to paper size

If the paper size is changed with one of the scheme functions (`set-default-paper-size` or `set-paper-size`), the values of several `\paper` variables are automatically scaled to the new size. To bypass the automatic scaling for a particular variable, set the variable after setting the paper size. Note that the automatic scaling is not triggered by setting the `paper-height` or `paper-width` variables, even though `paper-width` can influence other values (this is separate from scaling and is discussed below). The `set-default-paper-size` and `set-paper-size` functions are described in [Setting the paper size], page 495.

The vertical dimensions affected by automatic scaling are `top-margin` and `bottom-margin` (see Section 4.1.3 [Fixed vertical spacing \paper variables], page 496). The horizontal dimensions affected by automatic scaling are `left-margin`, `right-margin`, `inner-margin`, `outer-margin`, `binding-offset`, `indent`, and `short-indent` (see Section 4.1.5 [Horizontal spacing \paper variables], page 499).

The default values for these dimensions are set in '`ly/paper-defaults-init.ly`', using internal variables named `top-margin-default`, `bottom-margin-default`, etc. These are the values that result at the default paper size `a4`. For reference, with `a4` paper the `paper-height` is `297\mm` and the `paper-width` is `210\mm`.

See also

Notation Reference: Section 4.1.3 [Fixed vertical spacing \paper variables], page 496, Section 4.1.5 [Horizontal spacing \paper variables], page 499.

Installed Files: '`ly/paper-defaults-init.ly`', '`scm/paper.scm`'.

4.1.3 Fixed vertical spacing \paper variables

Note: Some `\paper` dimensions are automatically scaled to the paper size, which may lead to unexpected behavior. See [Automatic scaling to paper size], page 496.

Default values (before scaling) are defined in '`ly/paper-defaults-init.ly`'.

`paper-height`
: The height of the page, unset by default. Note that the automatic scaling of some vertical dimensions is not affected by this.

`top-margin`
: The margin between the top of the page and the top of the printable area. If the paper size is modified, this dimension's default value is scaled accordingly.

`bottom-margin`
: The margin between the bottom of the printable area and the bottom of the page. If the paper size is modified, this dimension's default value is scaled accordingly.

`ragged-bottom`
: If this is set to true, systems will be set at their natural spacing, neither compressed nor stretched vertically to fit the page.

`ragged-last-bottom`
: If this is set to false, then the last page, and the last page in each section created with a `\bookpart` block, will be vertically justified in the same way as the earlier pages.

See also

Notation Reference: [Automatic scaling to paper size], page 496.

Installed Files: '`ly/paper-defaults-init.ly`'.

Snippets: Section "Spacing" in *Snippets*.

Known issues and warnings

The titles (from the `\header` block) are treated as a system, so `ragged-bottom` and `ragged-last-bottom` will add space between the titles and the first system of the score.

Explicitly defined paper-sizes will override any user-defined top or bottom margin settings.

4.1.4 Flexible vertical spacing `\paper` variables

In most cases, it is preferable for the vertical distances between certain items (such as margins, titles, systems, and separate scores) to be flexible, so that they stretch and compress nicely according to each situation. A number of `\paper` variables (listed below) are available to fine-tune the stretching behavior of these dimensions.

Note that the `\paper` variables discussed in this section do not control the spacing of staves within individual systems. Within-system spacing is controlled by grob properties, with settings typically entered inside a `\score` or `\layout` block, and not inside a `\paper` block. See Section 4.4.1 [Flexible vertical spacing within systems], page 515.

Structure of flexible vertical spacing alists

Each of the flexible vertical spacing `\paper` variables is an alist (association list) containing four *keys*:

- `basic-distance` – the vertical distance, measured in staff-spaces, between the *reference points* of the two items, when no collisions would result, and no stretching or compressing is in effect. The reference point of a (title or top-level) markup is its highest point, and the reference point of a system is the vertical center of the nearest `StaffSymbol` – even if a non-staff line (such as a `Lyrics` context) is in the way. Values for `basic-distance` that are less than either `padding` or `minimum-distance` are not meaningful, since the resulting distance will never be less than either `padding` or `minimum-distance`.

- `minimum-distance` – the smallest allowable vertical distance, measured in staff-spaces, between the reference points of the two items, when compressing is in effect. Values for `minimum-distance` that are less than `padding` are not meaningful, since the resulting distance will never be less than `padding`.
- `padding` – the minimum required amount of unobstructed vertical whitespace between the bounding boxes (or skylines) of the two items, measured in staff-spaces.
- `stretchability` – a unitless measure of the dimension's relative propensity to stretch. If zero, the distance will not stretch (unless collisions would result). When positive, the significance of a particular dimension's `stretchability` value lies only in its relation to the `stretchability` values of the other dimensions. For example, if one dimension has twice the `stretchability` of another, it will stretch twice as easily. Values should be non-negative and finite. The value `+inf.0` triggers a `programming_error` and is ignored, but `1.0e7` can be used for an almost infinitely stretchable spring. If unset, the default value is set to `basic-distance`. Note that the dimension's propensity to *compress* cannot be directly set by the user and is equal to (`basic-distance` − `minimum-distance`).

If a page has a ragged bottom, the resulting distance is the largest of:

- `basic-distance`,
- `minimum-distance`, and
- `padding` plus the smallest distance necessary to eliminate collisions.

For multi-page scores with a ragged bottom on the last page, the last page uses the same spacing as the preceding page, provided there is enough space for that.

Specific methods for modifying alists are discussed in Section 5.3.6 [Modifying alists], page 573. The following example demonstrates the two ways these alists can be modified. The first declaration updates one key-value individually, and the second completely redefines the variable:

```
\paper {
  system-system-spacing #'basic-distance = #8
  score-system-spacing =
    #'((basic-distance . 12)
       (minimum-distance . 6)
       (padding . 1)
       (stretchability . 12))
}
```

List of flexible vertical spacing \paper variables

The names of these variables follow the format *`upper-lower-`*`spacing`, where *`upper`* and *`lower`* are the items to be spaced. Each distance is measured between the reference points of the two items (see the description of the alist structure above). Note that in these variable names, the term '`markup`' refers to both *title markups* (`bookTitleMarkup` or `scoreTitleMarkup`) and *top-level markups* (see Section 3.1.5 [File structure], page 446). All distances are measured in staff-spaces.

Default settings are defined in '`ly/paper-defaults-init.ly`'.

`markup-system-spacing`
: the distance between a (title or top-level) markup and the system that follows it.

`score-markup-spacing`
: the distance between the last system of a score and the (title or top-level) markup that follows it.

`score-system-spacing`
: the distance between the last system of a score and the first system of the score that follows it, when no (title or top-level) markup exists between them.

`system-system-spacing`
: the distance between two systems in the same score.

`markup-markup-spacing`
: the distance between two (title or top-level) markups.

`last-bottom-spacing`
: the distance from the last system or top-level markup on a page to the bottom of the printable area (i.e. the top of the bottom margin).

`top-system-spacing`
: the distance from the top of the printable area (i.e. the bottom of the top margin) to the first system on a page, when there is no (title or top-level) markup between the two.

`top-markup-spacing`
: the distance from the top of the printable area (i.e. the bottom of the top margin) to the first (title or top-level) markup on a page, when there is no system between the two.

See also

Notation Reference: Section 4.4.1 [Flexible vertical spacing within systems], page 515.

Installed Files: '`ly/paper-defaults-init.ly`'.

Snippets: Section "Spacing" in *Snippets*.

4.1.5 Horizontal spacing \paper variables

Note: Some `\paper` dimensions are automatically scaled to the paper size, which may lead to unexpected behavior. See [Automatic scaling to paper size], page 496.

\paper variables for widths and margins

Default values (before scaling) that are not listed here are defined in '`ly/paper-defaults-init.ly`'.

`paper-width`
: The width of the page, unset by default. While `paper-width` has no effect on the automatic scaling of some horizontal dimensions, it does influence the `line-width` variable. If both `paper-width` and `line-width` are set, then `left-margin` and `right-margin` will also be updated. Also see `check-consistency`.

`line-width`
: The horizontal extent of the staff lines in unindented, non-ragged systems, equal to `(paper-width − left-margin − right-margin)` when unset. If `line-width` is set, and both `left-margin` and `right-margin` are unset, then the margins will be updated to center the systems on the page automatically. Also see `check-consistency`. This variable can also be set in a `\layout` block.

`left-margin`
: The margin between the left edge of the page and the start of the staff lines in unindented systems. If the paper size is modified, this dimension's default value is scaled accordingly. If `left-margin` is unset, and

both `line-width` and `right-margin` are set, then `left-margin` is set to `(paper-width − line-width − right-margin)`. If only `line-width` is set, then both margins are set to `((paper-width − line-width) / 2)`, and the systems are consequently centered on the page. Also see `check-consistency`.

`right-margin`
: The margin between the right edge of the page and the end of the staff lines in non-ragged systems. If the paper size is modified, this dimension's default value is scaled accordingly. If `right-margin` is unset, and both `line-width` and `left-margin` are set, then `right-margin` is set to `(paper-width − line-width − left-margin)`. If only `line-width` is set, then both margins are set to `((paper-width − line-width) / 2)`, and the systems are consequently centered on the page. Also see `check-consistency`.

`check-consistency`
: If set to true, print a warning if `left-margin`, `line-width`, and `right-margin` do not exactly add up to `paper-width`, and replace each of these (except `paper-width`) with its default value (scaled to the paper size if necessary). If set to false, ignore any inconsistencies and allow systems to run off the edge of the page.

`ragged-right`
: If set to true, systems will not fill the line width. Instead, systems end at their natural horizontal length. Default: `#t` for scores with only one system, and `#f` for scores with two or more systems. This variable can also be set in a `\layout` block.

`ragged-last`
: If set to true, the last system in the score will not fill the line width. Instead the last system ends at its natural horizontal length. Default: `#f`. This variable can also be set in a `\layout` block.

See also

Notation Reference: [Automatic scaling to paper size], page 496.

Installed Files: '`ly/paper-defaults-init.ly`'.

Known issues and warnings

Explicitly defined paper-sizes will override any user-defined left or right margin settings.

`\paper` variables for two-sided mode

Default values (before scaling) are defined in '`ly/paper-defaults-init.ly`'.

`two-sided`
: If set to true, use `inner-margin`, `outer-margin` and `binding-offset` to determine margins depending on whether the page number is odd or even. This overrides `left-margin` and `right-margin`.

`inner-margin`
: The margin all pages have at the inner side if they are part of a book. If the paper size is modified, this dimension's default value is scaled accordingly. Works only with `two-sided` set to true.

`outer-margin`
: The margin all pages have at the outer side if they are part of a book. If the paper size is modified, this dimension's default value is scaled accordingly. Works only with `two-sided` set to true.

`binding-offset`
: The amount `inner-margin` is increased to make sure nothing will be hidden by the binding. If the paper size is modified, this dimension's default value is scaled accordingly. Works only with `two-sided` set to true.

See also

Notation Reference: [Automatic scaling to paper size], page 496.

Installed Files: '`ly/paper-defaults-init.ly`'.

\paper variables for shifts and indents

Default values (before scaling) that are not listed here are defined in '`ly/paper-defaults-init.ly`'.

`horizontal-shift`
: The amount that all systems (including titles and system separators) are shifted to the right. Default: `0.0\mm`.

`indent`
: The level of indentation for the first system in a score. If the paper size is modified, this dimension's default value is scaled accordingly. This variable can also be set in a `\layout` block.

`short-indent`
: The level of indentation for all systems in a score besides the first system. If the paper size is modified, this dimension's default value is scaled accordingly. This variable can also be set in a `\layout` block.

See also

Notation Reference: [Automatic scaling to paper size], page 496.

Installed Files: '`ly/paper-defaults-init.ly`'.

Snippets: Section "Spacing" in *Snippets*.

4.1.6 Other \paper variables

\paper variables for line breaking

`max-systems-per-page`
: The maximum number of systems that will be placed on a page. This is currently supported only by the `ly:optimal-breaking` algorithm. Default: unset.

`min-systems-per-page`
: The minimum number of systems that will be placed on a page. This may cause pages to be overfilled if it is made too large. This is currently supported only by the `ly:optimal-breaking` algorithm. Default: unset.

`systems-per-page`
: The number of systems that should be placed on each page. This is currently supported only by the `ly:optimal-breaking` algorithm. Default: unset.

`system-count`
: The number of systems to be used for a score. Default: unset. This variable can also be set in a `\layout` block.

See also

Notation Reference: Section 4.3.1 [Line breaking], page 507.

\paper variables for page breaking

Default values not listed here are defined in 'ly/paper-defaults-init.ly'

`page-breaking`
: The page-breaking algorithm to use. Choices are `ly:minimal-breaking`, `ly:page-turn-breaking`, `ly:one-line-breaking` and `ly:optimal-breaking` (the default).

`page-breaking-system-system-spacing`
: Tricks the page breaker into thinking that `system-system-spacing` is set to something different than it really is. For example, if `page-breaking-system-system-spacing #'padding` is set to something substantially larger than `system-system-spacing #'padding`, then the page-breaker will put fewer systems on each page. Default: unset.

`page-count`
: The number of pages to be used for a score, unset by default.

The following variables are effective only when `page-breaking` is set to `ly:page-turn-breaking`. Page breaks are then chosen to minimize the number of page turns. Since page turns are required on moving from an odd-numbered page to an even-numbered one, a layout in which the last page is odd-numbered will usually be favoured. Places where page turns are preferred can be indicated manually by inserting `\allowPageTurn` or automatically by including the `Page_turn_engraver` (see Section 4.3.4 [Optimal page turning], page 510).

If there are insufficient choices available for making suitable page turns, LilyPond may insert a blank page either within a score, between scores (if there are two or more scores), or by ending a score on an even-numbered page. The values of the following three variables may be increased to make these actions less likely.

The values are penalties, i.e. the higher the value the less likely will be the associated action relative to other choices.

`blank-page-penalty`
: The penalty for having a blank page in the middle of a score. If `blank-page-penalty` is large and `ly:page-turn-breaking` is selected, then LilyPond will be less likely to insert a page in the middle of a score. Instead, it will space out the music further to fill the blank page and the following one. Default: 5.

`blank-last-page-penalty`
: The penalty for ending the score on an even-numbered page. If `blank-last-page-penalty` is large and `ly:page-turn-breaking` is selected, then LilyPond will be less likely to produce a score in which the last page is even-numbered. Instead, it will adjust the spacing in order to use one page more or one page less. Default: 0.

`blank-after-score-page-penalty`
: The penalty for having a blank page after the end of one score and before the next. By default, this is smaller than `blank-page-penalty`, so that blank pages after scores are inserted in preference to blank pages within a score. Default: 2.

See also

Notation Reference: Section 4.3.2 [Page breaking], page 509, Section 4.3.3 [Optimal page breaking], page 510, Section 4.3.4 [Optimal page turning], page 510, Section 4.3.5 [Minimal page breaking], page 511, Section 4.3.6 [One-line page breaking], page 511.

Installed Files: 'ly/paper-defaults-init.ly'.

\paper variables for page numbering

Default values not listed here are defined in '`ly/paper-defaults-init.ly`'

`auto-first-page-number`
: The page breaking algorithm is affected by the first page number being odd or even. If set to true, the page breaking algorithm will decide whether to start with an odd or even number. This will result in the first page number remaining as is or being increased by one. Default: `#f`.

`first-page-number`
: The value of the page number on the first page.

`print-first-page-number`
: If set to true, a page number is printed on the first page.

`print-page-number`
: If set to false, page numbers are not printed.

See also

Installed Files: '`ly/paper-defaults-init.ly`'.

Known issues and warnings

Odd page numbers are always on the right. If you want the music to start on page 1 there must be a blank page on the back of the cover page so that page 1 is on the right hand side.

Miscellaneous \paper variables

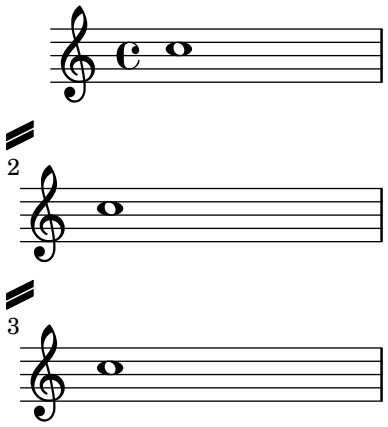
`page-spacing-weight`
: The relative importance of page (vertical) spacing and line (horizontal) spacing. High values will make page spacing more important. Default: `10`.

`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`.

`system-separator-markup`
: A markup object that is inserted between systems, often used for orchestral scores. Default: unset. The `\slashSeparator` markup, defined in '`ly/titling-init.ly`', is provided as a sensible default, for example:

```
#(set-default-paper-size "a8")

\book {
  \paper {
    system-separator-markup = \slashSeparator
  }
  \header {
    tagline = ##f
  }
  \score {
    \relative c'' { c1 \break c1 \break c1 }
  }
}
```



See also

Installed Files: ‘`ly/titling-init.ly`’.

Snippets: Section “Spacing” in *Snippets*.

Known issues and warnings

The default page header puts the page number and the `instrument` field from the `\header` block on a line.

4.2 Score layout

This section discusses score layout options for the `\layout` block.

4.2.1 The `\layout` block

While the `\paper` block contains settings that relate to the page formatting of the whole document, the `\layout` block contains settings for score-specific layout. To set score layout options globally, enter them in a toplevel `\layout` block. To set layout options for an individual score, enter them in a `\layout` block inside the `\score` block, after the music. Settings that can appear in a `\layout` block include:

- the `layout-set-staff-size` scheme function,
- context modifications in `\context` blocks, and
- `\paper` variables that affect score layout.

The `layout-set-staff-size` function is discussed in the next section, Section 4.2.2 [Setting the staff size], page 506. Context modifications are discussed in a separate chapter; see Section 5.1.4 [Modifying context plug-ins], page 553 and Section 5.1.5 [Changing context default settings], page 555. The `\paper` variables that can appear in a `\layout` block are:

- `line-width`, `ragged-right` and `ragged-last` (see [`\paper` variables for widths and margins], page 499)
- `indent` and `short-indent` (see [`\paper` variables for shifts and indents], page 501)
- `system-count` (see [`\paper` variables for line breaking], page 501)

Here is an example `\layout` block:

```
\layout {
  indent = 2\cm
  \context {
    \StaffGroup
    \override StaffGrouper.staff-staff-spacing.basic-distance = #8
  }
  \context {
    \Voice
```

```
    \override TextScript.padding = #1
    \override Glissando.thickness = #3
  }
}
```

Multiple `\layout` blocks can be entered as toplevel expressions. This can, for example, be useful if different settings are stored in separate files and included optionally. Internally, when a `\layout` block is evaluated, a copy of the current `\layout` configuration is made, then any changes defined within the block are applied and the result is saved as the new current configuration. From the user's perspective the `\layout` blocks are combined, but in conflicting situations (when the same property is changed in different blocks) the later definitions take precedence.

For example, if this block:

```
\layout {
  \context {
    \Voice
    \override TextScript.color = #magenta
    \override Glissando.thickness = #1.5
  }
}
```

is placed after the one from the preceding example the `'padding` and `'color` overrides for `TextScript` are combined, but the later `'thickness` override for `Glissando` replaces (or hides) the earlier one.

`\layout` blocks may be assigned to variables for reuse later, but the way this works is slightly but significantly different from writing them literally.

If a variable is defined like this:

```
layoutVariable = \layout {
  \context {
    \Voice
    \override NoteHead.font-size = #4
  }
}
```

it will hold the current `\layout` configuration with the `NoteHead.font-size` override added, but this combination is *not* saved as the new current configuration. Be aware that the 'current configuration' is read when the variable is defined and not when it is used, so the content of the variable is dependent on its position in the source.

The variable can then be used inside another `\layout` block, for example:

```
\layout {
  \layoutVariable
  \context {
    \Voice
    \override NoteHead.color = #red
  }
}
```

A `\layout` block containing a variable, as in the example above, does *not* copy the current configuration but instead uses the content of `\layoutVariable` as the base configuration for the further additions. This means that any changes defined between the definition and the use of the variable are lost.

If `layoutVariable` is defined (or `\included`) immediately before being used, its content is just the current configuration plus the overrides defined within it. So in the example above showing the use of `\layoutVariable` the final `\layout` block would consist of:

```
  TextScript.padding = #1
  TextScript.color = #magenta
  Glissando.thickness = #1.5
  NoteHead.font-size = #4
  NoteHead.color = #red
```

plus the `indent` and the `StaffGrouper` overrides.

But if the variable had already been defined before the first `\layout` block the current configuration would now contain only

```
  NoteHead.font-size = #4 % (written in the variable definition)
  NoteHead.color = #red % (added after the use of the variable)
```

If carefully planned, `\layout` variables can be a valuable tool to structure the layout design of sources, and also to reset the `\layout` configuration to a known state.

See also

Notation Reference: Section 5.1.5 [Changing context default settings], page 555.

Snippets: Section “Spacing” in *Snippets*.

4.2.2 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 204.

Snippets: Section “Spacing” in *Snippets*.

Known issues and warnings

`layout-set-staff-size` does not change the distance between the staff lines.

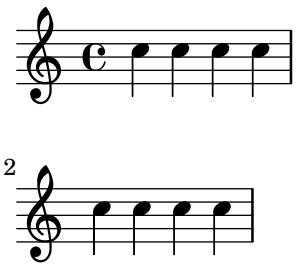
4.3 Breaks

4.3.1 Line breaking

Line breaks are normally determined automatically. They are chosen so that lines look neither cramped nor loose, and consecutive lines have similar density.
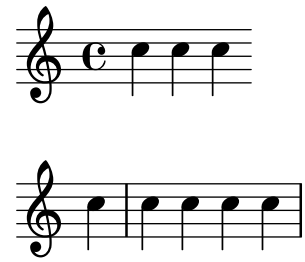
To manually force a line break at a bar line, use the `\break` command:

```
c4 c c c | \break
c4 c c c |
```



By default, a `\break` in the middle of a measure is ignored, and a warning is printed. To force a line break in the middle of a measure, add an invisible bar line with ‘`\bar ""`’:

```
c4 c c
\bar "" \break
c |
c4 c c c |
```
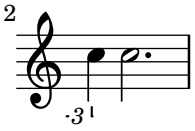


A `\break` occurring at a bar line is also ignored if the previous measure ends in the middle of a note, such as when a tuplet begins and ends in different measures. To allow `\break` commands to work in these situations, remove the `Forbid_line_break_engraver` from the `Voice` context. Note that manually forced line breaks have to be added in parallel with the music:

```
\new Voice \with {
  \remove "Forbid_line_break_engraver"
} \relative c'' {
  <<
    { c2. \tuplet 3/2 { c4 c c } c2. | }
    { s1 | \break s1 | }
```
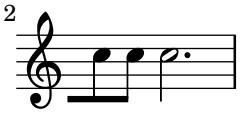
```
  >>
}
```





Similarly, line breaks are normally forbidden when beams cross bar lines. This behavior can be changed by setting `\override Beam.breakable = ##t`:

```
\override Beam.breakable = ##t
c2. c8[ c | \break
c8 c] c2. |
```





The `\noBreak` command 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\mm
  line-width = 150\mm
  ragged-last = ##t
}
```

For line breaks at regular intervals use `\break` separated by skips and repeated with `\repeat`. For example, this would cause the following 28 measures (assuming 4/4 time) to be broken every 4 measures, and only there:

```
<<
  \repeat unfold 7 {
    s1 \noBreak s1 \noBreak
    s1 \noBreak s1 \break
  }
  { the actual music... }
>>
```

Predefined commands

`\break`, `\noBreak`.

See also

Notation Reference: [`\paper` variables for line breaking], page 501.

Snippets: Section “Spacing” in *Snippets*.

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

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. If `ragged-bottom` is set to `#t` the systems will not be justified vertically. When `ragged-last-bottom` is set to `#t`, as it is by default, empty space is allowed at the bottom of the final page (or the final page in each `\bookpart`). See Section 4.1.3 [Fixed vertical spacing `\paper` variables], page 496.

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 {
  page-breaking = #ly:page-turn-breaking
}
```

When a book has many scores and pages, the page breaking problem may be difficult to solve, requiring large processing time and memory. To ease the page breaking process, `\bookpart` blocks are used to divide the book into several parts: the page breaking occurs separately on each part. Different page breaking functions may also be used in different book parts.

```
\bookpart {
  \header {
    subtitle = "Preface"
  }
  \paper {
     %% In a part consisting mostly of text,
     %% ly:minimal-breaking may be preferred
     page-breaking = #ly:minimal-breaking
  }
  \markup { ... }
  ...
}
\bookpart {
  %% In this part, consisting of music, the default optimal
  %% page breaking function is used.
  \header {
    subtitle = "First movement"
  }
```

```
  \score { ... }
  ...
}
```

Predefined commands

`\pageBreak`, `\noPageBreak`.

See also

Notation Reference: [`\paper` variables for page breaking], page 502.

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 509. 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

Notation Reference: [`\paper` variables for line breaking], page 501.

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 {
  page-breaking = #ly:minimal-breaking
}
```

See also

Snippets: Section “Spacing” in *Snippets*.

4.3.6 One-line page breaking

The `ly:one-line-breaking` function is a special-purpose page breaking algorithm that puts each score on its own page, and on a single line. This page breaking function does not typeset titles or margins; only the score will be displayed.

The page width will be adjusted so that the longest score fits on one line. In particular, `paper-width`, `line-width` and `indent` variables in the `\paper` block will be ignored, although `left-margin` and `right-margin` will still be honored. The height of the page will be left unmodified.

4.3.7 Explicit breaks

Lily sometimes rejects explicit `\break` and `\pageBreak` commands. There are two commands to override this behavior:

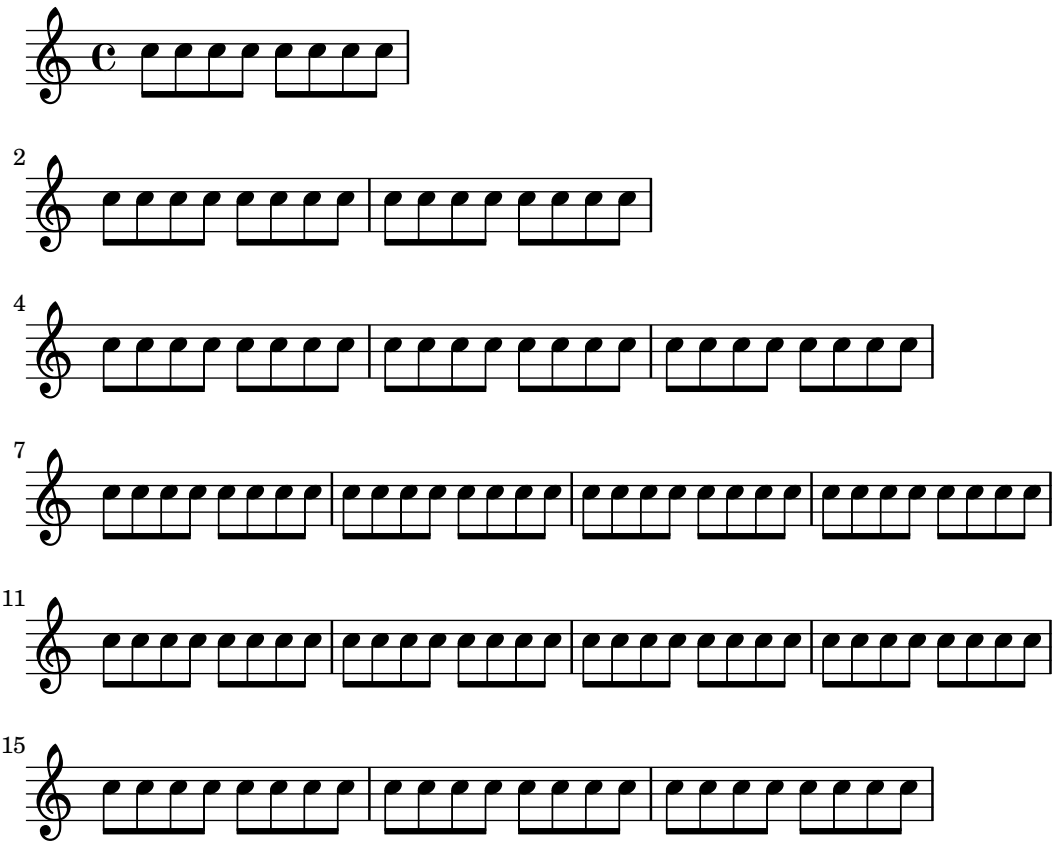
```
\override NonMusicalPaperColumn.line-break-permission = ##f
\override NonMusicalPaperColumn.page-break-permission = ##f
```

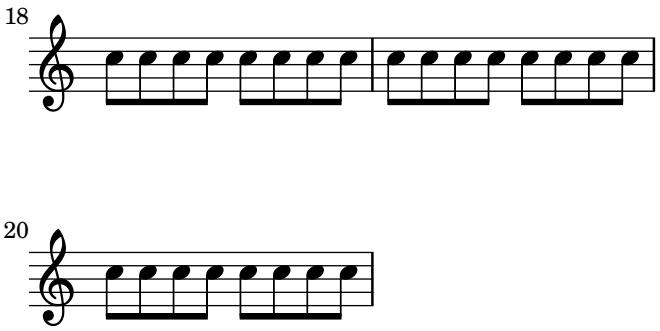
When `line-break-permission` is overridden to false, Lily will insert line breaks at explicit `\break` commands and nowhere else. When `page-break-permission` is overridden to false, Lily will insert page breaks at explicit `\pageBreak` commands and nowhere else.

```
\paper {
  indent = #0
  ragged-right = ##t
  ragged-bottom = ##t
}

music = \relative c'' { c8 c c c }

\score {
  \new Staff {
    \repeat unfold 2 { \music } \break
    \repeat unfold 4 { \music } \break
    \repeat unfold 6 { \music } \break
    \repeat unfold 8 { \music } \pageBreak
    \repeat unfold 8 { \music } \break
    \repeat unfold 6 { \music } \break
    \repeat unfold 4 { \music } \break
    \repeat unfold 2 { \music }
  }
  \layout {
    \context {
      \Score
      \override NonMusicalPaperColumn.line-break-permission = ##f
      \override NonMusicalPaperColumn.page-break-permission = ##f
    }
  }
}
```





See also

Snippets: Section "Spacing" in *Snippets*.

4.3.8 Using an extra voice for breaks

Line- and page-breaking information usually appears within note entry directly.
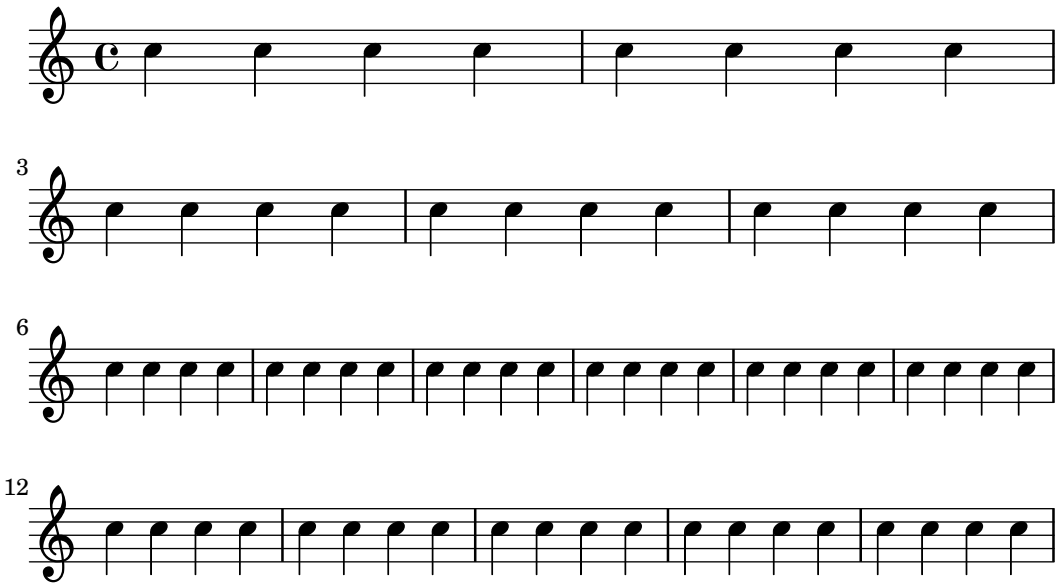
```
music = \relative c'' { c4 c c c }

\score {
  \new Staff {
    \repeat unfold 2 { \music } \break
    \repeat unfold 3 { \music }
  }
}
```

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.

```
music = \relative c'' { c4 c c c }

\header { tagline = ##f }
\paper { left-margin = 0\mm }
\book {
  \score {
    \new Staff <<
      \new Voice {
        s1 * 2 \break
        s1 * 3 \break
        s1 * 6 \break
        s1 * 5 \break
      }
      \new Voice {
        \repeat unfold 2 { \music }
        \repeat unfold 3 { \music }
        \repeat unfold 6 { \music }
        \repeat unfold 5 { \music }
      }
    >>
  }
}
```



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 515.

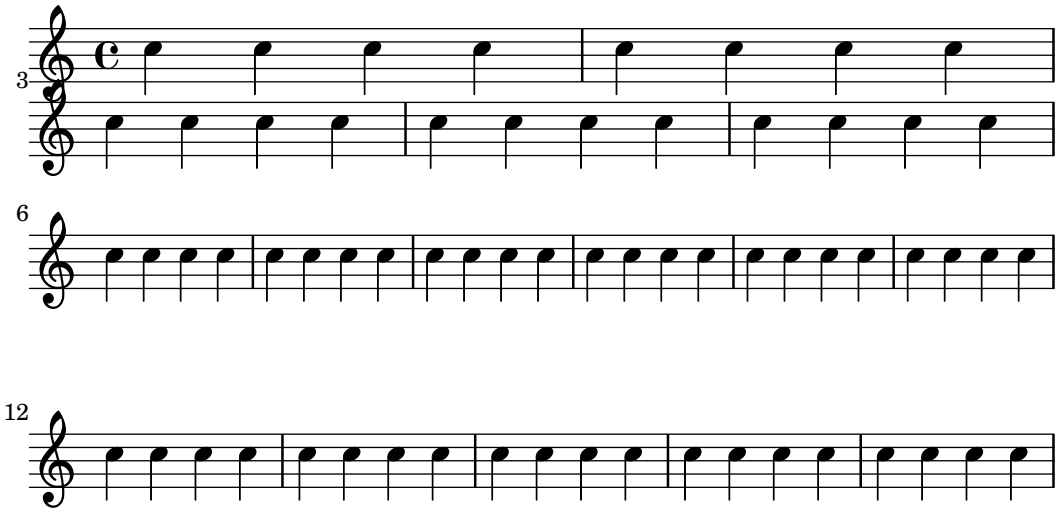
```
music = \relative c'' { c4 c c c }

\header { tagline = ##f }
\paper { left-margin = 0\mm }
\book {
  \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 . 5))
        s1 * 3 \break

        \overrideProperty Score.NonMusicalPaperColumn.line-break-system-details
          #'((Y-offset . 15))
        s1 * 6 \break

        \overrideProperty Score.NonMusicalPaperColumn.line-break-system-details
          #'((Y-offset . 30))
        s1 * 5 \break
      }
      \new Voice {
        \repeat unfold 2 { \music }
        \repeat unfold 3 { \music }
        \repeat unfold 6 { \music }
        \repeat unfold 5 { \music }
      }
    >>
  }
}
```



See also

Notation Reference: Section 4.4 [Vertical spacing], page 515.

Snippets: Section “Spacing” in *Snippets*.

4.4 Vertical spacing

Vertical spacing is controlled by three things: the amount of space available (i.e., paper size and margins), the amount of space between systems, and the amount of space between staves inside a system.

4.4.1 Flexible vertical spacing within systems

Three separate mechanisms control the flexible vertical spacing within systems, one for each of the following categories:

- *ungrouped staves*,
- *grouped staves* (staves within a staff-group such as `ChoirStaff`, etc.), and
- *non-staff lines* (such as `Lyrics`, `ChordNames`, etc.).

The height of each system is determined in two steps. First, all of the staves are spaced according to the amount of space available. Then, the non-staff lines are distributed between the staves.

Note that the spacing mechanisms discussed in this section only control the vertical spacing of staves and non-staff lines within individual systems. The vertical spacing between separate systems, scores, markups, and margins is controlled by `\paper` variables, which are discussed in Section 4.1.4 [Flexible vertical spacing `\paper` variables], page 497.

Within-system spacing properties

The within-system vertical spacing mechanisms are controlled by two sets of grob properties. The first set is associated with the `VerticalAxisGroup` grob, which is created by all staves and non-staff lines. The second set is associated with the `StaffGrouper` grob, which can be created by staff-groups, but only if explicitly called. These properties are described individually at the end of this section.

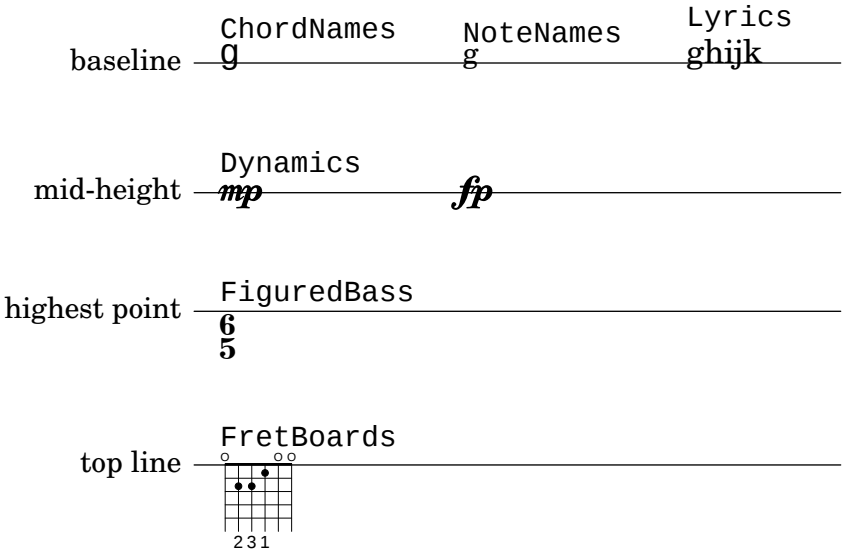
The names of these properties (except for `staff-affinity`) follow the format *`item1`*`-`*`item2`*`-spacing`, where *`item1`* and *`item2`* are the items to be spaced. Note that *`item2`* is not necessarily below *`item1`*; for example, `nonstaff-relatedstaff-spacing` will measure upwards from the non-staff line if `staff-affinity` is `UP`.

Each distance is measured between the *reference points* of the two items. The reference point for a staff is the vertical center of its `StaffSymbol` (i.e. the middle line if `line-count` is odd;

the middle space if `line-count` is even). The reference points for individual non-staff lines are given in the following table:

Non-staff line	Reference point
`ChordNames`	baseline
`NoteNames`	baseline
`Lyrics`	baseline
`Dynamics`	mid-height of 'm'
`FiguredBass`	highest point
`FretBoards`	top line

In the following image, horizontal lines indicate the positions of these reference points:



Each of the vertical spacing grob properties (except `staff-affinity`) uses the same alist structure as the `\paper` spacing variables discussed in Section 4.1.4 [Flexible vertical spacing `\paper` variables], page 497. Specific methods for modifying alists are discussed in Section 5.3.6 [Modifying alists], page 573. Grob properties should be adjusted with an `\override` inside a `\score` or `\layout` block, and not inside a `\paper` block.

The following example demonstrates the two ways these alists can be modified. The first declaration updates one key-value individually, and the second completely re-defines the property:

```
\new Staff \with {
  \override VerticalAxisGroup.default-staff-staff-spacing.basic-distance = #10
} { ... }

\new Staff \with {
  \override VerticalAxisGroup.default-staff-staff-spacing =
    #'((basic-distance . 10)
       (minimum-distance . 9)
       (padding . 1)
       (stretchability . 10))
} { ... }
```

To change any spacing settings globally, put them in the `\layout` block:

```
\layout {
  \context {
    \Staff
    \override VerticalAxisGroup.default-staff-staff-spacing.basic-distance = #10
  }
}
```

Standard settings for the vertical spacing grob properties are listed in Section "VerticalAxisGroup" in *Internals Reference* and Section "StaffGrouper" in *Internals Reference*. Default overrides for specific types of non-staff lines are listed in the relevant context descriptions in Section "Contexts" in *Internals Reference*.

Properties of the `VerticalAxisGroup` grob

`VerticalAxisGroup` properties are typically adjusted with an `\override` at the `Staff` level (or equivalent).

`staff-staff-spacing`
: Used to determine the distance between the current staff and the staff just below it in the same system, even if one or more non-staff lines (such as `Lyrics`) are placed between the two staves. Does not apply to the bottom staff of a system.

  Initially, the `staff-staff-spacing` of a `VerticalAxisGroup` is a Scheme function that applies the properties of the `StaffGrouper` if the staff is part of a group, or the `default-staff-staff-spacing` of the staff otherwise. This allows staves to be spaced differently when they are grouped. For uniform spacing regardless of grouping, this function may be replaced by a flexible-spacing alist, using the complete-redefinition form of override shown above.

`default-staff-staff-spacing`
: A flexible-spacing alist defining the `staff-staff-spacing` used for ungrouped staves, unless `staff-staff-spacing` has been explicitly set with an `\override`.

`staff-affinity`
: The direction of the staff to use for spacing the current non-staff line. Choices are `UP`, `DOWN`, and `CENTER`. If `CENTER`, the non-staff line will be placed equidistant between the two nearest staves on either side, unless collisions or other spacing constraints prevent this. Adjacent non-staff lines should have non-increasing `staff-affinity` from top to bottom, e.g. a non-staff line set to `UP` should not immediately follow one that is set to `DOWN`. Non-staff lines at the top of a system should use `DOWN`; those at the bottom should use `UP`. Setting `staff-affinity` for a staff causes it to be treated as a non-staff line. Setting `staff-affinity` to `#f` causes a non-staff line to be treated as a staff. Setting `staff-affinity` to `UP`, `CENTER`, or `DOWN` causes a staff to be spaced as a non-staff line.

`nonstaff-relatedstaff-spacing`
: The distance between the current non-staff line and the nearest staff in the direction of `staff-affinity`, if there are no non-staff lines between the two, and `staff-affinity` is either `UP` or `DOWN`. If `staff-affinity` is `CENTER`, then `nonstaff-relatedstaff-spacing` is used for the nearest staves on *both* sides, even if other non-staff lines appear between the current one and either of the staves. This means that the placement of a non-staff line depends on both the surrounding staves and the surrounding non-staff lines. Setting the `stretchability` of one of these types of spacing to a small value will make that spacing dominate. Setting the `stretchability` to a large value will make that spacing have little effect.

`nonstaff-nonstaff-spacing`
: The distance between the current non-staff line and the next non-staff line in the direction of `staff-affinity`, if both are on the same side of the related staff, and `staff-affinity` is either `UP` or `DOWN`.

`nonstaff-unrelatedstaff-spacing`
: The distance between the current non-staff line and the staff in the opposite direction from `staff-affinity`, if there are no other non-staff lines between the two, and `staff-affinity` is either `UP` or `DOWN`. This can be used, for example, to require a minimum amount of padding between a `Lyrics` line and the staff to which it does not belong.

Properties of the `StaffGrouper` grob

`StaffGrouper` properties are typically adjusted with an `\override` at the `StaffGroup` level (or equivalent).

`staff-staff-spacing`
: The distance between consecutive staves within the current staff-group. The `staff-staff-spacing` property of an individual staff's `VerticalAxisGroup` grob can be overriden with different spacing settings for that staff.

`staffgroup-staff-spacing`
: The distance between the last staff of the current staff-group and the staff just below it in the same system, even if one or more non-staff lines (such as `Lyrics`) exist between the two staves. Does not apply to the bottom staff of a system. The `staff-staff-spacing` property of an individual staff's `VerticalAxisGroup` grob can be overriden with different spacing settings for that staff.

See also

Notation Reference: Section 4.1.4 [Flexible vertical spacing `\paper` variables], page 497, Section 5.3.6 [Modifying alists], page 573.

Installed Files: '`ly/engraver-init.ly`', '`scm/define-grobs.scm`'.

Internals Reference: Section "Contexts" in *Internals Reference*, Section "VerticalAxisGroup" in *Internals Reference*, Section "StaffGrouper" in *Internals Reference*.

Spacing of ungrouped staves

Staves (such as `Staff`, `DrumStaff`, `TabStaff`, etc.) are contexts that can contain one or more voice contexts, but cannot contain any other staves.

The following properties affect the spacing of *ungrouped* staves:

- `VerticalAxisGroup` properties:
  - `default-staff-staff-spacing`
  - `staff-staff-spacing`

These grob properties are described individually above; see [Within-system spacing properties], page 515.

Additional properties are involved for staves that are part of a staff-group; see [Spacing of grouped staves], page 519.

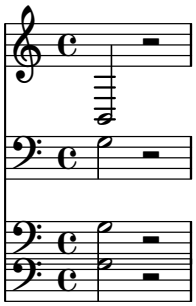
The following example shows how the `default-staff-staff-spacing` property can affect the spacing of ungrouped staves. The same overrides applied to `staff-staff-spacing` would have the same effect, but would also apply in cases where the staves are combined in a group or groups.

