LilyPond

The music typesetter

Internals Reference

The LilyPond development team

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For LilyPond version 2.23.2

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This is the Internals Reference (IR) for version 2.23.2 of LilyPond, the GNU music typesetter.

1 Music definitions

1.1 Music expressions

1.1.1 AbsoluteDynamicEvent

Create a dynamic mark.

Syntax: *note*\x, where \x is a dynamic mark like \ppp or \sfz. A complete list is in file ly/dynamic-scripts-init.ly.

Event classes: absolute-dynamic-event (page 45), dynamic-event (page 47), music-event (page 50), and StreamEvent (page 53).

Accepted by: Dynamic_engraver (page 293), and Dynamic_performer (page 293).

Properties:

name (symbol):
'AbsoluteDynamicEvent
Name of this music object.

types (list):
'(post-event
event
dynamic-event
absolute-dynamic-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.2 AlternativeEvent

Create an alternative event.

Event classes: alternative-event (page 45), music-event (page 50), and StreamEvent (page 53).

Accepted by: Timing_translator (page 323).

Properties:

name (symbol):
'AlternativeEvent
Name of this music object.

types (list):
'(event alternative-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.3 AnnotateOutputEvent

Print an annotation of an output element.

Event classes: annotate-output-event (page 46), music-event (page 50), and StreamEvent (page 53).

Accepted by: Balloon_engraver (page 283).

Properties:

name (symbol):
'AnnotateOutputEvent
Name of this music object.

`types` (list):
`'(event annotate-output-event post-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.4 ApplyContext

Call the argument with the current context during interpreting phase.

Properties:

`iterator-ctor` (procedure):
`ly:apply-context-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'ApplyContext`
Name of this music object.

`types` (list):
`'(apply-context)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.5 ApplyOutputEvent

Call the argument with all current grobs during interpreting phase.

Syntax: `\applyOutput #'`*`context func`*

Arguments to *func* are 1. the grob, 2. the originating context, and 3. the context where *func* is called.

Event classes: `apply-output-event` (page 46), `layout-instruction-event` (page 49), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Output_property_engraver` (page 309).

Properties:

`name` (symbol):
`'ApplyOutputEvent`
Name of this music object.

`types` (list):
`'(event apply-output-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.6 ArpeggioEvent

Make an arpeggio on this note.

Syntax: *note*`-\arpeggio`

Event classes: `arpeggio-event` (page 46), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Arpeggio_engraver` (page 281).

Properties:

`name` (symbol):
`'ArpeggioEvent`
Name of this music object.

`types` (list):

```
'(post-event arpeggio-event event)
```

The types of this music object; determines by what engraver this music expression is processed.

1.1.7 ArticulationEvent

Add an articulation marking to a note.

Syntax: *note*`xy`, where `x` is a direction (`^` for up or `_` for down), or LilyPond's choice (no direction specified), and where `y` is an articulation (such as `-.`, `->`, `\tenuto`, `\downbow`). See the Notation Reference for details.

Event classes: `articulation-event` (page 46), `music-event` (page 50), `script-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Note_performer` (page 308), and `Script_engraver` (page 315).

Properties:

`name` (symbol):

```
'ArticulationEvent
```

Name of this music object.

`types` (list):

```
'(post-event
   event
   articulation-event
   script-event)
```

The types of this music object; determines by what engraver this music expression is processed.

1.1.8 AutoChangeMusic

Used for making voices that switch between piano staves automatically.

Properties:

`iterator-ctor` (procedure):

```
ly:auto-change-iterator::constructor
```

Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):

```
ly:music-wrapper::length-callback
```

How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):

```
'AutoChangeMusic
```

Name of this music object.

`start-callback` (procedure):

```
ly:music-wrapper::start-callback
```

Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):

```
'(music-wrapper-music auto-change-instruction)
```

The types of this music object; determines by what engraver this music expression is processed.

1.1.9 BarCheck

Check whether this music coincides with the start of the measure.

Properties:

`iterator-ctor` (procedure):
`ly:bar-check-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'BarCheck`
Name of this music object.

`types` (list):
`'(bar-check)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.10 BassFigureEvent

Print a bass-figure text.

Event classes: `bass-figure-event` (page 46), `music-event` (page 50), `rhythmic-event` (page 51), and `StreamEvent` (page 53).

Accepted by: `Figured_bass_engraver` (page 294).

Properties:

`name` (symbol):
`'BassFigureEvent`
Name of this music object.

`types` (list):
`'(event rhythmic-event bass-figure-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.11 BeamEvent

Start or stop a beam.

Syntax for manual control: `c8-[ c c-] c8`

Event classes: `beam-event` (page 46), `music-event` (page 50), `span-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Beam_engraver` (page 284), `Beam_performer` (page 285), and `Grace_beam_engraver` (page 298).

Properties:

`name` (symbol):
`'BeamEvent`
Name of this music object.

`types` (list):
`'(post-event event beam-event span-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.12 BeamForbidEvent

Specify that a note may not auto-beamed.

Event classes: `beam-forbid-event` (page 46), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Auto_beam_engraver` (page 281), and `Grace_auto_beam_engraver` (page 297).

Properties:

`name` (symbol):
`'BeamForbidEvent`

Name of this music object.

`types` (list):
`'(post-event event beam-forbid-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.13 BendAfterEvent

A drop/fall/doit jazz articulation.

Event classes: `bend-after-event` (page 46), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Bend_engraver` (page 285).

Properties:

`name` (symbol):
`'BendAfterEvent`

Name of this music object.

`types` (list):
`'(post-event bend-after-event event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.14 BendSpanEvent

Used to signal where a bend spanner starts and stops.

Event classes: `bend-span-event` (page 46), `music-event` (page 50), `span-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Bend_spanner_engraver` (page 285).

Properties:

`name` (symbol):
`'BendSpanEvent`

Name of this music object.

`types` (list):
`'(bend-span-event post-event span-event event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.15 BreakDynamicSpanEvent

End an alignment spanner for dynamics here.

Event classes: break-dynamic-span-event (page 46), break-span-event (page 47), music-event (page 50), and StreamEvent (page 53).

Accepted by: Dynamic_engraver (page 293).

Properties:

name (symbol):
'BreakDynamicSpanEvent
Name of this music object.

types (list):
'(post-event
break-span-event
break-dynamic-span-event
event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.16 BreathingEvent

Create a 'breath mark' or 'comma'.

Syntax: *note*\breathe

Event classes: breathing-event (page 47), music-event (page 50), and StreamEvent (page 53).

Accepted by: Breathing_sign_engraver (page 286), and Note_performer (page 308).

Properties:

midi-length (procedure):
breathe::midi-length
Function to determine how long to play a note in MIDI. It should take a moment (the written length of the note) and a context, and return a moment (the length to play the note).

name (symbol):
'BreathingEvent
Name of this music object.

types (list):
'(event breathing-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.17 ClusterNoteEvent

A note that is part of a cluster.

Event classes: cluster-note-event (page 47), melodic-event (page 49), music-event (page 50), rhythmic-event (page 51), and StreamEvent (page 53).

Accepted by: Cluster_spanner_engraver (page 288).

Properties:

iterator-ctor (procedure):
ly:rhythmic-music-iterator::constructor
Function to construct a music-event-iterator object for this music.

`name` (symbol):

```
'ClusterNoteEvent
```

Name of this music object.

`types` (list):

```
'(cluster-note-event
   melodic-event
   rhythmic-event
   event)
```

The types of this music object; determines by what engraver this music expression is processed.

1.1.18 CompletizeExtenderEvent

Used