```
\layout {
  \context {
    \Staff
    \override VerticalAxisGroup.default-staff-staff-spacing =
      #'((basic-distance . 8)
         (minimum-distance . 7)
         (padding . 1))
  }
}

<<
  % The very low note here needs more room than 'basic-distance
  % can provide, so the distance between this staff and the next
  % is determined by 'padding.
  \new Staff { b,2 r | }

  % Here, 'basic-distance provides enough room, and there is no
  % need to compress the space (towards 'minimum-distance) to make
  % room for anything else on the page, so the distance between
  % this staff and the next is determined by 'basic-distance.
  \new Staff { \clef bass g2 r | }

  % By setting 'padding to a negative value, staves can be made to
  % collide.  The lowest acceptable value for 'basic-distance is 0.
  \new Staff \with {
    \override VerticalAxisGroup.default-staff-staff-spacing =
      #'((basic-distance . 3.5)
         (padding . -10))
  } { \clef bass g2 r | }
  \new Staff { \clef bass g2 r | }
>>
```



See also

Installed Files: ‘`scm/define-grobs.scm`’.

Snippets: Section “Spacing” in *Snippets*.

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

Spacing of grouped staves

In orchestral and other large scores, it is common to place staves in groups. The space between groups is typically larger than the space between staves of the same group.

Staff-groups (such as `StaffGroup`, `ChoirStaff`, etc.) are contexts that can contain one or more staves simultaneously.

The following properties affect the spacing of staves inside staff-groups:

- `VerticalAxisGroup` properties:
  - `staff-staff-spacing`
- `StaffGrouper` properties:
  - `staff-staff-spacing`
  - `staffgroup-staff-spacing`

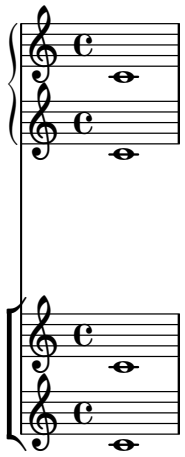
These grob properties are described individually above; see [Within-system spacing properties], page 515.

The following example shows how properties of the `StaffGrouper` grob can affect the spacing of grouped staves:

```
\layout {
  \context {
    \Score
    \override StaffGrouper.staff-staff-spacing.padding = #0
    \override StaffGrouper.staff-staff-spacing.basic-distance = #1
  }
}

<<
  \new PianoStaff \with {
    \override StaffGrouper.staffgroup-staff-spacing.basic-distance = #20
  } <<
    \new Staff { c'1 }
    \new Staff { c'1 }
  >>

  \new StaffGroup <<
    \new Staff { c'1 }
    \new Staff { c'1 }
  >>
>>
```



See also

Installed Files: ‘scm/define-grobs.scm’.

Snippets: Section “Spacing” in *Snippets*.

Internals Reference: Section “VerticalAxisGroup” in *Internals Reference*, Section “StaffGrouper” in *Internals Reference*.

Spacing of non-staff lines

Non-staff lines (such as `Lyrics`, `ChordNames`, etc.) are contexts whose layout objects are engraved like staves (i.e. in horizontal lines within systems). Specifically, non-staff lines are non-staff contexts that create the `VerticalAxisGroup` layout object.

The following properties affect the spacing of non-staff lines:

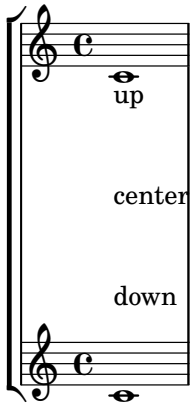
- `VerticalAxisGroup` properties:
  - `staff-affinity`
  - `nonstaff-relatedstaff-spacing`
  - `nonstaff-nonstaff-spacing`
  - `nonstaff-unrelatedstaff-spacing`

These grob properties are described individually above; see [Within-system spacing properties], page 515.

The following example shows how the `nonstaff-nonstaff-spacing` property can affect the spacing of consecutive non-staff lines. Here, by setting the `stretchability` key to a very high value, the lyrics are able to stretch much more than usual:

```
\layout {
  \context {
    \Lyrics
    \override VerticalAxisGroup.nonstaff-nonstaff-spacing.stretchability = #1000
  }
}

\new StaffGroup
<<
  \new Staff \with {
    \override VerticalAxisGroup.staff-staff-spacing = #'((basic-distance . 30))
  } { c'1 }
  \new Lyrics \with {
    \override VerticalAxisGroup.staff-affinity = #UP
  } \lyricmode { up }
  \new Lyrics \with {
    \override VerticalAxisGroup.staff-affinity = #CENTER
  } \lyricmode { center }
  \new Lyrics \with {
    \override VerticalAxisGroup.staff-affinity = #DOWN
  } \lyricmode { down }
  \new Staff { c'1 }
>>
```



See also

Installed Files: ‘`ly/engraver-init.ly`’, ‘`scm/define-grobs.scm`’.

Snippets: Section “Spacing” in *Snippets*.

Internals Reference: Section “Contexts” in *Internals Reference*, Section “VerticalAxisGroup” in *Internals Reference*.

4.4.2 Explicit staff and system positioning

One way to understand the flexible vertical spacing mechanisms explained above is as a collection of settings that control the amount of vertical padding between staves and systems.

It is possible to approach vertical spacing in a different way using `NonMusicalPaperColumn.line-break-system-details`. While the flexible vertical spacing mechanisms specify vertical padding, `NonMusicalPaperColumn.line-break-system-details` can specify exact vertical positions on the page.

`NonMusicalPaperColumn.line-break-system-details` accepts an associative list of three different settings:

- `X-offset`
- `Y-offset`
- `alignment-distances`

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))
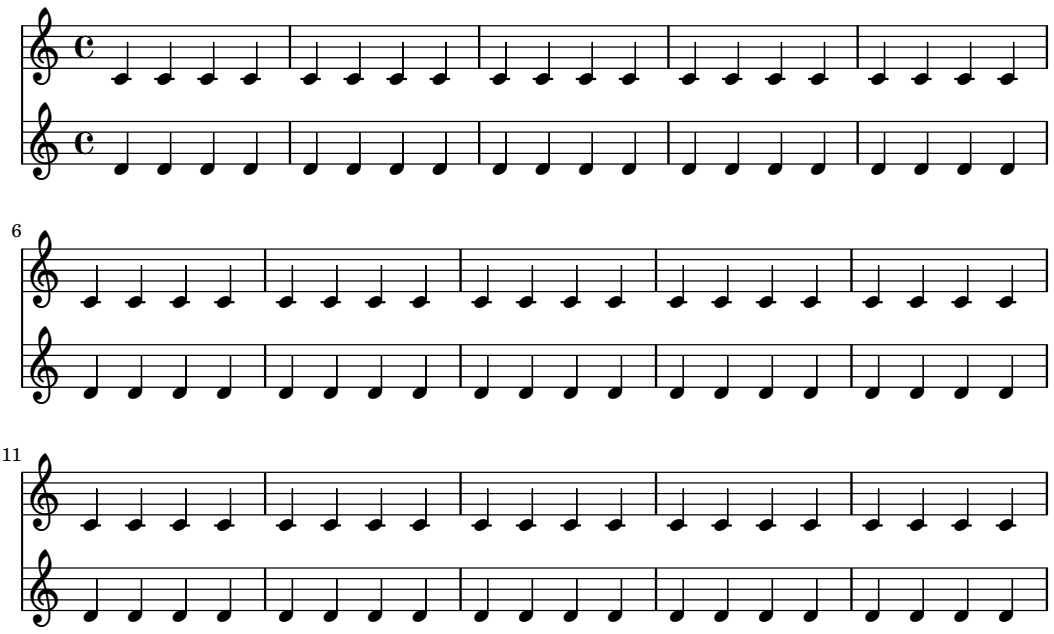
\overrideProperty NonMusicalPaperColumn.line-break-system-details
  #'((X-offset . 20)
     (Y-offset . 40))
```

```
\overrideProperty NonMusicalPaperColumn.line-break-system-details
  #'((alignment-distances . (15)))

\overrideProperty NonMusicalPaperColumn.line-break-system-details
  #'((X-offset . 20)
     (Y-offset . 40)
     (alignment-distances . (15)))
```

To understand how each of these different settings work, we begin by looking at an example that includes no overrides at all.
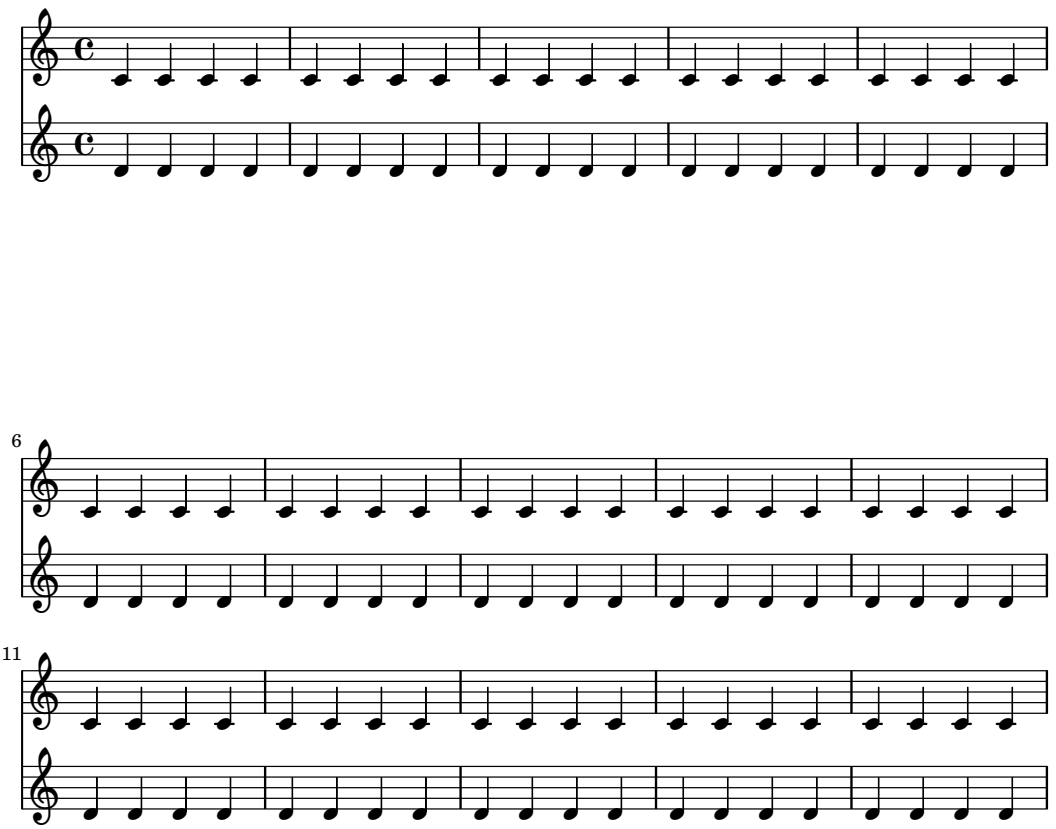
```
\header { tagline = ##f }
\paper { left-margin = 0\mm }
\book {
  \score {
    <<
      \new Staff <<
        \new Voice {
          s1*5 \break
          s1*5 \break
          s1*5 \break
        }
        \new Voice { \repeat unfold 15 { c'4 c' c' c' } }
      >>
      \new Staff {
        \repeat unfold 15 { d'4 d' d' d' }
      }
    >>
  }
}
```



This score isolates 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 4.3.8 [Using an extra voice for breaks], page 513.

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:

```
\header { tagline = ##f }
\paper { left-margin = 0\mm }
\book {
  \score {
    <<
      \new Staff <<
        \new Voice {
          \overrideProperty Score.NonMusicalPaperColumn.line-break-system-details
            #'((Y-offset . 0))
          s1*5 \break
          \overrideProperty Score.NonMusicalPaperColumn.line-break-system-details
            #'((Y-offset . 40))
          s1*5 \break
          \overrideProperty Score.NonMusicalPaperColumn.line-break-system-details
            #'((Y-offset . 60))
          s1*5 \break
        }
        \new Voice { \repeat unfold 15 { c'4 c' c' c' } }
      >>
      \new Staff {
        \repeat unfold 15 { d'4 d' d' d' }
      }
    >>
  }
}
```

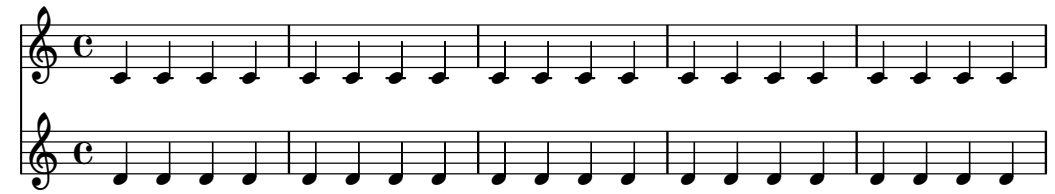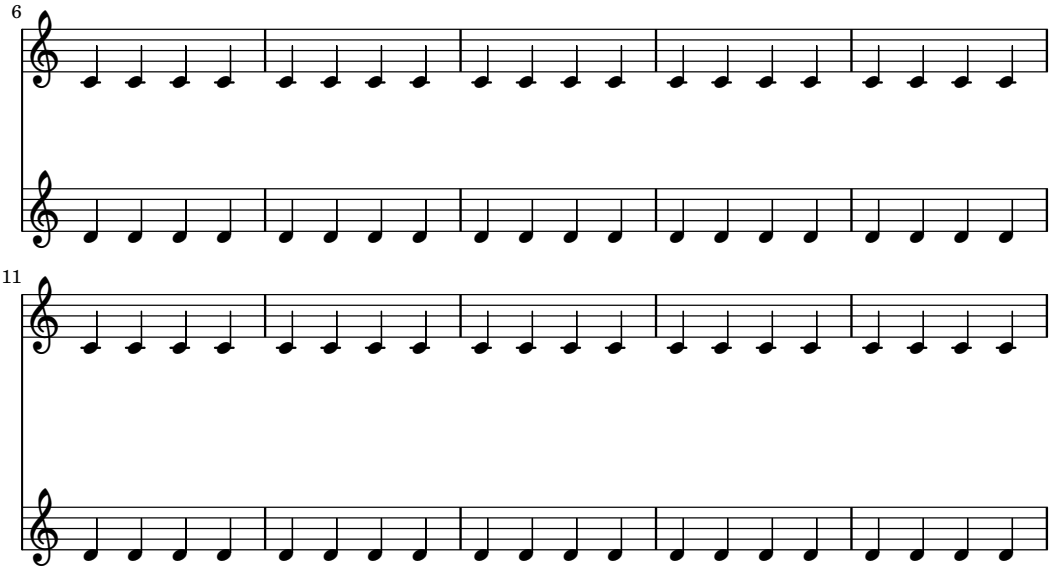


Note that `line-break-system-details` takes an associative list of potentially many values, but that we set only one value here. Note, too, that the `Y-offset` property here determines the exact vertical position on the page at which each new system will render.

Now that we have set the vertical startpoint of each system explicitly, we can also set the vertical distances between staves within each system manually. We do this using the `alignment-distances` subproperty of `line-break-system-details`.

```
\header { tagline = ##f }
\paper { left-margin = 0\mm }
\book {
  \score {
    <<
      \new Staff <<
        \new Voice {
          \overrideProperty Score.NonMusicalPaperColumn.line-break-system-details
            #'((Y-offset . 20)
               (alignment-distances . (10)))
          s1*5 \break
          \overrideProperty Score.NonMusicalPaperColumn.line-break-system-details
            #'((Y-offset . 60)
               (alignment-distances . (15)))
          s1*5 \break
          \overrideProperty Score.NonMusicalPaperColumn.line-break-system-details
          #'((Y-offset . 85)
             (alignment-distances . (20)))
          s1*5 \break
        }
        \new Voice { \repeat unfold 15 { c'4 c' c' c' } }
      >>
      \new Staff {
        \repeat unfold 15 { d'4 d' d' d' }
```
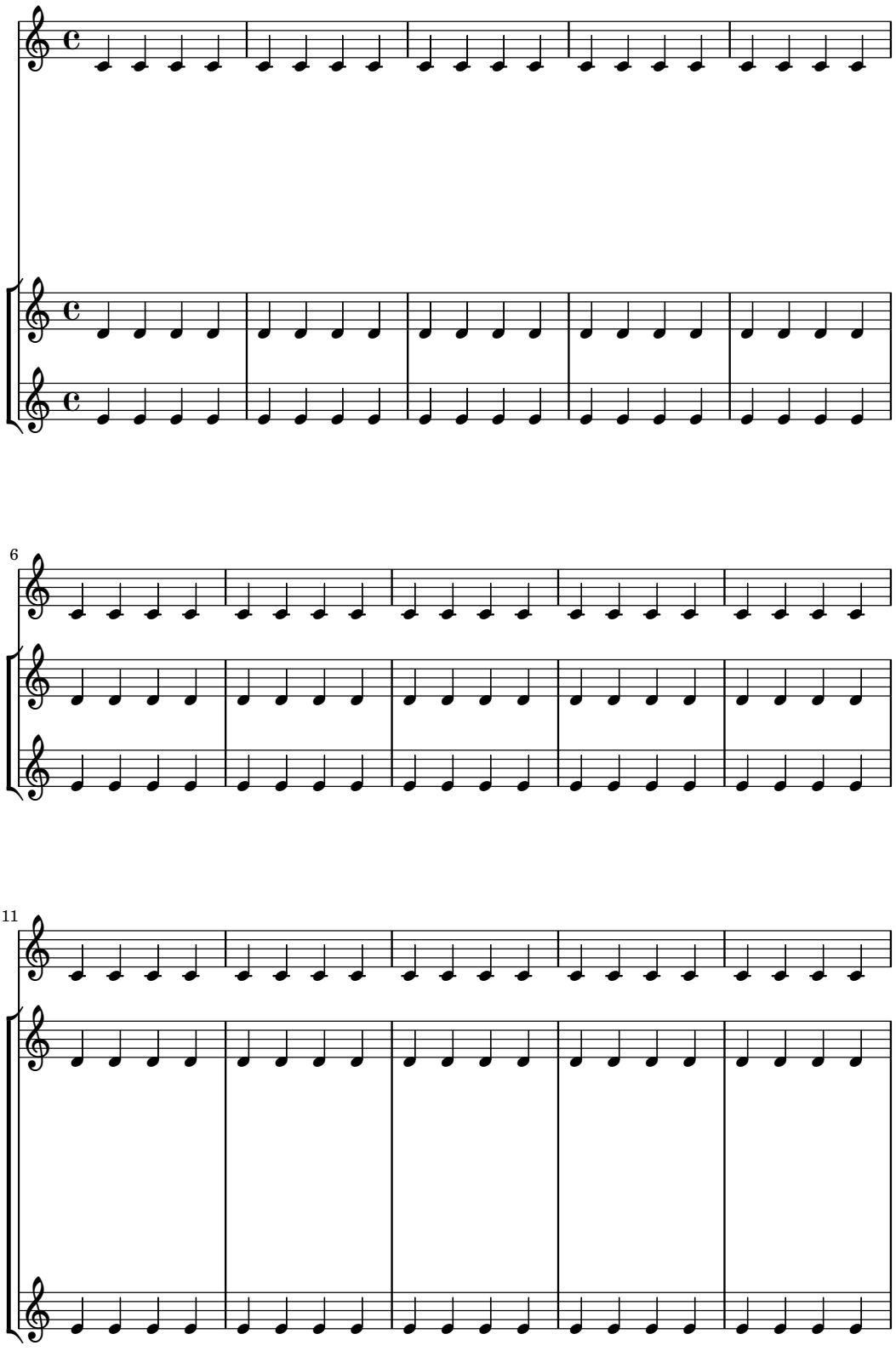
```
      }
    >>
  }
}
```





Note that here we assign two different values to the `line-break-system-details` attribute of the `NonMusicalPaperColumn` grob. Though the `line-break-system-details` attribute alist accepts many additional spacing parameters (including, for example, a corresponding `X-offset` pair), we need only set the `Y-offset` and `alignment-distances` pairs to control the vertical startpoint of every system and every staff. Finally, note that `alignment-distances` specifies the vertical positioning of staves but not of staff groups.

```
\header { tagline = ##f }
\paper { left-margin = 0\mm }
\book {
  \score {
    <<
```

```
      \new Staff <<
        \new Voice {
          \overrideProperty Score.NonMusicalPaperColumn.line-break-system-details
            #'((Y-offset . 0)
               (alignment-distances . (30 10)))
          s1*5 \break
          \overrideProperty Score.NonMusicalPaperColumn.line-break-system-details
            #'((Y-offset . 60)
               (alignment-distances . (10 10)))
          s1*5 \break
          \overrideProperty Score.NonMusicalPaperColumn.line-break-system-details
            #'((Y-offset . 100)
               (alignment-distances . (10 30)))
          s1*5 \break
        }
        \new Voice { \repeat unfold 15 { c'4 c' c' c' } }
      >>
      \new StaffGroup <<
        \new Staff { \repeat unfold 15 { d'4 d' d' d' } }
        \new Staff { \repeat unfold 15 { e'4 e' e' e' } }
      >>
    >>
  }
}
```



Some points to consider:

- When using `alignment-distances`, lyrics and other non-staff lines do not count as a staff.
- The units of the numbers passed to `X-offset`, `Y-offset` and `alignment-distances` are interpreted as multiples of the distance between adjacent staff lines. Positive values move staves and lyrics up, negative values move staves and lyrics down.
- Because the `NonMusicalPaperColumn.line-break-system-details` settings given here allow the positioning of staves and systems anywhere on the page, it is possible to violate

paper or margin boundaries or even to print staves or systems on top of one another. Reasonable values passed to these different settings will avoid this.

See also

Snippets: Section "Spacing" in *Snippets*.

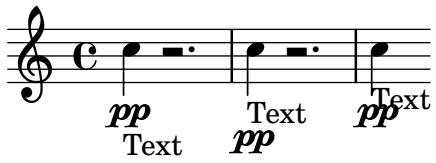
4.4.3 Vertical collision avoidance

Intuitively, there are some objects in musical notation that belong to the staff and there are other objects that should be placed outside the staff. Objects belonging outside the staff include things such as rehearsal marks, text and dynamic markings (from now on, these will be called outside-staff objects). LilyPond's rule for the vertical placement of outside-staff objects is to place them as close to the staff as possible but not so close that they collide with another object.

LilyPond uses the `outside-staff-priority` property to determine whether a grob is an outside-staff object: if `outside-staff-priority` is a number, the grob is an outside-staff object. In addition, `outside-staff-priority` tells LilyPond in which order the objects should be placed.

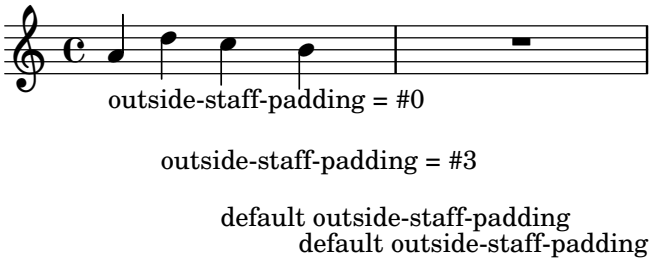
First, LilyPond places all the objects that do not belong outside the staff. Then it sorts the outside-staff objects according to their `outside-staff-priority` (in increasing order). One by one, LilyPond takes the outside-staff objects and places them so that they do not collide with any objects that have already been placed. That is, if two outside-staff grobs are competing for the same space, the one with the lower `outside-staff-priority` will be placed closer to the staff.

```
c4_"Text"\pp
r2.
\once \override TextScript.outside-staff-priority = #1
c4_"Text"\pp % this time the text will be closer to the staff
r2.
% by setting outside-staff-priority to a non-number,
% we disable the automatic collision avoidance
\once \override TextScript.outside-staff-priority = ##f
\once \override DynamicLineSpanner.outside-staff-priority = ##f
c4_"Text"\pp % now they will collide
```



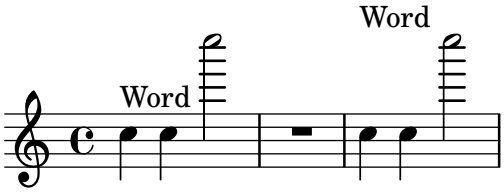
The vertical padding around outside-staff objects can be controlled with `outside-staff-padding`.

```
\once \override TextScript.outside-staff-padding = #0
a4-"outside-staff-padding = #0"
\once \override TextScript.outside-staff-padding = #3
d-"outside-staff-padding = #3"
c-"default outside-staff-padding"
b-"default outside-staff-padding"
R1
```



By default, outside-staff objects are placed so they avoid a horizontal collision with previously-positioned grobs. This can lead to situations in which objects are placed close to each other horizontally. As shown in the example below, setting `outside-staff-horizontal-padding` increases the horizontal spacing required, and in this case moves the text up to prevent it from getting too close to the ledger lines.

```
c4^"Word" c c''2
R1
\once \override TextScript.outside-staff-horizontal-padding = #1
c,,4^"Word" c c''2
```



See also

Snippets: Section "Spacing" in *Snippets*.
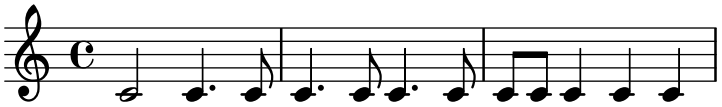
4.5 Horizontal spacing

4.5.1 Horizontal spacing overview

The spacing engine translates differences in durations into stretchable distances ('springs') of differing lengths. Longer durations get more space, shorter durations get less. The shortest durations get a fixed amount of space (which is controlled by `shortest-duration-space` in the Section "SpacingSpanner" in *Internals Reference* object). The longer the duration, the more space it gets: doubling a duration adds 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 c c4 c c
```



Normally, `spacing-increment` is set to 1.2 staff space, which is approximately the width of a note head, and `shortest-duration-space` is set to 2.0, meaning that the shortest note gets 2.4 staff space (2.0 times the `spacing-increment`) of horizontal space. This space is counted from the left edge of the symbol, so the shortest notes are generally followed by one NHW of space.
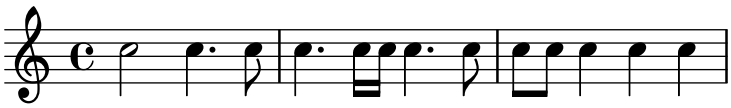
If one would follow the above procedure exactly, then adding a single 32nd note to a score that uses 8th and 16th notes, would widen up the entire score a lot. The shortest note is no longer a 16th, but a 32nd, thus adding 1 NHW to every note. To prevent this, the shortest duration for spacing is not the shortest note in the score, but rather the one which occurs most frequently.

The most common shortest duration is determined as follows: in every measure, the shortest duration is determined. The most common shortest duration is taken as the basis for the spacing, with the stipulation that this shortest duration should always be equal to or shorter than an 8th note. The shortest duration is printed when you run `lilypond` with the '`--verbose`' option.
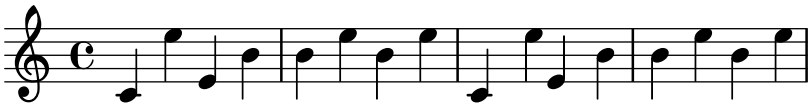
These durations may also be customized. If you set the `common-shortest-duration` in Section "SpacingSpanner" in *Internals Reference*, then this sets the base duration for spacing. The maximum duration for this base (normally an 8th), is set through `base-shortest-duration`.

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 c c4 c c
```



In the *Essay on automated music engraving*, it was explained that stem directions influence spacing (see Section "Optical spacing" in *Essay*). 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 535.

See also

Essay on automated music engraving: Section "Optical spacing" in *Essay*.

Snippets: Section "Spacing" in *Snippets*.

Internals Reference: Section "SpacingSpanner" in *Internals Reference*, Section "NoteSpacing" in *Internals Reference*, Section "StaffSpacing" in *Internals Reference*, Section "NonMusicalPaperColumn" in *Internals Reference*.

Known issues and warnings

There is no convenient mechanism to manually override spacing. The following work-around may be used to insert extra space into a score, adjusting the padding value as necessary.

```
\override Score.NonMusicalPaperColumn.padding = #10
```
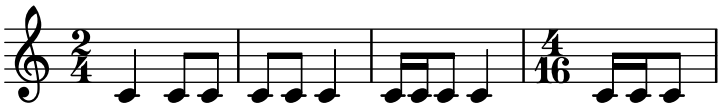
No work-around exists for decreasing the amount of space.

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.
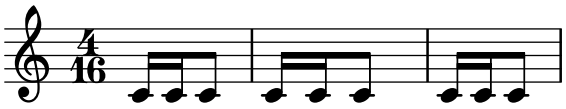
In the following example, the time signature change introduces a new section, and hence the 16ths notes are automatically spaced slightly wider.

```
\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 at that musical moment. If the automatic spacing adjustments do not give the required spacing, manual `\override`s may be applied to its properties. These must be applied at the same musical moment as the `\newSpacingSection` command itself. They will then affect the spacing of all the following music until the properties are changed in a new spacing section, for example,

```
\time 4/16
c16[ c c8]
\newSpacingSection
\override Score.SpacingSpanner.spacing-increment = #2
c16[ c c8]
\newSpacingSection
\revert Score.SpacingSpanner.spacing-increment
c16[ c c8]
```



See also

Snippets: Section "Spacing" in *Snippets*.
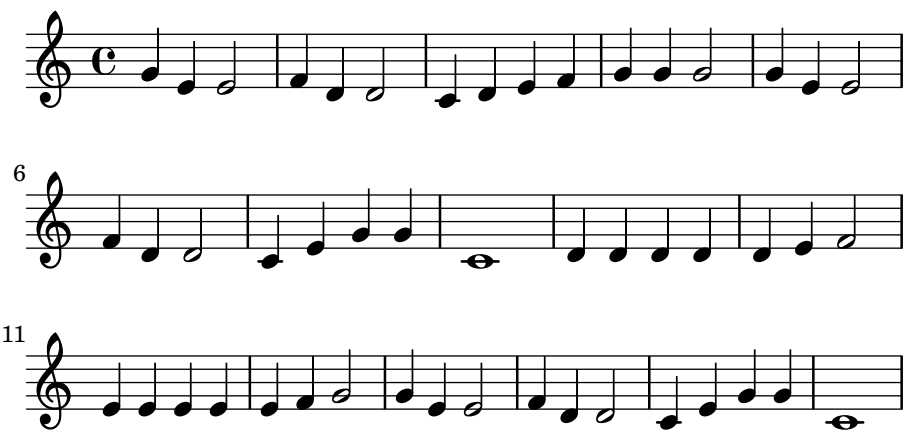
Internals Reference: Section "SpacingSpanner" in *Internals Reference*.

4.5.3 Changing horizontal spacing
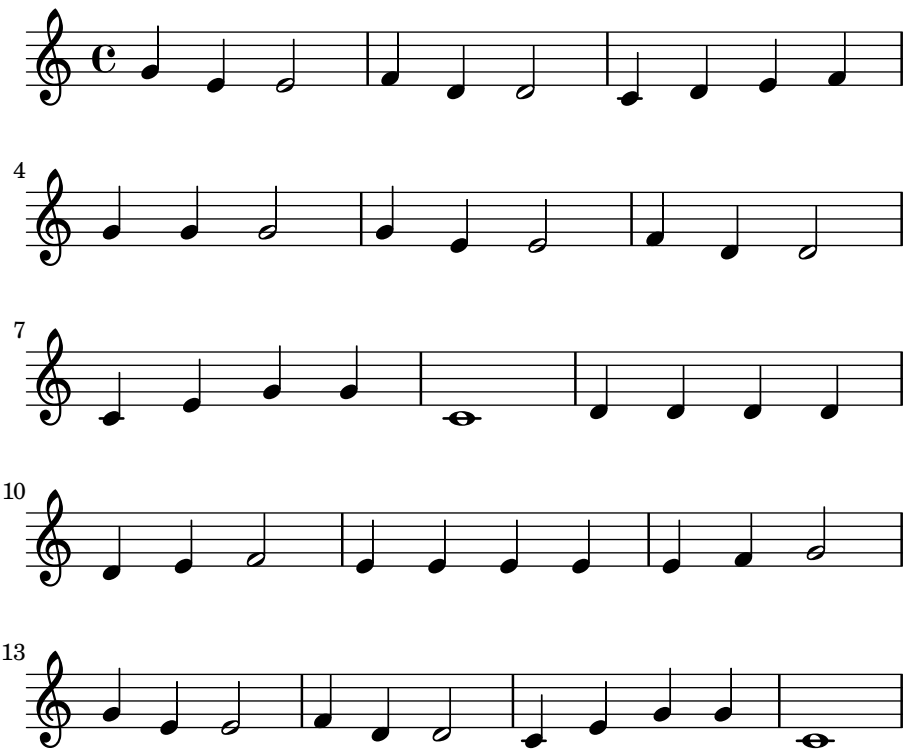
Horizontal spacing may be altered with the `base-shortest-duration` property. Here we compare the same music; once without altering the property, and then altered. Larger values of `ly:make-moment` will produce smaller music. Note that `ly:make-moment` constructs a duration, so `1 4` is a longer duration 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 |
  }
```

```
}
```



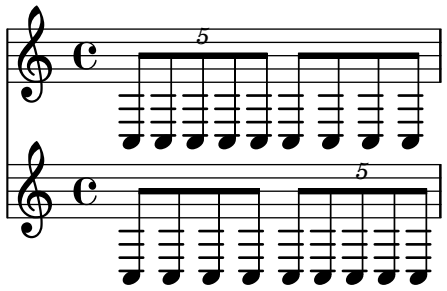
```
\score {
  \relative c'' {
    g4 e e2 | f4 d d2 | c4 d e f | g4 g g2 |
    g4 e e2 | f4 d d2 | c4 e g g | c,1 |
    d4 d d d | d4 e f2 | e4 e e e | e4 f g2 |
    g4 e e2 | f4 d d2 | c4 e g g | c,1 |
  }
  \layout {
    \context {
      \Score
      \override SpacingSpanner.base-shortest-duration = #(ly:make-moment 1/16)
    }
  }
}
```



Selected Snippets

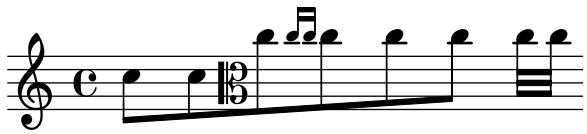
By default, spacing in tuplets depends on various non-duration factors (such as accidentals, clef changes, etc). To disregard such symbols and force uniform equal-duration spacing, use `Score.SpacingSpanner.uniform-stretching`. This property can only be changed at the beginning of a score,

```
\score {
  <<
    \new Staff {
      \tuplet 5/4 { c8 c c c c } c8 c c c
    }
    \new Staff {
      c8 c c c \tuplet 5/4 { c8 c c c c }
    }
  >>
  \layout {
    \context {
      \Score
      \override SpacingSpanner.uniform-stretching = ##t
    }
  }
}
```



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[ c] }
```



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 normal default setting is false, but if the score has only one system the default value is true.

The option `ragged-last` is similar to `ragged-right`, but only affects the last line of the piece. No restrictions are put on that line. The result is similar to formatting text paragraphs. In a paragraph, the last line simply takes its natural horizontal length.

```
\layout {
  indent = #0
  line-width = #150
  ragged-last = ##t
}
```

See also

Snippets: Section "Spacing" in *Snippets*.

4.5.5 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.
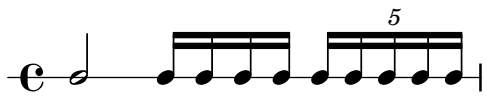
LilyPond supports five different settings for proportional notation, which may be used together or alone:

- `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.

```
\score {
  <<
    \new RhythmicStaff {
      c'2 c'16 c' c' c' \tuplet 5/4 { c'16 c' c' c' c' }
    }
  >>
}
```

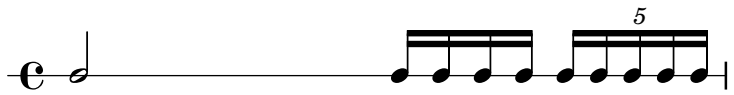


Notice that the half note which begins the measure takes up far less than half of the horizontal space of the measure. Likewise, the sixteenth notes and sixteenth-note quintuplets (or twentieth notes) which end the measure together take up far more than half the horizontal space of the measure.

In classical engraving, this spacing may be exactly what we want because we can borrow horizontal space from the half note and conserve horizontal space across the measure as a whole.

On the other hand, if we want to insert a measured timeline or other graphic above or below our score, we need proportional notation. We turn proportional notation on with the proportionalNotationDuration setting.

```
\score {
  <<
    \new RhythmicStaff {
      c'2 c'16 c' c' c' \tuplet 5/4 { c'16 c' c' c' c' }
    }
  >>
 \layout {
    \context {
      \Score
      proportionalNotationDuration = #(ly:make-moment 1/20)
    }
  }
}
```



The half note at the beginning of the measure and the faster notes in the second half of the measure now occupy equal amounts of horizontal space. We could place a measured timeline or graphic above or below this example.

The `proportionalNotationDuration` setting is a context setting that lives in `Score`. Remember that context settings can appear in one of three locations within our input file – in a `\with` block, in a `\context` block, or directly in music entry preceded by the `\set` command. As with all context settings, users can pick which of the three different locations they would like to set `proportionalNotationDuration` in to.

The `proportionalNotationDuration` setting takes a single argument, which is the reference duration against that 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. Values such as `(ly:make-moment 1/16)`, `(ly:make-moment 1/8)`, and `(ly:make-moment 3/97)` are all possible as well.

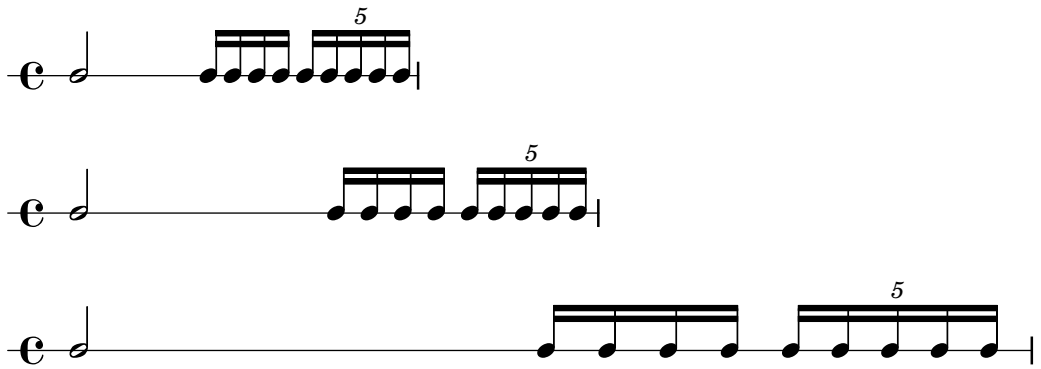
How do we select the right reference duration to pass to `proportionalNotationDuration`? Usually by a process of trial and error, beginning with a duration close to the fastest (or smallest) duration in the piece. Smaller reference durations space music loosely; larger reference durations space music tightly.

```
\score {
  <<
    \new RhythmicStaff {
      c'2 c'16 c' c' c' \tuplet 5/4 { c'16 c' c' c' c' }
    }
  >>
  \layout {
    \context {
      \Score
      proportionalNotationDuration = #(ly:make-moment 1/8)
    }
  }
```

```
}

\score {
  <<
    \new RhythmicStaff {
      c'2 c'16 c' c' c' \tuplet 5/4 { c'16 c' c' c' c' }
    }
  >>
  \layout {
    \context {
      \Score
      proportionalNotationDuration = #(ly:make-moment 1/16)
    }
  }
}

\score {
  <<
    \new RhythmicStaff {
      c'2 c'16 c' c' c' \tuplet 5/4 { c'16 c' c' c' c' }
    }
  >>
  \layout {
    \context {
      \Score
      proportionalNotationDuration = #(ly:make-moment 1/32)
    }
  }
}
```



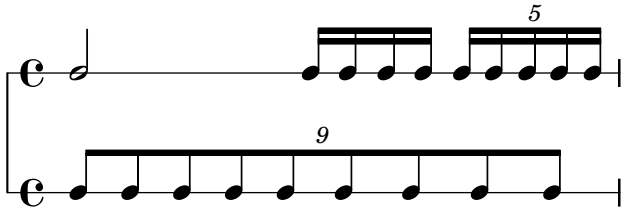
Note that too large a reference duration – such as the eighth note, above – spaces music too tightly and can cause note head collisions. Also that proportional notation in general takes up more horizontal space than classical spacing. Proportional spacing provides rhythmic clarity at the expense of horizontal space.

Next we examine how to optimally space overlapping tuplets.

We start by examining what happens to our original example, with classical spacing, when we add a second staff with a different type of tuplet.

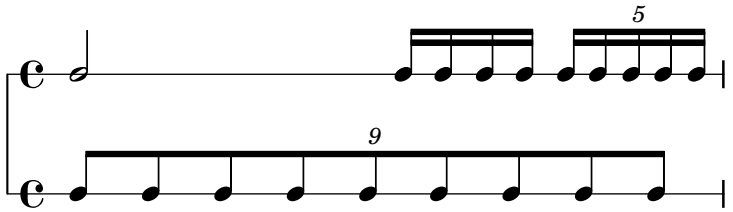
```
\score {
  <<
    \new RhythmicStaff {
```

```
      c'2 c'16 c' c' c' \tuplet 5/4 { c'16 c' c' c' c' }
    }
    \new RhythmicStaff {
      \tuplet 9/8 { c'8 c' c' c' c' c' c' c' c' }
    }
  >>
}
```



The spacing is bad because the evenly spaced notes of the bottom staff do not stretch uniformly. Classical engravings include very few complex triplets and so classical engraving rules can generate this type of result. Setting `proportionalNotationDuration` fixes this.

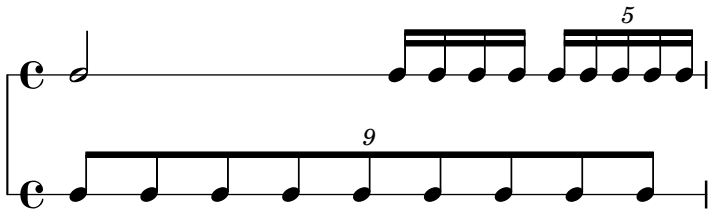
```
\score {
  <<
    \new RhythmicStaff {
      c'2 c'16 c' c' c' \tuplet 5/4 { c'16 c' c' c' c' }
    }
    \new RhythmicStaff {
      \tuplet 9/8 { c'8 c' c' c' c' c' c' c' c' }
    }
  >>
  \layout {
    \context {
      \Score
      proportionalNotationDuration = #(ly:make-moment 1/20)
    }
  }
}
```



But if we look very carefully we can see that notes of the second half of the 9-tuplet space ever so slightly more widely than the notes of the first half of the 9-tuplet. To ensure uniform stretching, we turn on `uniform-stretching`, which is a property of `SpacingSpanner`.

```
\score {
  <<
    \new RhythmicStaff {
      c'2 c'16 c' c' c' \tuplet 5/4 { c'16 c' c' c' c' }
    }
    \new RhythmicStaff {
      \tuplet 9/8 { c'8 c' c' c' c' c' c' c' c' }
```

```
    }
  >>
  \layout {
    \context {
      \Score
      proportionalNotationDuration = #(ly:make-moment 1/20)
      \override SpacingSpanner.uniform-stretching = ##t
    }
  }
}
```



Our two-staff example now spaces exactly, our rhythmic relationships are visually clear, and we can include a measured timeline or graphic if we want.

Note that the LilyPond's proportional notation package expects that all proportional scores set the SpacingSpanner's 'uniform-stretching attribute to ##t. Setting proportionalNotation-Duration without also setting the SpacingSpanner's 'uniform-stretching attribute to ##t will, for example, cause Skips to consume an incorrect amount of horizontal space.

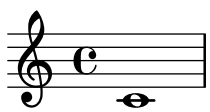
The SpacingSpanner is an abstract grob that lives in the Score context. As with our settings of proportionalNotationDuration, overrides to the SpacingSpanner can occur in any of three different places in our input file – in the Score \with block, in a Score \context block, or in note entry directly.
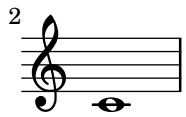
There is by default only one `SpacingSpanner` per `Score`. This means that, by default, `uniform-stretching` is either turned on for the entire score or turned off for the entire score. We can, however, override this behavior and turn on different spacing features at different places in the score. We do this with the command `\newSpacingSection`. See Section 4.5.2 [New spacing area], page 532, for more info.

Next we examine the effects of the `Separating_line_group_engraver` and see why proportional scores frequently remove this engraver. The following example shows that there is a small amount of "prefatory" space just before the first note in each system.

```
\paper {
  indent = #0
}

\new Staff {
  c'1
  \break
  c'1
}
```

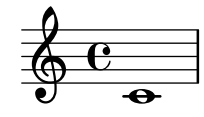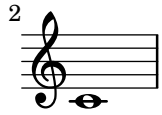




The amount of this prefatory space is the same whether after a time signature, a key signature or a clef. `Separating_line_group_engraver` is responsible for this space. Removing `Separating_line_group_engraver` reduces this space to zero.

```
\paper {
  indent = #0
}

\new Staff \with {
  \remove "Separating_line_group_engraver"
} {
  c'1
  \break
  c'1
}
```
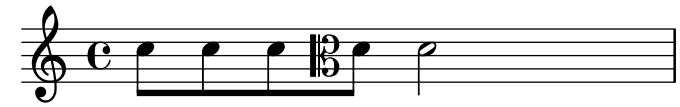




non-musical elements like time signatures, key signatures, clefs and accidentals are problematic in proportional notation. None of these elements has rhythmic duration. But all of these elements consume horizontal space. Different proportional scores approach these problems differently.
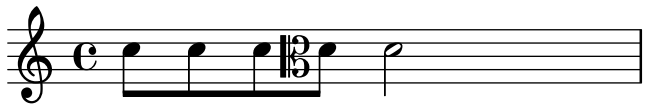
It may be possible to avoid spacing problems with key signatures simply by not having any. This is a valid option since most proportional scores are contemporary music. The same may be true of time signatures, especially for those scores that include a measured timeline or other graphic. But these scores are exceptional and most proportional scores include at least some time signatures. Clefs and accidentals are even more essential.

So what strategies exist for spacing non-musical elements in a proportional context? One good option is the `strict-note-spacing` property of `SpacingSpanner`. Compare the two scores below:

```
\new Staff {
  \set Score.proportionalNotationDuration = #(ly:make-moment 1/16)
  c''8 c'' c'' \clef alto d' d'2
}

\new Staff {
  \set Score.proportionalNotationDuration = #(ly:make-moment 1/16)
  \override Score.SpacingSpanner.strict-note-spacing = ##t
  c''8 c'' c'' \clef alto d' 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`
- `\set tupletFullLength = ##t`
- `\override Beam.breakable = ##t`
- `\override Glissando.breakable = ##t`
- `\override TextSpanner.breakable = ##t`
- `\remove "Forbid_line_break_engraver" in the Voice context`

These settings space grace notes strictly, extend tuplet brackets to mark both rhythmic start- and stop-points, and allow spanning elements to break across systems and pages. See the respective parts of the manual for these related settings.

See also

Notation Reference: Section 4.5.2 [New spacing area], page 532.

Snippets: Section “Spacing” in *Snippets*.

4.6 Fitting music onto fewer pages

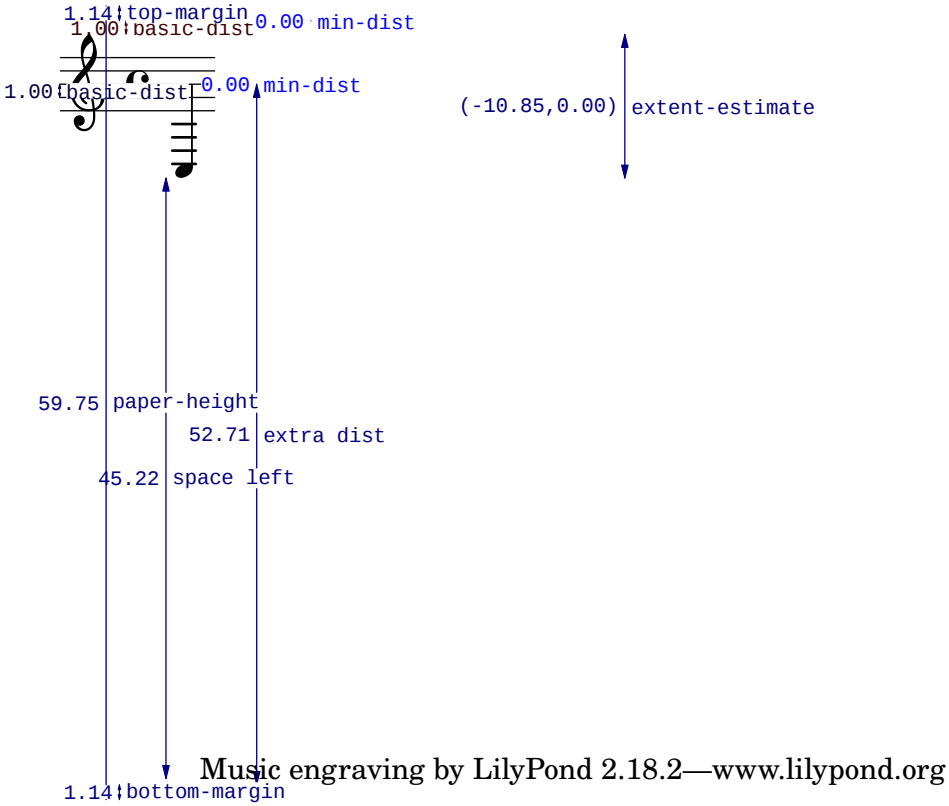
Sometimes you can end up with one or two staves on a second (or third, or fourth. . .) page. This is annoying, especially if you look at previous pages and it looks like there is plenty of room left on those.

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 541.

4.6.1 Displaying spacing

To graphically display the dimensions of vertical layout variables that may be altered for page formatting, set `annotate-spacing` in the `\paper` block:

```
\book {
  \score { { c4 } }
  \paper { annotate-spacing = ##t }
}
```



All layout dimensions are displayed in staff-spaces, regardless of the units specified in the `\paper` or `\layout` block. In the above example, `paper-height` has a value of 59.75 `staff-spaces`, and the `staff-size` is 20 points (the default value). Note that:

1 point = (25.4/72.27) mm

1 staff-space = (`staff-size`)/4 pts
= (`staff-size`)/4 * (25.4/72.27) mm

In this case, one `staff-space` is approximately equal to 1.757mm. 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

Notation Reference: Section 4.2.2 [Setting the staff size], page 506.

Snippets: Section “Spacing” in *Snippets*.

4.6.2 Changing spacing

The output of `annotate-spacing` reveals vertical dimensions in great detail. For details about modifying margins and other layout variables, see Section 4.1 [Page layout], page 494.

Other than margins, there are a few other options to save space:

- Force systems to move as close together as possible (to fit as many systems as possible onto a page) while being spaced so that there is no blank space at the bottom of the page.

```
\paper {
  system-system-spacing = #'((basic-distance . 0.1) (padding . 0))
  ragged-last-bottom = ##f
  ragged-bottom = ##f
}
```

- Force the number of systems. This can help in two ways. Just setting a value, even the same value as the number of systems being typeset by default, will sometimes cause more systems to be fitted onto each page, as an estimation step is then bypassed, giving a more accurate fit to each page. Also, forcing an actual reduction in the number of systems may save a further page. For example, if the default layout has 11 systems, the following assignment will force a layout with 10 systems.
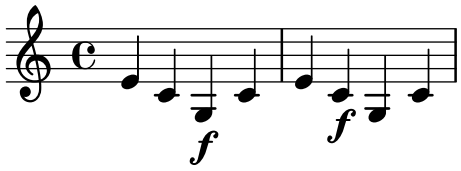
```
\paper {
  system-count = #10
}
```

- Force the number of pages. For example, the following assignment will force a layout with 2 pages.

```
\paper {
  page-count = #2
}
```
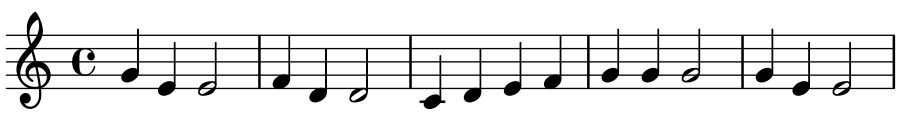
- Avoid (or reduce) objects that increase the vertical size of a system. For example, volta repeats (or alternate repeats) require extra space. If these repeats are spread over two systems, they will take up more space than one system with the volta repeats and another system without. For example, dynamics that 'stick out' of a system can be moved closer to the staff:

```
e4 c g\f c
e4 c g-\tweak X-offset #-2.7 \f c
```



- Alter the horizontal spacing via `SpacingSpanner`. For more details, see Section 4.5.3 [Changing horizontal spacing], page 532. The following example illustrates the default spacing:
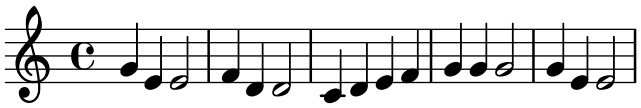
```
\score {
  \relative c'' {
    g4 e e2 |
    f4 d d2 |
    c4 d e f |
    g4 g g2 |
    g4 e e2 |
  }
}
```



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 [Page layout], page 494, Section 4.5.3 [Changing horizontal spacing], page 532.

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:

Output definitions - blueprints for contexts

This section explains the relevance of output definitions when working with contexts. Examples for actual output definitions are given later (see [Changing all contexts of the same type], page 555).

While music written in a file may refer to context types and names, contexts are created only when the music is actually being interpreted. LilyPond interprets music under control of an 'output definition' and may do so for several different output definitions, resulting in different output. The output definition relevant for printing music is specified using `\layout`.

A much simpler output definition used for producing Midi output is specified using `\midi`. Several other output definitions are used by LilyPond internally, like when using the part combiner ([Automatic part combining], page 167) or creating music quotes ([Quoting other voices], page 195).

Output definitions define the relation between contexts as well as their respective default settings. While most changes will usually be made inside of a `\layout` block, Midi-related settings will only have an effect when made within a `\midi` block.

Some settings affect several outputs: for example, if `autoBeaming` is turned off in some context, beams count as melismata for the purpose of matching music to lyrics as described in

[1] Section "Scheme tutorial" in *Extending*, contains a short tutorial on entering numbers, lists, strings, and symbols in Scheme.

[Automatic syllable durations], page 243. This matching is done both for printed output as well as for Midi. If changes made to `autoBeaming` within a context definition of a `\layout` block are not repeated in the corresponding `\midi` block, lyrics and music will get out of sync in Midi.

See also

Installed Files: '`ly/engraver-init.ly`'. '`ly/performer-init.ly`'.

Score - the master of all contexts

This is the top level notation context. No other context can contain a Score context. By default the Score context handles the administration of time signatures and makes sure that items such as clefs, time signatures, and key-signatures are aligned across staves.

A Score context is instantiated implicitly when a `\score {...}` block is processed.

Top-level contexts - staff containers

StaffGroup

Groups staves while adding a bracket on the left side, grouping the staves together. The bar lines of the contained staves are connected vertically. `StaffGroup` only consists of a collection of staves, with a bracket in front and spanning bar lines.

ChoirStaff

Identical to `StaffGroup` except that the bar lines of the contained staves are not connected vertically.

GrandStaff

A group of staves, with a brace on the left side, grouping the staves together. The bar lines of the contained staves are connected vertically.

PianoStaff

Just like `GrandStaff`, but with support for instrument names to the left of each system.

Intermediate-level contexts - staves

Staff

Handles clefs, bar lines, keys, accidentals. It can contain `Voice` contexts.

RhythmicStaff

Like `Staff` but for printing rhythms. Pitches are ignored when engraving; the notes are printed on one line. The MIDI rendition retains pitches unchanged.

TabStaff

Context for generating tablature. By default lays the music expression out as a guitar tablature, printed on six lines.

DrumStaff

Handles typesetting for percussion. Can contain `DrumVoice`

VaticanaStaff

Same as `Staff`, except that it is designed for typesetting a piece in gregorian style.

MensuralStaff

Same as `Staff`, except that it is designed for typesetting a piece in mensural style.

Bottom-level contexts - voices

Voice-level contexts initialise certain properties and start appropriate engravers. A bottom-level context is one without `defaultchild`. While it is possible to let it accept/contain subcontexts, they can only be created and entered explicitly.

Voice

Corresponds to a voice on a staff. This context handles the conversion of dynamic signs, stems, beams, super- and 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.

CueVoice

A voice context used to render notes of a reduced size, intended primarily for adding cue notes to a staff, see [Formatting cue notes], page 198. Usually left to be created implicitly.

ChordNames

Typesets chord names.

5.1.2 Creating and referencing contexts

LilyPond will create lower-level contexts automatically if a music expression is encountered before a suitable context exists, but this is usually successful only for simple scores or music fragments like the ones in the documentation. For more complex scores it is advisable to specify all contexts explicitly with either the `\new` or `\context` command. The syntax of these two commands is very similar:
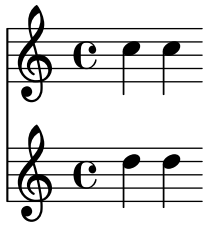
`[\new | \context]` *`Context`* `[ = name] [music-expression]`

where either `\new` or `\context` may be specified. *Context* is the type of context which is to be created, *name* is an optional name to be given to the particular context being created and *music-expression* is a single music expression that is to be interpreted by the engravers and performers in this context.

The `\new` prefix without a name is commonly used to create scores with many staves:
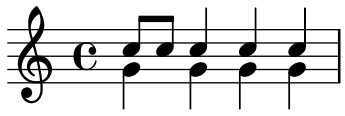
```
<<
  \new Staff {
    % leave the Voice context to be created implicitly
    c4 c
  }
  \new Staff {
    d4 d
```

```
  }
>>
```



and to place several voices into one staff:

```
<<
  \new Staff <<
    \new Voice {
      \voiceOne
      c8 c c4 c c
    }
    \new Voice {
      \voiceTwo
      g4 g g g
    }
  >>
>>
```
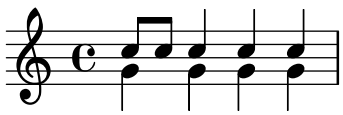


`\new` should always be used to specify unnamed contexts.

The difference between `\new` and `\context` is in the action taken:

- `\new` with or without a name will always create a fresh, distinct, context, even if one with the same name already exists:

```
<<
  \new Staff <<
    \new Voice = "A" {
      \voiceOne
      c8 c c4 c c
    }
    \new Voice = "A" {
      \voiceTwo
      g4 g g g
    }
  >>
>>
```
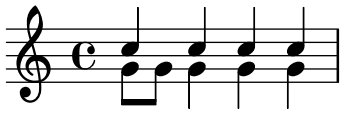


- `\context` with a name specified will create a distinct context only if a context of the same type with the same name in the same context hierarchy does not already exist. Otherwise

it will be taken as a reference to that previously created context, and its music expression will be passed to that context for interpretation.

One application of named contexts is in separating the score layout from the musical content. Either of these two forms is valid:

```
\score {
  <<
    % score layout
    \new Staff <<
      \new Voice = "one" {
        \voiceOne
      }
      \new Voice = "two" {
        \voiceTwo
      }
    >>
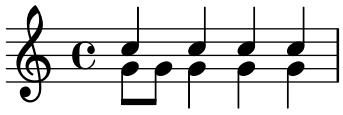
    % musical content
    \context Voice = "one" {
      \relative c'' {
        c4 c c c
      }
    }
    \context Voice = "two" {
      \relative c'' {
        g8 g g4 g g
      }
    }
  >>
}
```



```
\score {
  <<
    % score layout
    \new Staff <<
      \context Voice = "one" {
        \voiceOne
      }
      \context Voice = "two" {
        \voiceTwo
      }
    >>

    % musical content
    \context Voice = "one" {
      \relative c'' {
        c4 c c c
      }
    }
```

```
    \context Voice = "two" {
      \relative c'' {
        g8 g g4 g g
      }
    }
  >>
}
```



Alternatively, variables may be employed to similar effect. See Section "Organizing pieces with variables" in *Learning Manual*.

- `\context` with no name will match the first of any previously created contexts of the same type in the same context heirarchy, even one that has been given a name, and its music expression will be passed to that context for interpretation. This form is rarely useful. However, `\context` with no name and no music expression is used to set the context in which a Scheme procedure specified with `\applyContext` is executed:

```
\new Staff \relative c' {
  c1
  \context Timing
  \applyContext #(lambda (ctx)
                   (newline)
                   (display (ly:context-current-moment ctx)))
  c1
}
```

A context must be named if it is to be referenced later, for example when lyrics are associated with music:

```
\new Voice = "tenor" music
...
\new Lyrics \lyricsto "tenor" lyrics
```

For details of associating lyrics with music see [Automatic syllable durations], page 243.

The properties of all contexts of a particular type can be modified in a `\layout` block (with a different syntax), see [Changing all contexts of the same type], page 555. This construct also provides a means of keeping layout instructions separate from the musical content. If a single context is to be modified, a `\with` block must be used, see [Changing just one specific context], page 558.

See also

Learning Manual: Section "Organizing pieces with variables" in *Learning Manual*.

Notation Reference: [Changing just one specific context], page 558, [Automatic syllable durations], page 243.

5.1.3 Keeping contexts alive

Contexts are usually terminated at the first musical moment in which they have nothing to do. So `Voice` contexts die as soon as they contain no events; `Staff` contexts die as soon as all the `Voice` contexts within them contain no events; etc. This can cause difficulties if earlier contexts which have died have to be referenced, for example, when changing staves with `\change`

commands, associating lyrics with a voice with `\lyricsto` commands, or when adding further musical events to an earlier context.

There is an exception to this general rule: just one of the `Voice` contexts in a `Staff` context or in a `<<...>>` construct will always persist to the end of the enclosing `Staff` context or `<<...>>` construct, even though there may be periods when it has nothing to do. The context to persist in this way will be the first one encountered in the first enclosed `{...}` construct, ignoring any in enclosed `<<...>>` constructs.
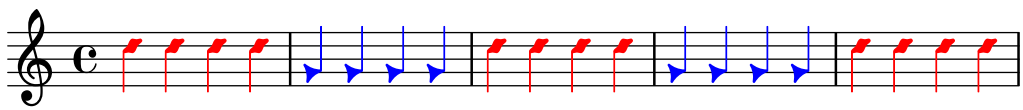
Any context can be kept alive by ensuring it has something to do at every musical moment. `Staff` contexts are kept alive by ensuring one of their voices is kept alive. One way of doing this is to add spacer rests to a voice in parallel with the real music. These need to be added to every `Voice` context which needs to be kept alive. If several voices are to be used sporadically it is safest to keep them all alive rather than attempting to rely on the exceptions mentioned above.

In the following example, both voice A and voice B are kept alive in this way for the duration of the piece:

```
musicA = \relative c'' { d4 d d d }
musicB = \relative c'' { g4 g g g }
keepVoicesAlive = {
  <<
    \new Voice = "A" { s1*5 }  % Keep Voice "A" alive for 5 bars
    \new Voice = "B" { s1*5 }  % Keep Voice "B" alive for 5 bars
  >>
}

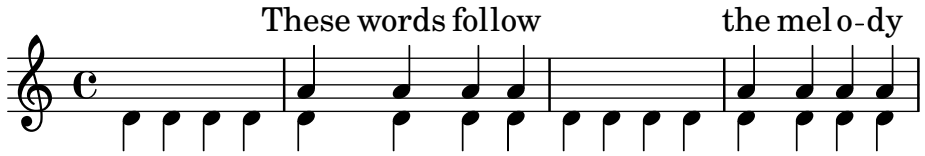
music = {
  \context Voice = "A" {
    \voiceOneStyle
    \musicA
  }
  \context Voice = "B" {
    \voiceTwoStyle
    \musicB
  }
  \context Voice = "A" { \musicA }
  \context Voice = "B" { \musicB }
  \context Voice = "A" { \musicA }
}

\score {
  \new Staff <<
    \keepVoicesAlive
    \music
  >>
}
```



The following example shows how a sporadic melody line with lyrics might be written using this approach. In a real situation the melody and accompaniment would consist of several different sections, of course.

```
melody = \relative c'' { a4 a a a }
accompaniment = \relative c' { d4 d d d }
words = \lyricmode { These words fol -- low the mel -- o -- dy }
\score {
  <<
    \new Staff = "music" {
      <<
        \new Voice = "melody" {
          \voiceOne
          s1*4  % Keep Voice "melody" alive for 4 bars
        }
        {
          \new Voice = "accompaniment" {
            \voiceTwo
            \accompaniment
          }
          <<
            \context Voice = "melody" { \melody }
            \context Voice = "accompaniment" { \accompaniment }
          >>
          \context Voice = "accompaniment" { \accompaniment }
          <<
            \context Voice = "melody" { \melody }
            \context Voice = "accompaniment" { \accompaniment }
          >>
        }
      >>
    }
    \new Lyrics \with { alignAboveContext = #"music" }
    \lyricsto "melody" { \words }
  >>
}
```

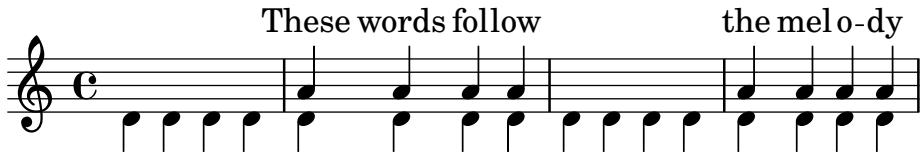


An alternative way, which may be better in many circumstances, is to keep the melody line alive by simply including spacer notes to line it up correctly with the accompaniment:

```
melody = \relative c'' {
  s1  % skip a bar
  a4 a a a
  s1  % skip a bar
  a4 a a a
}
accompaniment = \relative c' {
  d4 d d d
  d4 d d d
  d4 d d d
  d4 d d d
}
```

```
words = \lyricmode { These words fol -- low the mel -- o -- dy }

\score {
  <<
    \new Staff = "music" {
      <<
        \new Voice = "melody" {
          \voiceOne
          \melody
        }
        \new Voice = "accompaniment" {
          \voiceTwo
          \accompaniment
        }
      >>
    }
    \new Lyrics \with { alignAboveContext = #"music" }
    \lyricsto "melody" { \words }
  >>
}
```



5.1.4 Modifying context plug-ins

Notation contexts (like `Score` and `Staff`) not only store properties, they also contain plug-ins called 'engravers' that create notation elements. For example, the `Voice` context contains a `Note_heads_engraver` and the `Staff` context contains a `Key_engraver`.

For a full a description of each plug-in, see Internals Reference ↦ Translation ↦ Engravers. Every context described in Internals Reference ↦ Translation ↦ Context. lists the engravers used for that context.
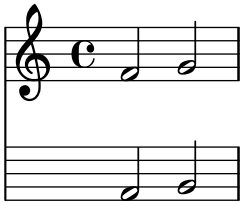
It can be useful to shuffle around these plug-ins. This is done by starting a new context with `\new` or `\context`, and modifying it,

```
\new context \with {
  \consists ...
  \consists ...
  \remove ...
  \remove ...
  etc.
}
{
  ...music...
}
```

where 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
```

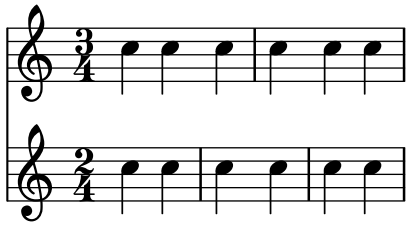
```
  }
  \new Staff \with {
     \remove "Time_signature_engraver"
     \remove "Clef_engraver"
  } {
    f2 g2
  }
>>
```



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.

```
\score {
  <<
    \new Staff \with {
      \consists "Timing_translator"
      \consists "Default_bar_line_engraver"
    }
    \relative c'' {
        \time 3/4
        c4 c c c c c
    }
  \new Staff \with {
    \consists "Timing_translator"
    \consists "Default_bar_line_engraver"
  }
  \relative c'' {
      \time 2/4
      c4 c c c c c
  }
>>
\layout {
  \context {
    \Score
    \remove "Timing_translator"
    \remove "Default_bar_line_engraver"
    }
  }
}
```



Known issues and warnings

The order in which the engravers are specified is the order in which they are called to carry out their processing. Usually the order in which the engravers are specified does not matter, but in a few special cases the order is important, for example where one engraver writes a property and another reads it, or where one engraver creates a grob and another must process it.

The following orderings are important:

- the `Bar_engraver` must normally be first,
- the `New_fingering_engraver` must come before the `Script_column_engraver`,
- the `Timing_translator` must come before the `Bar_number_engraver`.

See also

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

5.1.5 Changing context default settings

Context and grob properties can be changed with `\set` and `\override` commands, as described in Section 5.3 [Modifying properties], page 567. These commands create music events, making the changes take effect at the point in time the music is being processed.

In contrast, this section explains how to change the *default* values of context and grob properties at the time the context is created. There are two ways of doing this. One modifies the default values in all contexts of a particular type, the other modifies the default values in just one particular instance of a context.

Changing all contexts of the same type

The default context settings which are to be used for typesetting in `Score`, `Staff`, `Voice` and other contexts may be specified in a `\context` block within any `\layout` block.

Settings for Midi output as opposed to typesetting will have to be separately specified in `\midi` blocks (see [Output definitions - blueprints for contexts], page 545).

The `\layout` block should be placed within the `\score` block to which it is to apply, after the music.

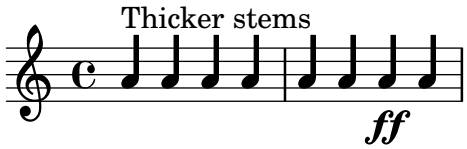
```
\layout {
  \context {
    \Voice
    [context settings for all Voice contexts]
  }
  \context {
    \Staff
    [context settings for all Staff contexts]
  }
}
```

The following types of settings may be specified:

- An `\override` command, but with the context name omitted

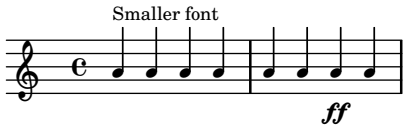
  ```
  \score {
    \relative c'' {
  ```

```
    a4^"Thicker stems" a a a
    a4 a a\ff a
  }
  \layout {
    \context {
      \Staff
      \override Stem.thickness = #4.0
    }
  }
}
```



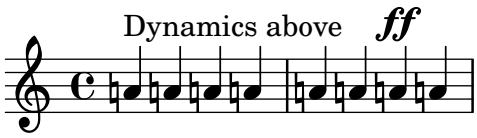
- Directly setting a context property

```
\score {
  \relative c'' {
    a4^"Smaller font" a a a
    a4 a a\ff a
  }
  \layout {
    \context {
      \Staff
      fontSize = #-4
    }
  }
}
```



- A predefined command such as `\dynamicUp` or a music expression like `\accidentalStyle dodecaphonic`

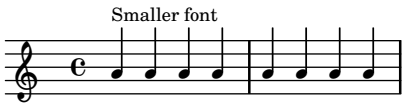
```
\score {
  \relative c'' {
    a4^"Dynamics above" a a a
    a4 a a\ff a
  }
  \layout {
    \context {
      \Voice
      \dynamicUp
    }
    \context {
      \Staff
      \accidentalStyle dodecaphonic
    }
  }
}
```



- A user-defined variable containing a `\with` block; for details of the `\with` block see [Changing just one specific context], page 558.
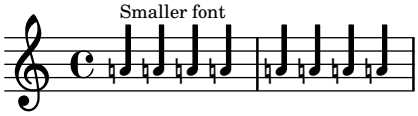
```
StaffDefaults = \with {
  fontSize = #-4
}

\score {
  \new Staff {
    \relative c'' {
      a4^"Smaller font" a a a
      a4 a a a
    }
  }
  \layout {
    \context {
      \Staff
      \StaffDefaults
    }
  }
}
```



Property-setting commands can be placed in a `\layout` block without being enclosed in a `\context` block. Such settings are equivalent to including the same property-setting commands at the start of every context of the type specified. If no context is specified *every* bottom-level context is affected, see [Bottom-level contexts - voices], page 547. The syntax of a property-setting command in a `\layout` block is the same as the same command written in the music stream.

```
\score {
  \new Staff {
    \relative c'' {
      a4^"Smaller font" a a a
      a4 a a a
    }
  }
  \layout {
    \accidentalStyle dodecaphonic
    \set fontSize = #-4
    \override Voice.Stem.thickness = #4.0
  }
}
```



Changing just one specific context

The context properties of just one specific context instance can be changed in a `\with` block. All other context instances of the same type retain the default settings built into LilyPond and modified by any `\layout` block within scope. The `\with` block must be placed immediately after the `\new` *context-type* command:

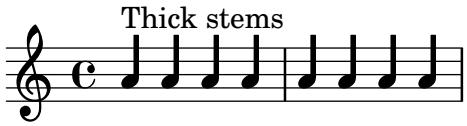
```
\new Staff \with { [context settings for this context instance only] }
{
  ...
}
```

Since such a 'context modification' is specified inside of music, it will affect *all* outputs (typesetting *and* Midi) as opposed to changes within an output definition.

The following types of settings may be specified:

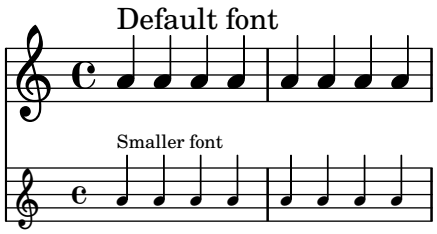
- An `\override` command, but with the context name omitted

```
\score {
  \new Staff {
    \new Voice \with { \override Stem.thickness = #4.0 }
    {
      \relative c'' {
        a4^"Thick stems" a a a
        a4 a a a
      }
    }
  }
}
```



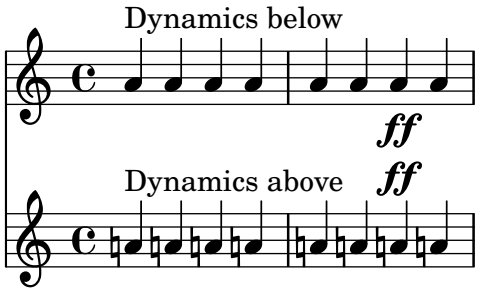
- Directly setting a context property

```
\score {
  <<
    \new Staff {
      \relative c'' {
        a4^"Default font" a a a
        a4 a a a
      }
    }
    \new Staff \with { fontSize = #-4 }
    {
      \relative c'' {
        a4^"Smaller font" a a a
        a4 a a a
      }
    }
  >>
}
```



- A predefined command such as `\dynamicUp`

```
\score {
  <<
    \new Staff {
      \new Voice {
        \relative c'' {
          a4^"Dynamics below" a a a
          a4 a a\ff a
        }
      }
    }
    \new Staff \with { \accidentalStyle dodecaphonic }
    {
      \new Voice \with { \dynamicUp }
      {
        \relative c'' {
          a4^"Dynamics above" a a a
          a4 a a\ff a
        }
      }
    }
  >>
}
```



Order of precedence

The value of a property which applies at a particular time is determined as follows:

- if an `\override` or `\set` command in the input stream is in effect that value is used,
- otherwise the default value taken from a `\with` statement on the context initiation statement is used,
- otherwise the default value taken from the most recent appropriate `\context` block in the `\layout` or `\midi` blocks is used,
- otherwise the LilyPond built-in default is used.

See also

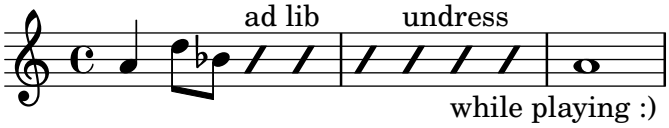
Learning Manual: Section “Modifying context properties” in *Learning Manual*.

Notation Reference: Section 5.1.1 [Contexts explained], page 545, [Bottom-level contexts - voices], page 547, Section 5.3.2 [The set command], page 567, Section 5.3.3 [The override command], page 569, Section 4.2.1 [The `\layout` block], page 504.

5.1.6 Defining new contexts

Specific contexts, like `Staff` and `Voice`, are made from simple building blocks. It is possible to create new types of contexts with different combinations of engraver plug-ins.

The next example shows how to build a different type of `Voice` context from scratch. It will be similar to `Voice`, but only prints centered slash note heads. It can be used to indicate improvisation in jazz pieces,



These settings are defined within a `\context` block inside a `\layout` block,

```
\layout {
  \context {
    ...
  }
}
```

In the following discussion, the example input shown should go in place of the ... in the previous fragment.

First it is necessary to define a name for the new context:

```
\name ImproVoice
```

Since it is similar to the `Voice` context, we want commands that work in (existing) `Voice` contexts to continue working. This is achieved by giving the new context an alias of `Voice`,

```
\alias Voice
```

The context will print notes and instructive texts, so we need to add the engravers which provide this functionality, plus the engraver which groups notes, stems and rests which occur at the same musical moment into columns,

```
\consists "Note_heads_engraver"
\consists "Text_engraver"
\consists "Rhythmic_column_engraver"
```

The note heads should all be placed on the center line,

```
\consists "Pitch_squash_engraver"
squashedPosition = #0
```

The `Pitch_squash_engraver` modifies note heads (created by the `Note_heads_engraver`) and sets their vertical position to the value of `squashedPosition`, in this case `0`, the center line.

The notes look like a slash, and have no stem,

```
\override NoteHead.style = #'slash
\hide Stem
```

All these plug-ins have to communicate under the control of the context. The mechanisms with which contexts communicate are established by declaring the context `\type`. Within a `\layout` block, most contexts will be of type `Engraver_group`. Some special contexts and contexts in `\midi` blocks use other context types. Copying and modifying an existing context definition will also fill in the type. Since this example creates a definition from scratch, it needs to be specified explicitly.

```
\type "Engraver_group"
```

Put together, we get

```
\context {
  \name ImproVoice
  \type "Engraver_group"
  \consists "Note_heads_engraver"
  \consists "Text_engraver"
  \consists "Rhythmic_column_engraver"
  \consists "Pitch_squash_engraver"
  squashedPosition = #0
  \override NoteHead.style = #'slash
  \hide Stem
  \alias Voice
}
```

Contexts form hierarchies. We want to place the `ImproVoice` context within the `Staff` context, just like normal `Voice` contexts. Therefore, we modify the `Staff` definition with the `\accepts` command,

```
\context {
  \Staff
  \accepts ImproVoice
}
```

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
}
```

To complete this example, changes affecting the context hierarchy should be repeated in a `\midi` block so that Midi output depends on the same context relations.

See also

Internals Reference: Section "Engraver_group" in *Internals Reference*, Section "Note_heads_engraver" in *Internals Reference*, Section "Text_engraver" in *Internals Reference*, Section "Rhythmic_column_engraver" in *Internals Reference*, Section "Pitch_squash_engraver" in *Internals Reference*.

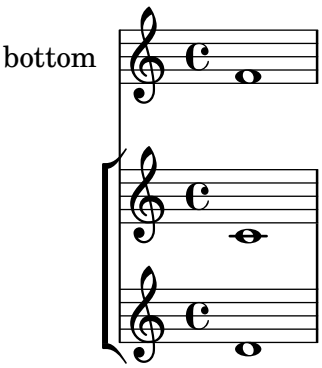
5.1.7 Context layout order

Contexts are normally positioned in a system from top to bottom in the order in which they are encountered in the input file. When contexts are nested, the outer context will include inner nested contexts as specified in the input file, provided the inner contexts are included in the outer context's "accepts" list. Nested contexts which are not included in the outer context's "accepts" list will be repositioned below the outer context rather than nested within it.

The "accepts" list of a context can be changed with the `\accepts` or `\denies` commands. `\accepts` adds a context to the "accepts" list and `\denies` removes a context from the list.

For example, a square-braced staff group is not usually found within a curved-braced staff with connecting staff bars, and a `GrandStaff` does not accept a `StaffGroup` inside it by default.

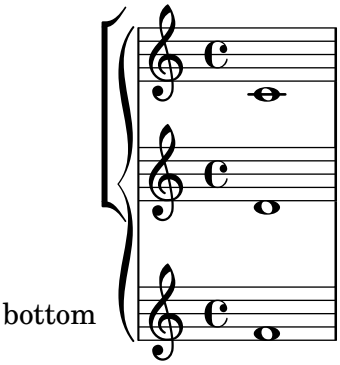
```
\score {
  \new GrandStaff <<
    \new StaffGroup <<
      \new Staff { c'1 }
      \new Staff { d'1 }
    >>
    \new Staff { \set Staff.instrumentName = bottom f'1 }
  >>
}
```



However, by using the `\accepts` command, `StaffGroup` can be added to the `GrandStaff` context:

```
\score {
  \new GrandStaff <<
    \new StaffGroup <<
      \new Staff { c'1 }
      \new Staff { d'1 }
    >>
    \new Staff { \set Staff.instrumentName = bottom f'1 }
  >>
  \layout {
    \context {
      \GrandStaff
      \accepts "StaffGroup"
    }
```

```
  }
}
```



`\denies` is mainly used when a new context is being based on another, but the required nesting differs. For example, the `VaticanaStaff` context is based on the `Staff` context, but with the `VaticanaVoice` context substituted for the `Voice` context in the "accepts" list.

Note that a context will be silently created implicitly if a command is encountered when there is no suitable context available to contain it.

Within a context definition, the type of subcontext to be implicitly created is specified using `\defaultchild`. A number of music events require a '`Bottom`' context: when such an event is encountered, subcontexts are created recursively until reaching a context with no '`defaultchild`' setting.

Implicit context creation can at times give rise to unexpected new staves or scores. Using `\new` to create contexts explicitly avoids those problems.

Sometimes a context is required to exist for just a brief period, a good example being the staff context for an ossia. This is usually achieved by introducing the context definition at the appropriate place in parallel with corresponding section of the main music. By default, the temporary context will be placed below all the existing contexts. To reposition it above the context called "main", it should be defined like this:

```
\new Staff \with { alignAboveContext = #"main" }
```

A similar situation arises when positioning a temporary lyrics context within a multi-staved layout such as a `ChoirStaff`, for example, when adding a second verse to a repeated section. By default the temporary lyrics context will be placed beneath the lower staves. By defining the temporary lyrics context with `alignBelowContext` it can be positioned correctly beneath the (named) lyrics context containing the first verse.

Examples showing this repositioning of temporary contexts can be found elsewhere — see Section "Nesting music expressions" in *Learning Manual*, Section 1.6.2 [Modifying single staves], page 182 and Section 2.1.2 [Techniques specific to lyrics], page 251.

See also

Learning Manual: Section "Nesting music expressions" in *Learning Manual*.

Notation Reference: Section 1.6.2 [Modifying single staves], page 182, Section 2.1.2 [Techniques specific to lyrics], page 251.

Application Usage: Section "An extra staff appears" in *Application Usage*.
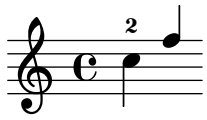
Installed Files: '`ly/engraver-init.ly`'.

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 205), 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 *interfaces*, which are listed on the Section "Fingering" in *Internals Reference* page at the bottom

This object supports the following interfaces: Section "item-interface" in *Internals Reference*, Section "self-alignment-interface" in *Internals Reference*, Section "side-position-interface" in *Internals Reference*, Section "text-interface" in *Internals Reference*, Section "text-script-interface" in *Internals Reference*, Section "font-interface" in *Internals Reference*, Section "finger-interface" in *Internals Reference*, and Section "grob-interface" in *Internals Reference*.

Clicking any of the links will take you to the page of the respective object interface. Each interface has a number of properties. Some of them are not user-serviceable ('Internal properties'), but others can be modified.

We have been talking of *the* `Fingering` object, but actually it does not amount to much. The initialization file (see Section "Other sources of information" in *Learning Manual*) '`scm/define-grobs.scm`' shows the soul of the 'object',
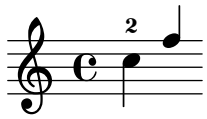
```
(Fingering
  . ((padding . 0.5)
     (avoid-slur . around)
     (slur-padding . 0.2)
     (staff-padding . 0.5)
     (self-alignment-X . 0)
     (self-alignment-Y . 0)
     (script-priority . 100)
     (stencil . ,ly:text-interface::print)
     (direction . ,ly:script-interface::calc-direction)
     (font-encoding . fetaText)
     (font-size . -5)  ; don't overlap when next to heads.
     (meta . ((class . Item)
     (interfaces . (finger-interface
                    font-interface
                    text-script-interface
                    text-interface
                    side-position-interface
                    self-alignment-interface
                    item-interface))))))
```

As you can see, the `Fingering` object is nothing more than a bunch of variable settings, and the 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)
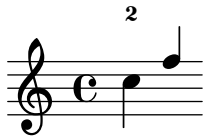
Add this much extra space between objects that are next to each other.

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

Questions to be answered:

- 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.

There are two different kinds of properties stored in contexts: context properties and grob properties. Context properties are properties that apply to the context as a whole and control how the context itself is displayed. In contrast, grob properties apply to specific grob types that will be displayed in the context.

The `\set` and `\unset` commands are used to change values for context properties. The `\override` and `\revert` commands are used to change values for grob properties.

See also

Internals Reference: Section "Backend" in *Internals Reference*, Section "All layout objects" in *Internals Reference*, Section "OverrideProperty" in *Internals Reference*, Section "RevertProperty" in *Internals Reference*, Section "PropertySet" in *Internals Reference*.

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 has a set of *properties*, variables contained in that context. Context properties are changed with the `\set` command, which has the following syntax:

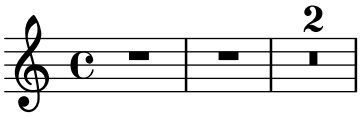
`\set` *`context.property`* `= #`*`value`*

value is a Scheme object, which is why it must be preceded by the `#` character.

Contexts properties are usually named in `studlyCaps`. They mostly control the translation from music to notation, e.g. `localKeySignature` (for determining whether to print accidentals), or `measurePosition` (for determining when to print a bar line). Context properties can change value over time while interpreting a piece of music; `measurePosition` is an obvious example of this. Context properties are modified with `\set`.
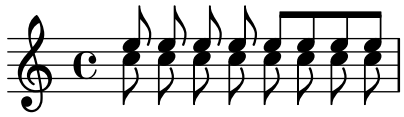
For example, multimeasure rests will be combined into a single bar if the context property `skipBars` is set to `#t`:

```
R1*2
\set Score.skipBars = ##t
R1*2
```



If the *context* argument is left out, then the property will be set in the current bottom context (typically `ChordNames`, `Voice`, `TabVoice`, or `Lyrics`).

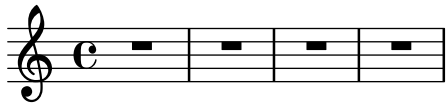
```
\set Score.autoBeaming = ##f
<<
  {
    e8 e e e
    \set autoBeaming = ##t
    e8 e e e
  } \\ {
    c8 c c c c8 c c c
  }
>>
```



The change is applied 'on-the-fly', during the music, so that the setting only affects the second group of eighth notes.

Note that the bottom-most context does not always contain the property that you wish to change – for example, attempting to set the `skipBars` property of the default bottom context, in this case `Voice`, will have no effect, because skipBars is a property of the `Score` context.

```
R1*2
\set skipBars = ##t
R1*2
```



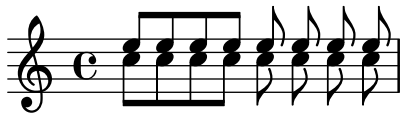
Contexts are hierarchical, so if an enclosing context was specified, for example `Staff`, then the change would also apply to all `Voice`s in the current staff.

The `\unset` command:

`\unset` *`context.property`*

is used to remove the definition of *property* from *context*. This command removes the definition only if it is set in *context*. Properties that have been set in enclosing contexts will not be altered by an unset in an enclosed context:

```
\set Score.autoBeaming = ##t
<<
  {
    \unset autoBeaming
    e8 e e e
    \unset Score.autoBeaming
    e8 e e e
  } \\ {
    c8 c c c c8 c c c
  }
>>
```
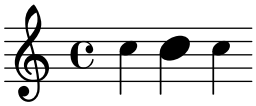


Like `\set`, the *context* argument does not have to be specified for a bottom context, so the two statements

```
\set Voice.autoBeaming = ##t
\set autoBeaming = ##t
```

are equivalent if the current bottom context is `Voice`.

Preceding a `\set` command by `\once` makes the setting apply to only a single time-step:

```
c4
\once \set fontSize = #4.7
c4
c4
```



A full description of all available context properties is in the internals reference, see Translation ↦ Tunable context properties.

See also

Internals Reference: Section "Tunable context properties" in *Internals Reference*.

5.3.3 The `\override` command
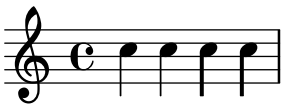
There is a special type of context property: the grob description. Grob descriptions are named in `StudlyCaps` (starting with capital letters). They contain the 'default settings' for a particular kind of grob as an association list. See '`scm/define-grobs.scm`' to see the settings for each grob description. Grob descriptions are modified with `\override`.

The syntax for the `\override` command is

```
\override [context.]GrobName.property = #value
```
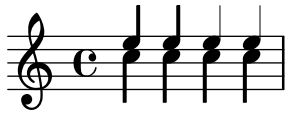
For example, we can increase the thickness of a note stem by overriding the `thickness` property of the `Stem` object:

```
c4 c
\override Voice.Stem.thickness = #3.0
c4 c
```



If no context is specified in an `\override`, the bottom context is used:

```
{ \override Staff.Stem.thickness = #3.0
  <<
    {
      e4 e
      \override Stem.thickness = #0.5
      e4 e
    } \\ {
      c4 c c c
    }
  >>
}
```



Some tweakable options are called 'subproperties' and reside inside properties. To tweak those, use commands in the form

```
\override Stem.details.beamed-lengths = #'(4 4 3)
```

or to modify the ends of spanners, use a form like these

```
\override TextSpanner.bound-details.left.text = #"left text"
\override TextSpanner.bound-details.right.text = #"right text"
```
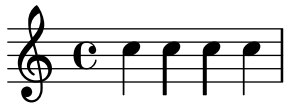
The effects of `\override` can be undone by `\revert`.

The syntax for the `\revert` command is

```
\revert [context.]GrobName.property
```
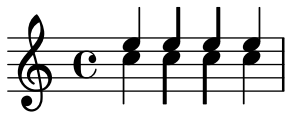
For example,

```
c4
\override Voice.Stem.thickness = #3.0
c4 c
\revert Voice.Stem.thickness
c4
```



The effects of `\override` and `\revert` apply to all grobs in the affected context from the current time forward:
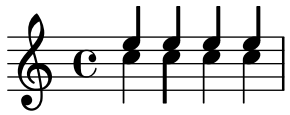
```
{
  <<
    {
      e4
      \override Staff.Stem.thickness = #3.0
      e4 e e
    } \\ {
      c4 c c
      \revert Staff.Stem.thickness
      c4
    }
  >>
}
```



`\once` can be used with `\override` to affect only the current time step:

```
{
  <<
    {
      \override Stem.thickness = #3.0
      e4 e e e
    } \\ {
      c4
```

```
      \once \override Stem.thickness = #3.0
      c4 c c
    }
  >>
}
```



See also

Internals Reference: Section "Backend" in *Internals Reference*

5.3.4 The `\tweak` command

Changing grob properties with `\override` causes the changes to apply to all of the given grobs in the context at the moment the change applies. Sometimes, however, it is desirable to have changes apply to just one grob, rather than to all grobs in the affected context. This is accomplished with the `\tweak` command, which has the following syntax:

`\tweak [`*`layout-object.`*`]`*`grob-property value`*

Specifying *layout-object* is optional. The `\tweak` command applies to the music object that immediately follows *value* in the music stream.
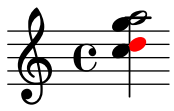
For an introduction to the syntax and uses of the tweak command see Section "Tweaking methods" in *Learning Manual*.

When several similar items are placed at the same musical moment, the `\override` command cannot be used to modify just one of them – this is where the `\tweak` command must be used. Items which may appear more than once at the same musical moment include the following:

- note heads of notes inside a chord
- articulation signs on a single note
- ties between notes in a chord
- tuplet brackets starting at the same time

In this example, the color of one note head and the type of another note head are modified within a single chord:

```
< c
  \tweak color #red
  d
  g
  \tweak duration-log #1
  a
> 4
```
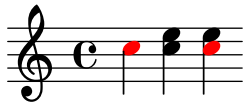


`\tweak` can be used to modify slurs:

```
c-\tweak thickness #5 ( d e f)
```



For the `\tweak` command to work, it must remain immediately adjacent to the object to which it is to apply after the input file has been converted to a music stream. Tweaking a whole chord does not do anything since its music event only acts as a container, and all layout objects are created from events inside of the `EventChord`:
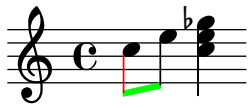
```
\tweak color #red c4
\tweak color #red <c e>4
<\tweak color #red c e>4
```



The simple `\tweak` command cannot be used to modify any object that is not directly created from the input. In particular it will not affect stems, automatic beams or accidentals, since these are generated later by `NoteHead` layout objects rather than by music elements in the input stream.

Such indirectly created layout objects can be tweaked using the form of the `\tweak` command in which the grob name is specified explicitly:
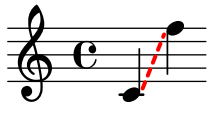
```
\tweak Stem.color #red
\tweak Beam.color #green c8 e
<c e \tweak Accidental.font-size #-3 ges>4
```



`\tweak` cannot be used to modify clefs or time signatures, since these become separated from any preceding `\tweak` command in the input stream by the automatic insertion of extra elements required to specify the context.

Several `\tweak` commands may be placed before a notational element – all affect it:

```
c
-\tweak style #'dashed-line
-\tweak dash-fraction #0.2
-\tweak thickness #3
-\tweak color #red
 \glissando
f'
```



The music stream which is generated from a section of an input file, including any automatically inserted elements, may be examined, see Section “Displaying music expressions” in *Extending*. This may be helpful in determining what may be modified by a `\tweak` command, or in determining how to adjust the input to make a `\tweak` apply.

See also

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

Extending LilyPond: Section “Displaying music expressions” in *Extending*.

Known issues and warnings

The `\tweak` command cannot be used to modify the control points of just one of several ties in a chord, other than the first one encountered in the input file.

5.3.5 `\set` vs. `\override`

Both `\set` and `\override` manipulate properties associated with contexts. In either case, properties heed the hierarchy of contexts: properties not set in a context itself show the values of the respective parent context.

Values and lifetime of context properties are dynamic and only available when music is being interpreted, 'iterated'. At the time of context creation, properties are initialized from the corresponding context definition and possible context modifications. Afterwards, changes are achieved with property-setting commands in the music itself.

Now grob definitions are a special category of context properties. Since their structure, bookkeeping and use is different from ordinary context properties, they are accessed with a different set of commands, and treated separately in the documentation.

As opposed to plain context properties, grob definitions are subdivided into grob properties. A "grob" (graphical object) is usually created by an engraver at the time of interpreting a music expression and receives its initial properties from the current grob definition of the engraver's context. The engraver (or other 'backend' parts of LilyPond) may subsequently add or change properties to the grob, but that does not affect the context's grob definition.

What we call 'grob properties' in the context of user-level tweaking are actually the properties of a context's grob definition. In contrast to ordinary context properties, grob definitions have the bookkeeping required to keep track of its parts, the individual grob properties (and even subproperties of them) separately so that it is possible to define those parts in different contexts and have the overall grob definition at the time of grob creation be assembled from pieces provided in different contexts among the current context and its parents.

Grob definitions are manipulated using `\override` and `\revert` and have a name starting with a capital letter (like '`NoteHead`') whereas ordinary context properties are manipulated using `\set` and `\unset` and are named starting with a lowercase letter.

The special commands `\tweak` and `\overrideProperty` change grob properties bypassing context properties completely. Instead they catch grobs as they are being created and then directly set properties on them when they originate from a tweaked music event or are of a particular kind, respectively.

5.3.6 Modifying alists

Some user-configurable properties are internally represented as *alists* (association lists), which store pairs of *keys* and *values*. The structure of an alist is:

```
'((key1 . value1)
  (key2 . value2)
  (key3 . value3)
  ...)
```

If an alist is a grob property or `\paper` variable, its keys can be modified individually without affecting other keys.

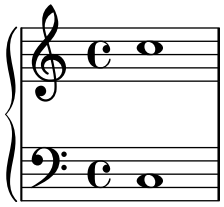
For example, to reduce the space between adjacent staves in a staff-group, use the `staff-staff-spacing` property of the `StaffGrouper` grob. The property is an alist with four keys: `basic-distance`, `minimum-distance`, `padding`, and `stretchability`. The standard settings for this property are listed in the "Backend" section of the Internals Reference (see Section "StaffGrouper" in *Internals Reference*):
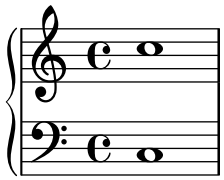
```
'((basic-distance . 9)
  (minimum-distance . 7)
  (padding . 1)
  (stretchability . 5))
```

One way to bring the staves closer together is by reducing the value of the `basic-distance` key (9) to match the value of `minimum-distance` (7). To modify a single key individually, use a *nested declaration*:

```
% default space between staves
\new PianoStaff <<
  \new Staff { \clef treble c''1 }
  \new Staff { \clef bass   c1   }
>>

% reduced space between staves
\new PianoStaff \with {
  % this is the nested declaration
  \override StaffGrouper.staff-staff-spacing.basic-distance = #7
} <<
  \new Staff { \clef treble c''1 }
  \new Staff { \clef bass   c1   }
>>
```
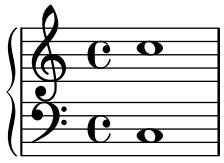




Using a nested declaration will update the specified key (such as `basic-distance` in the above example) without altering any other keys already set for the same property.

Now suppose we want the staves to be as close as possible without overlapping. The simplest way to do this is to set all four alist keys to zero. However, it is not necessary to enter four nested declarations, one for each key. Instead, the property can be completely re-defined with one declaration, as an alist:

```
\new PianoStaff \with {
  \override StaffGrouper.staff-staff-spacing =
    #'((basic-distance . 0)
       (minimum-distance . 0)
       (padding . 0)
       (stretchability . 0))
} <<
  \new Staff { \clef treble c''1 }
  \new Staff { \clef bass   c1   }
>>
```



Note that any keys not explicitly listed in the alist definition will be reset to their *default-when-unset* values. In the case of `staff-staff-spacing`, any unset key-values would be reset to zero (except `stretchability`, which takes the value of `basic-distance` when unset). Thus the following two declarations are equivalent:

```
\override StaffGrouper.staff-staff-spacing =
  #'((basic-distance . 7))

\override StaffGrouper.staff-staff-spacing =
  #'((basic-distance . 7)
     (minimum-distance . 0)
     (padding . 0)
     (stretchability . 7))
```

One (possibly unintended) consequence of this is the removal of any standard settings that are set in an initialization file and loaded each time an input file is compiled. In the above example, the standard settings for `padding` and `minimum-distance` (defined in '`scm/define-grobs.scm`') are reset to their default-when-unset values (zero for both keys). Defining a property or variable as an alist (of any size) will always reset all unset key-values to their default-when-unset values. Unless this is the intended result, it is safer to update key-values individually with a nested declaration.

Note: Nested declarations will not work for context property alists (such as `beamExceptions`, `keySignature`, `timeSignatureSettings`, etc.). These properties can only be modified by completely re-defining them as alists.

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 384. 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 389.

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 362.

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 362.

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 398.

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 398.

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 318.

To create fret diagrams above a staff, you have two choices. You can either use the `FretBoards` context (see [Automatic fret diagrams], page 353 or you can enter them as a markup above the notes using the `\fret-diagram` command (see [Fret diagram markups], page 334).

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 239.

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 A.10 [Text markup commands], page 645.

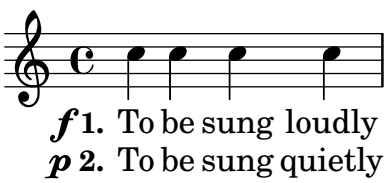
Note mode

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.

Articulation direction indicators
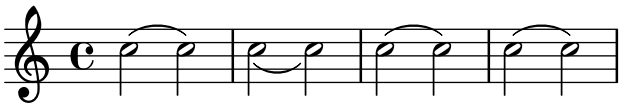
By default some directions are always up or always down (e.g. dynamics or fermata), while other things can alternate between up or down based on the stem direction (like slurs or accents).

The default action may be overridden by prefixing the articulation by a *direction indicator*. Three direction indicators are available: `^` (meaning "up"), `_` (meaning "down") and `-` (meaning "use default direction"). The direction indicator can usually be omitted, in which case `-` is assumed, but a direction indicator is **always** required before

- `\tweak` commands
- `\markup` commands
- `\tag` commands
- string markups, e.g. `-"string"`
- fingering instructions, e.g. `-1`
- articulation shortcuts, e.g. `-.`, `->`, `--`

Direction indicators affect only the next note:

```
c2( c)
c2_( c)
c2( c)
c2^( c)
```



The direction property

The position or direction of many layout objects is controlled by the `direction` property.

The value of the `direction` property may be set to `1`, meaning "up" or "above", or to `-1`, meaning "down" or "below". The symbols `UP` and `DOWN` may be used instead of `1` and `-1` respectively. The default direction may be specified by setting `direction` to `0` or `CENTER`. Alternatively, in many cases predefined commands exist to specify the direction. These are of the form

```
\xxxUp, \xxxDown or \xxxNeutral
```
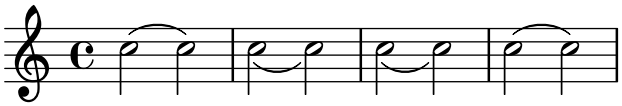
where `\xxxNeutral` means "use the default" direction. See Section "Within-staff objects" in *Learning Manual*.

In a few cases, arpeggio for example, the value of the `direction` property can specify whether the object is to be placed to the right or left of the parent. In this case `-1` or `LEFT` means "to the left" and `1` or `RIGHT` means "to the right". `0` or `CENTER` means "use the default" direction.

These indications affect all notes until they are canceled.

```
c2( c)
\slurDown
c2( c)
```

```
c2( c)
\slurNeutral
c2( c)
```



In polyphonic music, it is generally better to specify an explicit `voice` than change an object's direction. For more information. See Section 1.5.2 [Multiple voices], page 159.

See also

Learning Manual: Section "Within-staff objects" in *Learning Manual*.

Notation Reference: Section 1.5.2 [Multiple voices], page 159.

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 [Page layout], page 494.

Scaled distances are always specified in units of the staff-space or, rarely, the half staff-space. The staff-space is the distance between two adjacent staff lines. The default value can be changed globally by setting the global staff size, or it can be overridden locally by changing the `staff-space` property of `StaffSymbol`. Scaled distances automatically scale with any change to the either the global staff size or the `staff-space` property of `StaffSymbol`, but fonts scale automatically only with changes to the global staff size. The global staff size thus enables the overall size of a rendered score to be easily varied. For the methods of setting the global staff size see Section 4.2.2 [Setting the staff size], page 506.

If just a section of a score needs to be rendered to a different scale, for example an ossia section or a footnote, the global staff size cannot simply be changed as this would affect the entire score. In such cases the change in size is made by overriding both the `staff-space` property of `StaffSymbol` and the size of the fonts. A Scheme function, `magstep`, is available to convert from a font size change to the equivalent change in `staff-space`. For an explanation and an example of its use, see Section "Length and thickness of objects" in *Learning Manual*.

See also

Learning Manual: Section "Length and thickness of objects" in *Learning Manual*.
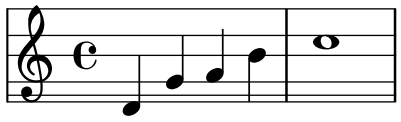
Notation Reference: Section 4.1 [Page layout], page 494, Section 4.2.2 [Setting the staff size], page 506.

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.
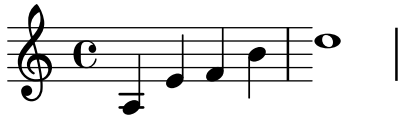
Note: The `'line-positions` property overrides the `'line-count` property. The number of staff lines is implicitly defined by the number of elements in the list of values for `'line-positions`.

```
\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, essentially 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*

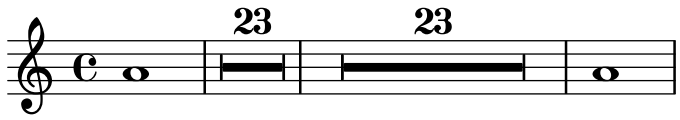
The minimum length of the spanner is specified by the `minimum-length` property. Increasing this usually has the necessary effect of increasing the spacing of the notes between the two end points. However, this override has no effect on many spanners, as their length is determined by other considerations. A few examples where it is effective are shown below.

```
a~ a
a
% increase the length of the tie
-\tweak minimum-length #5
~ a
```
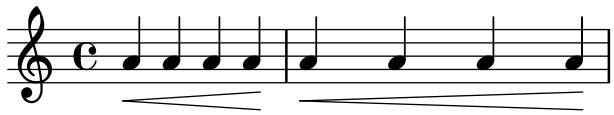


```
a1
\compressFullBarRests
R1*23
```

```
% increase the length of the rest bar
\once \override MultiMeasureRest.minimum-length = #20
R1*23
a1
```
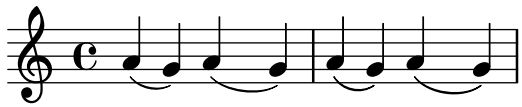



```
a \< a a a \!
% increase the length of the hairpin
\override Hairpin.minimum-length = #20
a \< a a a \!
```



This override can also be used to increase the length of slurs and phrasing slurs:

```
a( g)
a
-\tweak minimum-length #5
( g)

a\( g\)
a
-\tweak minimum-length #5
\( g\)
```
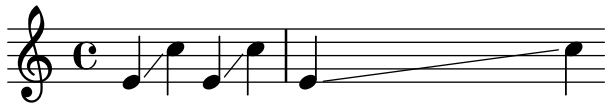


For some layout objects, the `minimum-length` property becomes effective only if the `set-spacing-rods` procedure is called explicitly. To do this, the `springs-and-rods` property should be set to `ly:spanner::set-spacing-rods`. For example, the minimum length of a glissando has no effect unless the `springs-and-rods` property is set:

```
% default
e \glissando c'

% not effective alone
\once \override Glissando.minimum-length = #20
e, \glissando c'
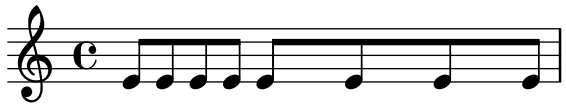
% effective only when both overrides are present
\once \override Glissando.minimum-length = #20
\once \override Glissando.springs-and-rods = #ly:spanner::set-spacing-rods
e, \glissando c'
```



The same is true of the `Beam` object:

```
% not effective alone
\once \override Beam.minimum-length = #20
e8 e e e

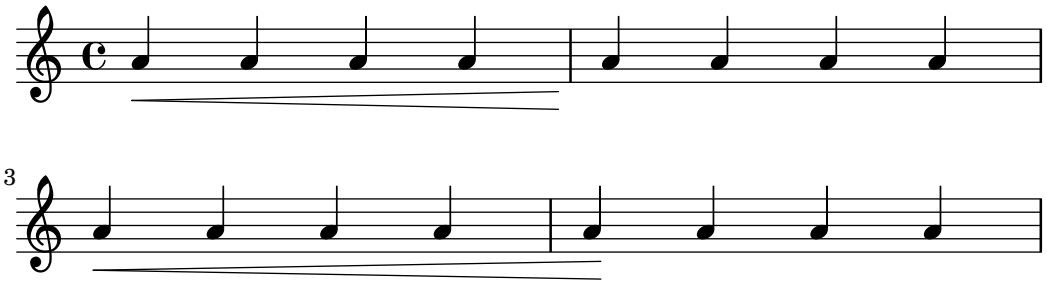
% effective only when both overrides are present
\once \override Beam.minimum-length = #20
\once \override Beam.springs-and-rods = #ly:spanner::set-spacing-rods
e8 e e e
```



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, setting it to `#t` has no effect on slurs or phrasing slurs or on other spanners for which terminating on the bar line would not be meaningful.
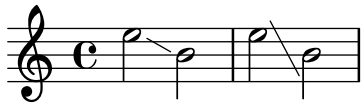
Using the `line-spanner-interface`

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
```

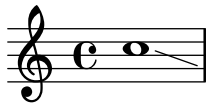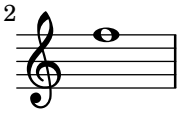


The units for the `Y` property are `staff-space`s, with the center line of the staff being the zero point. For the glissando, this is the value for `Y` at the X-coordinate corresponding to the center point of each note head, if the line is imagined to be extended to there.

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.
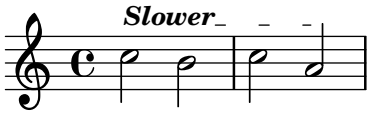
`attach-dir` This determines where the line starts and ends in the X-direction, relative to the bound object. So, a value of `-1` (or `LEFT`) makes the line start/end at the left side of the note head it is attached to.

`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
```
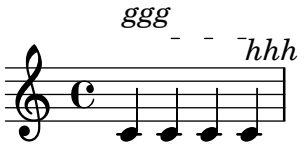


`stencil-align-dir-y`
`stencil-offset`

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
```
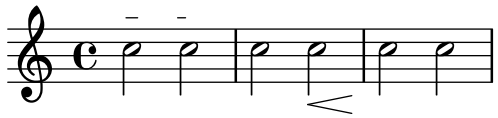


Note that negative values move the text *up*, contrary to the effect that might be expected, as a value of `-1` or `DOWN` means align the *bottom* edge of the text with the spanner line. A value of `1` or `UP` aligns the top edge of the text with the spanner line.

`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

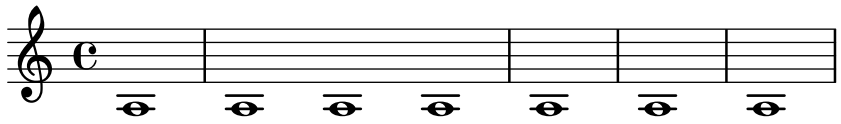
There are four main ways in which the visibility of layout objects can be controlled: their stencil can be removed, they can be made transparent, they can be colored white, or their `break-visibility` property can be overridden. The first three apply to all layout objects; the last to just a few – the *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

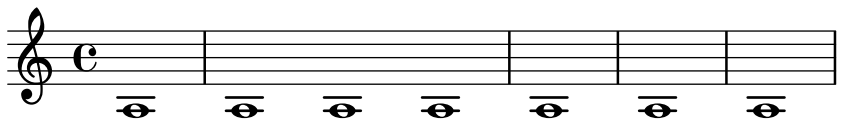
Every layout object has a stencil property. By default this is set to the specific function which draws that object. If this property is overridden to `#f` no function will be called and the object will not be drawn. The default action can be recovered with `\revert`.

```
a1 a
\override Score.BarLine.stencil = ##f
a a
\revert Score.BarLine.stencil
a a a
```



This rather common operation has a shortcut `\omit`:
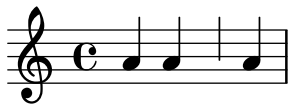
```
a1 a
\omit Score.BarLine
a a
\undo \omit Score.BarLine
a a a
```



Making objects transparent
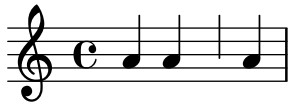
Every layout object has a transparent property which by default is set to `#f`. If set to `#t` the object still occupies space but is made invisible.

```
a4 a
\once \override NoteHead.transparent = ##t
a a
```



This rather common operation has a shortcut `\hide`:

```
a4 a
\once \hide NoteHead
a a
```



Painting objects white

Every layout object has a color property which by default is set to `black`. If this is overridden to `white` the object will be indistinguishable from the white background. However, if the object crosses other objects the color of the crossing points will be determined by the order in which they are drawn, and this may leave a ghostly image of the white object, as shown here:
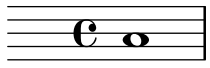
```
\override Staff.Clef.color = #white
a1
```



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:
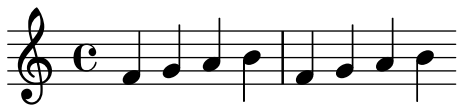
Function form	**Vector form**	**Before break**	**At no break**	**After break**
`all-visible`	`'#(#t #t #t)`	yes	yes	yes
`begin-of-line-visible`	`'#(#f #f #t)`	no	no	yes
`center-visible`	`'#(#f #t #f)`	no	yes	no
`end-of-line-visible`	`'#(#t #f #f)`	yes	no	no
`begin-of-line-invisible`	`'#(#t #t #f)`	yes	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
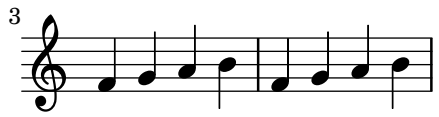
The default settings of `break-visibility` depend on the layout object. The following table shows all the layout objects of interest which are affected by `break-visibility` and the default setting of this property:

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`
`KeyCancellation`	`Staff`	`begin-of-line-invisible`
`KeySignature`	`Staff`	`begin-of-line-visible`
`ClefModifier`	`Staff`	`begin-of-line-visible`
`RehearsalMark`	`Score`	`end-of-line-invisible`
`TimeSignature`	`Staff`	`all-visible`

The example below shows the use of the vector form to control the visibility of bar lines:

```
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:
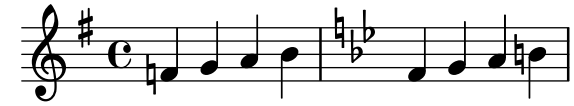
- Bar lines cannot be printed at start of line.
- A bar number cannot be printed at the start of the first line unless it is set to be different from 1.
- Clef – see below
- Double percent repeats are either all printed or all suppressed. Use begin-of line-invisible to print and all-invisible to suppress.
- Key signature – see below
- ClefModifier – see below
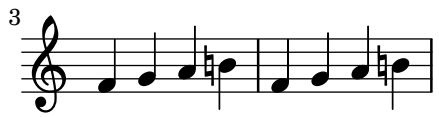
Special considerations

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.
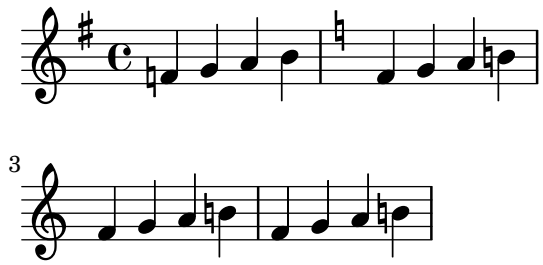
```
\key g \major
f4 g a b
% Try to remove all key signatures
\override Staff.KeySignature.break-visibility = #all-invisible
\key bes \major
f4 g a b
\break
f4 g a b
f4 g a b
```





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.
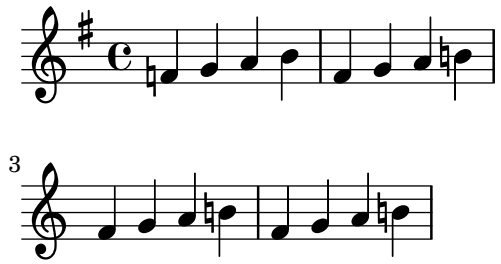
```
\key g \major
f4 g a b
\set Staff.explicitKeySignatureVisibility = #all-invisible
\override Staff.KeySignature.break-visibility = #all-invisible
\key bes \major
f4 g a b \break
f4 g a b
f4 g a b
```



Visibility of cancelling accidentals

To remove the cancelling 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
```
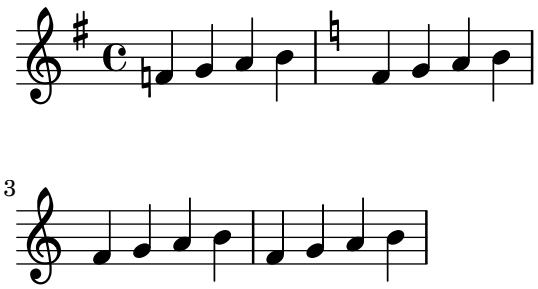


With these overrides only the accidentals before the notes remain to indicate the change of key.

Note that when changing the key to C major or A minor the cancelling accidentals would be the *only* indication of the key change. In this case setting `printKeyCancellation` to `#f` has no effect:
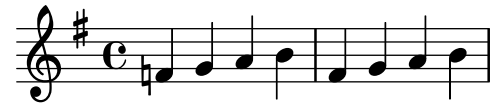
```
\key g \major
f4 g a b
\set Staff.explicitKeySignatureVisibility = #all-invisible
\set Staff.printKeyCancellation = ##f
\key c \major
f4 g a b \break
f4 g a b
```
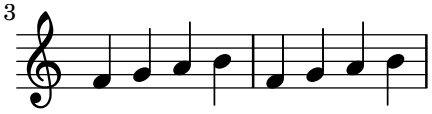
```
f4 g a b
```



To suppress the cancelling accidentals even when the key is changed to C major or A minor, override the visibility of the `KeyCancellation` grob instead:

```
\key g \major
f4 g a b
\set Staff.explicitKeySignatureVisibility = #all-invisible
\override Staff.KeyCancellation.break-visibility = #all-invisible
\key c \major
f4 g a b \break
f4 g a b
f4 g a b
```





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.

Transposed clefs

The small transposition symbol on transposed clefs is produced by the `ClefModifier` layout object. Its visibility is automatically inherited from the `Clef` object, so it is not necessary to apply any required `break-visibility` overrides to the `ClefModifier` layout objects to suppress transposition symbols for invisible clefs.

For explicit clef changes, the `explicitClefVisibility` property controls both the clef symbol and any transposition symbol associated with it.

See also

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

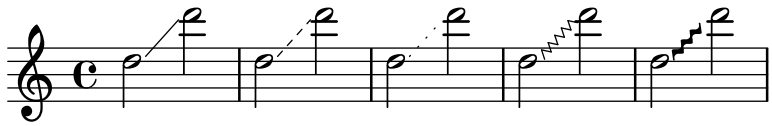
5.4.7 Line styles

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.
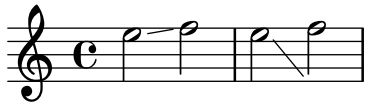
Here is an example showing the different line styles available, and how to tune them.

```
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 579.

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.
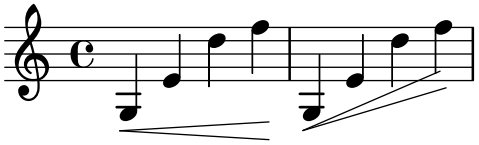
Rotating layout objects

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:

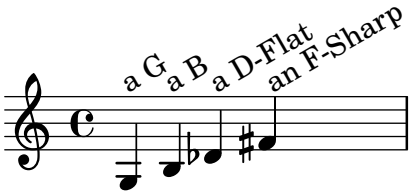
```
g4\< e' d' f\!
\override Hairpin.rotation = #'(20 -1 0)
g,,4\< e' d' f\!
```



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 564, Section 5.3 [Modifying properties], page 567.

Extending LilyPond: Section “Interfaces for programmers” in *Extending*.

Installed Files: ‘`scm/define-grobs.scm`’.

Snippets: Section “Tweaks and overrides” in *Snippets*.

Internals Reference: Section “All layout objects” in *Internals Reference*.

5.5.1 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.

Note: Many objects have special positioning considerations which cause any setting of `X-offset` or `Y-offset` to be ignored or modified, even though the object supports the `self-alignment-interface`. Overriding the `X-offset` or `Y-offset` properties to a fixed value causes the respective `self-alignment` property to be disregarded.

For example, an accidental can be repositioned vertically by setting `Y-offset` but any changes to `X-offset` have no effect.

Rehearsal marks may be aligned with breakable objects such as bar lines, clef symbols, time signature symbols and key signatures. There are special properties to be found in the `break-aligned-interface` for positioning rehearsal marks on such objects.

See also
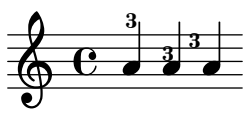
Notation Reference: [Using the break-alignable-interface], page 594.

Extending LilyPond: Section "Callback functions" in *Extending*.

Setting `X-offset` and `Y-offset` directly

Numerical values may be given to the `X-offset` and `Y-offset` properties of many objects. The following example shows three notes with the default fingering position and the positions with `X-offset` and `Y-offset` modified.

```
a-3
a
-\tweak X-offset #0
-\tweak Y-offset #0
-3
a
-\tweak X-offset #-1
-\tweak Y-offset #1
-3
```



Using the `side-position-interface`

An object which supports the `side-position-interface` can be placed next to its parent object so that the specified edges of the two objects touch. The object may be placed above, below, to the right or to the left of the parent. The parent cannot be specified; it is determined by the order of elements in the input stream. Most objects have the associated note head as their parent.

The values of the `side-axis` and `direction` properties determine where the object is to be placed, as follows:

`side-axis` **property**	`direction` **property**	**Placement**
`0`	`-1`	left
`0`	`1`	right
`1`	`-1`	below
`1`	`1`	above

When `side-axis` is `0`, `X-offset` should be set to the procedure `ly:side-position-interface::x-aligned-side`. This procedure will return the correct value of `X-offset` to place the object to the left or right side of the parent according to value of `direction`.

When `side-axis` is `1`, `Y-offset` should be set to the procedure `ly:side-position-interface::y-aligned-side`. This procedure will return the correct value of `Y-offset` to place the object to the top or bottom of the parent according to value of `direction`.

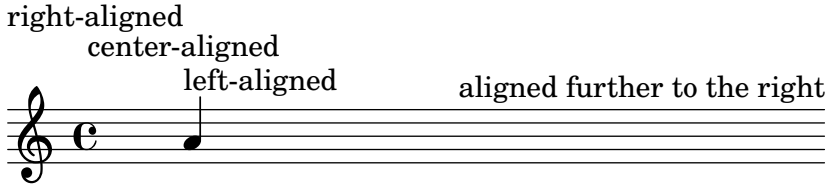
Using the `self-alignment-interface`

Self-aligning objects horizontally

The horizontal alignment of an object which supports the `self-alignment-interface` is controlled by the value of the `self-alignment-X` property, provided the object's `X-offset` property is set to `ly:self-alignment-interface::x-aligned-on-self`. `self-alignment-X` may be given any real value, in units of half the total X extent of the object. Negative values move the object to the right, positive to the left. A value of `0` centers the object on the reference point of its parent, a value of `-1` aligns the left edge of the object on the reference point of its parent, and a value of `1` aligns the right edge of the object on the reference point of its parent. The symbols `LEFT`, `CENTER`, and `RIGHT` may be used instead of the values `-1`, `0`, and `1`, respectively.

Normally the `\override` command would be used to modify the value of `self-alignment-X`, but the `\tweak` command can be used to separately align several annotations on a single note:

```
a'
-\tweak self-alignment-X #-1
^"left-aligned"
-\tweak self-alignment-X #0
^"center-aligned"
-\tweak self-alignment-X #RIGHT
^"right-aligned"
-\tweak self-alignment-X #-2.5
^"aligned further to the right"
```



Self-aligning objects vertically
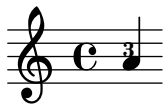
Objects may be aligned vertically in an analogous way to aligning them horizontally if the `Y-offset` property is set to `ly:self-alignment-interface::y-aligned-on-self`. However, other mechanisms are often involved in vertical alignment: the value of `Y-offset` is just one variable taken into account. This may make adjusting the value of some objects tricky. The units are just half the vertical extent of the object, which is usually quite small, so quite large numbers may be required. A value of `-1` aligns the lower edge of the object with the reference point of the parent object, a value of `0` aligns the center of the object with the reference point of the parent, and a value of `1` aligns the top edge of the object with the reference point of the parent. The symbols `DOWN`, `CENTER`, and `UP` may be substituted for `-1`, `0`, and `1`, respectively.

Self-aligning objects in both directions

By setting both `X-offset` and `Y-offset`, an object may be aligned in both directions simultaneously.

The following example shows how to adjust a fingering mark so that it nestles close to the note head.

```
a
-\tweak self-alignment-X #0.5  % move horizontally left
-\tweak Y-offset #ly:self-alignment-interface::y-aligned-on-self
-\tweak self-alignment-Y #-1  % move vertically up
-3  % third finger
```
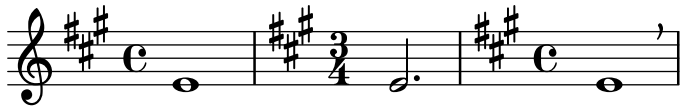


Using the `break-alignable-interface`

Rehearsal marks 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`.

Each type of object has its own default reference point, to which rehearsal marks are aligned:
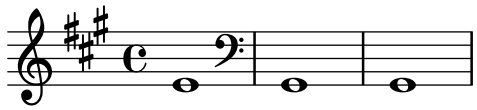
```
% The rehearsal mark will be aligned to the right edge of the Clef
\override Score.RehearsalMark.break-align-symbols = #'(clef)
\key a \major
\clef treble
\mark ""
e1
% The rehearsal mark will be aligned to the left edge of the Time Signature
\override Score.RehearsalMark.break-align-symbols = #'(time-signature)
\key a \major
\clef treble
\time 3/4
\mark ""
e2.
% The rehearsal mark will be centered above the Breath Mark
\override Score.RehearsalMark.break-align-symbols = #'(breathing-sign)
\key a \major
\clef treble
\time 4/4
e1
```

```
\breathe
\mark ""
```



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.
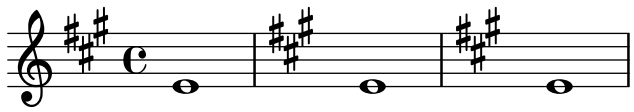
```
% The rehearsal mark will be aligned to the right edge of the Key Signature
\override Score.RehearsalMark.break-align-symbols = #'(key-signature clef)
\key a \major
\clef treble
\mark ""
e1
% The rehearsal mark will be aligned to the right edge of the Clef
\set Staff.explicitKeySignatureVisibility = #all-invisible
\override Score.RehearsalMark.break-align-symbols = #'(key-signature clef)
\key a \major
\clef bass
\mark ""
gis,,1
% The rehearsal mark will be centered above the Bar Line
\set Staff.explicitKeySignatureVisibility = #all-invisible
\set Staff.explicitClefVisibility = #all-invisible
\override Score.RehearsalMark.break-align-symbols = #'(key-signature clef)
\key a \major
\clef treble
\mark ""
e''1
```



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.
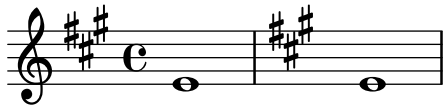
```
% The RehearsalMark will be aligned with the right edge of the Key Signature
\override Score.RehearsalMark.break-align-symbols = #'(key-signature)
\key a \major
\clef treble
\time 4/4
\mark ""
e1
% The RehearsalMark will be centered above the Key Signature
\once \override Score.KeySignature.break-align-anchor-alignment = #CENTER
```

```
\mark ""
\key a \major
e1
% The RehearsalMark will be aligned with the left edge of the Key Signature
\once \override Score.KeySignature.break-align-anchor-alignment = #LEFT
\key a \major
\mark ""
e1
```



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 Key Signature
% 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 ""
e1
% The RehearsalMark will be aligned with the left edge of the Key Signature
% and then shifted left by 2 staff-spaces
\once \override Score.KeySignature.break-align-anchor = #-2
\key a \major
\mark ""
e1
```



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
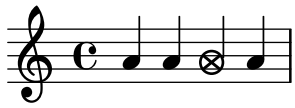
All layout objects have a `stencil` property which is part of the `grob-interface`. By default, this property is usually set to a function specific to the object that is tailor-made to render the symbol which represents it in the output. For example, the standard setting for the `stencil` property of 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 230.

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 A.8 [The Feta font], page 624.

See also

Notation Reference: [Graphic notation inside markup], page 230, Section 1.8.2 [Formatting text], page 223, Section A.10 [Text markup commands], page 645, Section A.8 [The Feta font], page 624.

5.5.4 Modifying shapes

Modifying ties and slurs

`Ties`, `Slurs`, `PhrasingSlurs`, `LaissezVibrerTies` and `RepeatTies` are all drawn as third-order Bézier curves. If the shape of the tie or slur which is calculated automatically is not optimum, the shape may be modified manually in two ways:

a. by specifying the displacements to be made to the control points of the automatically calculated Bézier curve, or

b. by explicitly specifying the positions of the four control points required to define the wanted curve.

Both methods are explained below. The first method is more suitable if only slight adjustments to the curve are required; the second may be better for creating curves which are related to just a single note.

Cubic Bézier curves
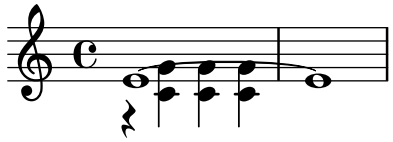
Third-order or cubic Bézier curves are defined by four control points. The first and fourth control points are precisely the starting and ending points of the curve. The intermediate two control points define the shape. Animations showing how the curve is drawn can be found on the web, but the following description 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. Translations, rotations and scaling of the control points all result in exactly the same operations on the curve.

Specifying displacements from current control points

In this example the automatic placement of the tie is not optimum, and `\tieDown` would not help.

```
<<
  { e1~ e }
\\
  { r4 <g c,> <g c,> <g c,> }
>>
```



Adjusting the control points of the tie with `\shape` allows the collisions to be avoided.

The syntax of `\shape` is

`[-]\shape` *`displacements item`*
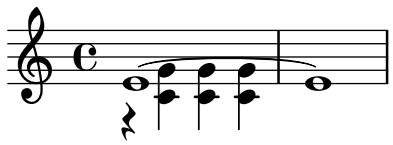
This will reposition the control-points of *item* by the amounts given by *displacements*. The *displacements* argument is a list of number pairs or a list of such lists. Each element of a pair represents the displacement of one of the coordinates of a control-point. If *item* is a string, the result is `\once\override` for the specified grob type. If *item* is a music expression, the result is the same music expression with an appropriate tweak applied.

In other words, the `\shape` function can act as either a `\once\override` command or a `\tweak` command depending on whether the *item* argument is a grob name, like "Slur", or a music expression, like "(". The *displacements* argument specifies the displacements of the four control points as a list of four pairs of (dx . dy) values in units of staff-spaces (or a list of such lists if the curve has more than one segment).

The leading hyphen is required if and only if the `\tweak` form is being used.
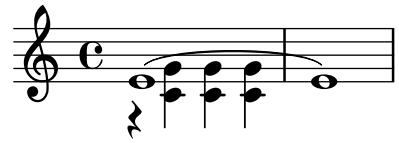
So, using the same example as above and the `\once\override` form of `\shape`, this will raise the tie by half a staff-space:

```
<<
  {
    \shape #'((0 . 0.5) (0 . 0.5) (0 . 0.5) (0 . 0.5)) Tie
    e1~ e
  }
\\
  { r4 <g c,> <g c,> <g c,> }
>>
```
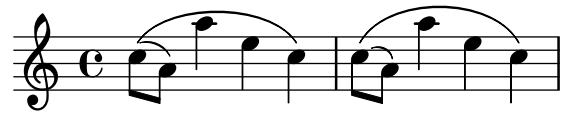


This positioning of the tie is better, but maybe it should be raised more in the center. The following example does this, this time using the alternative `\tweak` form:

```
<<
  {
    e1-\shape #'((0 . 0.5) (0 . 1) (0 . 1) (0 . 0.5)) ~ e
  }
\\
  { r4 <g c,> <g c,> <g c,> }
>>
```
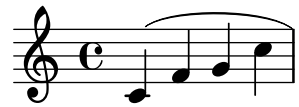


Changes to the horizontal positions of the control points may be made in the same way, and two different curves starting at the same musical moment may also be shaped:
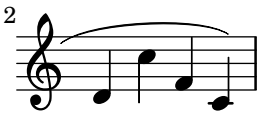
```
c8(\( a) a'4 e c\)
\shape #'((0.7 . -0.4) (0.5 . -0.4) (0.3 . -0.3) (0 . -0.2)) Slur
\shape #'((0 . 0) (0 . 0.5) (0 . 0.5) (0 . 0)) PhrasingSlur
c8(\( a) a'4 e c\)
```



The `\shape` function can also displace the control points of curves which stretch across line breaks. Each piece of the broken curve can be given its own list of offsets. If changes to a particular segment are not needed, the empty list can serve as a placeholder. In this example the line break makes the single slur look like two:
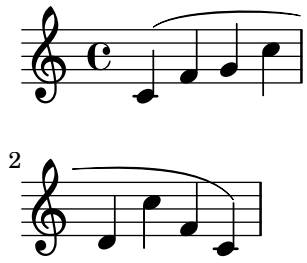
```
c4( f g c
\break
d,4 c' f, c)
```
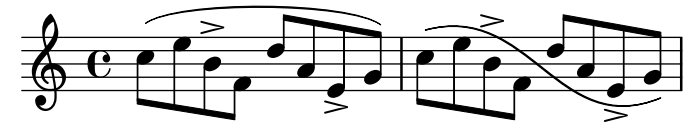




Changing the shapes of the two halves of the slur makes it clearer that the slur continues over the line break:

```
% () may be used as a shorthand for ((0 . 0) (0 . 0) (0 . 0) (0 . 0))
% if any of the segments does not need to be changed
\shape #'(
           (( 0 . 0) (0 . 0) (0 . 0) (0 . 1))
           ((0.5 . 1.5) (1 . 0) (0 . 0) (0 . -1.5))
         ) Slur
c4( f g c
\break
d,4 c' f, c)
```



If an S-shaped curve is required the control points must always be adjusted manually — LilyPond will never select such shapes automatically.

```
c8( e b-> f d' a e-> g)
\shape #'((0 . -1) (5.5 . -0.5) (-5.5 . -10.5) (0 . -5.5)) PhrasingSlur
c8\( e b-> f d' a e-> g\)
```

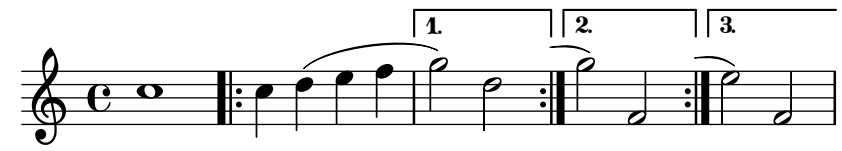


Specifying control points explicitly

The coordinates of the Bézier control points are specified in units of staff-spaces. The X coordinate is relative to the reference point of the note to which the tie or slur is attached, and the Y coordinate is relative to the staff center line. The coordinates are specified as a list of four pairs of decimal numbers (reals). One approach is to estimate the coordinates of the two end points, and then guess the two intermediate points. The optimum values are then found by trial and error. Be aware that these values may need to be manually adjusted if any further changes are made to the music or the layout.

One situation where specifying the control points explicitly is preferable to specifying displacements is when they need to be specified relative to a single note. Here is an example of this. It shows one way of indicating a slur extending into alternative sections of a volta repeat.

```
c1
\repeat volta 3 { c4 d( e f }
\alternative {
  { g2) d }
  {
    g2
    % create a slur and move it to a new position
    % the <> is just an empty chord to carry the slur termination
    -\tweak control-points #'((-2 . 3.8) (-1 . 3.9) (0 . 4) (1 . 3.4)) ( <> )
    f,
  }
  {
    e'2
    % create a slur and move it to a new position
    -\tweak control-points #'((-2 . 3) (-1 . 3.1) (0 . 3.2) (1 . 2.4)) ( <> )
    f,
  }
}
```



Known issues and warnings

It is not possible to modify shapes of ties or slurs by changing the `control-points` property if there are multiple ties or slurs at the same musical moment – the `\tweak` command will also not work in this case. However, the `tie-configuration` property of `TieColumn` can be overridden to set start line and direction as required.

See also
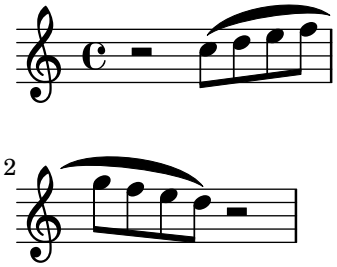
Internals Reference: Section "TieColumn" in *Internals Reference*.

5.5.5 Modifying broken spanners

Using `\alterBroken`

When a spanner crosses a line break or breaks, each piece inherits the attributes of the original spanner. Thus, ordinary tweaking of a broken spanner applies the same modifications to each of its segments. In the example below, overriding `thickness` affects the slur on either side of the line break.

```
r2
\once\override Slur.thickness = 10
c8( d e f
\break
g8 f e d) r2
```



Independently modifying the appearance of individual pieces of a broken spanner is possible with the `\alterBroken` command. This command can produce either an `\override` or a `\tweak` of a spanner property.

The syntax for `\alterBroken` is

`[-]\alterBroken` *`property values item`*

The argument *values* is a list of values, one for each broken piece. If *item* is a grob name like `Slur` or `Staff.PianoPedalBracket`, the result is an `\override` of the specified grob type. If *item* is a music expression such as "(" or "[" the result is the same music expression with an appropriate tweak applied.

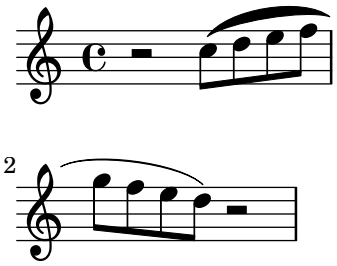
The leading hyphen must be used with the `\tweak` form. Do not add it when `\alterBroken` is used as an `\override`.

In its `\override` usage, `\alterBroken` may be prefaced by `\once` or `\temporary` and reverted by using `\revert` with *property*.

The following code applies an independent `\override` to each of the slur segments in the previous example:

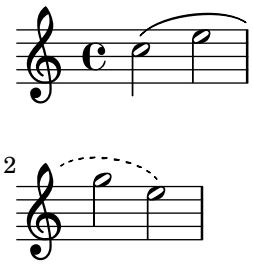
```
r2
\alterBroken thickness #'(10 1) Slur
c8( d e f
\break
```

```
g8 f e d) r2
```



The `\alterBroken` command may be used with any spanner object, including `Tie`, `PhrasingSlur`, `Beam` and `TextSpanner`. For example, an editor preparing a scholarly edition may wish to indicate the absence of part of a phrasing slur in a source by dashing only the segment which has been added. The following example illustrates how this can be done, in this case using the `\tweak` form of the command:

```
% The empty list is conveniently used below, because it is the
% default setting of dash-definition, resulting in a solid curve.
c2-\alterBroken dash-definition #'(() ((0 1.0 0.4 0.75))) \(e
\break
g2 e\)
```



It is important to understand that `\alterBroken` will set each piece of a broken spanner to the corresponding value in *values*. When there are fewer values than pieces, any additional piece will be assigned the empty list. This may lead to undesired results if the layout property is not set to the empty list by default. In such cases, each segment should be assigned an appropriate value.

Known issues and warnings

Line breaks may occur in different places following changes in layout. Settings chosen for `\alterBroken` may be unsuitable for a spanner that is no longer broken or is split into more segments than before. Explicit use of `\break` can guard against this situation.

The `\alterBroken` command is ineffective for spanner properties accessed before line-breaking such as `direction`.

See also

Extending LilyPond: Section “Difficult tweaks” in *Extending*.

5.5.6 Unpure-pure containers

Unpure-pure containers are useful for overriding *Y-axis* spacing calculations - specifically `Y-offset` and `Y-extent` - with a Scheme function instead of a literal (i.e. a number or pair).

For certain grobs, the `Y-extent` is based on the `stencil` property, overriding the stencil property of one of these will require an additional `Y-extent` override with an unpure-pure

container. When a function overrides a `Y-offset` and/or `Y-extent` it is assumed that this will trigger line breaking calculations too early during compilation. So the function is not evaluated at all (usually returning a value of '`0`' or ''`(0 . 0)`') which can result in collisions. A 'pure' function will not affect properties, objects or grob suicides and therefore will always have its Y-axis-related evaluated correctly.

Currently, there are about thirty functions that are already considered 'pure' and Unpure-pure containers are a way to set functions not on this list as 'pure'. The 'pure' function is evaluated *before* any line-breaking and so the horizontal spacing can be adjusted 'in time'. The 'unpure' function is then evaluated *after* line breaking.

Note: As it is difficult to always know which functions are on this list we recommend that any 'pure' functions you create do not use `Beam` or `VerticalAlignment` grobs.

An unpure-pure container is constructed as follows;

`(ly:make-unpure-pure-container f0 f1)`

where `f0` is a function taking *n* arguments (*n >= 1*) and the first argument must always be the grob. This is the function that gives the actual result. *f1* is the function being labeled as 'pure' that takes *n + 2* arguments. Again, the first argument must always still be the grob but the second and third are 'start' and 'end' arguments.

start and *end* are, for all intents and purposes, dummy values that only matter for `Spanners` (i.e `Hairpin` or `Beam`), that can return different height estimations based on a starting and ending column.

The rest are the other arguments to the first function (which may be none if *n = 1*).

The results of the second function are used as an approximation of the value needed which is then used by the first function to get the real value which is then used for fine-tuning much later during the spacing process.
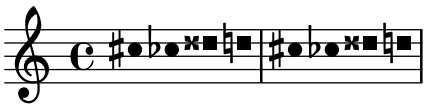
```
#(define (square-line-circle-space grob)
(let* ((pitch (ly:event-property (ly:grob-property grob 'cause) 'pitch))
       (notename (ly:pitch-notename pitch)))
 (if (= 0 (modulo notename 2))
     (make-circle-stencil 0.5 0.0 #t)
     (make-filled-box-stencil '(0 . 1.0)
                              '(-0.5 . 0.5)))))

squareLineCircleSpace = {
  \override NoteHead.stencil = #square-line-circle-space
}

smartSquareLineCircleSpace = {
  \squareLineCircleSpace
  \override NoteHead.Y-extent =
   #(ly:make-unpure-pure-container
      ly:grob::stencil-height
      (lambda (grob start end) (ly:grob::stencil-height grob)))
}

\new Voice \with { \remove "Stem_engraver" }
\relative c'' {
  \squareLineCircleSpace
  cis4 ces disis d
```

```
  \smartSquareLineCircleSpace
  cis4 ces disis d
}
```



In the first measure, without the unpure-pure container, the spacing engine does not know the width of the note head and lets it collide with the accidentals. In the second measure, with unpure-pure containers, the spacing engine knows the width of the note heads and avoids the collision by lengthening the line accordingly.

Usually for simple calculations nearly-identical functions for both the 'unpure' and 'pure' parts can be used, by only changing the number of arguments passed to, and the scope of, the function.

Note: If a function is labeled as 'pure' and it turns out not to be, the results can be unexpected.

5.6 Using music functions

Where tweaks need to be reused with different music expressions, it is often convenient to make the tweak part of a *music function*. In this section, we discuss only *substitution* functions, where the object is to substitute a variable into a piece of LilyPond input code. Other more complex functions are described in Section "Music functions" in *Extending*.

5.6.1 Substitution function syntax

Making a function that substitutes a variable into LilyPond code is easy. The general form of these functions is

```
function =
#(define-music-function
     (parser location arg1 arg2 ...)
     (type1? type2? ...)
   #{
     ...music...
   #})
```

where

argN	*n*th argument
typeN?	a scheme *type predicate* for which *argN* must return `#t`.
...music...	normal LilyPond input, using `$` (in places where only Lilypond constructs are allowed) or `#` (to use it as a Scheme value or music function argument or music inside of music lists) to reference arguments (eg. '`#arg1`').

The `parser` and `location` arguments are mandatory, and are used in some advanced situations as described in the 'Extending' manual (see Section "Music functions" in *Extending*). For substitution functions, just be sure to include them.

The list of type predicates is also required. Some of the most common type predicates used in music functions are:

```
boolean?
cheap-list?  (use instead of 'list?'
 for faster processing)
ly:duration?
ly:music?
ly:pitch?
markup?
number?
pair?
string?
symbol?
```

For a list of available type predicates, see Section A.20 [Predefined type predicates], page 744. User-defined type predicates are also allowed.

See also

Notation Reference: Section A.20 [Predefined type predicates], page 744.

Extending Lilypond: Section "Music functions" in *Extending*.

Installed Files: 'lily/music-scheme.cc', 'scm/c++.scm', 'scm/lily.scm'.
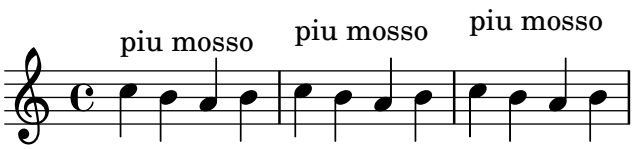
5.6.2 Substitution function examples

This section introduces some substitution function examples. These are not intended to be exhaustive, but rather to demonstrate some of the possibilities of simple substitution functions.

In the first example, a function is defined that simplifies setting the padding of a TextScript:

```
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" b a b
  \padText #2.6
  c4^"piu mosso" b a b
}
```
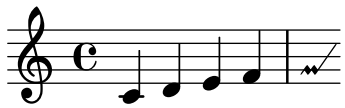


In addition to numbers, we can use music expressions such as notes for arguments to music functions:

```
custosNote =
#(define-music-function
     (parser location note)
     (ly:music?)
```

```
   #{
     \tweak NoteHead.stencil #ly:text-interface::print
     \tweak NoteHead.text
        \markup \musicglyph #"custodes.mensural.u0"
     \tweak Stem.stencil ##f
     #note
   #})

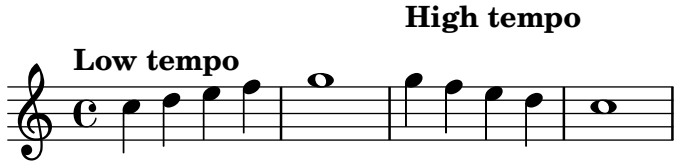
\relative c' { c4 d e f \custosNote g }
```



Substitution functions with multiple arguments can be defined:

```
tempoPadded =
#(define-music-function
     (parser location padding tempotext)
     (number? markup?)
   #{
     \once \override Score.MetronomeMark.padding = #padding
     \tempo \markup { \bold #tempotext }
   #})

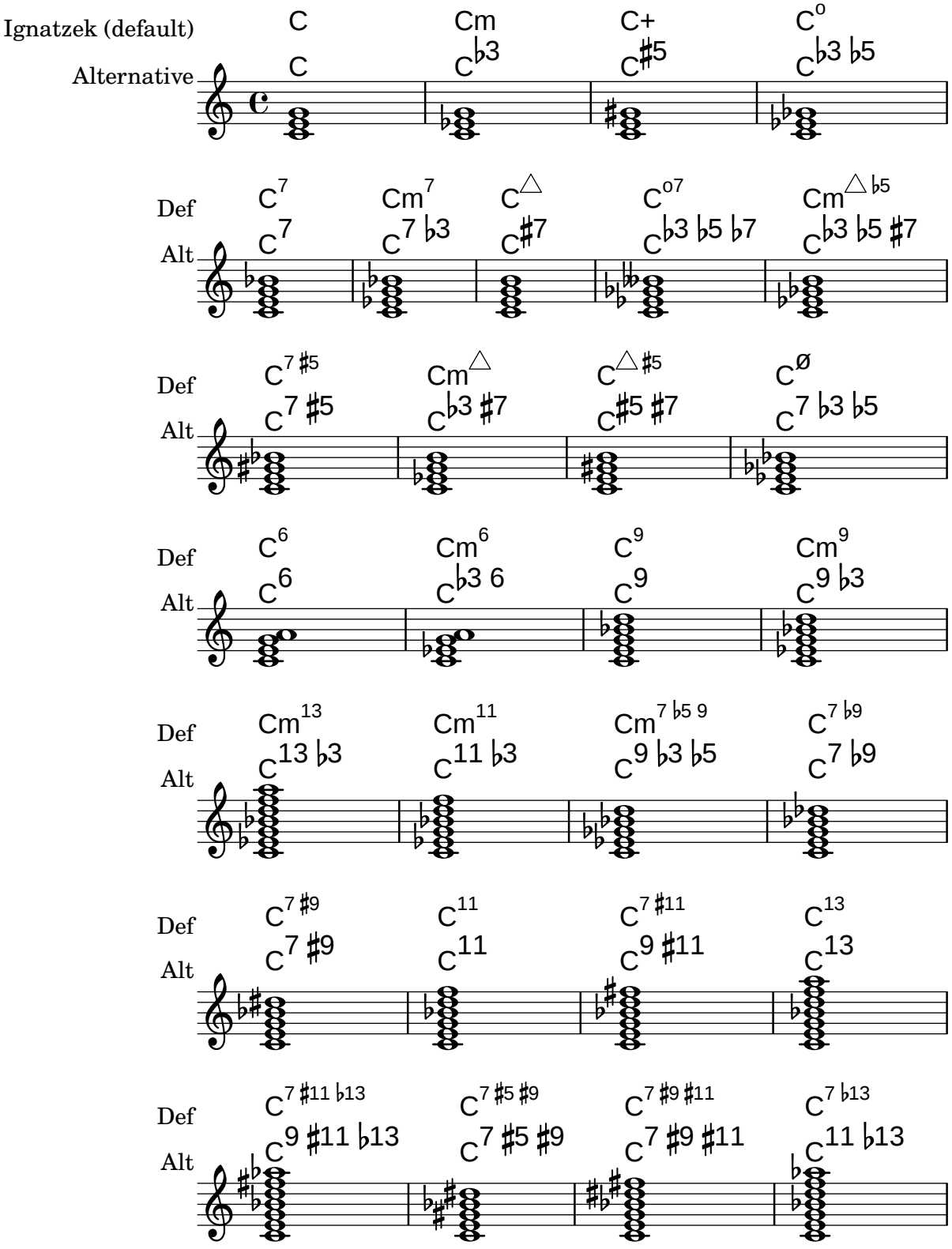
\relative c'' {
  \tempo \markup { "Low tempo" }
  c4 d e f g1
  \tempoPadded #4.0 "High tempo"
  g4 f e d c1
}
```

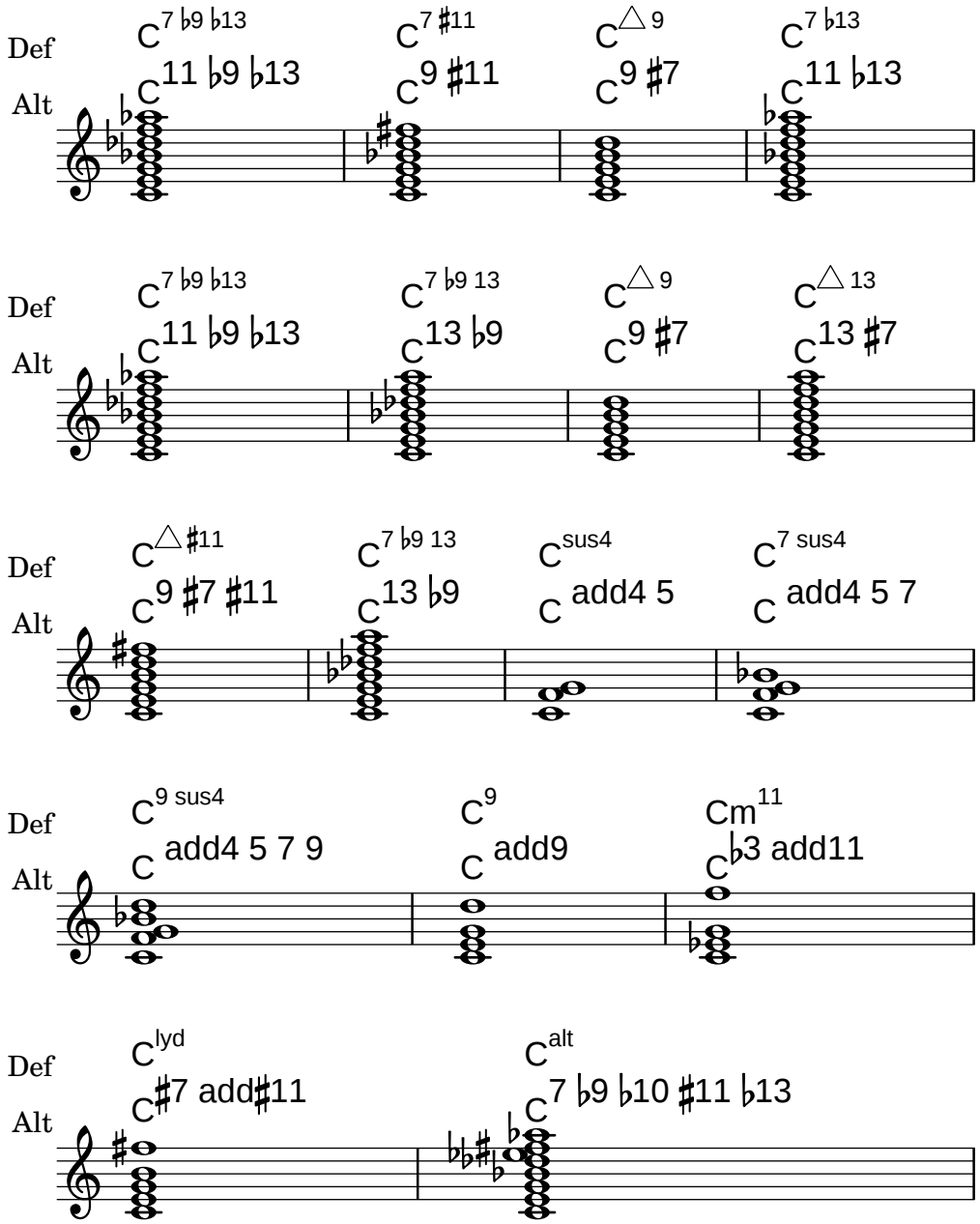


Appendix A Notation manual tables

A.1 Chord name chart
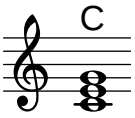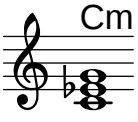
The following chart shows two standard systems for printing chord names, along with the pitches they represent.
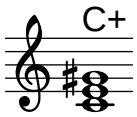
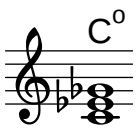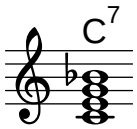
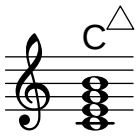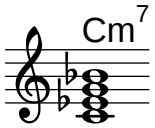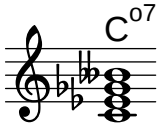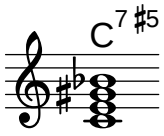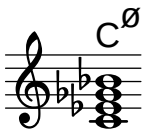
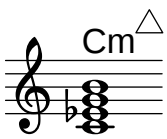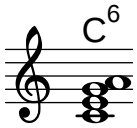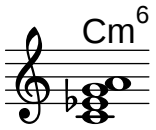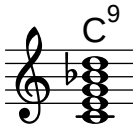


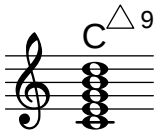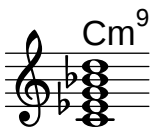
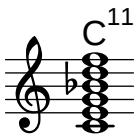
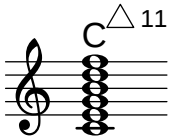
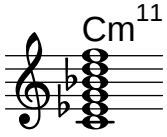


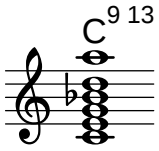
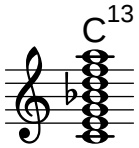
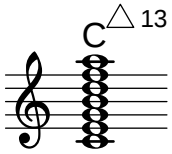
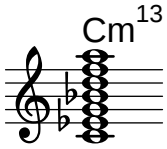
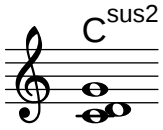
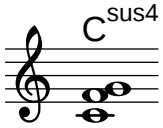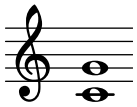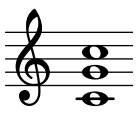
A.2 Common chord modifiers

The following table shows chord modifiers that can be used to generate standard chord structures.

Type	Interval	Modifier	Example	Output
Major	Major third, perfect fifth	`5` or nothing	`c1:5`	
Minor	Minor third, perfect fifth	`m` or `m5`	`c1:m`	

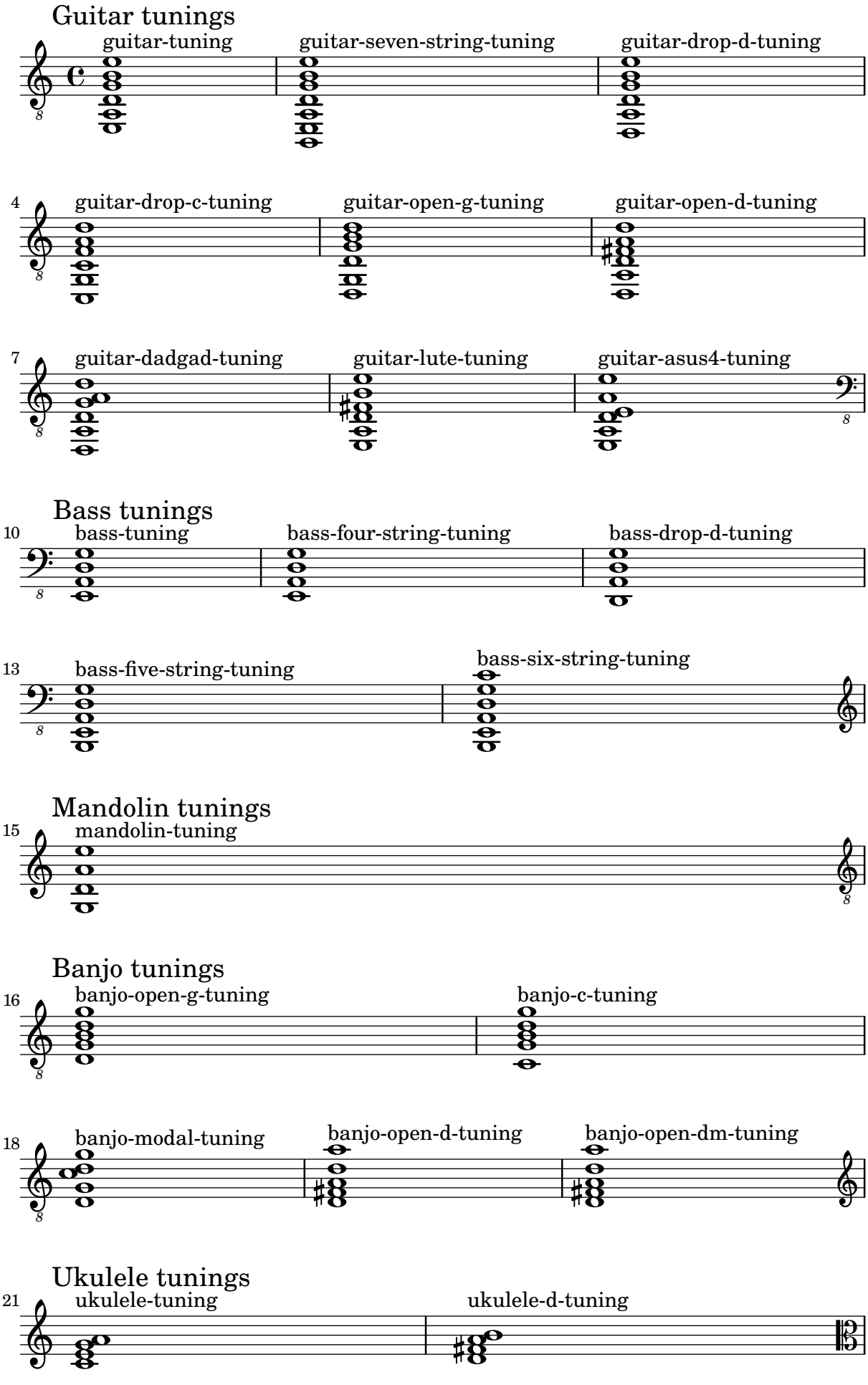
Augmented	Major third, augmented fifth	`aug`	`c1:aug`	
Diminished	Minor third, diminished fifth	`dim`	`c1:dim`	
Dominant seventh	Major triad, minor seventh	`7`	`c1:7`	
Major seventh	Major triad, major seventh	`maj7` or `maj`	`c1:maj7`	
Minor seventh	Minor triad, minor seventh	`m7`	`c1:m7`	
Diminished seventh	Diminished triad, diminished seventh	`dim7`	`c1:dim7`	
Augmented seventh	Augmented triad, minor seventh	`aug7`	`c1:aug`	
Half-diminished seventh	Diminished triad, minor seventh	`m7.5-`	`c1:m7.5-`	
Minor-major seventh	Minor triad, major seventh	`m7+`	`m7+`	

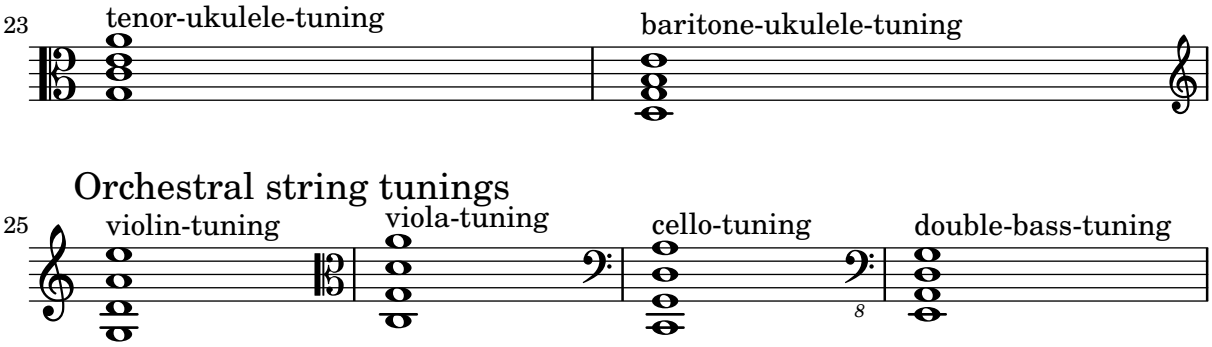
Major sixth	Major triad, sixth	`6`	`c1:6`	
Minor sixth	Minor triad, sixth	`m6`	`c1:m6`	
Dominant ninth	Dominant seventh, major ninth	`9`	`c1:9`	
Major ninth	Major seventh, major ninth	`maj9`	`c1:maj9`	
Minor ninth	Minor seventh, major ninth	`m9`	`c1:m9`	
Dominant eleventh	Dominant ninth, perfect eleventh	`11`	`c1:11`	
Major eleventh	Major ninth, perfect eleventh	`maj11`	`c1:maj11`	
Minor eleventh	Minor ninth, perfect eleventh	`m11`	`c1:m11`	

Dominant thirteenth	Dominant ninth, major thirteenth	`13`	`c1:13`	
Dominant thirteenth	Dominant eleventh, major thirteenth	`13.11`	`c1:13.11`	
Major thirteenth	Major eleventh, major thirteenth	`maj13.11`	`c1:maj13.11`	
Minor thirteenth	Minor eleventh, major thirteenth	`m13.11`	`c1:m13.11`	
Suspended second	Major second, perfect fifth	`sus2`	`c1:sus2`	
Suspended fourth	Perfect fourth, perfect fifth	`sus4`	`c1:sus4`	
Power chord (two-voiced)	Perfect fifth	`1.5`	`\powerChords c1:1.5`	
Power chord (three-voiced)	Perfect fifth, octave	`1.5.8`	`\powerChords c1:1.5.8`	

A.3 Predefined string tunings

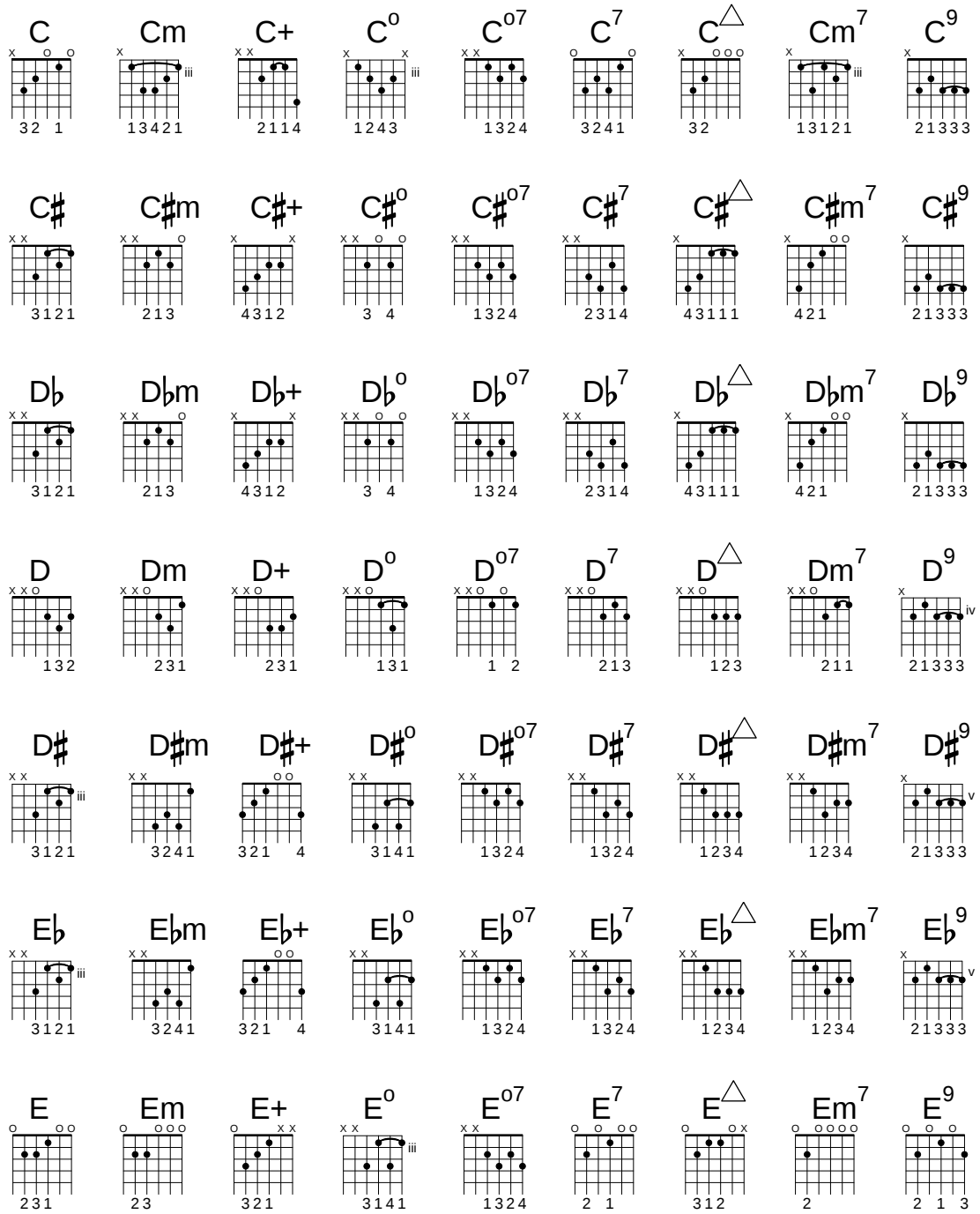
The chart below shows the predefined string tunings.

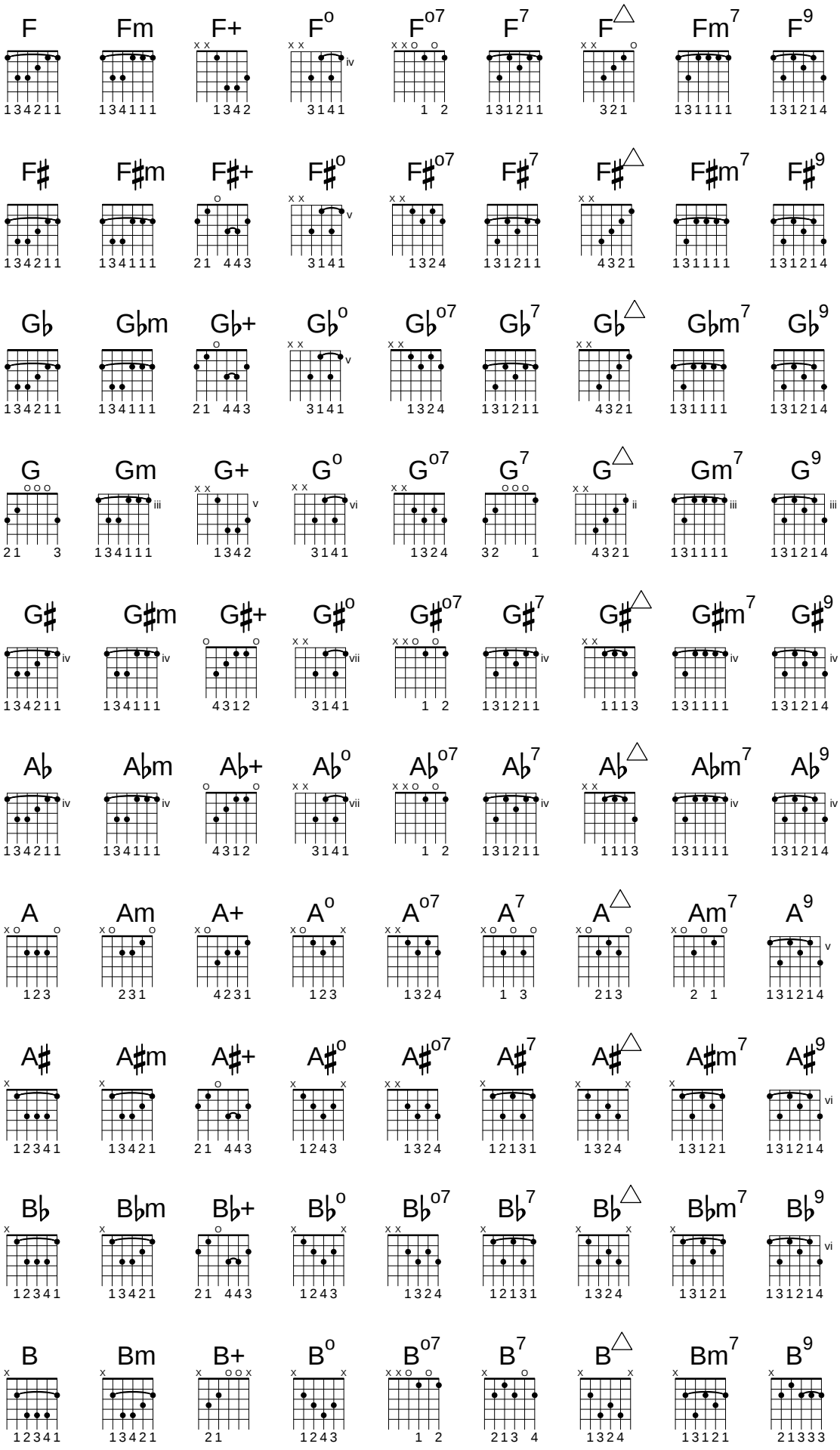

Guitar tunings
guitar-tuning
guitar-seven-string-tuning
guitar-drop-d-tuning
4
guitar-drop-c-tuning
guitar-open-g-tuning
guitar-open-d-tuning
7
guitar-dadgad-tuning
guitar-lute-tuning
guitar-asus4-tuning
Bass tunings
10
bass-tuning
bass-four-string-tuning
bass-drop-d-tuning
13
bass-five-string-tuning
bass-six-string-tuning
Mandolin tunings
15
mandolin-tuning
Banjo tunings
16
banjo-open-g-tuning
banjo-c-tuning
18
banjo-modal-tuning
banjo-open-d-tuning
banjo-open-dm-tuning
Ukulele tunings
21
ukulele-tuning
ukulele-d-tuning



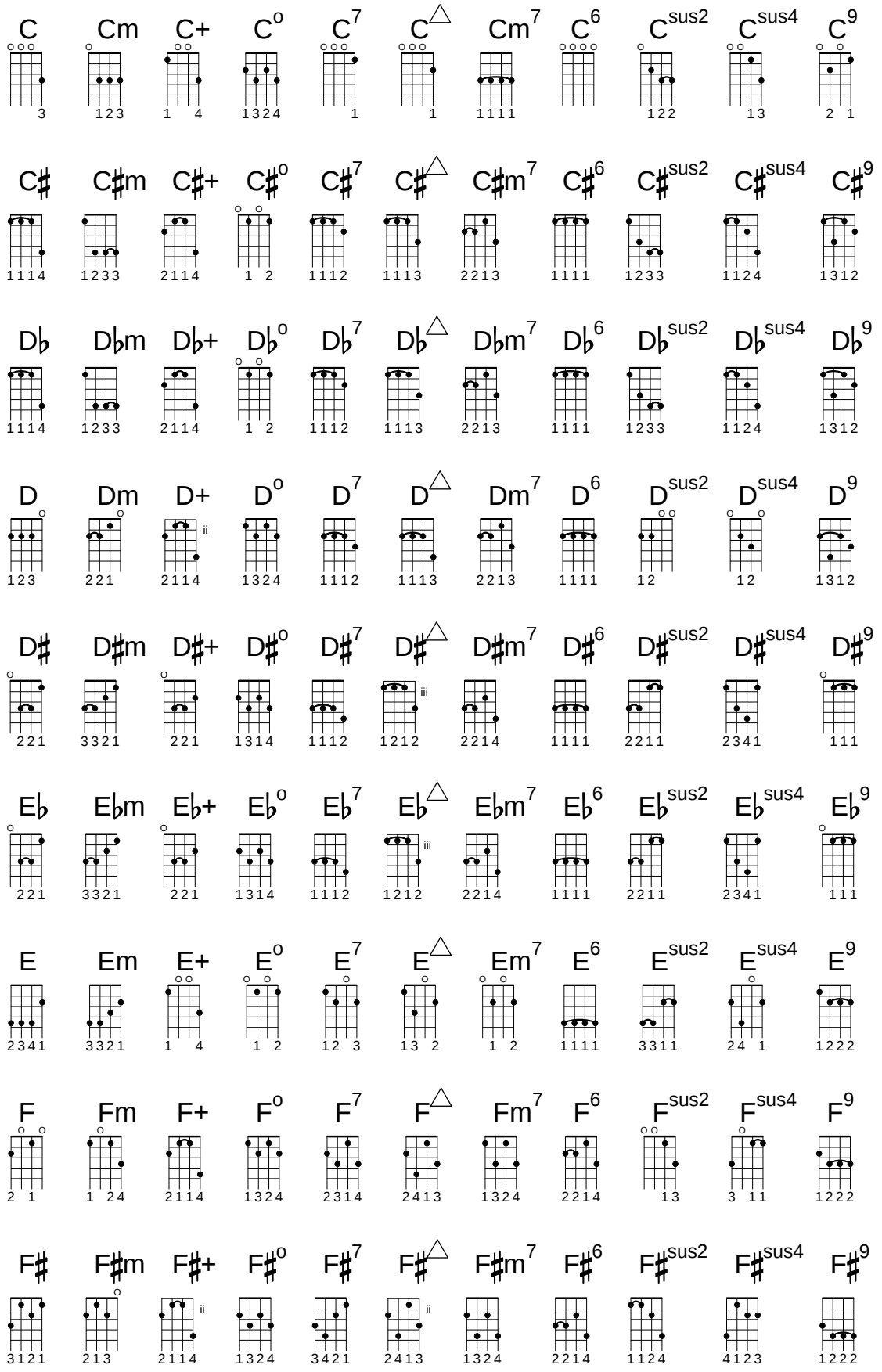
A.4 Predefined fretboard diagrams

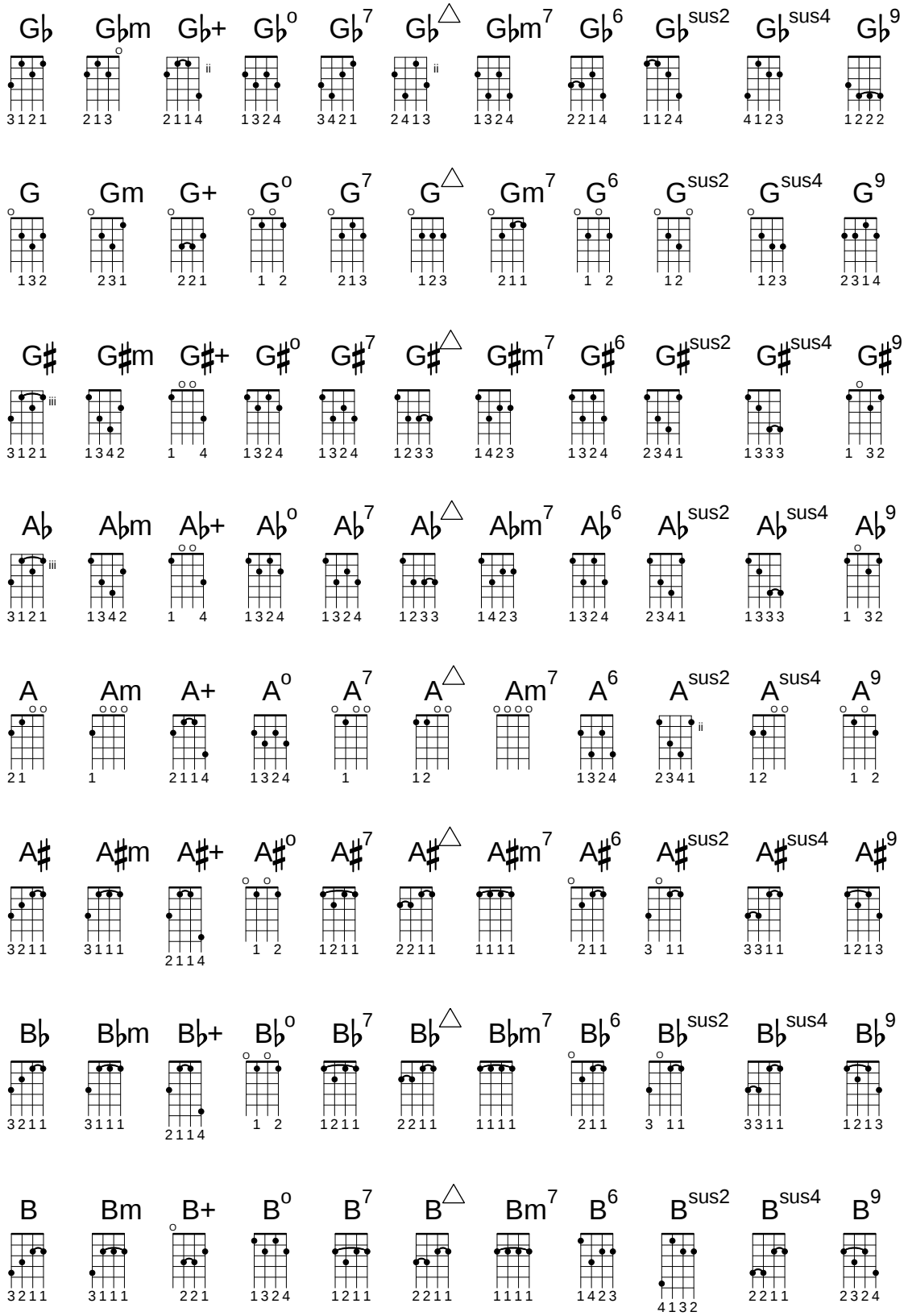
Diagrams for Guitar



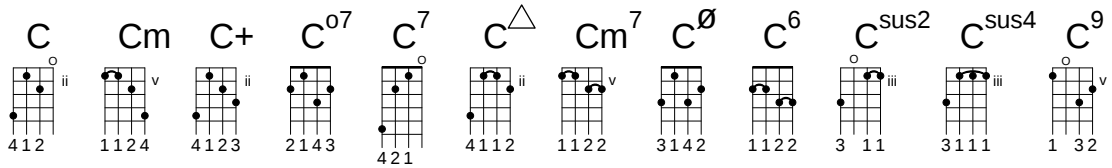

F Fm F+ F° F°7 F7 F△ Fm7 F9
F♯ F♯m F♯+ F♯° F♯°7 F♯7 F♯△ F♯m7 F♯9
G♭ G♭m G♭+ G♭° G♭°7 G♭7 G♭△ G♭m7 G♭9
G Gm G+ G° G°7 G7 G△ Gm7 G9
G♯ G♯m G♯+ G♯° G♯°7 G♯7 G♯△ G♯m7 G♯9
A♭ A♭m A♭+ A♭° A♭°7 A♭7 A♭△ A♭m7 A♭9
A Am A+ A° A°7 A7 A△ Am7 A9
A♯ A♯m A♯+ A♯° A♯°7 A♯7 A♯△ A♯m7 A♯9
B♭ B♭m B♭+ B♭° B♭°7 B♭7 B♭△ B♭m7 B♭9
B Bm B+ B° B°7 B7 B△ Bm7 B9

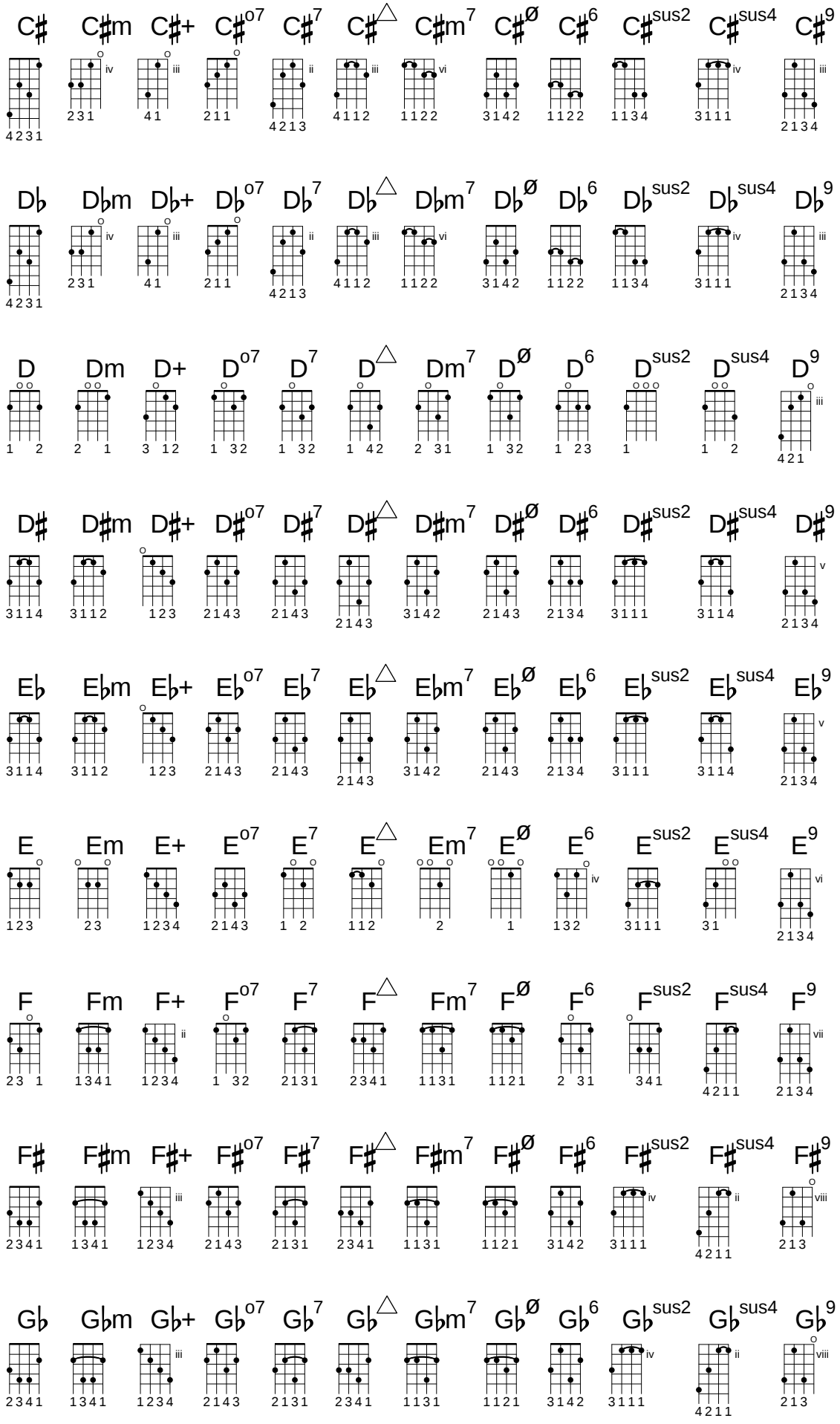
Diagrams for Ukulele

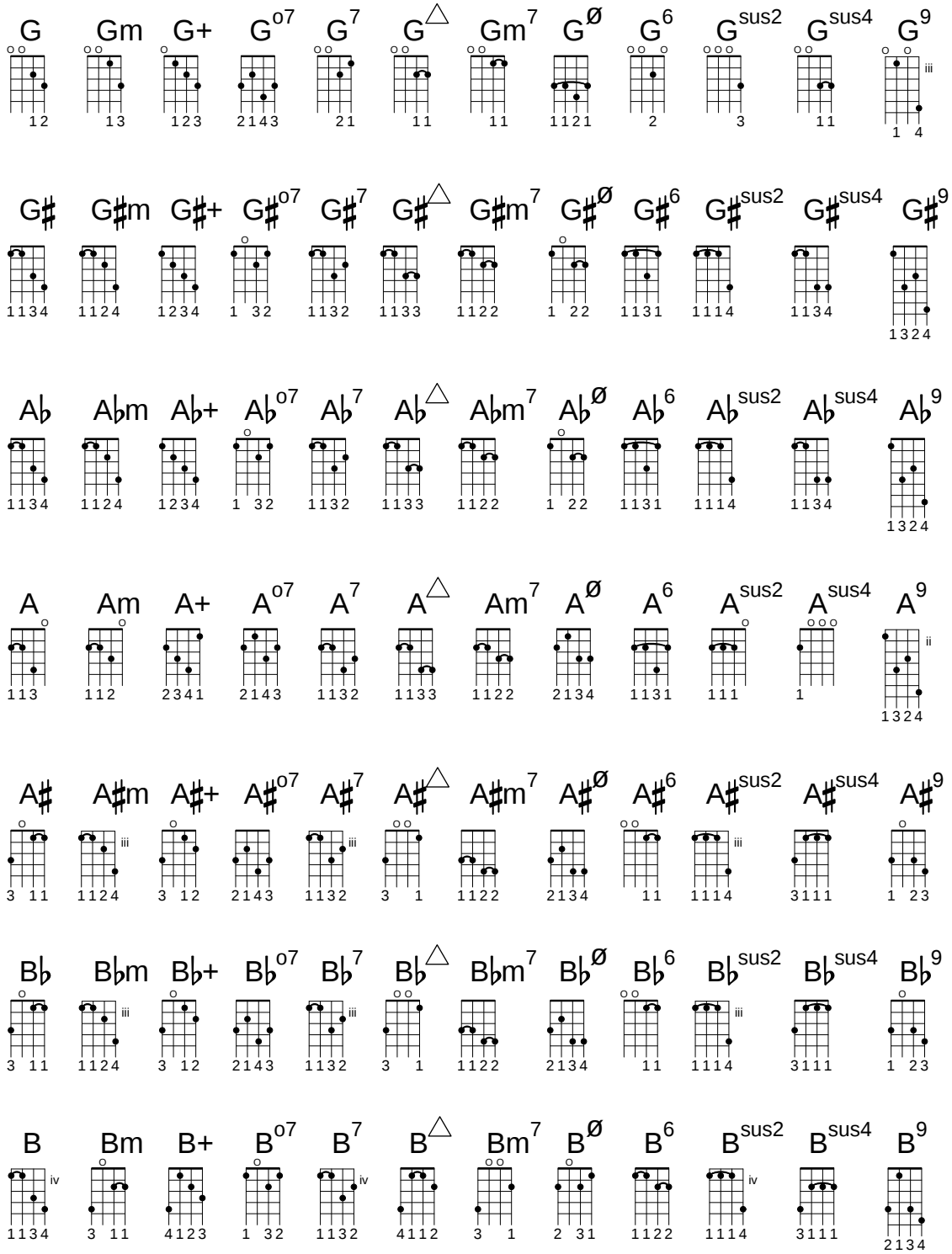




Diagrams for Mandolin




C♯ C♯m C♯+ C♯o7 C♯7 C♯△ C♯m7 C♯ø C♯6 C♯sus2 C♯sus4 C♯9
D♭ D♭m D♭+ D♭o7 D♭7 D♭△ D♭m7 D♭ø D♭6 D♭sus2 D♭sus4 D♭9
D Dm D+ Do7 D7 D△ Dm7 Dø D6 Dsus2 Dsus4 D9
D♯ D♯m D♯+ D♯o7 D♯7 D♯△ D♯m7 D♯ø D♯6 D♯sus2 D♯sus4 D♯9
E♭ E♭m E♭+ E♭o7 E♭7 E♭△ E♭m7 E♭ø E♭6 E♭sus2 E♭sus4 E♭9
E Em E+ Eo7 E7 E△ Em7 Eø E6 Esus2 Esus4 E9
F Fm F+ Fo7 F7 F△ Fm7 Fø F6 Fsus2 Fsus4 F9
F♯ F♯m F♯+ F♯o7 F♯7 F♯△ F♯m7 F♯ø F♯6 F♯sus2 F♯sus4 F♯9
G♭ G♭m G♭+ G♭o7 G♭7 G♭△ G♭m7 G♭ø G♭6 G♭sus2 G♭sus4 G♭9



A.5 Predefined paper sizes

Paper sizes are defined in '`scm/paper.scm`'

The "ISO 216" A Series

`"a10"` (26 x 37 mm)

`"a9"` (37 x 52 mm)

`"a8"` (52 x 74 mm)

`"a7"` (74 x 105 mm)

`"a6"` (105 x 148 mm)

`"a5"` (148 x 210 mm)

`"a4"` (210 x 297 mm)

`"a3"` (297 x 420 mm)

`"a2"` (420 x 594 mm)

`"a1"` (594 x 841 mm)

`"a0"` (841 x 1189 mm)

The "ISO 216" B Series

`"b10"` (31 x 44 mm)

`"b9"` (44 x 62 mm)

`"b8"` (62 x 88 mm)

`"b7"` (88 x 125 mm)

`"b6"` (125 x 176 mm)

`"b5"` (176 x 250 mm)

`"b4"` (250 x 353 mm)

`"b3"` (353 x 500 mm)

`"b2"` (500 x 707 mm)

`"b1"` (707 x 1000 mm)

`"b0"` (1000 x 1414 mm)

Two extended sizes as defined in "DIN 476"

`"4a0"` (1682 x 2378 mm)

`"2a0"` (1189 x 1682 mm)

"ISO 269" standard C series

`"c10"` (28 x 40 mm)

`"c9"` (40 x 57 mm)

`"c8"` (57 x 81 mm)

`"c7"` (81 x 114 mm)

`"c6"` (114 x 162 mm)

`"c5"` (162 x 229 mm)

`"c4"` (229 x 324 mm)

`"c3"` (324 x 458 mm)

`"c2"` (458 x 648 mm)

`"c1"` (648 x 917 mm)

`"c0"` (917 x 1297 mm)

North American paper sizes

`"junior-legal"` (8.0 x 5.0 in)

`"legal"` (8.5 x 14.0 in)

`"ledger"` (17.0 x 11.0 in)

`"letter"` (8.5 x 11.0 in)

`"tabloid"`
(11.0 x 17.0 in)

`"11x17"` (11.0 x 17.0 in)

`"17x11"` (17.0 x 11.0 in)

Government-letter by IEEE Printer Working Group, for children's writing

`"government-letter"`
(8 x 10.5 in)

`"government-legal"`
(8.5 x 13.0 in)

`"philippine-legal"`
(8.5 x 13.0 in)

ANSI sizes

`"ansi a"` (8.5 x 11.0 in)

`"ansi b"` (17.0 x 11.0 in)

`"ansi c"` (17.0 x 22.0 in)

`"ansi d"` (22.0 x 34.0 in)

`"ansi e"` (34.0 x 44.0 in)

`"engineering f"`
(28.0 x 40.0 in)

North American Architectural sizes

`"arch a"` (9.0 x 12.0 in)

`"arch b"` (12.0 x 18.0 in)

`"arch c"` (18.0 x 24.0 in)

`"arch d"` (24.0 x 36.0 in)

`"arch e"` (36.0 x 48.0 in)

`"arch e1"` (30.0 x 42.0 in)

Antique sizes still used in the United Kingdom

`"statement"`
(5.5 x 8.5 in)

`"half letter"`
(5.5 x 8.5 in)

`"quarto"` (8.0 x 10.0 in)

`"octavo"` (6.75 x 10.5 in)

`"executive"`
(7.25 x 10.5 in)

`"monarch"`
(7.25 x 10.5 in)

`"foolscap"`
(8.27 x 13.0 in)

`"folio"` (8.27 x 13.0 in)

`"super-b"`
(13.0 x 19.0 in)

`"post"` (15.5 x 19.5 in)

`"crown"` (15.0 x 20.0 in)

`"large post"`
(16.5 x 21.0 in)

`"demy"` (17.5 x 22.5 in)

`"medium"` (18.0 x 23.0 in)

`"broadsheet"`
(18.0 x 24.0 in)

`"royal"` (20.0 x 25.0 in)

`"elephant"`
(23.0 x 28.0 in)

`"double demy"`
(22.5 x 35.0 in)

`"quad demy"`
(35.0 x 45.0 in)

`"atlas"` (26.0 x 34.0 in)

`"imperial"`
(22.0 x 30.0 in)

`"antiquarian"`
(31.0 x 53.0 in)

PA4 based sizes

`"pa0"` (840 x 1120 mm)

`"pa1"` (560 x 840 mm)

`"pa2"` (420 x 560 mm)

`"pa3"` (280 x 420 mm)

`"pa4"` (210 x 280 mm)

`"pa5"` (140 x 210 mm)

`"pa6"` (105 x 140 mm)

`"pa7"` (70 x 105 mm)

`"pa8"` (52 x 70 mm)

`"pa9"` (35 x 52 mm)

`"pa10"` (26 x 35 mm)

Used in Southeast Asia and Australia

`"f4"` (210 x 330 mm)

Used for very small `@lilypond` examples in the documentation based on a8 landscape.

`"a8landscape"`
(74 x 52 mm)

A.6 MIDI instruments

The following is a list of names that can be used for the `midiInstrument` property. The order of the instruments below, starting in the left-hand column moving down, corresponds to the General MIDI Standard's 128 Program Numbers.

```
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
concertina
acoustic guitar (nylon)
acoustic guitar (steel)
electric guitar (jazz)
electric guitar (clean)
electric guitar (muted)
overdriven guitar
distorted guitar
guitar harmonics
acoustic bass
electric bass (finger)
electric bass (pick)
fretless bass
slap bass 1
slap bass 2
synth bass 1
synth bass 2
violin
viola
cello
contrabass
tremolo strings
pizzicato strings
orchestral harp
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
tenor sax
baritone sax
oboe
english horn
bassoon
clarinet
piccolo
flute
recorder
pan flute
blown bottle
shakuhachi
whistle
ocarina
lead 1 (square)
lead 2 (sawtooth)
lead 3 (calliope)
lead 4 (chiff)
lead 5 (charang)
lead 6 (voice)
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
bagpipe
fiddle
shanai
tinkle bell
agogo
steel drums
woodblock
taiko drum
melodic tom
synth drum
reverse cymbal
guitar fret noise
breath noise
seashore
bird tweet
telephone ring
helicopter
applause
gunshot
```

A.7 List of colors

Normal colors

Usage syntax is detailed in [Coloring objects], page 208.

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.

A.8 The Feta font

The following symbols are available in the Emmentaler font and may be accessed directly using text markup with the name of the glyph as shown in the tables below, such as `g^\markup {\musicglyph #"scripts.segno" }` or `\markup {\musicglyph #"five"}`. For more information, see Section 1.8.2 [Formatting text], page 223.

Clef glyphs

`clefs.C`		`clefs.C_change`	
`clefs.F`		`clefs.F_change`	
`clefs.G`		`clefs.G_change`	
`clefs.percussion`		`clefs.percussion_change`	
`clefs.tab`		`clefs.tab_change`	

Time Signature glyphs

`timesig.C44`		`timesig.C22`	

Number glyphs

plus	+	comma	,
hyphen	-	period	.
zero	0	one	1
two	2	three	3
four	4	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.sM1double		noteheads.s0diamond	
noteheads.s1diamond		noteheads.s2diamond	
noteheads.s0triangle		noteheads.d1triangle	
noteheads.u1triangle		noteheads.u2triangle	
noteheads.d2triangle		noteheads.s0slash	

noteheads.s1slash		noteheads.s2slash	
noteheads.s0cross		noteheads.s1cross	
noteheads.s2cross		noteheads.s2xcircle	
noteheads.s0harmonic		noteheads.s2harmonic	

Shape-note Notehead glyphs

noteheads.s0do		noteheads.d1do	
noteheads.u1do		noteheads.d2do	
noteheads.u2do		noteheads.s0doThin	
noteheads.d1doThin		noteheads.u1doThin	
noteheads.d2doThin		noteheads.u2doThin	
noteheads.s0re		noteheads.u1re	
noteheads.d1re		noteheads.u2re	
noteheads.d2re		noteheads.s0reThin	
noteheads.u1reThin		noteheads.d1reThin	
noteheads.u2reThin		noteheads.d2reThin	
noteheads.s0mi		noteheads.s1mi	

noteheads.s2mi

noteheads.s0miMirror

noteheads.s1miMirror

noteheads.s2miMirror

noteheads.s0miThin

noteheads.s1miThin

noteheads.s2miThin

noteheads.u0fa

noteheads.d0fa

noteheads.u1fa

noteheads.d1fa

noteheads.u2fa

noteheads.d2fa

noteheads.u0faThin

noteheads.d0faThin

noteheads.u1faThin

noteheads.d1faThin

noteheads.u2faThin

noteheads.d2faThin

noteheads.s0sol

noteheads.s1sol

noteheads.s2sol

noteheads.s0la

noteheads.s1la

noteheads.s2la

noteheads.s0laThin

noteheads.s1laThin

noteheads.s2laThin

noteheads.s0ti

noteheads.u1ti

noteheads.d1ti		noteheads.u2ti	
noteheads.d2ti		noteheads.s0tiThin	
noteheads.u1tiThin		noteheads.d1tiThin	
noteheads.u2tiThin		noteheads.d2tiThin	
noteheads.u0doFunk		noteheads.d0doFunk	
noteheads.u1doFunk		noteheads.d1doFunk	
noteheads.u2doFunk		noteheads.d2doFunk	
noteheads.u0reFunk		noteheads.d0reFunk	
noteheads.u1reFunk		noteheads.d1reFunk	
noteheads.u2reFunk		noteheads.d2reFunk	
noteheads.u0miFunk		noteheads.d0miFunk	
noteheads.u1miFunk		noteheads.d1miFunk	
noteheads.s2miFunk		noteheads.u0faFunk	
noteheads.d0faFunk		noteheads.u1faFunk	
noteheads.d1faFunk		noteheads.u2faFunk	

noteheads.d2faFunk

noteheads.s0solFunk

noteheads.s1solFunk

noteheads.s2solFunk

noteheads.s0laFunk

noteheads.s1laFunk

noteheads.s2laFunk

noteheads.u0tiFunk

noteheads.d0tiFunk

noteheads.u1tiFunk

noteheads.d1tiFunk

noteheads.u2tiFunk

noteheads.d2tiFunk

noteheads.s0doWalker

noteheads.u1doWalker

noteheads.d1doWalker

noteheads.u2doWalker

noteheads.d2doWalker

noteheads.s0reWalker

noteheads.u1reWalker

noteheads.d1reWalker

noteheads.u2reWalker

noteheads.d2reWalker

noteheads.s0miWalker

noteheads.s1miWalker

noteheads.s2miWalker

noteheads.s0faWalker

noteheads.u1faWalker

noteheads.d1faWalker

noteheads.u2faWalker

noteheads.d2faWalker

noteheads.s0laWalker

noteheads.s1laWalker

noteheads.s2laWalker

noteheads.s0tiWalker

noteheads.u1tiWalker

noteheads.d1tiWalker

noteheads.u2tiWalker

noteheads.d2tiWalker

Rest glyphs

rests.0

rests.1

rests.0o

rests.1o

rests.M3

rests.M2

rests.M1

rests.M1o

rests.2

rests.2classical

rests.3

rests.4

rests.5

rests.6

rests.7

Flag glyphs

flags.u3		flags.u4	
flags.u5		flags.u6	
flags.u7		flags.d3	
flags.d4		flags.d5	
flags.d6		flags.d7	
flags.ugrace		flags.dgrace	

Dot glyphs

dots.dot	

Dynamic glyphs

space		f	
m		p	
r		s	
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.halfopen		scripts.halfopenvertical	
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.varsegno		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.tickmark	
scripts.snappizzicato		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.discant		accordion.dot	
accordion.freebass		accordion.stdbass	
accordion.bayanbass		accordion.oldEE	
accordion.push		accordion.pull	

Tie glyphs

ties.lyric.short		ties.lyric.default	

Vaticana glyphs

clefs.vaticana.do		clefs.vaticana.do_change	
clefs.vaticana.fa		clefs.vaticana.fa_change	
custodes.vaticana.u0		custodes.vaticana.u1	
custodes.vaticana.u2		custodes.vaticana.d0	
custodes.vaticana.d1		custodes.vaticana.d2	
accidentals.vaticanaM1		accidentals.vaticana0	
dots.dotvaticana		noteheads .svaticana.punctum	
noteheads.svaticana .punctum.cavum		noteheads.svaticana .linea.punctum	

noteheads.svaticana .linea.punctum.cavum		noteheads.svaticana .inclinatum	
noteheads.svaticana.lpes		noteheads .svaticana.vlpes	
noteheads.svaticana.upes		noteheads .svaticana.vupes	
noteheads .svaticana.plica		noteheads .svaticana.vplica	
noteheads .svaticana.epiphonus		noteheads.svaticana .vepiphonus	
noteheads.svaticana .reverse.plica		noteheads.svaticana .reverse.vplica	
noteheads.svaticana .inner.cephalicus		noteheads.svaticana .cephalicus	
noteheads .svaticana.quilisma			

Medicaea glyphs

clefs.medicaea.do		clefs.medicaea.do_change	
clefs.medicaea.fa		clefs.medicaea.fa_change	
custodes.medicaea.u0		custodes.medicaea.u1	
custodes.medicaea.u2		custodes.medicaea.d0	
custodes.medicaea.d1		custodes.medicaea.d2	
accidentals.medicaeaM1		noteheads.smedicaea .inclinatum	
noteheads .smedicaea.punctum		noteheads .smedicaea.rvirga	
noteheads .smedicaea.virga			

Hufnagel glyphs

clefs.hufnagel.do		clefs.hufnagel.do_change	
clefs.hufnagel.fa		clefs.hufnagel.fa_change	
clefs.hufnagel.do.fa		clefs.hufnagel .do.fa_change	
custodes.hufnagel.u0		custodes.hufnagel.u1	
custodes.hufnagel.u2		custodes.hufnagel.d0	
custodes.hufnagel.d1		custodes.hufnagel.d2	
accidentals.hufnagelM1		noteheads .shufnagel.punctum	
noteheads .shufnagel.virga		noteheads.shufnagel.lpes	

Mensural glyphs

rests.M3mensural		rests.M2mensural	
rests.M1mensural		rests.0mensural	
rests.1mensural		rests.2mensural	
rests.3mensural		rests.4mensural	
clefs.mensural.c		clefs.mensural.c_change	
clefs.blackmensural.c		clefs.blackmensural .c_change	

clefs.mensural.f		clefs.mensural.f_change	
clefs.mensural.g		clefs.mensural.g_change	
custodes.mensural.u0		custodes.mensural.u1	
custodes.mensural.u2		custodes.mensural.d0	
custodes.mensural.d1		custodes.mensural.d2	
accidentals.mensural1		accidentals.mensuralM1	
flags.mensuralu03		flags.mensuralu13	
flags.mensuralu23		flags.mensurald03	
flags.mensurald13		flags.mensurald23	
flags.mensuralu04		flags.mensuralu14	
flags.mensuralu24		flags.mensurald04	
flags.mensurald14		flags.mensurald24	
flags.mensuralu05		flags.mensuralu15	
flags.mensuralu25		flags.mensurald05	
flags.mensurald15		flags.mensurald25	

flags.mensuralu06



flags.mensuralu16

flags.mensuralu26



flags.mensurald06

flags.mensurald16

flags.mensurald26

timesig.mensural44



timesig.mensural22



timesig.mensural32



timesig.mensural64



timesig.mensural94



timesig.mensural34



timesig.mensural68



timesig.mensural98



timesig.mensural48



timesig.mensural68alt



timesig.mensural24



noteheads.uM3mensural



noteheads.dM3mensural



noteheads.sM3ligmensural



noteheads.uM2mensural



noteheads.dM2mensural



noteheads.sM2ligmensural



noteheads.sM1mensural



noteheads.urM3mensural



noteheads.drM3mensural



noteheads
.srM3ligmensural



noteheads.urM2mensural



noteheads.drM2mensural



noteheads
.srM2ligmensural



noteheads.srM1mensural 

noteheads
.uM3semimensural 

noteheads
.dM3semimensural 

noteheads
.sM3semiligmensural 

noteheads
.uM2semimensural 

noteheads
.dM2semimensural 

noteheads
.sM2semiligmensural 

noteheads
.sM1semimensural 

noteheads
.urM3semimensural 

noteheads
.drM3semimensural 

noteheads
.srM3semiligmensural 

noteheads
.urM2semimensural 

noteheads
.drM2semimensural 

noteheads
.srM2semiligmensural 

noteheads
.srM1semimensural 

noteheads
.uM3blackmensural 

noteheads
.dM3blackmensural 

noteheads
.sM3blackligmensural 

noteheads
.uM2blackmensural 

noteheads
.dM2blackmensural 

noteheads
.sM2blackligmensural 

noteheads
.sM1blackmensural 

noteheads.s0mensural

noteheads.s1mensural

noteheads.s2mensural

noteheads
.s0blackmensural

Neomensural glyphs

rests.M3neomensural		rests.M2neomensural	
rests.M1neomensural		rests.0neomensural	
rests.1neomensural		rests.2neomensural	
rests.3neomensural		rests.4neomensural	
clefs.neomensural.c		clefs.neomensural .c_change	
timesig.neomensural44		timesig.neomensural22	
timesig.neomensural32		timesig.neomensural64	
timesig.neomensural94		timesig.neomensural34	
timesig.neomensural68		timesig.neomensural98	
timesig.neomensural48		timesig.neomensural68alt	
timesig.neomensural24		noteheads.uM3neomensural	
noteheads.dM3neomensural		noteheads.uM2neomensural	
noteheads.dM2neomensural		noteheads.sM1neomensural	
noteheads .urM3neomensural		noteheads .drM3neomensural	

noteheads .urM2neomensural 

noteheads .drM2neomensural 

noteheads .srM1neomensural 

noteheads.s0neomensural 

noteheads.s1neomensural 

noteheads.s2neomensural 

Petrucci glyphs

clefs.petrucci.c1 

clefs.petrucci.c1_change 

clefs.petrucci.c2 

clefs.petrucci.c2_change 

clefs.petrucci.c3 

clefs.petrucci.c3_change 

clefs.petrucci.c4 

clefs.petrucci.c4_change 

clefs.petrucci.c5 

clefs.petrucci.c5_change 

clefs.petrucci.f 

clefs.petrucci.f_change 

clefs.petrucci.g 

clefs.petrucci.g_change 

noteheads.s0petrucci 

noteheads.s1petrucci 

noteheads.s2petrucci 

noteheads .s0blackpetrucci 

noteheads .s1blackpetrucci 

noteheads .s2blackpetrucci 

Solesmes glyphs

noteheads.ssolesmes.incl.parvum

noteheads.ssolesmes.auct.asc

noteheads.ssolesmes.auct.desc

noteheads.ssolesmes.incl.auctum

noteheads.ssolesmes.stropha

noteheads.ssolesmes.stropha.aucta

noteheads.ssolesmes.oriscus

Kievan Notation glyphs

clefs.kievan.do

clefs.kievan.do_change

accidentals.kievan1

accidentals.kievanM1

scripts.barline.kievan

dots.dotkievan

noteheads.sM2kievan

noteheads.sM1kievan

noteheads.s0kievan

noteheads.d2kievan

noteheads.u2kievan

noteheads.s1kievan

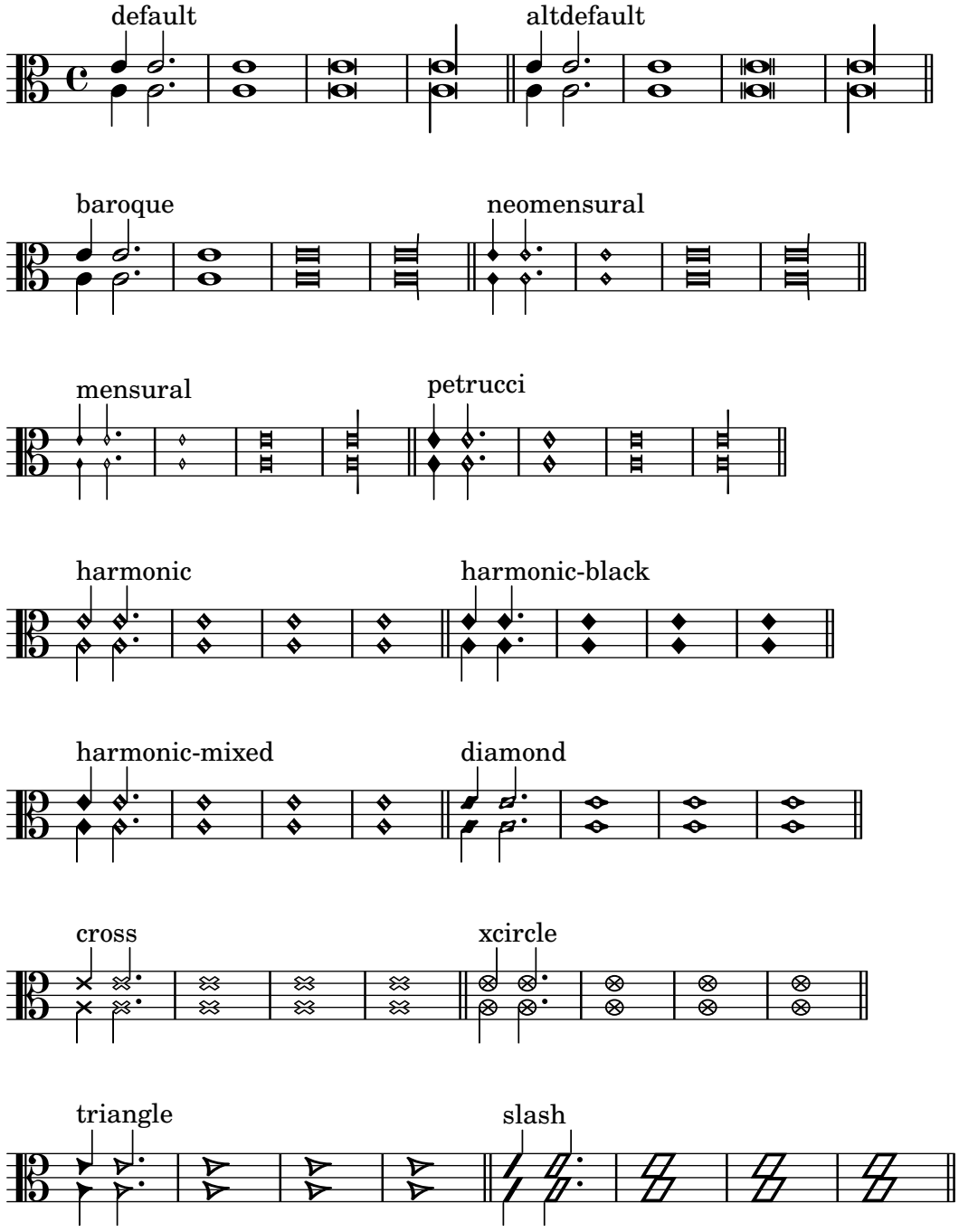
noteheads.sr1kievan

noteheads.d3kievan

noteheads.u3kievan

A.9 Note head styles

The following styles may be used for note heads.



A.10 Text markup commands

The following commands can all be used inside `\markup { }`.

A.10.1 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. }
}
```

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 $_{\text{subscript in standard size}}$

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 $^{\text{superscript in standard size}}$

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 {
    huge bold sans caps
    \hspace #2
    \normal-text {
      huge normal
    }
```

```
    \hspace #2
    as before
  }
}
```

HUGE BOLD SANS CAPS huge normal **AS BEFORE**

`\normalsize` *arg* (markup)
Set font size to default.

```
\markup {
  \teeny {
    this is very small
    \hspace #2
    \normalsize {
      normal size
    }
    \hspace #2
    teeny again
  }
}
```

this is very small normal size teeny again

`\number` *arg* (markup)
Set font family to `number`, which yields the font used for 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.,

`\replace` *replacements* (list) *arg* (markup)
Used to automatically replace a string by another in the markup *arg*. Each pair of the alist *replacements* specifies what should be replaced. The `key` is the string to be replaced by the `value` string.

```
\markup \replace #'(("thx" . "Thanks!")) thx
```

Thanks!

`\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 `offset` to determine line y-offset.

```
\markup \fill-line {
  \underline "underlined"
  \override #'(offset . 5)
  \override #'(thickness . 1)
  \underline "underlined"
  \override #'(offset . 1)
  \override #'(thickness . 5)
  \underline "underlined"
}
```

underlined underlined underlined

Used properties:

- `offset` (2)
- `thickness` (1)

`\upright` *arg* (markup)
Set `font-shape` to `upright`. This is the opposite of `italic`.

```
\markup {
  \italic {
    italic text
    \hspace #2
    \upright {
      upright text
    }
    \hspace #2
    italic again
  }
}
```

italic text upright text *italic again*

A.10.2 Align

`\center-align` *arg* (markup)
Align `arg` to its X center.

```
\markup {
  \column {
    one
    \center-align
    two
    three
  }
}
```

one
two
three

`\center-column` *args* (markup list)
Put `args` in a centered column.

```
\markup {
  \center-column {
    one
    two
    three
  }
}
```

one
two
three

Used properties:

- `baseline-skip`

`\column` *args* (markup list)

Stack the markups in *args* vertically. The property `baseline-skip` determines the space between markups in *args*.

```
\markup {
  \column {
    one
    two
    three
  }
}
```

one
two
three

Used properties:

- `baseline-skip`

`\combine` *arg1* (markup) *arg2* (markup)

Print two markups on top of each other.

Note: `\combine` cannot take a list of markups enclosed in curly braces as an argument; 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* (markup list)

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* (markup list)
Make a column of *args*, going up or down, depending on the setting of the `direction` layout property.

```
\markup {
  \override #`(direction . ,UP) {
    \dir-column {
      going up
    }
  }
  \hspace #1
  \dir-column {
    going down
  }
  \hspace #1
  \override #'(direction . 1) {
    \dir-column {
      going up
    }
  }
}
```

up
going
going
up
going

Used properties:

- `baseline-skip`
- `direction`

`\fill-line` *args* (markup list)
Put *markups* in a horizontal line of width *line-width*. The markups are spaced or flushed to fill the entire line. If there are no arguments, return an empty stencil.

```
\markup {
  \column {
    \fill-line {
      Words evenly spaced across the page
    }
    \null
    \fill-line {
      \line { Text markups }
      \line {
        \italic { evenly spaced }
```

```
      }
      \line { across the page }
    }
  }
}
```

Words evenly spaced across the page

Text markups *evenly spaced* across the page

Used properties:

- `line-width` (#f)
- `word-space` (0.6)
- `text-direction` (1)

`\fill-with-pattern` *space* (number) *dir* (direction) *pattern* (markup) *left* (markup) *right* (markup)

Put *left* and *right* in a horizontal line of width `line-width` with a line of markups *pattern* in between. Patterns are spaced apart by *space*. Patterns are aligned to the *dir* markup.

```
\markup \column {
  "right-aligned :"
  \fill-with-pattern #1 #RIGHT . first right
  \fill-with-pattern #1 #RIGHT . second right
  \null
  "center-aligned :"
  \fill-with-pattern #1.5 #CENTER - left right
  \null
  "left-aligned :"
  \override #'(line-width . 50)
  \fill-with-pattern #2 #LEFT : left first
  \override #'(line-width . 50)
  \fill-with-pattern #2 #LEFT : left second
}
```

right-aligned :
first . . . . . right
second . . . . . right

center-aligned :
left - right

left-aligned :
left : : : : : : : : : : : : : : : first
left : : : : : : : : : : : : : : : second

Used properties:

- `line-width`
- `word-space`

`\general-align` *axis* (integer) *dir* (number) *arg* (markup)
Align *arg* in *axis* direction to the *dir* side.

```
\markup {
  \column {
    one
    \general-align #X #LEFT
    two
    three
    \null
    one
    \general-align #X #CENTER
    two
    three
    \null
    \line {
      one
      \general-align #Y #UP
      two
      three
    }
    \null
    \line {
      one
      \general-align #Y #3.2
      two
      three
    }
  }
}
```

one
two
three

one
two
three

one two three

one three
two

`\halign` *dir* (number) *arg* (markup)
Set horizontal alignment. If *dir* is `-1`, then it is left-aligned, while `+1` is right. Values in between interpolate alignment accordingly.

```
\markup {
  \column {
    one
    \halign #LEFT
```

```
    two
    three
    \null
    one
    \halign #CENTER
    two
    three
    \null
    one
    \halign #RIGHT
    two
    three
    \null
    one
    \halign #-5
    two
    three
  }
}
```

one
two
three

one
two
three
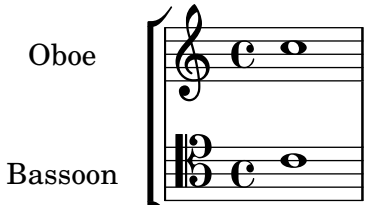
one
two
three

one
two
three

`\hcenter-in` *length* (number) *arg* (markup)
Center *arg* horizontally within a box of extending *length*/2 to the left and right.

```
\new StaffGroup <<
  \new Staff {
    \set Staff.instrumentName = \markup {
      \hcenter-in #12
      Oboe
    }
    c''1
  }
  \new Staff {
    \set Staff.instrumentName = \markup {
      \hcenter-in #12
      Bassoon
```

```
    }
    \clef tenor
    c'1
  }
>>
```



`\hspace` *amount* (number)

Create an invisible object taking up horizontal space *amount*.

```
\markup {
  one
  \hspace #2
  two
  \hspace #8
  three
}
```

one two three

`\justify-field` *symbol* (symbol)

Justify the data which has been assigned to *symbol*.

```
\header {
  title = "My title"
  myText = "Lorem ipsum dolor sit amet, consectetur adipisicing
    elit, sed do eiusmod tempor incididunt ut labore et dolore magna
    aliqua.  Ut enim ad minim veniam, quis nostrud exercitation ullamco
    laboris nisi ut aliquip ex ea commodo consequat."
}

\paper {
  bookTitleMarkup = \markup {
    \column {
      \fill-line { \fromproperty #'header:title }
      \null
      \justify-field #'header:myText
    }
  }
}

\markup {
  \null
}
```

My title

Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

`\justify` *args* (markup list)

Like `\wordwrap`, but with lines stretched to justify the margins. Use `\override #'(line-width . X)` to set the line width; X is the number of staff spaces.

```
\markup {
  \justify {
    Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
    do eiusmod tempor incididunt ut labore et dolore magna aliqua.
    Ut enim ad minim veniam, quis nostrud exercitation ullamco
    laboris nisi ut aliquip ex ea commodo consequat.
  }
}
```

Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

Used properties:

- `text-direction` (1)
- `word-space`
- `line-width` (#f)
- `baseline-skip`

`\justify-string` *arg* (string)

Justify a string. Paragraphs may be separated with double newlines

```
\markup {
  \override #'(line-width . 40)
  \justify-string #"Lorem ipsum dolor sit amet, consectetur
      adipisicing elit, sed do eiusmod tempor incididunt ut labore
      et dolore magna aliqua.


      Ut enim ad minim veniam, quis nostrud exercitation ullamco
      laboris nisi ut aliquip ex ea commodo consequat.


      Excepteur sint occaecat cupidatat non proident, sunt in culpa
      qui officia deserunt mollit anim id est laborum"
}
```

Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.
Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum

Used properties:

- `text-direction` (1)
- `word-space`
- `line-width`
- `baseline-skip`

`\left-align` *arg* (markup)
Align *arg* on its left edge.

```
\markup {
  \column {
    one
    \left-align
    two
    three
  }
}
```

one
two
three

`\left-column` *args* (markup list)
Put `args` in a left-aligned column.

```
\markup {
  \left-column {
    one
    two
    three
  }
}
```

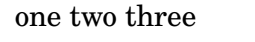
one
two
three

Used properties:

- `baseline-skip`

`\line` *args* (markup list)
Put *args* in a horizontal line. The property `word-space` determines the space between markups in *args*.

```
\markup {
  \line {
    one two three
  }
}
```

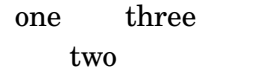


Used properties:

- `text-direction` (1)
- `word-space`

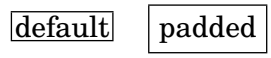
`\lower` *amount* (number) *arg* (markup)
: Lower *arg* by the distance *amount*. A negative *amount* indicates raising; see also `\raise`.

```
\markup {
  one
  \lower #3
  two
  three
}
```



`\pad-around` *amount* (number) *arg* (markup)
: Add padding *amount* all around *arg*.

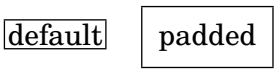
```
\markup {
  \box {
    default
  }
  \hspace #2
  \box {
    \pad-around #0.5 {
      padded
    }
  }
}
```



`\pad-markup` *amount* (number) *arg* (markup)
: Add space around a markup object. Identical to `pad-around`.

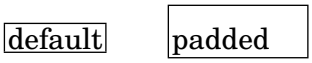
```
\markup {
  \box {
    default
  }
  \hspace #2
  \box {
    \pad-markup #1 {
      padded
```

```
    }
  }
}
```



`\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+
}
```

C **9/7+**

`\right-align` *arg* (markup)
Align *arg* on its right edge.

```
\markup {
  \column {
    one
    \right-align
    two
    three
  }
}
```

one
two
three

`\right-column` *args* (markup list)
Put `args` in a right-aligned column.

```
\markup {
  \right-column {
    one
    two
    three
  }
}
```

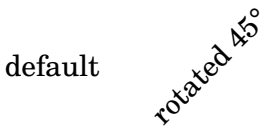
one
two
three

Used properties:

- `baseline-skip`

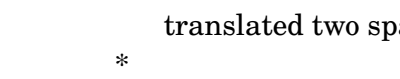
`\rotate` *ang* (number) *arg* (markup)
Rotate object with *ang* degrees around its center.

```
\markup {
  default
  \hspace #2
  \rotate #45
  \line {
    rotated 45˚
  }
}
```



`\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 }
}
```



`\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
  }
}
```

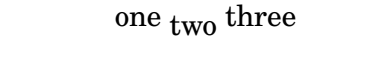


Used properties:

- `font-size` (0)

`\vcenter` *arg* (markup)
Align `arg` to its Y center.

```
\markup {
  one
  \vcenter
  two
  three
}
```



`\vspace` *amount* (number)
Create an invisible object taking up vertical space of *amount* multiplied by 3.

```
\markup {
    \center-column {
    one
    \vspace #2
    two
    \vspace #5
    three
  }
```

```
}
```

one

two

three

`\wordwrap-field` *symbol* (symbol)
Wordwrap the data which has been assigned to *symbol*.

```
\header {
  title = "My title"
  myText = "Lorem ipsum dolor sit amet, consectetur adipisicing
    elit, sed do eiusmod tempor incididunt ut labore et dolore
    magna aliqua.  Ut enim ad minim veniam, quis nostrud
    exercitation ullamco laboris nisi ut aliquip ex ea commodo
    consequat."
}

\paper {
  bookTitleMarkup = \markup {
    \column {
      \fill-line { \fromproperty #'header:title }
      \null
      \wordwrap-field #'header:myText
    }
  }
}

\markup {
  \null
}
```

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.

`\wordwrap` *args* (markup list)
Simple wordwrap. Use `\override #'(line-width . X)` to set the line width, where X is the number of staff spaces.

```
\markup {
  \wordwrap {
    Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
    do eiusmod tempor incididunt ut labore et dolore magna aliqua.
    Ut enim ad minim veniam, quis nostrud exercitation ullamco
    laboris nisi ut aliquip ex ea commodo consequat.
  }
}
```

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:

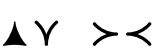
- `text-direction` (1)
- `word-space`
- `line-width`
- `baseline-skip`

A.10.3 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.

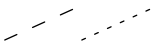
```
\markup {
  \draw-circle #2 #0.5 ##f
  \hspace #2
  \draw-circle #2 #0 ##t
}
```



`\draw-dashed-line` *dest* (pair of numbers)
A dashed line.

If `full-length` is set to #t (default) the dashed-line extends to the whole length given by *dest*, without white space at beginning or end. `off` will then be altered to fit. To insist on the given (or default) values of `on`, `off` use `\override #'(full-length . #f)` Manual settings for `on`,`off` and `phase` are possible.

```
\markup {
  \draw-dashed-line #'(5.1 . 2.3)
  \override #'(on . 0.3)
  \override #'(off . 0.5)
  \draw-dashed-line #'(5.1 . 2.3)
}
```



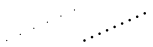
Used properties:

- `full-length` (#t)
- `phase` (0)
- `off` (1)
- `on` (1)
- `thickness` (1)

`\draw-dotted-line` *dest* (pair of numbers)
A dotted line.

The dotted-line always extends to the whole length given by *dest*, without white space at beginning or end. Manual settings for `off` are possible to get larger or smaller space between the dots. The given (or default) value of `off` will be altered to fit the line-length.

```
\markup {
  \draw-dotted-line #'(5.1 . 2.3)
  \override #'(thickness . 2)
  \override #'(off . 0.2)
  \draw-dotted-line #'(5.1 . 2.3)
}
```



Used properties:

- `phase` (0)
- `off` (1)
- `thickness` (1)

`\draw-hline`

Draws a line across a page, where the property `span-factor` controls what fraction of the page is taken up.

```
\markup {
  \column {
    \draw-hline
    \override #'(span-factor . 1/3)
    \draw-hline
  }
}
```



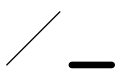
Used properties:

- `span-factor` (1)
- `line-width`
- `draw-line-markup`

`\draw-line` *dest* (pair of numbers)

A simple line.

```
\markup {
  \draw-line #'(4 . 4)
  \override #'(thickness . 5)
  \draw-line #'(-3 . 0)
}
```



Used properties:

- `thickness` (1)

`\ellipse` *arg* (markup)

Draw an ellipse around *arg*. Use `thickness`, `x-padding`, `y-padding` and `font-size` properties to determine line thickness and padding around the markup.

```
\markup {
  \ellipse {
```

```
    Hi
  }
}
```

Hi

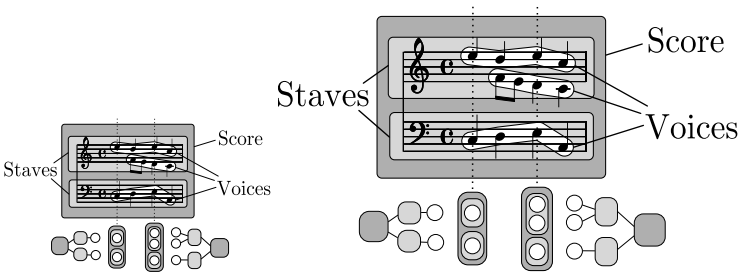
Used properties:

- `y-padding` (0.2)
- `x-padding` (0.2)
- `font-size` (0)
- `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"
  }
}
```



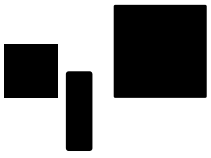
`\filled-box` *xext* (pair of numbers) *yext* (pair of numbers) *blot* (number)

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).

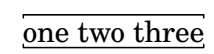
```
\markup {
  \filled-box #'(0 . 4) #'(0 . 4) #0
  \filled-box #'(0 . 2) #'(-4 . 2) #0.4
  \filled-box #'(1 . 8) #'(0 . 7) #0.2
  \with-color #white
  \filled-box #'(-4.5 . -2.5) #'(3.5 . 5.5) #0.7
}
```



`\hbracket` *arg* (markup)

Draw horizontal brackets around *arg*.

```
\markup {
  \hbracket {
    \line {
      one two three
    }
  }
}
```



`\oval` *arg* (markup)
: Draw an oval around *arg*. Use `thickness`, `x-padding`, `x-padding` and `font-size` properties to determine line thickness and padding around the markup.

```
\markup {
  \oval {
    Hi
  }
}
```

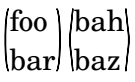


Used properties:

- `y-padding` (0.75)
- `x-padding` (0.75)
- `font-size` (0)
- `thickness` (1)

`\parenthesize` *arg* (markup)
: Draw parentheses around *arg*. This is useful for parenthesizing a column containing several lines of text.

```
\markup {
  \line {
    \parenthesize {
      \column {
        foo
        bar
      }
    }
    \override #'(angularity . 2) {
      \parenthesize {
        \column {
          bah
          baz
        }
      }
    }
  }
}
```



Used properties:

- `width` (0.25)
- `thickness` (1)
- `size` (1)
- `padding`
- `angularity` (0)

`\path` *thickness* (number) *commands* (list)

Draws a path with line *thickness* according to the directions given in *commands*. *commands* is a list of lists where the `car` of each sublist is a drawing command and the `cdr` comprises the associated arguments for each command.

There are seven commands available to use in the list `commands`: `moveto`, `rmoveto`, `lineto`, `rlineto`, `curveto`, `rcurveto`, and `closepath`. Note that the commands that begin with *r* are the relative variants of the other three commands.

The commands `moveto`, `rmoveto`, `lineto`, and `rlineto` take 2 arguments; they are the X and Y coordinates for the destination point.

The commands `curveto` and `rcurveto` create cubic Bézier curves, and take 6 arguments; the first two are the X and Y coordinates for the first control point, the second two are the X and Y coordinates for the second control point, and the last two are the X and Y coordinates for the destination point.

The `closepath` command takes zero arguments and closes the current subpath in the active path.

Note that a sequence of commands *must* begin with a `moveto` or `rmoveto` to work with the SVG output.

Line-cap styles and line-join styles may be customized by overriding the `line-cap-style` and `line-join-style` properties, respectively. Available line-cap styles are `'butt`, `'round`, and `'square`. Available line-join styles are `'miter`, `'round`, and `'bevel`.

The property `filled` specifies whether or not the path is filled with color.

```
samplePath =
  #'((moveto 0 0)
     (lineto -1 1)
     (lineto 1 1)
     (lineto 1 -1)
     (curveto -5 -5 -5 5 -1 0)
     (closepath))

\markup {
  \path #0.25 #samplePath

  \override #'(line-join-style . miter) \path #0.25 #samplePath

  \override #'(filled . #t) \path #0.25 #samplePath
}
```



Used properties:

- `filled` (#f)

- `line-join-style` (round)
- `line-cap-style` (round)
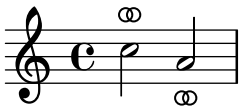
`\postscript` *str* (string)

This inserts *str* directly into the output as a PostScript command string.

```
ringsps = #"
  0.15 setlinewidth
  0.9 0.6 moveto
  0.4 0.6 0.5 0 361 arc
  stroke
  1.0 0.6 0.5 0 361 arc
  stroke
  "

rings = \markup {
  \with-dimensions #'(-0.2 . 1.6) #'(0 . 1.2)
  \postscript #ringsps
}
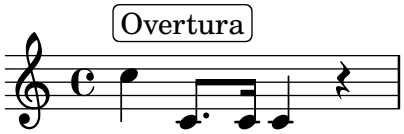
\relative c'' {
  c2^\rings
  a2_\rings
}
```



`\rounded-box` *arg* (markup)

Draw a box with rounded corners around *arg*. Looks at `thickness`, `box-padding` and `font-size` properties to determine line thickness and padding around the markup; the `corner-radius` property makes it possible to define another shape for the corners (default is 1).

```
c4^\markup {
  \rounded-box {
    Overtura
  }
}
c,8. c16 c4 r
```



Used properties:

- `box-padding` (0.5)
- `font-size` (0)
- `corner-radius` (1)
- `thickness` (1)

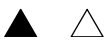
`\scale` *factor-pair* (pair of numbers) *arg* (markup)
: Scale *arg*. *factor-pair* is a pair of numbers representing the scaling-factor in the X and Y axes. Negative values may be used to produce mirror images.

```
\markup {
  \line {
    \scale #'(2 . 1)
    stretched
    \scale #'(1 . -1)
    mirrored
  }
}
```



`\triangle` *filled* (boolean)
: A triangle, either filled or empty.

```
\markup {
  \triangle ##t
  \hspace #2
  \triangle ##f
}
```



Used properties:

- `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/" {
    LilyPond ... \italic {
      music notation for everyone
    }
  }
}
```

LilyPond ... *music notation for everyone*

A.10.4 Music

`\customTabClef` *num-strings* (integer) *staff-space* (number)
: Draw a tab clef sans-serif style.

`\doubleflat`
: Draw a double flat symbol.

```
\markup {
  \doubleflat
}
```



`\doublesharp`

Draw a double sharp symbol.

```
\markup {
  \doublesharp
}
```

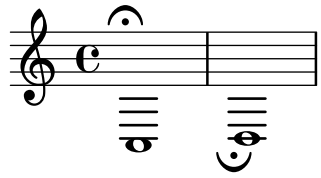


`\fermata`

Create a fermata glyph. When *direction* is `DOWN`, use an inverted glyph. Note that within music, one would usually use the `\fermata` articulation instead of a markup.

```
{ c1^\markup \fermata d1_\markup \fermata }

\markup { \fermata \override #`(direction . ,DOWN) \fermata }
```





Used properties:

- `direction` (1)

`\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 and flag. By using fractional values for *dir*, longer or shorter stems can be obtained. Supports all note-head-styles. Supported flag-styles are `default`, `old-straight-flag`, `modern-straight-flag` and `flat-flag`.

```
\markup {
  \note-by-number #3 #0 #DOWN
  \hspace #2
  \note-by-number #1 #2 #0.8
}
```



Used properties:

- `style` ('())
- `flag-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` ('())
- `flag-style` ('())
- `font-size` (0)

`\rest-by-number` *log* (number) *dot-count* (number)

A rest or multi-measure-rest symbol.

```
\markup {
  \rest-by-number #3 #2
  \hspace #2
  \rest-by-number #0 #1
```

```
  \hspace #2
  \override #'(multi-measure-rest . #t)
  \rest-by-number #0 #0
}
```



Used properties:

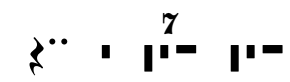
- `multi-measure-rest` (#f)
- `style` ('())
- `font-size` (0)

`\rest` *duration* (string)

This produces a rest, with the *duration* for the rest type and augmentation dots. `"breve"`, `"longa"` and `"maxima"` are valid input-strings.

Printing MultiMeasureRests could be enabled with `\override #'(multi-measure-rest . #t)` If MultiMeasureRests are taken, the MultiMeasureRestNumber is printed above. This is enabled for all styles using default-glyphs. Could be disabled with `\override #'(multi-measure-rest-number . #f)`

```
\markup {
  \rest #"4.."
  \hspace #2
  \rest #"breve"
  \hspace #2
  \override #'(multi-measure-rest . #t)
  {
  \rest #"7"
  \hspace #2
  \override #'(multi-measure-rest-number . #f)
  \rest #"7"
  }
}
```



Used properties:

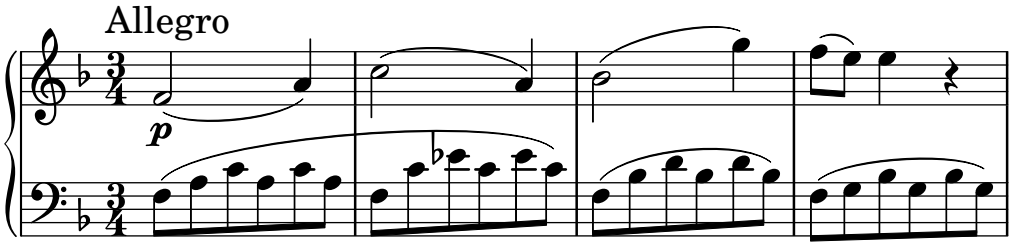
- `word-space` (0.6)
- `multi-measure-rest-number` (#t)
- `multi-measure-rest` (#f)
- `style` ('())

`\score` *score* (score)

Inline an image of music. The reference point (usually the middle staff line) of the lowest staff in the top system is placed on the baseline.

```
\markup {
  \score {
    \new PianoStaff <<
      \new Staff \relative c' {
        \key f \major
        \time 3/4
```

```
        \mark \markup { Allegro }
        f2\p( a4)
        c2( a4)
        bes2( g'4)
        f8( e) e4 r
      }
      \new Staff \relative c {
        \clef bass
        \key f \major
        \time 3/4
        f8( a c a c a
        f c' es c es c)
        f,( bes d bes d bes)
        f( g bes g bes g)
      }
    >>
    \layout {
      indent = 0.0\cm
      \context {
        \Score
        \override RehearsalMark
          #'break-align-symbols = #'(time-signature key-signature)
        \override RehearsalMark
          #'self-alignment-X = #LEFT
      }
      \context {
        \Staff
        \override TimeSignature
          #'break-align-anchor-alignment = #LEFT
      }
    }
  }
}
```



Used properties:

- `baseline-skip`

`\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 \column {
  \tied-lyric #"Siam navi~all'onde~algenti Lasciate~in abbandono"
  \tied-lyric #"Impetuosi venti I nostri~affetti sono"
  \tied-lyric #"Ogni diletto~e scoglio Tutta la vita~e~un mar."
}
```

Siam navi‿all'onde‿algenti Lasciate‿in abbandono
Impetuosi venti I nostri‿affetti sono
Ogni diletto‿e scoglio Tutta la vita‿e‿un mar.

Used properties:

- `word-space`

A.10.5 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 (relative to normal line thickness). Default: 0.5.
  - `h:`*number* – Set the height of the diagram in frets. Default: 4.
  - `w:`*number* – Set the width of the diagram in strings. Default: 6.
  - `f:`*number* – Set fingering label type (0 = none, 1 = in circle on string, 2 = below string). Default: 0.
  - `d:`*number* – Set radius of dot, in terms of fret spacing. Default: 0.25.
  - `p:`*number* – Set the position of the dot in the fret space. 0.5 is centered; 1 is on lower fret bar, 0 is on upper fret bar. Default: 0.6.
  - `c:`*string1-string2-fret* – Include a barre mark from *string1* to *string2* on *fret*.
  - *string-fret* – Place a dot on *string* at *fret*. If *fret* is '`o`', *string* is identified as open. If *fret* is '`x`', *string* is identified as muted.
  - *string-fret-fingering* – Place a dot on *string* at *fret*, and label with *fingering* as defined by the `f:` code.
- Note: There is no limit to the number of fret indications per string.

Used properties:

- `thickness` (0.5)
- `fret-diagram-details`
- `size` (1.0)
- `align-dir` (-0.4)

`\fret-diagram-terse` *definition-string* (string)

Make a fret diagram markup using terse string-based syntax.

Here is an example

```
\markup \fret-diagram-terse #"x;x;o;2;3;2;"
```

for a D chord diagram.

Syntax rules for *definition-string*:

- Strings are terminated by semicolons; the number of semicolons is the number of strings in the diagram.
- Mute strings are indicated by '`x`'.
- Open strings are indicated by '`o`'.
- A number indicates a fret indication at that fret.
- If there are multiple fret indicators desired on a string, they should be separated by spaces.

- Fingerings are given by following the fret number with a `-`, followed by the finger indicator, e.g. '`3-2`' for playing the third fret with the second finger.
- Where a barre indicator is desired, follow the fret (or fingering) symbol with `-(` to start a barre and `-)` to end the barre.

Used properties:

- `thickness` (0.5)
- `fret-diagram-details`
- `size` (1.0)
- `align-dir` (-0.4)

`\fret-diagram-verbose` *marking-list* (pair)

Make a fret diagram containing the symbols indicated in *marking-list*.

For example,

```
\markup \fret-diagram-verbose
  #'((mute 6) (mute 5) (open 4)
     (place-fret 3 2) (place-fret 2 3) (place-fret 1 2))
```

produces a standard D chord diagram without fingering indications.

Possible elements in *marking-list*:

`(mute` *string-number*`)`
: Place a small 'x' at the top of string *string-number*.

`(open` *string-number*`)`
: Place a small 'o' at the top of string *string-number*.

`(barre` *start-string end-string fret-number*`)`
: Place a barre indicator (much like a tie) from string *start-string* to string *end-string* at fret *fret-number*.

`(capo` *fret-number*`)`
: Place a capo indicator (a large solid bar) across the entire fretboard at fret location *fret-number*. Also, set fret *fret-number* to be the lowest fret on the fret diagram.

`(place-fret` *string-number fret-number* `[`*finger-value* `[`*color-modifier*`]])`
: Place a fret playing indication on string *string-number* at fret *fret-number* with an optional fingering label *finger-value*, and an optional color modifier *color-modifier*. By default, the fret playing indicator is a solid dot. This can be globally changed by setting the value of the variable *dot-color*. Setting *color-modifier* to `inverted` inverts the dot color for a specific fingering. If the *finger* part of the `place-fret` element is present, *finger-value* will be displayed according to the setting of the variable *finger-code*. There is no limit to the number of fret indications per string.

Used properties:

- `thickness` (0.5)
- `fret-diagram-details`
- `size` (1.0)
- `align-dir` (-0.4)

`\harp-pedal` *definition-string* (string)

Make a harp pedal diagram.

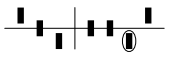
Possible elements in *definition-string*:

`^`	pedal is up
`-`	pedal is neutral
`v`	pedal is down
`|`	vertical divider line
`o`	the following pedal should be circled (indicating a change)

The function also checks if the string has the typical form of three pedals, then the divider and then the remaining four pedals. If not it prints out a warning. However, in any case, it will also print each symbol in the order as given. This means you can place the divider (even multiple dividers) anywhere you want, but you'll have to live with the warnings.

The appearance of the diagram can be tweaked inter alia using the size property of the TextScript grob (`\override Voice.TextScript #'size = #0.3`) for the overall, the thickness property (`\override Voice.TextScript #'thickness = #3`) for the line thickness of the horizontal line and the divider. The remaining configuration (box sizes, offsets and spaces) is done by the harp-pedal-details list of properties (`\override Voice.TextScript #'harp-pedal-details #'box-width = #1`). It contains the following settings: `box-offset` (vertical shift of the box center for up/down pedals), `box-width`, `box-height`, `space-before-divider` (the spacing between two boxes before the divider) and `space-after-divider` (box spacing after the divider).

```
\markup \harp-pedal #"^-v|--ov^"
```



Used properties:

- `thickness` (0.5)
- `harp-pedal-details` ('())
- `size` (1.2)

`\woodwind-diagram` *instrument* (symbol) *user-draw-commands* (list)
Make a woodwind-instrument diagram. For example, say

```
\markup \woodwind-diagram
  #'oboe #'((lh . (d ees)) (cc . (five3qT1q)) (rh . (gis)))
```

for an oboe with the left-hand d key, left-hand ees key, and right-hand gis key depressed while the five-hole of the central column effectuates a trill between 1/4 and 3/4 closed.

The following instruments are supported:

- piccolo
- flute
- oboe
- clarinet
- bass-clarinet
- saxophone
- bassoon
- contrabassoon

To see all of the callable keys for a given instrument, include the function `(print-keys 'instrument)` in your .ly file, where instrument is the instrument whose keys you want to print.

Certain keys allow for special configurations. The entire gamut of configurations possible is as follows:

- 1q (1/4 covered)
- 1h (1/2 covered)
- 3q (3/4 covered)
- R (ring depressed)
- F (fully covered; the default if no state put)

Additionally, these configurations can be used in trills. So, for example, `three3qTR` effectuates a trill between 3/4 full and ring depressed on the three hole. As another example, `threeRT` effectuates a trill between R and open, whereas `threeTR` effectuates a trill between open and shut. To see all of the possibilities for all of the keys of a given instrument, invoke `(print-keys-verbose 'instrument)`.

Lastly, substituting an empty list for the pressed-key alist will result in a diagram with all of the keys drawn but none filled, for example:

```
\markup \woodwind-diagram #'oboe #'()
```

Used properties:

- `graphical` (#t)
- `thickness` (0.1)
- `size` (1)

A.10.6 Accordion Registers

`\discant` *name* (string)

`\discant` *name* generates a discant accordion register symbol.

To make it available,

```
#(use-modules (scm accreg))
```

is required near the top of your input file.

The register names in the default `\discant` register set have modeled after numeric Swiss notation like depicted in `http://de.wikipedia.org/wiki/Register_%28Akkordeon%29`, omitting the slashes and dropping leading zeros.

The string *name* is basically a three-digit number with the lowest digit specifying the number of 16' reeds, the tens the number of 8' reeds, and the hundreds specifying the number of 4' reeds. Without modification, the specified number of reeds in 8' is centered in the symbol. Newer instruments may have registrations where 8' can be used either within or without a tone chamber, 'cassotto'. Notationally, the central dot then indicates use of cassotto. One can suffix the tens' digits '`1`' and '`2`' with '`+`' or '`-`' to indicate clustering the dots at the right or left respectively rather than centered.

Some examples are



\discant #"1" \discant #"1+0"



\discant #"120" \discant #"131"

Used properties:

- `font-size` (0)

`\freeBass` *name* (string)

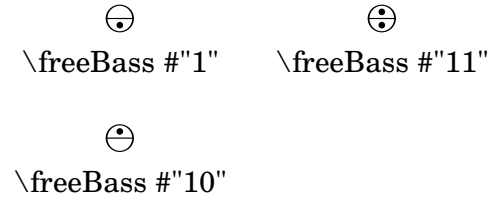
`\freeBass` ***name*** generates a free bass/converter accordion register symbol for the usual two-reed layout.

To make it available,

```
#(use-modules (scm accreg))
```

is required near the top of your input file.

Available registrations are



Used properties:

- `font-size` (0)

`\stdBass` *name* (string)

`\stdBass` ***name*** generates a standard bass accordion register symbol.

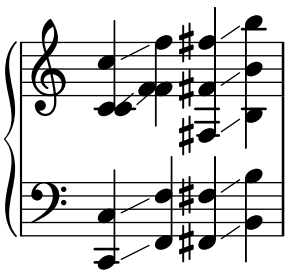
To make it available,

```
#(use-modules (scm accreg))
```

is required near the top of your input file.

The default bass register definitions have been modeled after the article http://www.accordions.com/index/art/stradella.shtml originally appearing in Accord Magazine.

The underlying register model is



This kind of overlapping arrangement is common for Italian instruments though the exact location of the octave breaks differ.

When not composing for a particular target instrument, using the five reed definitions makes more sense than using a four reed layout: in that manner, the '`Master`' register is unambiguous. This is rather the rule in literature bothering about bass registrations at all.

Available registrations are



\stdBass #"Soprano"



\stdBass #"Soft Bass"



\stdBass #"Alto"



\stdBass #"Soft Tenor"



\stdBass #"Tenor"



\stdBass #"Bass/Alto"



\stdBass #"Master"

Used properties:

- `font-size` (0)

`\stdBassIV` *name* (string)
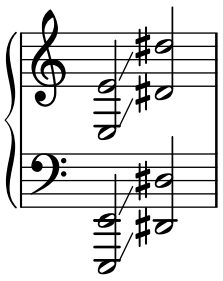
`\stdBassIV` ***name*** generates a standard bass accordion register symbol.

To make it available,

```
#(use-modules (scm accreg))
```

is required near the top of your input file.

The main use is for four-reed standard bass instruments with reedbank layout



Notable instruments are Morino models with MIII (the others are five-reed instead) and the Atlantic IV. Most of those models have three register switches. Some newer Morinos with MIII might have five or even seven.

The prevalent three-register layout uses the middle three switches '`Tenor`', '`Master`', '`Soft Bass`'. Note that the sound is quite darker than the same registrations of '`c,`'-based instruments.

Available registrations are



\stdBassIV #"Soprano"



\stdBassIV #"Soft Bass"



\stdBassIV #"Alto"



\stdBassIV #"Bass/Alto"



\stdBassIV #"Tenor"



\stdBassIV #"Soft Bass/Alto"



\stdBassIV #"Master"



\stdBassIV #"Soft Tenor"

Used properties:

- `font-size` (0)

`\stdBassV` *name* (string)
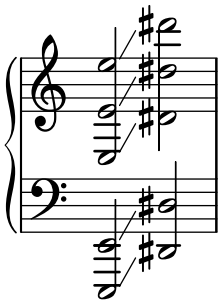
`\stdBassV` *`name`* generates a standard bass accordion register symbol.

To make it available,

```
#(use-modules (scm accreg))
```

is required near the top of your input file.

The main use is for five-reed standard bass instruments with reedbank layout



This tends to be the bass layout for Hohner's Morino series without convertor or MIII manual.

With the exception of the rather new 7-register layout, the highest two chord reeds are usually sounded together. The Older instruments offer 5 or 3 bass registers. The Tango VM offers an additional '`Solo Bass`' setting that mutes the chord reeds. The symbol on the register buttons of the Tango VM would actually match the physical five-octave layout reflected here, but it is not used in literature.

Composers should likely prefer the five-reed versions of these symbols. The mismatch of a four-reed instrument with five-reed symbols is easier to resolve for the player than the other way round.

Available registrations are



\stdBassV #"Bass/Alto"



\stdBassV #"Soft Bass"



\stdBassV #"Soft Bass/Alto"



\stdBassV #"Soft Tenor"



\stdBassV #"Alto"



\stdBassV #"Soprano"



\stdBassV #"Tenor"



\stdBassV #"Sopranos"



\stdBassV #"Master"



\stdBassV #"Solo Bass"

Used properties:

- `font-size` (0)

`\stdBassVI` *name* (string)
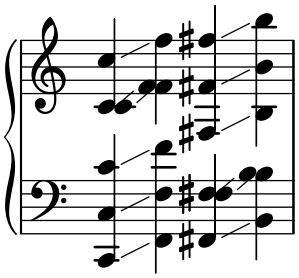
`\stdBassVI` ***name*** generates a standard bass accordion register symbol for six reed basses.

To make it available,

```
#(use-modules (scm accreg))
```

is required near the top of your input file.

This is primarily the register layout for the Hohner "Gola" model. The layout is



The registers are effectively quite similar to that of `\stdBass`. An additional bass reed at alto pitch is omitted for esthetical reasons from the '`Master`' setting, so the symbols are almost the same except for the '`Alto/Soprano`' register with bass notes at Alto pitch and chords at Soprano pitch.

Available registrations are



\stdBassVI #"Soprano"



\stdBassVI #"Alto/Soprano"



\stdBassVI #"Alto"



\stdBassVI #"Bass/Alto"



\stdBassVI #"Soft Tenor"



\stdBassVI #"Soft Bass"



\stdBassVI #"Master"

Used properties:

- `font-size` (0)

A.10.7 Other

`\auto-footnote` *mkup* (markup) *note* (markup)

Have footnote *note* act as an annotation to the markup *mkup*.

```
\markup {
  \auto-footnote a b
  \override #'(padding . 0.2)
  \auto-footnote c d
}
```

a c

The footnote will be annotated automatically.

Used properties:

- `padding` (0.0)
- `raise` (0.5)

`\backslashed-digit` *num* (integer)

A feta number, with backslash. This is for use in the context of figured bass notation.

```
\markup {
  \backslashed-digit #5
  \hspace #2
  \override #'(thickness . 3)
  \backslashed-digit #7
}
```



Used properties:

- `thickness` (1.6)
- `font-size` (0)

`\char` *num* (integer)

Produce a single character. Characters encoded in hexadecimal format require the prefix `#x`.

```
\markup {
  \char #65 \char ##x00a9
}
```

A ©

`\eyeglasses`

Prints out eyeglasses, indicating strongly to look at the conductor.

```
\markup { \eyeglasses }
```



`\footnote` *mkup* (markup) *note* (markup)

Have footnote *note* act as an annotation to the markup *mkup*.

```
\markup {
  \auto-footnote a b
  \override #'(padding . 0.2)
  \auto-footnote c d
}
```

a c

The footnote will not be annotated automatically.

`\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*

`\left-brace` *size* (number)

A feta brace in point size *size*.

```
\markup {
  \left-brace #35
  \hspace #2
  \left-brace #45
}
```



`\lookup` *glyph-name* (string)

Lookup a glyph by name.

```
\markup {
  \override #'(font-encoding . fetaBraces) {
    \lookup #"brace200"
    \hspace #2
    \rotate #180
    \lookup #"brace180"
  }
}
```



`\markalphabet` *num* (integer)

Make a markup letter for *num*. The letters start with A to Z and continue with double letters.

```
\markup {
  \markalphabet #8
  \hspace #2
  \markalphabet #26
}
```

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
}
```

J AB

`\null`

An empty markup with extents of a single point.

```
\markup {
  \null
}
```

`\on-the-fly` *procedure* (procedure) *arg* (markup)

Apply the *procedure* markup command to *arg*. *procedure* 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
      }
    }
  }
}
```

default
baseline-skip

increased
baseline-skip

`\page-link` *page-number* (number) *arg* (markup)

Add a link to the page *page-number* around *arg*. This only works in the PDF backend.

```
\markup {
  \page-link #2  { \italic { This links to page 2... } }
}
```

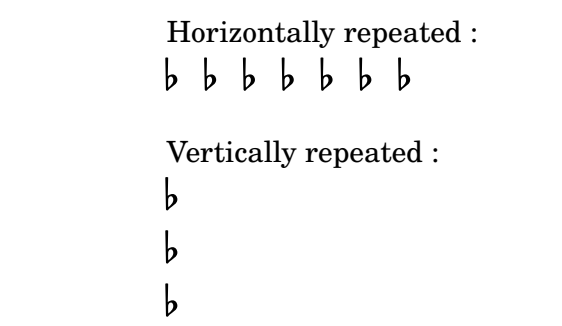
This links to page 2...

`\page-ref` *label* (symbol) *gauge* (markup) *default* (markup)

Reference to a page number. *label* is the label set on the referenced page (using 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.

`\pattern` *count* (integer) *axis* (integer) *space* (number) *pattern* (markup)
: Prints *count* times a *pattern* markup. Patterns are spaced apart by *space*. Patterns are distributed on *axis*.

```
\markup \column {
  "Horizontally repeated :"
  \pattern #7 #X #2 \flat
  \null
  "Vertically repeated :"
  \pattern #3 #Y #0.5 \flat
}
```



`\property-recursive` *symbol* (symbol)
: Print out a warning when a header field markup contains some recursive markup definition.

`\right-brace` *size* (number)
: A feta brace in point size *size*, rotated 180 degrees.

```
\markup {
  \right-brace #45
  \hspace #2
  \right-brace #35
}
```



`\slashed-digit` *num* (integer)
: A feta number, with slash. This is for use in the context of figured bass notation.

```
\markup {
  \slashed-digit #5
  \hspace #2
  \override #'(thickness . 3)
  \slashed-digit #7
}
```



Used properties:

- `thickness` (1.6)
- `font-size` (0)

`\stencil` *stil* (stencil)
: Use a stencil as markup.

```
\markup {
  \stencil #(make-circle-stencil 2 0 #t)
}
```



`\strut`
: Create a box of the same height as the space in the current font.

`\transparent` *arg* (markup)
: Make *arg* transparent.

```
\markup {
  \transparent {
    invisible text
  }
}
```

`\verbatim-file` *name* (string)
: Read the contents of file *name*, and include it verbatim.

```
\markup {
  \verbatim-file #"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 omitted.
\version "2.16.0"
```

`\whiteout` *arg* (markup)
: Provide a white background for *arg*.

```
\markup {
  \combine
    \filled-box #'(-1 . 10) #'(-3 . 4) #1
    \whiteout whiteout
}
```



`\with-color` *color* (color) *arg* (markup)
: Draw *arg* in color specified by *color*.

```
\markup {
  \with-color #red
  red
  \hspace #2
  \with-color #green
  green
  \hspace #2
  \with-color #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*.

`\with-link` *label* (symbol) *arg* (markup)
: Add a link to the page holding label *label* around *arg*. This only works in the PDF backend.

```
\markup {
  \with-link #'label {
    \italic { This links to the page containing the label... }
  }
}
```

This links to the page containing the label...

A.11 Text markup list commands

The following commands can all be used with `\markuplist`:

`\column-lines` *args* (markup list)
: Like `\column`, but return a list of lines instead of a single markup. `baseline-skip` determines the space between each markup in *args*.

  Used properties:

  - `baseline-skip`

`\justified-lines` *args* (markup list)
: Like `\justify`, but return a list of lines instead of a single markup. Use `\override-lines #'(line-width . X)` to set the line width; *X* is the number of staff spaces.

  Used properties:

  - `text-direction` (1)
  - `word-space`
  - `line-width` (#f)
  - `baseline-skip`

`\map-markup-commands` *compose* (procedure) *args* (markup list)
: This applies the function *compose* to every markup in *args* (including elements of markup list command calls) in order to produce a new markup list. Since the return value from a markup list command call is not a markup list but rather a list of stencils, this requires passing those stencils off as the results of individual markup calls. That way, the results should work out as long as no markups rely on side effects.

`\override-lines` *new-prop* (pair) *args* (markup list)
: Like `\override`, for markup lists.

`\table-of-contents`

`\wordwrap-internal` *justify* (boolean) *args* (markup list)
: Internal markup list command used to define `\justify` and `\wordwrap`.

  Used properties:

  - `text-direction` (1)
  - `word-space`
  - `line-width` (#f)

`\wordwrap-lines` *args* (markup list)
: Like `\wordwrap`, but return a list of lines instead of a single markup. Use `\override-lines #'(line-width . X)` to set the line width, where *X* is the number of staff spaces.

  Used properties:

  - `text-direction` (1)
  - `word-space`
  - `line-width` (#f)
  - `baseline-skip`

`\wordwrap-string-internal` *justify* (boolean) *arg* (string)
: Internal markup list command used to define `\justify-string` and `\wordwrap-string`.

  Used properties:

  - `text-direction` (1)
  - `word-space`
  - `line-width`

A.12 List of special characters

The following special characters references can be used; for more details, see [ASCII aliases], page 480.

The HTML syntax is used and most of these references are the same as HTML. The rest of them are inspired by LaTeX.

The characters are boxed so that you can see their size. A small padding has been added between the character and the box for more readability.

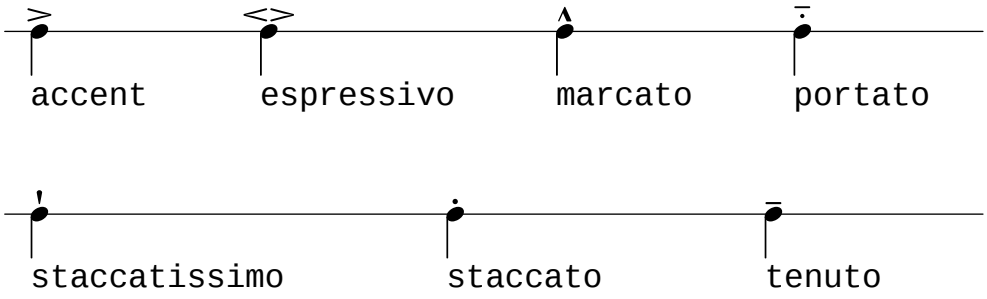
…	…	–	–	—	—	¡	¡		
¿	¿	&solidus;	⁄	&flq;	‹	&frq;	›		
&flqq;	«	&frqq;	»	&glq;	‚	&grq;	‘		
&glqq;	„	&grqq;	“	&elq;	‘	&erq;	’		
&elqq;	“	&erqq;	”		␣		␣		

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&registered;	®	&trademark;	™	†	†	‡	‡		
№	№	ª	ª	º	º	¶	¶		
§	§	°	°	№	№	‰	‰		
¦	¦	´	´	&acutedbl;	˝	`	`		
˘	˘	ˇ	ˇ	&cedilla;	¸	&circumflex;	^		
&diaeresis;	¨	&macron;	¯	&aa;	å	&AA;	Å		
&ae;	æ	&AE;	Æ	&dh;	ð	&DH;	Ð		
&dj;	đ	&DJ;	Đ	&l;	ł	&L;	Ł		
&ng;	ŋ	&NG;	Ŋ	&o;	ø	&O;	Ø		
&oe;	œ	&OE;	Œ	&s;	ß	&ss;	ß		
&th;	þ	&TH;	Þ	+	+	−	−		
×	×	÷	÷	¹	¹	²	²		
³	³	&sqrt;	√	&increment;	Δ	&infty;	∞		
∑	∑	±	±	&bulletop;	∙	&partial;	∂		
&neg;	¬	&currency;	¤	$	$	€	€		
&pounds;	£	¥	¥	¢	¢				

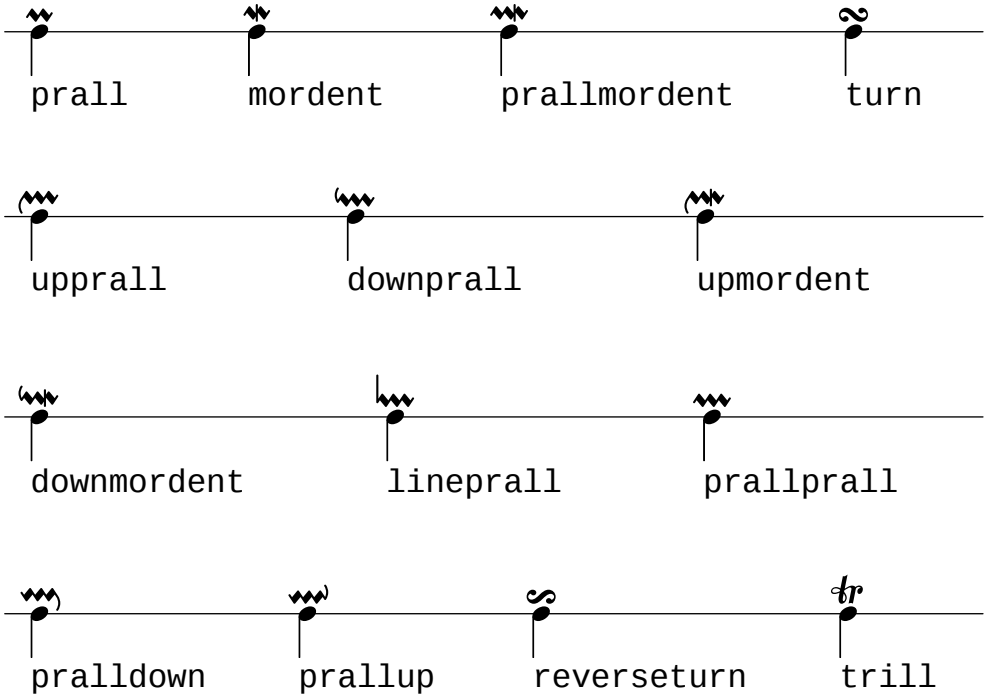
A.13 List of articulations

The following scripts are available in the Feta font and may be attached to notes (eg. '`c\accent`').

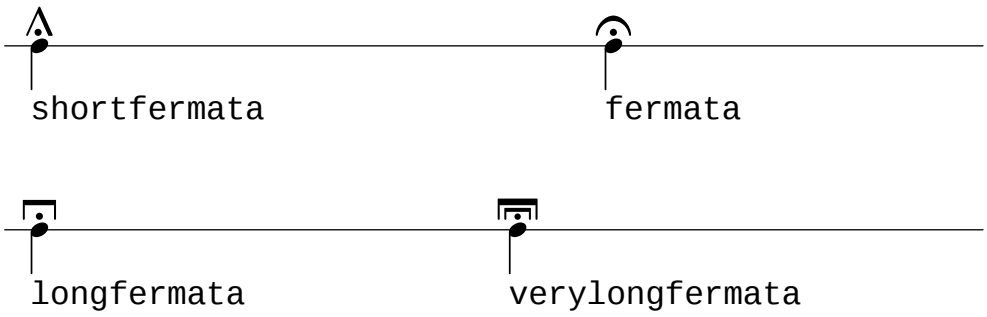
Articulation scripts



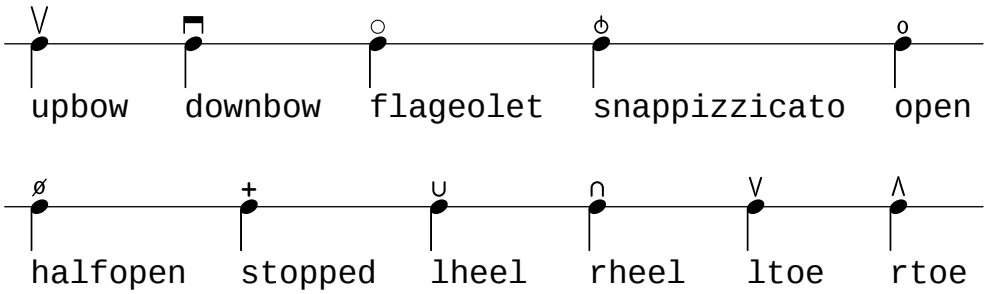
Ornament scripts



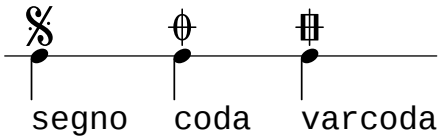
Fermata scripts



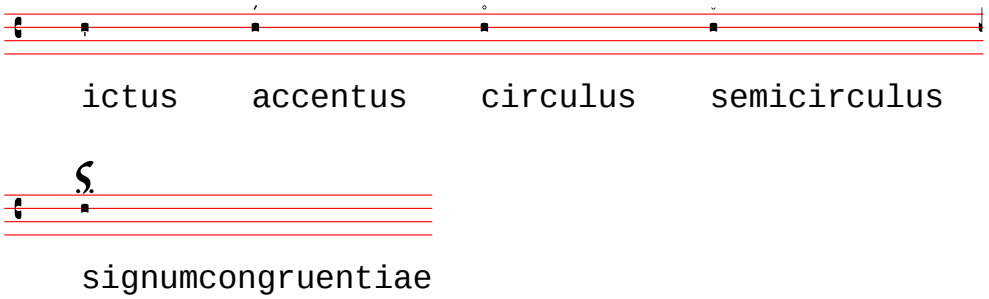
Instrument-specific scripts



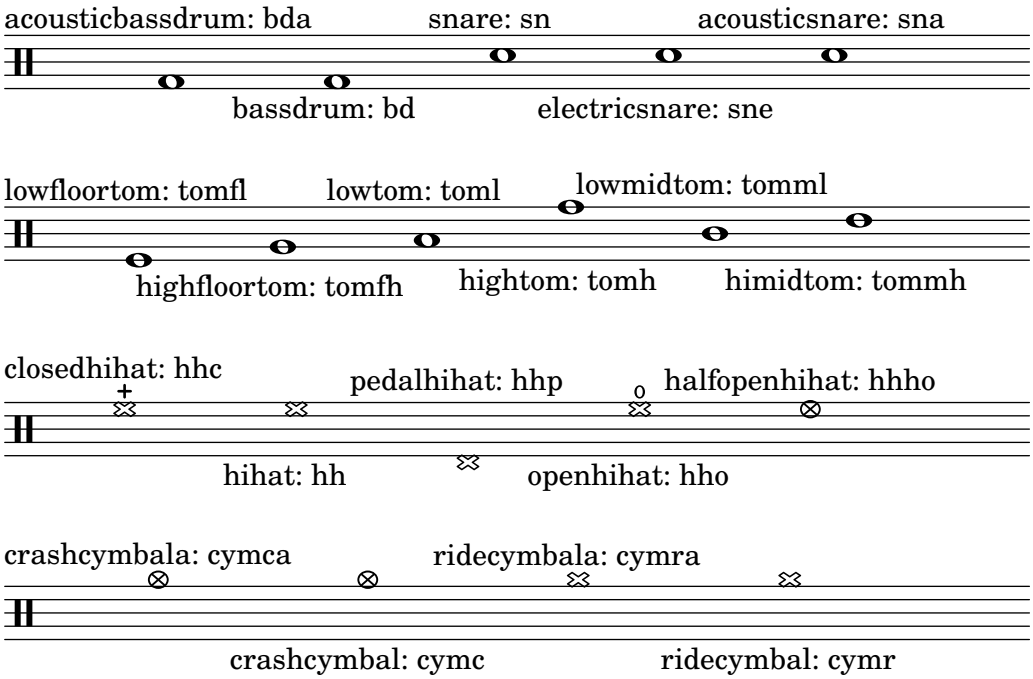
Repeat sign scripts

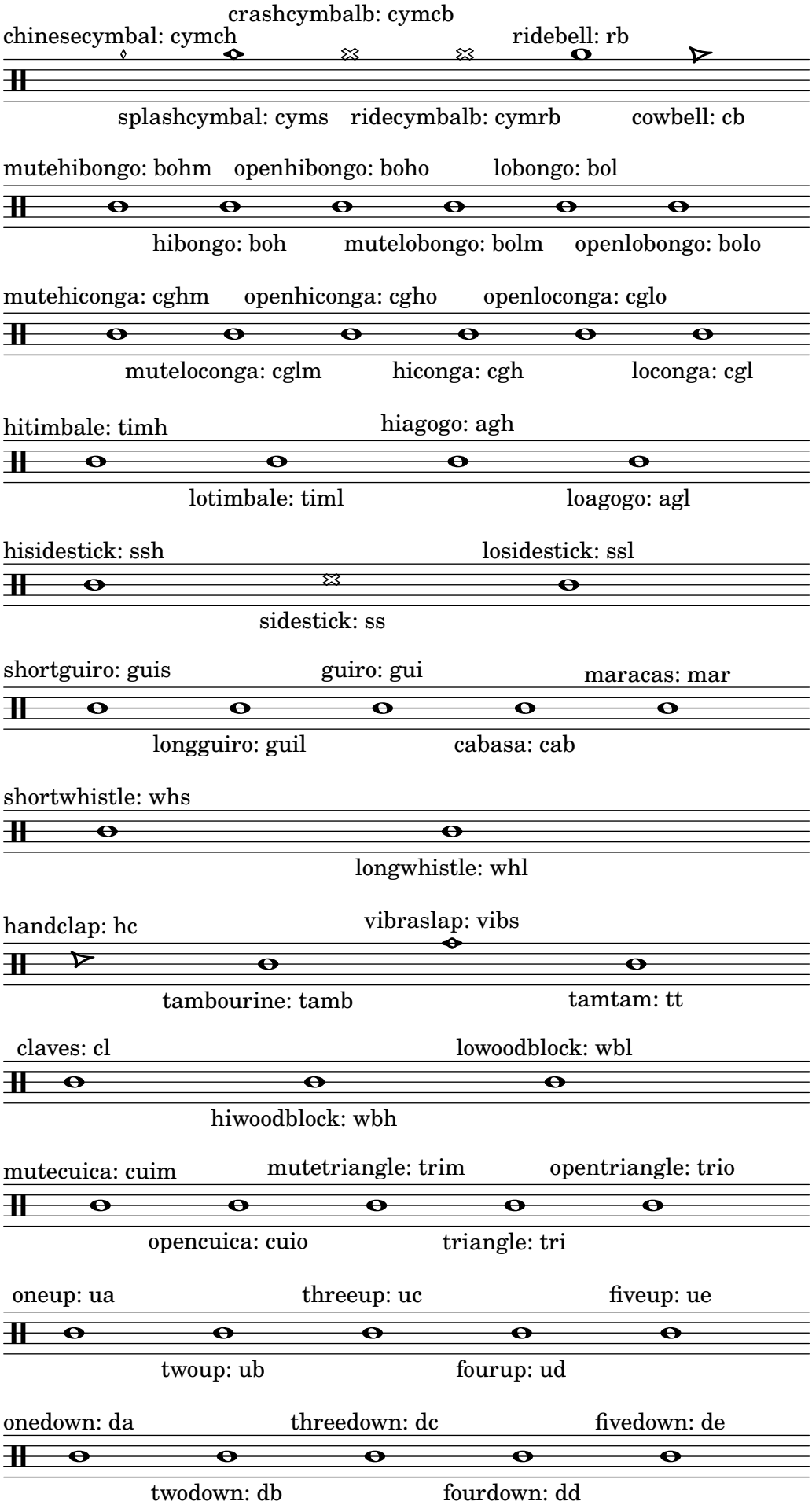


Ancient scripts



A.14 Percussion notes




crashcymbalb: cymcb
chinesecymbal: cymch
ridebell: rb
splashcymbal: cyms
ridecymbalb: cymrb
cowbell: cb
mutehibongo: bohm
openhibongo: boho
lobongo: bol
hibongo: boh
mutelobongo: bolm
openlobongo: bolo
mutehiconga: cghm
openhiconga: cgho
openloconga: cglo
muteloconga: cglm
hiconga: cgh
loconga: cgl
hitimbale: timh
hiagogo: agh
lotimbale: timl
loagogo: agl
hisidestick: ssh
losidestick: ssl
sidestick: ss
shortguiro: guis
guiro: gui
maracas: mar
longguiro: guil
cabasa: cab
shortwhistle: whs
longwhistle: whl
handclap: hc
vibraslap: vibs
tambourine: tamb
tamtam: tt
claves: cl
lowoodblock: wbl
hiwoodblock: wbh
mutecuica: cuim
mutetriangle: trim
opentriangle: trio
opencuica: cuio
triangle: tri
oneup: ua
threeup: uc
fiveup: ue
twoup: ub
fourup: ud
onedown: da
threedown: dc
fivedown: de
twodown: db
fourdown: dd

A.15 Technical glossary

A glossary of the technical terms and concepts used internally in LilyPond. These terms may appear in the manuals, on mailing lists or in the source code.

alist

An association list or **alist** for short is a Scheme pair which associates a value with a key: `(key . value)`. For example, in 'scm/lily.scm', the alist "type-p-name-alist" associates certain type predicates (e.g. `ly:music?`) with names (e.g. "music") so that type-check failures can be reported with a console message that includes the name of the expected type predicate.

callback

A **callback** is a routine, function or method whose reference is passed as an argument in a call to another routine, so allowing the called routine to invoke it. The technique enables a lower-level software layer to call a function defined in a higher layer. Callbacks are used extensively in LilyPond to permit user-level Scheme code to define how many low-level actions are performed.

closure

In Scheme, a **closure** is created when a function, usually a lambda expression, is passed as a variable. The closure contains the function's code plus references to the lexical bindings of the function's free variables (i.e. those variables used in the expression but defined outside it). When this function is applied to different arguments later, the free variable bindings that were captured in the closure are used to obtain the values of the free variables to be used in the calculation. One useful property of closures is the retention of internal variable values between invocations, so permitting state to be maintained.

A **simple closure** is a closure whose expression has no free variables and hence no free variable bindings.

A simple closure is represented in LilyPond by a smob containing the expression and a method to apply the expression to a passed list of arguments.

glyph

A **glyph** is a particular graphical representation of a typographic character, or a combination of two characters formating a ligature. A set of glyphs with a single style and shape comprise a font, and a set of fonts covering several styles and sizes comprise a typeface.

See also

Notation Reference: Section 1.8.3 [Fonts], page 236, Section 3.3.3 [Special characters], page 478.

grob

LilyPond objects which represent items of notation in the printed output such as note heads, stems, slurs, ties, fingering, clefs, etc are called 'Layout objects', often known as 'GRaphical OBjects', or **grobs** for short. They are represented by instances of the `Grob` class.

See also

Learning Manual: Section "Objects and interfaces" in *Learning Manual*, Section "Naming conventions of objects and properties" in *Learning Manual*, Section "Properties of layout objects" in *Learning Manual*.

Internals Reference: Section "grob-interface" in *Internals Reference*, Section "All layout objects" in *Internals Reference*.

immutable

An **immutable** object is one whose state cannot be modified after creation, in contrast to a mutable object, which can be modified after creation.

In LilyPond, immutable or shared properties define the default style and behavior of grobs. They are shared between many objects. In apparent contradiction to the name, they can be changed using `\override` and `\revert`.

See also

Notation Reference: [mutable], page 703.

interface

Actions and properties which are common to a number of grobs are grouped together in an object called a `grob-interface`, or just 'interface' for short.

See also

Learning Manual: Section "Objects and interfaces" in *Learning Manual*, Section "Naming conventions of objects and properties" in *Learning Manual*, Section "Properties found in interfaces" in *Learning Manual*.

Notation Reference: Section 5.2.2 [Layout interfaces], page 564.

Internals Reference: Section "Graphical Object Interfaces" in *Internals Reference*.

lexer

A **lexer** is a program which converts a sequence of characters into a sequence of tokens, a process called lexical analysis. The LilyPond lexer converts the stream obtained from an input '`.ly`' file into a tokenized stream more suited to the next stage of processing - parsing, for which see [parser], page 703. The LilyPond lexer is built with Flex from the lexer file '`lily/lexer.ll`' which contains the lexical rules. This file is part of the source code and is not included in the LilyPond binary installation.

mutable

A **mutable** object is one whose state can be modified after creation, in contrast to an immutable object, whose state is fixed at the time of creation.

In LilyPond, mutable properties contain values that are specific to one grob. Typically, lists of other objects or results from computations are stored in mutable properties.

See also

Notation Reference: [immutable], page 703.

output-def

An instance of the `Output-def` class contains the methods and data structures associated with an output block. Instances are created for midi, layout and paper blocks.

parser

A **parser** analyzes the sequence of tokens produced by a lexer to determine its grammatical structure, grouping the tokens progressively into larger groupings according to the rules of the grammar. If the sequence of tokens is valid the end product is a tree of tokens whose root is the grammar's start symbol. If this cannot be achieved the file is invalid and an appropriate error message is produced. The syntactic groupings and the rules for constructing the groupings from their parts for the LilyPond syntax are defined in '`lily/parser.yy`' and shown in Backus

Normal Form (BNF) in Section "LilyPond grammar" in *Contributor's Guide*. This file is used to build the parser during the program build by the parser generator, Bison. It is part of the source code and is not included in the LilyPond binary installation.

parser variable

These are variables defined directly in Scheme. Their direct use by users is strongly discouraged, because their scoping semantics can be confusing.

When the value of such a variable is changed in a '`.ly`' file, the change is global, and unless explicitly reverted, the new value will persist to the end of the file, affecting subsequent `\score` blocks as well as external files added with the `\include` command. This can lead to unintended consequences and in complex typesetting projects the consequent errors can be difficult to track down.

LilyPond uses the following parser variables:

- afterGraceFraction
- musicQuotes
- mode
- output-count
- output-suffix
- partCombineListener
- pitchnames
- toplevel-bookparts
- toplevel-scores
- showLastLength
- showFirstLength

prob

PRoperty OBjects, or **probs** for short, are instances of the `Prob` class, a simple base class for objects which have mutable and immutable property alists and the methods to manipulate them. The `Music` and `Stream_event` classes derive from `Prob`. Instances of the `Prob` class are also created to hold the formatted content of system grobs and titling blocks during page layout.

simple closure

See [closure], page 702.

smob

Smobs, or ScheMe OBjects, are part of the mechanism used by Guile to export C and C++ objects to Scheme code. In LilyPond, smobs are created from C++ objects through macros. There are two types of smob objects: simple smobs, intended for simple immutable objects like numbers, and complex smobs, used for objects with identities. If you have access to the LilyPond sources, more information can be found in '`lily/includes/smob.hh`'.

stencil

An instance of the **stencil** class holds the information required to print a typographical object. It is a simple smob containing a confining box, which defines the vertical and horizontal extents of the object, and a Scheme expression which will print the object when evaluated. Stencils may be combined to form more complex stencils defined by a tree of Scheme expressions formed from the Scheme expressions of the component stencils.

The `stencil` property, which connects a grob to its stencil, is defined in the `grob-interface` interface.

See also

Internals Reference: Section "grob-interface" in *Internals Reference*.

A.16 All context properties

`accidentalGrouping` (symbol)
: If set to `'voice`, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

`additionalPitchPrefix` (string)
: Text with which to prefix additional pitches within a chord name.

`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.

`alternativeNumberingStyle` (symbol)
: The style of an alternative's bar numbers. Can be `numbers` for going back to the same number or `numbers-with-letters` for going back to the same number with letter suffixes. No setting will not go back in measure-number time.

`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.

`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.

`barNumberFormatter` (procedure)
: A procedure that takes a bar number, measure position, and alternative number and returns a markup of the bar number to print.

`barNumberVisibility` (procedure)
: A procedure that takes a bar number and a measure position and returns whether the corresponding bar number should be printed. Note that the actual print-out of bar numbers is controlled with the `break-visibility` property.

  The following procedures are predefined:

  `all-bar-numbers-visible`
  : Enable bar numbers for all bars, including the first one and broken bars (which get bar numbers in parentheses).

  `first-bar-number-invisible`
  : Enable bar numbers for all bars (including broken bars) except the first one. If the first bar is broken, it doesn't get a bar number either.

  `first-bar-number-invisible-save-broken-bars`
  : Enable bar numbers for all bars (including broken bars) except the first one. A broken first bar gets a bar number.

  `first-bar-number-invisible-and-no-parenthesized-bar-numbers`
  : Enable bar numbers for all bars except the first bar and broken bars. This is the default.

  `(every-nth-bar-number-visible` *n*`)`
  : Assuming *n* is value 2, for example, this enables bar numbers for bars 2, 4, 6, etc.

  `(modulo-bar-number-visible` *n m*`)`
  : If bar numbers 1, 4, 7, etc., should be enabled, *n* (the modulo) must be set to 3 and *m* (the division remainder) to 1.

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`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`.

`beamExceptions` (list)
: An alist of exceptions to autobeam rules that normally end on beats.

`beamHalfMeasure` (boolean)
: Whether to allow a beam to begin halfway through the measure in triple time, which could look like 6/8.

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

`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.

`chordNameLowercaseMinor` (boolean)
: Downcase roots of minor chords?

`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.

`clefPosition` (number)
: Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

`clefTransposition` (integer)
: Add this much extra transposition. Values of 7 and -7 are common.

`clefTranspositionFormatter` (procedure)
: A procedure that takes the Transposition number as a string and the style as a symbol and returns a markup.

`clefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`completionBusy` (boolean)
: Whether a completion-note head is playing.

`completionUnit` (moment)
: Sub-bar unit of completion.

`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.`'.

`cueClefGlyph` (string)
: Name of the symbol within the music font.

`cueClefPosition` (number)
: Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

`cueClefTransposition` (integer)
: Add this much extra transposition. Values of 7 and -7 are common.

`cueClefTranspositionFormatter` (procedure)
: A procedure that takes the Transposition number as a string and the style as a symbol and returns a markup.

`cueClefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`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.

`defaultStrings` (list)
: A list of strings to use in calculating frets for tablatures and fretboards if no strings are provided in the notes for the current moment.

`doubleRepeatSegnoType` (string)
: Set the default bar line for the combinations double repeat with segno. Default is '`:|.S.|:`'.

`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.

`endRepeatSegnoType` (string)
: Set the default bar line for the combinations ending of repeat with segno. Default is '`:|.S`'.

`endRepeatType` (string)
: Set the default bar line for the ending of repeats.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`explicitCueClefVisibility` (vector)
: '`break-visibility`' function for cue 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 that reduce the effect of a previous alteration.

`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.

`fretLabels` (list)
: A list of strings or Scheme-formatted markups containing, in the correct order, the labels to be used for lettered frets in tablature.

`glissandoMap` (list)
: A map in the form of '((source1 . target1) (source2 . target2) (sourcen . targetn)) showing the glissandi to be drawn for note columns. The value '() will default to '((0 . 0) (1 . 1) (n . n)), where n is the minimal number of note-heads in the two note columns between which the glissandi occur.

`gridInterval` (moment)
: Interval for which to generate `GridPoint`s.

`handleNegativeFrets` (symbol)
: How the automatic fret calculator should handle calculated negative frets. Values include `'ignore`, to leave them out of the diagram completely, `'include`, to include them as calculated, and `'recalculate`, to ignore the specified string and find a string where they will fit with a positive fret number.

`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.

`includeGraceNotes` (boolean)
: Do not ignore grace notes for Section "Lyrics" in *Internals Reference*.

`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 `instrumentName` property labels the staff in the first system, and the `shortInstrumentName` property labels following lines.

`instrumentTransposition` (pitch)
: Define the transposition of the instrument. Its value is the pitch that sounds when the instrument plays written 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` (number)
: 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 two arguments: a `TempoChangeEvent` 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`.

`middleCCuePosition` (number)
: The position of the middle C, as determined only by the clef of the cue notes. This can be calculated by looking at `cueClefPosition` and `cueClefGlyph`.

`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`.

`midiBalance` (number)
: Stereo balance for the MIDI channel associated with the current context. Ranges from -1 to 1, where the values -1 (`#LEFT`), 0 (`#CENTER`) and 1 (`#RIGHT`) correspond to leftmost emphasis, center balance, and rightmost emphasis, respectively.

`midiChannelMapping` (symbol)
: How to map MIDI channels: per `staff` (default), `instrument` or `voice`.

`midiChorusLevel` (number)
: Chorus effect level for the MIDI channel associated with the current context. Ranges from 0 to 1 (0=off, 1=full effect).

`midiInstrument` (string)
: Name of the MIDI instrument to use.

`midiMaximumVolume` (number)
: Analogous to `midiMinimumVolume`.

`midiMergeUnisons` (boolean)
: If true, output only one MIDI note-on event when notes with the same pitch, in the same MIDI-file track, overlap.

`midiMinimumVolume` (number)
: Set the minimum loudness for MIDI. Ranges from 0 to 1.

`midiPanPosition` (number)
: Pan position for the MIDI channel associated with the current context. Ranges from -1 to 1, where the values -1 (`#LEFT`), 0 (`#CENTER`) and 1 (`#RIGHT`) correspond to hard left, center, and hard right, respectively.

`midiReverbLevel` (number)
: Reverb effect level for the MIDI channel associated with the current context. Ranges from 0 to 1 (0=off, 1=full effect).

`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.

`minorChordModifier` (markup)
: Markup displayed following the root for a minor chord

`noChordSymbol` (markup)
: Markup to be displayed for rests in a ChordNames context.

`noteToFretFunction` (procedure)
: Convert list of notes and list of defined strings to full list of strings and fret numbers. Parameters: The context, a list of note events, a list of tabstring events, and the fretboard grob if a fretboard is desired.

`ottavation` (markup)
: If set, the text for an ottava spanner. Changing this creates a new text spanner.

`output` (music output)
: The output produced by a score-level translator during music interpretation.

`partCombineTextsOnNote` (boolean)
: Print part-combine texts only on the next note rather than immediately on rests or skips.

`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.

`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.

`restCompletionBusy` (boolean)
: Signal whether a completion-rest is active.

`restNumberThreshold` (number)
: If a multimeasure rest has more measures than this, a number is printed.

`restrainOpenStrings` (boolean)
: Exclude open strings from the automatic fret calculator.

`searchForVoice` (boolean)
: Signal whether a search should be made of all contexts in the context hierarchy for a voice to provide rhythms for the lyrics.

`segnoType` (string)
: Set the default bar line for a requested segno. Default is '`S`'.

`shapeNoteStyles` (vector)
: Vector of symbols, listing style for each note head relative to the tonic (qv.) of the scale.

`shortInstrumentName` (markup)
: See `instrumentName`.

`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.

`slashChordSeparator` (markup)
: The markup object used to separate a chord name from its root note in case of inversions or slash chords.

`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.

`startRepeatSegnoType` (string)
: Set the default bar line for the combinations beginning of repeat with segno. Default is '`S.|:`'.

`startRepeatType` (string)
: Set the default bar line for the beginning of repeats.

`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`.

`strictBeatBeaming` (boolean)
: Should partial beams reflect the beat structure even if it causes flags to hang out?

`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 pitches of each string (starting with the lowest numbered one).

`strokeFingerOrientations` (list)
: See `fingeringOrientations`.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` 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: context, string number and, fret number. It returns the text as a markup.

`tabStaffLineLayoutFunction` (procedure)
: A function determining the staff position of a tablature note head. Called with two arguments: the context and the string.

`tempoHideNote` (boolean)
: Hide the note = count in tempo marks.

`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` (fraction, as pair)
: A pair of numbers, signifying the time signature. For example, `'(4 . 4)` is a 4/4 time signature.

`timeSignatureSettings` (list)
: A nested alist of settings for time signatures. Contains elements for various time signatures. The element for each time signature contains entries for `baseMoment`, `beatStructure`, and `beamExceptions`.

`timing` (boolean)
: Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

`tonic` (pitch)
: The tonic of the current scale.

`topLevelAlignment` (boolean)
: If true, the *Vertical_align_engraver* will create a *VerticalAlignment*; otherwise, it will create a *StaffGrouper*

`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.

`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 '`scm/bar-line.scm`'.

A.17 Layout properties

`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.

`annotation-balloon` (boolean)
: Print the balloon around an annotation.

`annotation-line` (boolean)
: Print the line from an annotation to the grob that it annotates.

`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.

`automatically-numbered` (boolean)
: Should a footnote be automatically numbered?

`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-scripts` (boolean)
: If set, a tuplet bracket avoids the scripts associated with the note heads it encompasses.

`avoid-slur` (symbol)
: Method of handling slur collisions. Choices are `inside`, `outside`, `around`, and `ignore`. `inside` adjusts the slur if needed to keep the grob inside the slur. `outside` moves the grob vertically to the outside of the slur. `around` moves the grob vertically to the outside of the slur only if there is a collision. `ignore` does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), `outside` and `around` behave like `ignore`.

`axes` (list)
: List of axis numbers. In the case of alignment grobs, this should contain only one number.

`bar-extent` (pair of numbers)
: The Y-extent of the actual bar line. This may differ from `Y-extent` because it does not include the dots in a repeat 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). Choices are `left-edge`, `ambitus`, `breathing-sign`, `clef`, `staff-bar`, `key-cancellation`, `key-signature`, `time-signature`, and `custos`.

`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.

`broken-bound-padding` (number)
: The amount of padding to insert when a spanner is broken at a line break.

`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.

`collision-bias` (number)
: Number determining how much to favor the left (negative) or right (positive). Larger absolute values in either direction will push a collision in this direction.

`collision-interfaces` (list)
: A list of interfaces for which automatic beam-collision resolution is run.

`collision-padding` (number)
: Amount of padding to apply after a collision is detected via the self-alignment-interface.

`collision-voice-only` (boolean)
: Does automatic beam collsion apply only to the voice in which the beam was created?

`color` (color)
: 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.

`count-from` (integer)
: The first measure in a measure count receives this number. The following measures are numbered in increments from this initial value.

`damping` (number)
: Amount of beam slope damping.

`dash-definition` (pair)
: List of `dash-elements` defining the dash structure. Each `dash-element` has a starting t value, an ending t-value, a `dash-fraction`, and a `dash-period`.

`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.

`default-staff-staff-spacing` (list)
: The settings to use for `staff-staff-spacing` when it is unset, for ungrouped staves and for grouped staves that do not have the relevant `StaffGrouper` property set (`staff-staff-spacing` or `staffgroup-staff-spacing`).

`details` (list)
: Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`digit-names` (vector)
: 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-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-count` (number)
: The number of tremolo beams.

`flat-positions` (list)
: Flats in key signatures are placed within the specified ranges of staff-positions. The general form is a list of pairs, with one pair for each type of clef, in order of the staff-position at which each clef places C: `(alto treble tenor soprano baritone mezzosoprano bass)`. If the list contains a single element it applies for all clefs. A single number in place of a pair sets accidentals within the octave ending at that staff-position.

`font-encoding` (symbol)
: The font encoding is the broadest category for selecting a font. Currently, only lilypond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (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.

`footnote` (boolean)
: Should this be a footnote or in-note?

`footnote-music` (music)
: Music creating a footnote.

`footnote-text` (markup)
: A footnote for the grob.

`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*.

`forced-spacing` (number)
: Spacing forced between grobs, used in various ligature engravers.

`fraction` (fraction, as pair)
: 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-custom-format` – The format string to be used label the lowest fret number, when `number-type` equals to `custom`. Default `"~a"`.
  - `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`, `arabic` and `custom`. In the later case, the format string is supplied by the `fret-label-custom-format` property. 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.

`glissando-skip` (boolean)
: Should this `NoteHead` be skipped by glissandi?

`glyph` (string)
: A string determining what 'style' of glyph is typeset. Valid choices depend on the function that is reading this property.

  In combination with (span) bar lines, it is a string resembling the bar line appearance in ASCII form.

`glyph-name` (string)
: The glyph name within the font.

  In the context of (span) bar lines, *glyph-name* represents a processed form of `glyph`, where decisions about line breaking etc. are already taken.

`glyph-name-alist` (list)
: An alist of key-string pairs.

`graphical` (boolean)
: Display in graphical (vs. text) form.

`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.

`hide-tied-accidental-after-break` (boolean)
: If set, an accidental that appears on a tied note after a line break will not be displayed.

`horizon-padding` (number)
: The amount to pad the axis along which a `Skyline` is built for the `side-position-interface`.

`horizontal-shift` (integer)
: An integer that identifies ranking of `NoteColumn`s for horizontal shifting. This is used by Section "note-collision-interface" in *Internals Reference*.

`horizontal-skylines` (pair of skylines)
: Two skylines, one to the left and one to the right of this grob.

`id` (string)
: An id string for the grob. Depending on the typestting backend being used, this id will be assigned to a group containing all of the stencils that comprise a given grob. For example, in the svg backend, the string will be assigned to the `id` attribute of a group (`<g>`) that encloses the stencils that comprise the grob. In the Postscript backend, as there is no way to group items, the setting of the id property will have no effect.

`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-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)
: An integer which determines the order of printing objects. 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.

`ledger-extra` (dimension, in staff space)
: Extra distance from staff line to draw ledger lines for.

`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.

`ledger-positions` (list)
: Repeating pattern for the vertical positions of ledger lines. Bracketed groups are always shown together.

`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 lyric extender).

`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).

`maximum-gap` (number)
: Maximum value allowed for `gap` property.

`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-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).

`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.

`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` (graphical (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-break-align-symbols` (list)
: A list of symbols that determine which NON-break-aligned interfaces to align this to.

`non-default` (boolean)
: Set for manually specified clefs.

`non-musical` (boolean)
: True if the grob belongs to a `NonMusicalPaperColumn`.

`nonstaff-nonstaff-spacing` (list)
: The spacing alist controlling the distance between the current non-staff line and the next non-staff line in the direction of `staff-affinity`, if both are on the same side of the related staff, and `staff-affinity` is either `UP` or `DOWN`. See `staff-staff-spacing` for a description of the alist structure.

`nonstaff-relatedstaff-spacing` (list)
: The spacing alist controlling the distance between the current non-staff line and the nearest staff in the direction of `staff-affinity`, if there are no non-staff lines between the two, and `staff-affinity` is either `UP` or `DOWN`. If `staff-affinity` is `CENTER`, then `nonstaff-relatedstaff-spacing` is used for the nearest staves on *both* sides, even if other non-staff lines appear between the current one and either of the staves. See `staff-staff-spacing` for a description of the alist structure.

`nonstaff-unrelatedstaff-spacing` (list)
: The spacing alist controlling the distance between the current non-staff line and the nearest staff in the opposite direction from `staff-affinity`, if there are no other non-staff lines between the two, and `staff-affinity` is either `UP` or `DOWN`. See `staff-staff-spacing` for a description of the alist structure.

`normalized-endpoints` (pair)
: Represents left and right placement over the total spanner, where the width of the spanner is normalized between 0 and 1.

`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 grobs when spacing according to `outside-staff-priority`. Two grobs with different `outside-staff-padding` values have the larger value of padding between them.

`outside-staff-placement-directive` (symbol)
: One of four directives telling how outside staff objects should be placed.
  - `left-to-right-greedy` – Place each successive grob from left to right.
  - `left-to-right-polite` – Place a grob from left to right only if it does not potentially overlap with another grob that has been placed on a pass through a grob array. If there is overlap, do another pass to determine placement.
  - `right-to-left-greedy` – Same as `left-to-right-greedy`, but from right to left.
  - `right-to-left-polite` – Same as `left-to-right-polite`, but from right to left.

`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.

`protrusion` (number)
: In an arpeggio bracket, the length of the horizontal edges.

`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?

`replacement-alist` (list)
: Alist of strings. The key is a string of the pattern to be replaced. The value is a string of what should be displayed. Useful for ligatures.

`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.

`round-up-exceptions` (list)
: A list of pairs where car is the numerator and cdr the denominator of a moment. Each pair in this list means that the multi-measure rests of the corresponding length will be rounded up to the longer rest. See *round-up-to-longer-rest*.

`round-up-to-longer-rest` (boolean)
: Displays the longer multi-measure rest when the length of a measure is between two values of `usable-duration-logs`. For example, displays a breve instead of a whole in a 3/2 measure.

`rounded` (boolean)
: Decide whether lines should be drawn rounded or not.

`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 key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

`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.

`sharp-positions` (list)
: Sharps in key signatures are placed within the specified ranges of staff-positions. The general form is a list of pairs, with one pair for each type of clef, in order of the staff-position at which each clef places C: `(alto treble tenor soprano baritone mezzosoprano bass)`. If the list contains a single element it applies for all clefs. A single number in place of a pair sets accidentals within the octave ending at that staff-position.

`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.

`simple-Y` (boolean)
: Should the Y placement of a spanner disregard changes in system heights?

`size` (number)
: Size of object, relative to standard size.

`skip-quanting` (boolean)
: Should beam quanting be skipped?

`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.

`skyline-vertical-padding` (number)
: The amount by which the left and right skylines of a column are padded vertically, beyond the `Y-extent`s and `extra-spacing-height`s of the constituent grobs in the column. Increase this to prevent interleaving of grobs from adjacent columns.

`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.

`snap-radius` (number)
: The maximum distance between two objects that will cause them to snap to alignment along an axis.

`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*.

`spacing-pair` (pair)
: A pair of alignment symbols which set an object's spacing relative to its left and right `BreakAlignment`s.

  For example, a `MultiMeasureRest` will ignore prefatory items at its bounds (i.e., clefs, key signatures and time signatures) using the following override:

  ```
  \override MultiMeasureRest
    #'spacing-pair = #'(staff-bar . staff-bar)
  ```

`spanner-id` (string)
: An identifier to distinguish concurrent spanners.

`springs-and-rods` (boolean)
: Dummy variable for triggering spacing routines.

`stacking-dir` (direction)
: Stack objects in which direction?

`staff-affinity` (direction)
: The direction of the staff to use for spacing the current non-staff line. Choices are `UP`, `DOWN`, and `CENTER`. If `CENTER`, the non-staff line will be placed equidistant between the two nearest staves on either side, unless collisions or other spacing constraints prevent this. Setting `staff-affinity` for a staff causes it to be treated as a non-staff line. Setting `staff-affinity` to `#f` causes a non-staff line to be treated as a staff.

`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`.

`staff-staff-spacing` (list)
: When applied to a staff-group's `StaffGrouper` grob, this spacing alist controls the distance between consecutive staves within the staff-group. When applied to a staff's `VerticalAxisGroup` grob, it controls the distance between the staff and the nearest staff below it in the same system, replacing any settings inherited from the `StaffGrouper` grob of the containing staff-group, if there is one. This property remains in effect even when non-staff lines appear between staves. The alist can contain the following keys:

  - `basic-distance` – the vertical distance, measured in staff-spaces, between the reference points of the two items when no collisions would result, and no stretching or compressing is in effect.
  - `minimum-distance` – the smallest allowable vertical distance, measured in staff-spaces, between the reference points of the two items, when compressing is in effect.
  - `padding` – the minimum required amount of unobstructed vertical whitespace between the bounding boxes (or skylines) of the two items, measured in staff-spaces.
  - `stretchability` – a unitless measure of the dimension's relative propensity to stretch. If zero, the distance will not stretch (unless collisions would result).

`staffgroup-staff-spacing` (list)
: The spacing alist controlling the distance between the last staff of the current staff-group and the staff just below it in the same system, even if one or more non-staff lines exist between the two staves. If the `staff-staff-spacing` property of the staff's `VerticalAxisGroup` grob is set, that is used instead. See `staff-staff-spacing` for a description of the alist structure.

`stem-attachment` (pair of numbers)
: An `(x . y)` pair where the stem attaches to the notehead.

`stem-begin-position` (number)
: User override for the begin position of a stem.

`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` (stencil)
: 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 for 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.

`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.

`usable-duration-logs` (list)
: List of `duration-log`s that can be used in typesetting the grob.

`use-skylines` (boolean)
: Should skylines be used for side positioning?

`used` (boolean)
: If set, this spacing column is kept in the spacing problem.

`vertical-skylines` (pair of skylines)
: Two skylines, one above and one below this grob.

`when` (moment)
: Global time step associated with this column happen?

`whiteout` (boolean)
: If true, the grob is printed over a white background to white-out underlying material, if the grob is visible. Usually #f by default.

`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.

`X-extent` (pair of numbers)
: Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`X-offset` (number)
: The horizontal amount that this object is moved relative to its X-parent.

`X-positions` (pair of numbers)
: Pair of X staff coordinates of a spanner in the form `(`*`left . right`*`)`, where both *left* and *right* are in `staff-space` units of the current staff.

`Y-extent` (pair of numbers)
: Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number)
: The vertical amount that this object is moved relative to its Y-parent.

`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.

A.18 Available music functions

`absolute` [music] - *music* (music)
: Make *music* absolute. This does not actually change the music itself but rather hides it from surrounding `\relative` commands.

`acciaccatura` [music] - *music* (music)
: Create an acciaccatura from the following music expression

`accidentalStyle` [music] - *style* (symbol list)
: Set accidental style to symbol list *style* in the form '`piano-cautionary`'. If *style* has a form like '`Staff.piano-cautionary`', the settings are applied to that context. Otherwise, the context defaults to '`Staff`', except for piano styles, which use '`GrandStaff`' as a context.

`addChordShape` [void] - *key-symbol* (symbol) *tuning* (pair) *shape-definition* (string or pair)
: Add chord shape *shape-definition* to the *chord-shape-table* hash with the key `(cons` *`key-symbol tuning`*`)`.

`addInstrumentDefinition` [void] - *name* (string) *lst* (list)
: Create instrument *name* with properties *list*.

`addQuote` [void] - *name* (string) *music* (music)
: Define *music* as a quotable music expression named *name*

`afterGrace` [music] - *main* (music) *grace* (music)
: Create *grace* note(s) after a *main* music expression.

`allowPageTurn` [music]
: Allow a page turn. May be used at toplevel (ie between scores or markups), or inside a score.

`allowVoltaHook` [void] - *bar* (string)
: (undocumented; fixme)

`alterBroken` [music] - *property* (symbol list or symbol) *arg* (list) *item* (symbol list or music)
: Override *property* for pieces of broken spanner *item* with values *arg*. *item* may either be music in the form of a starting spanner event, or a symbol list in the form '`Context.Grob`' or just '`Grob`'. Iff *item* is in the form of a spanner event, *property* may also have the form '`Grob.property`' for specifying a directed tweak.

`appendToTag` [music] - *tag* (symbol) *more* (music) *music* (music)
: Append *more* to the `elements` of all music expressions in *music* that are tagged with *tag*.

`applyContext` [music] - *proc* (procedure)
: Modify context properties with Scheme procedure *proc*.

`applyMusic` [music] - *func* (procedure) *music* (music)
: Apply procedure *func* to *music*.

`applyOutput` [music] - *ctx* (symbol) *proc* (procedure)
: Apply function `proc` to every layout object in context `ctx`

`appoggiatura` [music] - *music* (music)
: Create an appoggiatura from *music*

`assertBeamQuant` [music] - *l* (pair) *r* (pair)
: Testing function: check whether the beam quants *l* and *r* are correct

`assertBeamSlope` [music] - *comp* (procedure)
: Testing function: check whether the slope of the beam is the same as `comp`

`autochange` [music] - *music* (music)
: Make voices that switch between staves automatically

`balloonGrobText` [music] - *grob-name* (symbol) *offset* (pair of numbers) *text* (markup)
: Attach *text* to *grob-name* at offset *offset* (use like `\once`)

`balloonText` [post event] - *offset* (pair of numbers) *text* (markup)
: Attach *text* at *offset* (use like `\tweak`)

`bar` [music] - *type* (string)
: Insert a bar line of type *type*

`barNumberCheck` [music] - *n* (integer)
: Print a warning if the current bar number is not *n*.

`bendAfter` [post event] - *delta* (real number)
: Create a fall or doit of pitch interval *delta*.

`bookOutputName` [void] - *newfilename* (string)
: Direct output for the current book block to *newfilename*.

`bookOutputSuffix` [void] - *newsuffix* (string)
: Set the output filename suffix for the current book block to *newsuffix*.

`breathe` [music]
: Insert a breath mark.

`chordRepeats` [music] - *event-types* [list] *music* (music)
: Walk through *music* putting the notes of the previous chord into repeat chords, as well as an optional list of *event-types* such as `#'(string-number-event)`.

`clef` [music] - *type* (string)
: Set the current clef to *type*.

`compoundMeter` [music] - *args* (pair)
: Create compound time signatures. The argument is a Scheme list of lists. Each list describes one fraction, with the last entry being the denominator, while the first entries describe the summands in the enumerator. If the time signature consists of just one fraction, the list can be given directly, i.e. not as a list containing a single list. For example, a time signature of (3+1)/8 + 2/4 would be created as `\compoundMeter #'((3 1 8) (2 4))`, and a time signature of (3+2)/8 as `\compoundMeter #'((3 2 8))` or shorter `\compoundMeter #'(3 2 8)`.

`crossStaff` [music] - *notes* (music)
: Create cross-staff stems

`cueClef` [music] - *type* (string)
: Set the current cue clef to *type*.

`cueClefUnset` [music]
: Unset the current cue clef.

`cueDuring` [music] - *what* (string) *dir* (direction) *main-music* (music)
: Insert contents of quote *what* corresponding to *main-music*, in a CueVoice oriented by *dir*.

`cueDuringWithClef` [music] - *what* (string) *dir* (direction) *clef* (string) *main-music* (music)
: Insert contents of quote *what* corresponding to *main-music*, in a CueVoice oriented by *dir*.

`deadNote` [music] - *note* (music)
: Print *note* with a cross-shaped note head.

`defaultNoteHeads` [music]
: Revert to the default note head style.

`defineBarLine` [void] - *bar* (string) *glyph-list* (list)
: Define bar line settings for bar line *bar*. The list *glyph-list* must have three entries which define the appearance at the end of line, at the beginning of the next line, and the span bar, respectively.

`displayLilyMusic` [music] - *music* (music)
: Display the LilyPond input representation of *music* to the console.

`displayMusic` [music] - *music* (music)
: Display the internal representation of *music* to the console.

`displayScheme` (any type) - *expr* (any type)
: Display the internal representation of *expr* to the console.

`endSpanners` [music] - *music* (music)
: Terminate the next spanner prematurely after exactly one note without the need of a specific end spanner.

`eventChords` [music] - *music* (music)
: Compatibility function wrapping `EventChord` around isolated rhythmic events occuring since version 2.15.28, after expanding repeat chords '`q`'.

`featherDurations` [music] - *factor* (moment) *argument* (music)
: Adjust durations of music in *argument* by rational *factor*.

`finger` [post event] - *finger* (number or markup)
: Apply *finger* as a fingering indication.

`footnote` [music] - *mark* [markup] *offset* (pair of numbers) *footnote* (markup) *item* (symbol list or music)
: Make the markup *footnote* a footnote on *item*. The footnote is marked with a markup *mark* moved by *offset* with respect to the marked music.

  If *mark* is not given or specified as `\default`, it is replaced by an automatically generated sequence number. If *item* is a symbol list of form '`Grob`' or '`Context.Grob`', then grobs of that type will be marked at the current time step in the given context (default `Bottom`).

  If *item* is music, the music will get a footnote attached to a grob immediately attached to the event, like `\tweak` does. For attaching a footnote to an *indirectly* caused grob, write `\single\footnote`, use *item* to specify the grob, and follow it with the music to annotate.

  Like with `\tweak`, if you use a footnote on a following post-event, the `\footnote` command itself needs to be attached to the preceding note or rest as a post-event with `-`.

`grace` [music] - *music* (music)
: Insert *music* as grace notes.

`grobdescriptions` (any type) - *descriptions* (list)
: Create a context modification from *descriptions*, a list in the format of `all-grob-descriptions`.

`harmonicByFret` [music] - *fret* (number) *music* (music)
: Convert *music* into mixed harmonics; the resulting notes resemble harmonics played on a fretted instrument by touching the strings at *fret*.

`harmonicByRatio` [music] - *ratio* (number) *music* (music)
: Convert *music* into mixed harmonics; the resulting notes resemble harmonics played on a fretted instrument by touching the strings at the point given through *ratio*.

`harmonicNote` [music] - *note* (music)
: Print *note* with a diamond-shaped note head.

`harmonicsOn` [music]
: Set the default note head style to a diamond-shaped style.

`hide` [music] - *item* (symbol list or music)
: Set *item*'s '`transparent`' property to `#t`, making it invisible while still retaining its dimensions.

  If *item* is a symbol list of form `GrobName` or `Context.GrobName`, the result is an override for the grob name specified by it. If *item* is a music expression, the result is the same music expression with an appropriate tweak applied to it.

`inStaffSegno` [music]
: Put the segno variant 'varsegno' at this position into the staff, compatible with the repeat command.

`instrumentSwitch` [music] - *name* (string)
: Switch instrument to *name*, which must be predefined with `\addInstrumentDefinition`.

`inversion` [music] - *around* (pitch) *to* (pitch) *music* (music)
: Invert *music* about *around* and transpose from *around* to *to*.

`keepWithTag` [music] - *tag* (symbol list or symbol) *music* (music)
: Include only elements of *music* that are either untagged or tagged with one of the tags in *tag*. *tag* may be either a single symbol or a list of symbols.

`key` [music] - *tonic* [pitch] *pitch-alist* [list]
: Set key to *tonic* and scale *pitch-alist*. If both are null, just generate `KeyChangeEvent`.

`killCues` [music] - *music* (music)
: Remove cue notes from *music*.

`label` [music] - *label* (symbol)
: Create *label* as a bookmarking label.

`language` [void] - *language* (string)
: Set note names for language *language*.

`languageRestore` [void]
: Restore a previously-saved pitchnames alist.

`languageSaveAndChange` [void] - *language* (string)
: Store the previous pitchnames alist, and set a new one.

`makeClusters` [music] - *arg* (music)
: Display chords in *arg* as clusters.

`makeDefaultStringTuning` [void] - *symbol* (symbol) *pitches* (list)
: This defines a string tuning *symbol* via a list of *pitches*. The *symbol* also gets registered in `defaultStringTunings` for documentation purposes.

`mark` [music] - *label* [any type]
: Make the music for the \mark command.

`modalInversion` [music] - *around* (pitch) *to* (pitch) *scale* (music) *music* (music)
: Invert *music* about *around* using *scale* and transpose from *around* to *to*.

`modalTranspose` [music] - *from* (pitch) *to* (pitch) *scale* (music) *music* (music)
: Transpose *music* from pitch *from* to pitch *to* using *scale*.

`musicMap` [music] - *proc* (procedure) *mus* (music)
: Apply *proc* to *mus* and all of the music it contains.

`noPageBreak` [music]
: Forbid a page break. May be used at toplevel (i.e., between scores or markups), or inside a score.

`noPageTurn` [music]
: Forbid a page turn. May be used at toplevel (i.e., between scores or markups), or inside a score.

`octaveCheck` [music] - *pitch* (pitch)
: Octave check.

`offset` [music] - *property* (symbol list or symbol) *offsets* (any type) *item* (symbol list or music)
: Offset the default value of *property* of *item* by *offsets*. If *item* is a string, the result is `\override` for the specified grob type. If *item* is a music expression, the result is the same music expression with an appropriate tweak applied.

`omit` [music] - *item* (symbol list or music)
: Set *item*'s '`stencil`' property to `#f`, effectively omitting it without taking up space.

  If *item* is a symbol list of form `GrobName` or `Context.GrobName`, the result is an override for the grob name specified by it. If *item* is a music expression, the result is the same music expression with an appropriate tweak applied to it.

`once` [music] - *music* (music)
: Set `once` to `#t` on all layout instruction events in *music*. This will complain about music with an actual duration. As a special exception, if *music* contains '`tweaks`' it will be silently ignored in order to allow for `\once \tweak` to work as both one-time override and proper tweak.

`ottava` [music] - *octave* (integer)
: Set the octavation.

`overrideProperty` [music] - *grob-property-path* (symbol list) *value* (any type)
: Set the grob property specified by *grob-property-path* to *value*. *grob-property-path* is a symbol list of the form `Context.GrobName.property` or `GrobName.property`, possibly with subproperties given as well.

`overrideTimeSignatureSettings` [music] - *time-signature* (fraction, as pair) *base-moment* (fraction, as pair) *beat-structure* (list) *beam-exceptions* (list)
: Override `timeSignatureSettings` for time signatures of *time-signature* to have settings of *base-moment*, *beat-structure*, and *beam-exceptions*.

`pageBreak` [music]
: Force a page break. May be used at toplevel (i.e., between scores or markups), or inside a score.

`pageTurn` [music]
: Force a page turn between two scores or top-level markups.

`palmMute` [music] - *note* (music)
: Print *note* with a triangle-shaped note head.

`palmMuteOn` [music]
: Set the default note head style to a triangle-shaped style.

`parallelMusic` [void] - *voice-ids* (list) *music* (music)
: Define parallel music sequences, separated by '`|`' (bar check signs), and assign them to the identifiers provided in *voice-ids*.

  voice-ids: a list of music identifiers (symbols containing only letters)

  music: a music sequence, containing BarChecks as limiting expressions.

  Example:

```
\parallelMusic #'(A B C) {
  c c | d d | e e |
  d d | e e | f f |
}
<==>
  A = { c c | d d | }
  B = { d d | e e | }
  C = { e e | f f | }
```

`parenthesize` [music] - *arg* (music)
: Tag *arg* to be parenthesized.

`partcombine` [music] - *part1* (music) *part2* (music)
: Take the music in *part1* and *part2* and typeset so that they share a staff.

`partcombineDown` [music] - *part1* (music) *part2* (music)
: Take the music in *part1* and *part2* and typeset so that they share a staff with stems directed downward.

`partcombineForce` [music] - *type* (symbol-or-boolean) *once* (boolean)
: Override the part-combiner.

`partcombineUp` [music] - *part1* (music) *part2* (music)
: Take the music in *part1* and *part2* and typeset so that they share a staff with stems directed upward.

`partial` [music] - *dur* (duration)
: Make a partial measure.

`phrasingSlurDashPattern` [music] - *dash-fraction* (number) *dash-period* (number)
: Set up a custom style of dash pattern for *dash-fraction* ratio of line to space repeated at *dash-period* interval for phrasing slurs.

`pitchedTrill` [music] - *main-note* (music) *secondary-note* (music)
: Print a trill with *main-note* as the main note of the trill and print *secondary-note* as a stemless note head in parentheses.

`pointAndClickOff` [void]
: Suppress generating extra code in final-format (e.g. pdf) files to point back to the lilypond source statement.

`pointAndClickOn` [void]
: Enable generation of code in final-format (e.g. pdf) files to reference the originating lilypond source statement; this is helpful when developing a score but generates bigger final-format files.

`pointAndClickTypes` [void] - *types* (symbol list or symbol)
: Set a type or list of types (such as `#'note-event`) for which point-and-click info is generated.

`pushToTag` [music] - *tag* (symbol) *more* (music) *music* (music)
: Add *more* to the front of `elements` of all music expressions in *music* that are tagged with *tag*.

`quoteDuring` [music] - *what* (string) *main-music* (music)
: Indicate a section of music to be quoted. *what* indicates the name of the quoted voice, as specified in an `\addQuote` command. *main-music* is used to indicate the length of music to be quoted; usually contains spacers or multi-measure rests.

`relative` [music] - *pitch* [pitch] *music* (music)
: Make *music* relative to *pitch*. If *pitch* is omitted, the first note in *music* is given in absolute pitch.

`removeWithTag` [music] - *tag* (symbol list or symbol) *music* (music)
: Remove elements of *music* that are tagged with one of the tags in *tag*. *tag* may be either a single symbol or a list of symbols.

`resetRelativeOctave` [music] - *pitch* (pitch)
: Set the octave inside a \relative section.

`retrograde` [music] - *music* (music)
: Return *music* in reverse order.

`revertTimeSignatureSettings` [music] - *time-signature* (pair)
: Revert `timeSignatureSettings` for time signatures of *time-signature*.

`rightHandFinger` [post event] - *finger* (number or markup)
: Apply *finger* as a fingering indication.

`scaleDurations` [music] - *fraction* (fraction, as pair) *music* (music)
: Multiply the duration of events in *music* by *fraction*.

`settingsFrom` (any type) - *ctx* [symbol] *music* (music)
: Take the layout instruction events from *music*, optionally restricted to those applying to context type *ctx*, and return a context modification duplicating their effect.

`shape` [music] - *offsets* (list) *item* (symbol list or music)
: Offset control-points of *item* by *offsets*. The argument is a list of number pairs or list of such lists. Each element of a pair represents an offset to one of the coordinates of a control-point. If *item* is a string, the result is `\once\override` for the specified grob type. If *item* is a music expression, the result is the same music expression with an appropriate tweak applied.

`shiftDurations` [music] - *dur* (integer) *dots* (integer) *arg* (music)
: Change the duration of *arg* by adding *dur* to the `durlog` of *arg* and *dots* to the `dots` of *arg*.

`single` [music] - *overrides* (music) *music* (music)
: Convert *overrides* to tweaks and apply them to *music*. This does not convert `\revert`, `\set` or `\unset`.

`skip` [music] - *dur* (duration)
: Skip forward by *dur*.

`slashedGrace` [music] - *music* (music)
: Create slashed graces (slashes through stems, but no slur) from the following music expression

`slurDashPattern` [music] - *dash-fraction* (number) *dash-period* (number)
: Set up a custom style of dash pattern for *dash-fraction* ratio of line to space repeated at *dash-period* interval for slurs.

`spacingTweaks` [music] - *parameters* (list)
: Set the system stretch, by reading the 'system-stretch property of the 'parameters' assoc list.

`storePredefinedDiagram` [void] - *fretboard-table* (hash table) *chord* (music) *tuning* (pair) *diagram-definition* (string or pair)
: Add predefined fret diagram defined by *diagram-definition* for the chord pitches *chord* and the stringTuning *tuning*.

`stringTuning` (any type) - *chord* (music)
: Convert *chord* to a string tuning. *chord* must be in absolute pitches and should have the highest string number (generally the lowest pitch) first.

`styledNoteHeads` [music] - *style* (symbol) *heads* (symbol list or symbol) *music* (music)
: Set *heads* in *music* to *style*.

`tabChordRepeats` [music] - *event-types* [list] *music* (music)
: Walk through *music* putting the notes, fingerings and string numbers of the previous chord into repeat chords, as well as an optional list of *event-types* such as `#'(articulation-event)`.

`tabChordRepetition` [void]
: Include the string and fingering information in a chord repetition. This function is deprecated; try using `\tabChordRepeats` instead.

`tag` [music] - *tag* (symbol list or symbol) *music* (music)
Tag the following *music* with *tag* and return the result, by adding the single symbol or symbol list *tag* to the `tags` property of *music*.

`temporary` [music] - *music* (music)
Make any `\override` in *music* replace an existing grob property value only temporarily, restoring the old value when a corresponding `\revert` is executed. This is achieved by clearing the '`pop-first`' property normally set on `\override`s.

An `\override`/`\revert` sequence created by using `\temporary` and `\undo` on the same music containing overrides will cancel out perfectly or cause a warning.

Non-property-related music is ignored, warnings are generated for any property-changing music that isn't an `\override`.

`tieDashPattern` [music] - *dash-fraction* (number) *dash-period* (number)
Set up a custom style of dash pattern for *dash-fraction* ratio of line to space repeated at *dash-period* interval for ties.

`time` [music] - *beat-structure* [number list] *fraction* (fraction, as pair)
Set *fraction* as time signature, with optional number list *beat-structure* before it.

`times` [music] - *fraction* (fraction, as pair) *music* (music)
Scale *music* in time by *fraction*.

`tocItem` [music] - *text* (markup)
Add a line to the table of content, using the `tocItemMarkup` paper variable markup

`transpose` [music] - *from* (pitch) *to* (pitch) *music* (music)
Transpose *music* from pitch *from* to pitch *to*.

`transposedCueDuring` [music] - *what* (string) *dir* (direction) *pitch* (pitch) *main-music* (music)
Insert notes from the part *what* into a voice called `cue`, using the transposition defined by *pitch*. This happens simultaneously with *main-music*, which is usually a rest. The argument *dir* determines whether the cue notes should be notated as a first or second voice.

`transposition` [music] - *pitch* (pitch)
Set instrument transposition

`tuplet` [music] - *ratio* (fraction, as pair) *tuplet-span* [duration] *music* (music)
Scale the given *music* to tuplets. *ratio* is a fraction that specifies how many notes are played in place of the nominal value: it will be '`3/2`' for triplets, namely three notes being played in place of two. If the optional duration *tuplet-span* is specified, it is used instead of `tupletSpannerDuration` for grouping the tuplets. For example,

```
\tuplet 3/2 4 { c8 c c c c c }
```

will result in two groups of three tuplets, each group lasting for a quarter note.

`tupletSpan` [music] - *tuplet-span* [duration]
Set `tupletSpannerDuration`, the length into which `\tuplet` without an explicit '`tuplet-span`' argument of its own will group its tuplets, to the duration *tuplet-span*. To revert to the default of not subdividing the contents of a `\tuplet` command without explicit '`tuplet-span`', use

```
\tupletSpan \default
```

`tweak` [music] - *prop* (symbol list or symbol) *value* (any type) *item* (symbol list or music)
Add a tweak to the following *item*, usually music. Layout objects created by *item* get their property *prop* set to *value*. If *prop* has the form '`Grob.property`', like with

`\tweak Accidental.color #red cis'`

an indirectly created grob ('`Accidental`' is caused by '`NoteHead`') can be tweaked; otherwise only directly created grobs are affected.

As a special case, *item* may be a symbol list specifying a grob path, in which case `\override` is called on it instead of creating tweaked music. This is mainly useful when using `\tweak` as as a component for building other functions.

If this use case would call for `\once \override` rather than a plain `\override`, writing `\once \tweak ...` can be convenient.

prop can contain additional elements in which case a nested property (inside of an alist) is tweaked.

`undo` [music] - *music* (music)
: Convert `\override` and `\set` in *music* to `\revert` and `\unset`, respectively. Any reverts and unsets already in *music* cause a warning. Non-property-related music is ignored.

`unfoldRepeats` [music] - *music* (music)
: Force any `\repeat volta`, `\repeat tremolo` or `\repeat percent` commands in *music* to be interpreted as `\repeat unfold`.

`void` [void] - *arg* (any type)
: Accept a scheme argument, return a void expression. Use this if you want to have a scheme expression evaluated because of its side-effects, but its value ignored.

`withMusicProperty` [music] - *sym* (symbol) *val* (any type) *music* (music)
: Set *sym* to *val* in *music*.

`xNote` [music] - *note* (music)
: Print *note* with a cross-shaped note head.

`xNotesOn` [music]
: Set the default note head style to a cross-shaped style.

A.19 Context modification identifiers

The following commands are defined for use as context modifications within a `\layout` or `\with` block.

`RemoveEmptyStaves`
: Remove staves which are considered to be empty according to the list of interfaces set by `keepAliveInterfaces`.
  - Sets grob property `remove-empty` in `Section ''VerticalAxisGroup'' in` *Internals Reference* to `#t`.

A.20 Predefined type predicates

R5RS primary predicates

Type predicate	Description
`boolean?`	boolean
`char?`	character
`number?`	number
`pair?`	pair
`port?`	port
`procedure?`	procedure

`string?`	string
`symbol?`	symbol
`vector?`	vector

R5RS secondary predicates

Type predicate	**Description**
`char-alphabetic?`	alphabetic character
`char-lower-case?`	lower-case character
`char-numeric?`	numeric character
`char-upper-case?`	upper-case character
`char-whitespace?`	whitespace character
`complex?`	complex number
`eof-object?`	end-of-file object
`even?`	even number
`exact?`	exact number
`inexact?`	inexact number
`input-port?`	input port
`integer?`	integer
`list?`	list *(use* `cheap-list?` *for faster processing)*
`negative?`	negative number
`null?`	null
`odd?`	odd number
`output-port?`	output port
`positive?`	positive number
`rational?`	rational number
`real?`	real number
`zero?`	zero

Guile predicates

Type predicate	**Description**
`hash-table?`	hash table

LilyPond scheme predicates

Type predicate	**Description**
`boolean-or-symbol?`	boolean or symbol
`cheap-list?`	list *(use this instead of* `list?` *for faster processing)*
`color?`	color
`fraction?`	fraction, as pair
`grob-list?`	list of grobs
`index?`	non-negative integer
`markup?`	markup
`markup-command-list?`	markup command list
`markup-list?`	markup list
`moment-pair?`	pair of moment objects
`number-list?`	number list
`number-or-grob?`	number or grob
`number-or-markup?`	number or markup
`number-or-pair?`	number or pair

number-or-string?	number or string
number-pair?	pair of numbers
number-pair-list?	list of number pairs
rhythmic-location?	rhythmic location
scheme?	any type
string-or-music?	string or music
string-or-pair?	string or pair
string-or-symbol?	string or symbol
symbol-list?	symbol list
symbol-list-or-music?	symbol list or music
symbol-list-or-symbol?	symbol list or symbol
void?	void

LilyPond exported predicates

Type predicate	**Description**
ly:book?	book
ly:box?	box
ly:context?	context
ly:context-def?	context definition
ly:context-mod?	context modification
ly:dimension?	dimension, in staff space
ly:dir?	direction
ly:dispatcher?	dispatcher
ly:duration?	duration
ly:event?	post event
ly:font-metric?	font metric
ly:grob?	graphical (layout) object
ly:grob-array?	array of grobs
ly:input-location?	input location
ly:item?	item
ly:iterator?	iterator
ly:lily-lexer?	lily-lexer
ly:lily-parser?	lily-parser
ly:listener?	listener
ly:moment?	moment
ly:music?	music
ly:music-function?	music function
ly:music-list?	list of music objects
ly:music-output?	music output
ly:otf-font?	OpenType font
ly:output-def?	output definition
ly:page-marker?	page marker
ly:pango-font?	pango font
ly:paper-book?	paper book
ly:paper-system?	paper-system Prob
ly:pitch?	pitch
ly:prob?	property object
ly:score?	score
ly:simple-closure?	simple closure
ly:skyline?	skyline

`ly:skyline-pair?`	pair of skylines
`ly:source-file?`	source file
`ly:spanner?`	spanner
`ly:spring?`	spring
`ly:stencil?`	stencil
`ly:stream-event?`	stream event
`ly:translator?`	translator
`ly:translator-group?`	translator group
`ly:unpure-pure-container?`	unpure/pure container

A.21 Scheme functions

`ly:add-context-mod` *contextmods modification* [Function]
Adds the given context *modification* to the list *contextmods* of context modifications.

`ly:add-file-name-alist` *alist* [Function]
Add mappings for error messages from *alist*.

`ly:add-interface` *iface desc props* [Function]
Add a new grob interface. *iface* is the interface name, *desc* is the interface description, and *props* is the list of user-settable properties for the interface.

`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*. *val* is the default value and *description* is a string description.

`ly:all-grob-interfaces` [Function]
Return the hash table with all grob 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 strict-checking* [Function]
Return value if *key* in *alist*, else *default-value* (or `#f` if not specified). If *strict-checking* is set to `#t` and *key* is not in *alist*, a programming_error is output.

`ly:axis-group-interface::add-element` *grob grob-element* [Function]
Set *grob* the parent of *grob-element* on all axes of *grob*.

`ly:basic-progress` *str rest* [Function]
A Scheme callable function to issue a basic progress message *str*. The message is formatted with `format` and *rest*.

`ly:beam-score-count` [Function]
count number of beam scores.

`ly:book?` *x* [Function]
Is *x* a `Book` object?

`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-book-parts` *book* [Function]
Return book parts in *book*.

`ly:book-header` *book* [Function]
Return header in *book*.

`ly:book-paper` *book* [Function]
Return paper in *book*.

`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:book-scores` *book* [Function]
Return scores in *book*.

`ly:book-set-header!` *book module* [Function]
Set the book header.

`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 default-value strict-checking* [Function]
Return value for *key* from a list of alists *achain*. If no entry is found, return *default-value* or `#f` if *default-value* is not specified. With *strict-checking* set to `#t`, a programming_error is output in such cases.

`ly:check-expected-warnings` [Function]
Check whether all expected warnings have really been triggered.

`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:connect-dispatchers` *to from* [Function]
Make the dispatcher *to* listen to events from *from*.

`ly:context?` *x* [Function]
Is *x* a `Context` object?

`ly:context-current-moment` *context* [Function]
Return the current moment of *context*.

`ly:context-def?` *x* [Function]
Is *x* a `Context_def` object?

`ly:context-def-lookup` *def sym val* [Function]
Return the value of *sym* in context definition *def* (e.g., `\Voice`). If no value is found, return *val* or `'()` if *val* is undefined. *sym* can be any of '`default-child`', '`consists`', '`description`', '`aliases`', '`accepts`', '`property-ops`', '`context-name`', '`group-type`'.

`ly:context-def-modify` *def mod* [Function]
Return the result of applying the context-mod *mod* to the context definition *def*. Does not change *def*.

`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-mod?` *x* [Function]
Is *x* a `Context_mod` object?

`ly:context-mod-apply!` *context mod* [Function]
Apply the context modification *mod* to *context*.

`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` *context sym def* [Function]
Return the value for property *sym* in *context*. If *def* is given, and property value is `'()`, return *def*.

`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:debug` *str rest* [Function]
A Scheme callable function to issue a debug message *str*. The message is formatted with `format` and *rest*.

`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]
Is *s* a direction? Valid directions are `-1`, `0`, or `1`, where `-1` represents left or down, `1` represents right or up, and `0` represents a neutral direction.

`ly:dispatcher?` *x* [Function]
Is *x* a `Dispatcher` object?

`ly:duration?` *x* [Function]
Is *x* a `Duration` object?

`ly:duration<?` *p1 p2* [Function]
Is *p1* shorter than *p2*?

`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-scale` *dur* [Function]
Extract the compression factor from *dur*. Return it as a rational.

`ly:effective-prefix` [Function]
Return effective prefix.

`ly:encode-string-for-pdf` *str* [Function]
Encode the given string to either Latin1 (which is a subset of the PDFDocEncoding) or if that's not possible to full UTF-16BE with Byte-Order-Mark (BOM).

`ly:engraver-announce-end-grob` *engraver grob cause* [Function]
Announce the end of a grob (i.e., the end of a spanner) originating from given *engraver* instance, with *grob* being a grob. *cause* should either be another grob or a music event.

`ly:engraver-make-grob` *engraver grob-name cause* [Function]
Create a grob originating from given *engraver* instance, with given *grob-name*, a symbol. *cause* should either be another grob or a music event.

`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?` *obj* [Function]
Is *obj* a proper (non-rhythmic) event object?

`ly:event-deep-copy` *m* [Function]
Copy *m* and all sub expressions of *m*.

`ly:event-property` *sev sym val* [Function]
Get the property *sym* of stream event *sev*. If *sym* is undefined, return *val* or `'()` if *val* is not specified.

`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:expect-warning` *str rest* [Function]
A Scheme callable function to register a warning to be expected and subsequently suppressed. If the warning is not encountered, a warning about the missing warning will be shown. The message should be translated with `(_ ...)` and changing parameters given after the format string.

`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 Emmentaler-Brace 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 Emmentaler-Brace 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 Emmentaler-Brace 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 Emmentaler-Brace 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`. Basic support for `~s` is also provided.

`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-context-mods` *contextmod* [Function]
Returns the list of context modifications stored in *contextmod*.

`ly:get-option` *var* [Function]
Get a global option setting.

`ly:get-spacing-spec` *from-scm to-scm* [Function]
Return the spacing spec going between the two given grobs, *from_scm* and *to_scm*.

`ly:get-undead` *undead* [Function]
Get back object from *undead*.

`ly:gettext` *original* [Function]
A Scheme wrapper function for `gettext`.

`ly:grob?` *x* [Function]
Is *x* a `Grob` object?

`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?` *x* [Function]
Is *x* a `Grob_array` object?

`ly:grob-array->list` *grob-arr* [Function]
Return the elements of *grob-arr* as a Scheme list.

`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-basic-properties` *grob* [Function]
Get the immutable properties of *grob*.

`ly:grob-chain-callback` *grob proc sym* [Function]
Find the callback that is stored as property *sym* of grob *grob* and chain *proc* to the head of this, meaning that it is called using *grob* and the previous callback's result.

`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 *grob*.

`ly:grob-extent` *grob refp axis* [Function]
Get the extent in *axis* direction of *grob* relative to the grob *refp*.

`ly:grob-get-vertical-axis-group-index` *grob* [Function]
Get the index of the vertical axis group the grob *grob* belongs to; return `-1` if none is found.

`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 *grob* of property *sym*. It returns `'()` (end-of-list) if *sym* is undefined in *grob*.

`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 val* [Function]
Return the value for property *sym* of *grob*. If no value is found, return *val* or `'()` if *val* is not specified.

`ly:grob-property-data` *grob sym* [Function]
Return the value for property *sym* of *grob*, but do not process callbacks.

`ly:grob-pure-height` *grob refp beg end val* [Function]
Return the pure height of *grob* given refpoint *refp*. If no value is found, return *val* or `'()` if *val* is not specified.

`ly:grob-pure-property` *grob sym beg end val* [Function]
Return the pure value for property *sym* of *grob*. If no value is found, return *val* or `'()` if *val* is not specified.

`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-nested-property!` *grob symlist val* [Function]
Set nested property *symlist* in grob *grob* to value *val*.

`ly:grob-set-object!` *grob sym val* [Function]
Set *sym* in grob *grob* to value *val*.

`ly:grob-set-parent!` *grob axis parent-grob* [Function]
Set *parent-grob* the parent of grob *grob* in axis *axis*.

`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 *grob* on axis *a* over distance *d*.

`ly:grob-vertical<?` *a b* [Function]
Does *a* lie above *b* on the page?

`ly:gulp-file` *name size* [Function]
Read *size* characters from the file *name*, and return its contents in a string. If *size* is undefined, the entire file is read. 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:input-warning` *sip msg rest* [Function]
Print *msg* as a GNU compliant warning 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:item?` *g* [Function]
Is *g* an `Item` object?

`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: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:listened-event-class?` *disp cl* [Function]
Does *disp* listen to any event type in the list *cl*?

`ly:listened-event-types` *disp* [Function]
Return a list of all event types that *disp* listens to.

`ly:listener?` *x* [Function]
Is *x* a `Listener` 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-context-mod` *mod-list* [Function]
Creates a context modification, optionally initialized via the list of modifications *mod-list*.

`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 integers *num* and *den*, alternatively by a single rational number.

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` *m g gn gd* [Function]
Create the moment with rational main timing *m*, and optional grace timing *g*.

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.

For compatibility reasons, it is possible to write two numbers specifying numerator and denominator instead of the rationals. These forms cannot be mixed, and the two-argument form is disambiguated by the sign of the second argument: if it is positive, it can only be a denominator and not a grace timing.

`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*'s cdr is a list containing either `ly:music?` predicates or other type predicates. Its car is the syntax function to call.

`ly:make-music-relative!` *music pitch* [Function]
Make *music* relative to *pitch*, return final pitch.

`ly:make-output-def` [Function]
Make an output definition.

`ly:make-page-label-marker` *label* [Function]
Return page marker with label *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. Optional *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 it.

`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 a1 a2 ...`).

`ly:make-spring` *ideal min-dist* [Function]
Make a spring. *ideal* is the ideal distance of the spring, and *min-dist* is the minimum distance.

`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 `empty-interval` 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:make-undead` *object* [Function]
This packages *object* in a manner that keeps it from triggering "Parsed object should be dead" messages.

`ly:make-unpure-pure-container` *unpure pure* [Function]
Make an unpure-pure container. *unpure* should be an unpure expression, and *pure* should be a pure expression. If *pure* is omitted, the value of *unpure* will be used twice, except that a callback is given two extra arguments that are ignored for the sake of pure calculations.

`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?` *x* [Function]
Is *x* a `Moment` object?

`ly:moment<?` *a b* [Function]
Compare two moments.

`ly:moment-add` *a b* [Function]
Add two moments.

`ly:moment-div` *a b* [Function]
Divide two moments.

`ly:moment-grace` *mom* [Function]
Extract grace timing as a rational number from *mom*.

`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` *mom* [Function]
Extract main timing as a rational number from *mom*.

`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:music?` *obj* [Function]
Is *obj* a music 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*. *m* may be an arbitrary type; cons cells and music are copied recursively.

`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?` *x* [Function]
Is *x* a `music-function`?

`ly:music-function-extract` *x* [Function]
Return the Scheme function inside *x*.

`ly:music-function-signature` *x* [Function]
Return the function signature inside *x*.

`ly:music-length` *mus* [Function]
Get the length of music expression *mus* and return it as a `Moment` object.

`ly:music-list?` *lst* [Function]
Is *lst* 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 val* [Function]
Return the value for property *sym* of music expression *mus*. If no value is found, return *val* or `'()` if *val* is not specified.

`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:note-column-accidentals` *note-column* [Function]
Return the `AccidentalPlacement` grob from *note-column* if any, or `SCM_EOL` otherwise.

`ly:note-column-dot-column` *note-column* [Function]
Return the `DotColumn` grob from *note-column* if any, or `SCM_EOL` otherwise.

`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 *s* to a string without generating many decimals.

`ly:one-line-breaking` *pb* [Function]
Put each score on a single line, and put each line on its own page. The paper-width setting will be modified so that every page will be wider than the widest line.

`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` *port* [Function]
Print `ly:set-option` usage. Optional *port* argumentfor the destination defaults to current output port.

`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?` *font* [Function]
Is *font* an OpenType font?

`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-glyph-count` *font* [Function]
Return the number of glyphs in *font*.

`ly:otf-glyph-list` *font* [Function]
Return a list of glyph names for *font*.

`ly:output-def?` *def* [Function]
Is *def* an output definition?

`ly:output-def-clone` *def* [Function]
Clone output definition *def*.

`ly:output-def-lookup` *def sym val* [Function]
Return the value of *sym* in output definition *def* (e.g., `\paper`). If no value is found, return *val* or `'()` if *val* is undefined.

`ly:output-def-parent` *def* [Function]
Return the parent output definition of *def*.

`ly:output-def-scope` *def* [Function]
Return 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-description` *output-def* [Function]
Return the description of translators in *output-def*.

`ly:output-find-context-def` *output-def context-name* [Function]
Return an alist of all context defs (matching *context-name*if given) 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-module` *outputter* [Function]
Return output module of *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?` *f* [Function]
Is *f* a pango font?

`ly:pango-font-physical-fonts` *f* [Function]
Return alist of `(ps-name file-name font-index)` lists for Pango font *f*.

`ly:paper-book?` *x* [Function]
Is *x* a `Paper_book` object?

`ly:paper-book-header` *pb* [Function]
Return the header definition (`\header`) in `Paper_book` object *pb*.

`ly:paper-book-pages` *pb* [Function]
Return pages in `Paper_book` object *pb*.

`ly:paper-book-paper` *pb* [Function]
Return the paper output definition (`\paper`) in `Paper_book` object *pb*.

`ly:paper-book-performances` *pb* [Function]
Return performances in `Paper_book` object *pb*.

`ly:paper-book-scopes` *pb* [Function]
Return scopes in `Paper_book` object *pb*.

`ly:paper-book-systems` *pb* [Function]
Return systems in `Paper_book` object *pb*.

`ly:paper-fonts` *def* [Function]
Return a list containing the fonts from output definition *def* (e.g., `\paper`).

`ly:paper-get-font` *def chain* [Function]
Find a font metric in output definition *def* satisfying the font-qualifiers in alist chain *chain*, and return it. (An alist chain is a list of alists, containing grob properties.)

`ly:paper-get-number` *def sym* [Function]
Return the value of variable *sym* in output definition *def* as a double.

`ly:paper-outputscale` *def* [Function]
Return the output-scale for output definition *def*.

`ly:paper-score-paper-systems` *paper-score* [Function]
Return vector of `paper_system` objects from *paper-score*.

`ly:paper-system?` *obj* [Function]
Is *obj* a C++ `Prob` object of type `paper-system`?

`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:parse-file` *name* [Function]
Parse a single `.ly` file. Upon failure, throw `ly-file-failed` key.

`ly:parse-string-expression` *parser-smob ly-code filename line* [Function]
Parse the string *ly-code* with *parser-smob*. Return the contained music expression. *filename* and *line* are optional source indicators.

`ly:parsed-undead-list!` [Function]
Return the list of objects that have been found live that should have been dead, and clear that list.

`ly:parser-clear-error` *parser* [Function]
Clear the error flag for the parser.

`ly:parser-clone` *parser-smob closures location* [Function]
Return a clone of *parser-smob*. An association list of port positions to closures can be specified in *closures* in order to have `$` and `#` interpreted in their original lexical environment. If *location* is a valid location, it becomes the source of all music expressions inside.

`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-include-string` *parser-smob ly-code* [Function]
Include the string *ly-code* into the input stream for *parser-smob*. Can only be used in immediate Scheme expressions (`$` instead of `#`).

`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 Type 1 font in PFB format to PFA format.

`ly:pitch?` *x* [Function]
Is *x* a `Pitch` object?

`ly:pitch<?` *p1 p2* [Function]
Is *p1* lexicographically smaller than *p2*?

`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-tones` *pp* [Function]
Calculate the number of tones of *pp* from middle C as a rational number.

`ly:pitch-transpose` *p delta* [Function]
Transpose *p* by the amount *delta*, where *delta* is relative to middle C.

`ly:pointer-group-interface::add-grob` *grob sym grob-element* [Function]
Add *grob-element* to *grob*'s *sym* grob array.

`ly:position-on-line?` *sg spos* [Function]
Return whether *spos* is on a line of the staff associated with the grob *sg* (even on an extender line).

`ly:prob?` *x* [Function]
Is *x* a `Prob` object?

`ly:prob-immutable-properties` *prob* [Function]
Retrieve an alist of immutable properties.

`ly:prob-mutable-properties` *prob* [Function]
Retrieve an alist of mutable properties.

`ly:prob-property` *prob sym val* [Function]
Return the value for property *sym* of Prob object *prob*. If no value is found, return *val* or `'()` if *val* is not specified.

`ly:prob-property?` *obj sym* [Function]
Is boolean prop *sym* of *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: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?` *x* [Function]
Is *x* a `Score` object?

`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.

`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: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]
Is *clos* a simple closure?

`ly:skyline?` *x* [Function]
Is *x* a `Skyline` object?

`ly:skyline-empty?` *sky* [Function]
Return whether *sky* is empty.

`ly:skyline-pair?` *x* [Function]
Is *x* a `Skyline_pair` object?

`ly:slur-score-count` [Function]
count number of slur scores.

`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?` *g* [Function]
Is *g* a spanner 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-set-bound!` *spanner dir item* [Function]
Set grob *item* as bound in direction *dir* for *spanner*.

`ly:spawn` *command rest* [Function]
Simple interface to g_spawn_sync *str*. The error is formatted with `format` and *rest*.

`ly:spring?` *x* [Function]
Is *x* a `Spring` object?

`ly:spring-set-inverse-compress-strength!` *spring strength* [Function]
Set the inverse compress *strength* of *spring*.

`ly:spring-set-inverse-stretch-strength!` *spring strength* [Function]
Set the inverse stretch *strength* of *spring*.

`ly:staff-symbol-line-thickness` *grob* [Function]
Returns the `line-thickness` of the staff associated with *grob*.

`ly:staff-symbol-staff-radius` *grob* [Function]
Returns the radius of the staff associated with *grob*.

`ly:staff-symbol-staff-space` *grob* [Function]
Returns the `staff-space` 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?` *x* [Function]
Is *x* a `Stencil` object?

`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* [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. *first* and *second* may also be `'()` or `#f`.

`ly:stencil-empty?` *stil axis* [Function]
Return whether *stil* is empty. If an optional *axis* is supplied, the emptiness check is restricted to that axis.

`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-scale` *stil x y* [Function]
Scale *stil* using the horizontal and vertical scaling factors *x* and *y*.

`ly:stencil-stack` *first axis direction second padding mindist* [Function]
Construct a stencil by stacking *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. *first* and *second* may also be `'()` or `#f`. As opposed to `ly:stencil-combine-at-edge`, metrics are suited for successively accumulating lines of stencils. Also, *second* stencil is drawn last.

If *mindist* is specified, reference points are placed apart at least by this distance. If either of the stencils is spacing, *padding* and *mindist* do not apply.

`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:stream-event?` *obj* [Function]
Is *obj* a `Stream_event` object?

`ly:string-percent-encode` *str* [Function]
Encode all characters in string *str* with hexadecimal percent escape sequences, with the following exceptions: characters `-`, `.`, `/`, and `_`; and characters in ranges `0-9`, `A-Z`, and `a-z`.

`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 Emmentaler-Brace 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: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:translate-cpp-warning-scheme` *str* [Function]
Translates a string in C++ printf format and modifies it to use it for scheme formatting.

`ly:translator?` *x* [Function]
Is *x* a `Translator` object?

`ly:translator-context` *trans* [Function]
Return the context of the translator object *trans*.

`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: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:undead?` *x* [Function]
Is *x* a `Undead` object?

`ly:unit` [Function]
Return the unit used for lengths as a string.

`ly:unpure-pure-container?` *clos* [Function]
Is *clos* an unpure pure container?

`ly:unpure-pure-container-pure-part` *pc* [Function]
Return the pure part of *pc*.

`ly:unpure-pure-container-unpure-part` *pc* [Function]
Return the unpure part of *pc*.

`ly:usage` [Function]
Print usage message.

`ly:verbose-output?` [Function]
Was verbose output requested, i.e. loglevel at least `DEBUG`?

`ly:version` [Function]
Return the current lilypond version as a list, e.g., `(1 3 127 uu1)`.
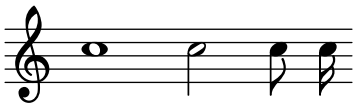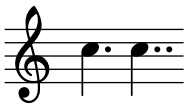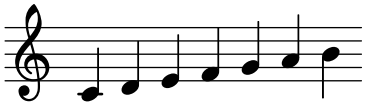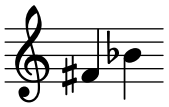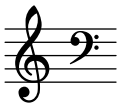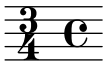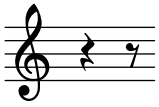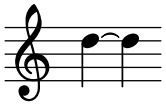
`ly:warning` *str rest* [Function]
A Scheme callable function to issue the warning *str*. The message is formatted with `format` and *rest*.

`ly:warning-located` *location str rest* [Function]
A Scheme callable function to issue the warning *str* at the specified location in an input file. The message is formatted with `format` and *rest*.
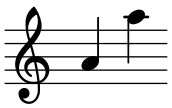
`ly:wide-char->utf-8` *wc* [Function]

Encode the Unicode codepoint *wc*, an integer, as UTF-8.
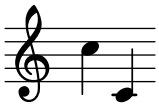
Appendix B Cheat sheet

Syntax	Description	Example
`1 2 8 16`	durations	
`c4. c4..`	augmentation dots	
`c d e f g a b`	scale	
`fis bes`	alteration	
`\clef treble \clef bass`	clefs	
`\time 3/4 \time 4/4`	time signature	
`r4 r8`	rest	
`d ~ d`	tie	
`\key es \major`	key signature	
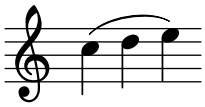
note`'` raise octave
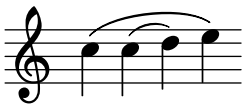


note`,` lower octave
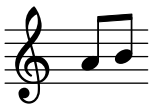


`c( d e)` slur



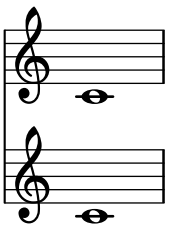
`c\( c( d) e\)` phrasing slur
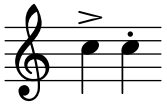


`a8[ b]` beam
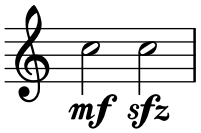


`<< \new Staff ... >>` more staves



`c-> c-.` articulations
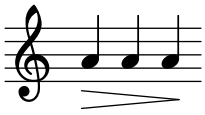


`c2\mf c\sfz` dynamics
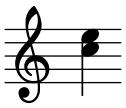


`a\< a a\!` crescendo
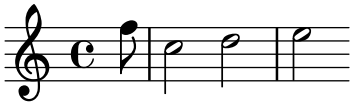


`a\> a a\!` decrescendo
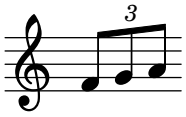


`< >` chord
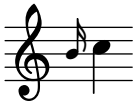


`\partial 8` pickup / upbeat



`\tuplet 3/2 {f g a}` triplets



`\grace` grace notes

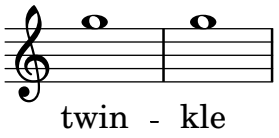


`\lyricmode { twinkle }` entering lyrics twinkle
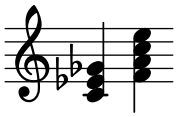
`\new Lyrics` printing lyrics

twinkle

`twin -- kle` lyric hyphen
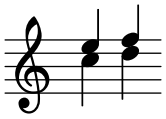


`\chordmode { c:dim f:maj7 }` chords



`\context ChordNames` printing chord names

C° F△

`<<{e f} \\ {c d}>>` polyphony



`s4 s8 s16`	spacer rests

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Appendix D LilyPond command index

This index lists all the LilyPond commands and keywords with links to those sections of the manual 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.

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Appendix E 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.

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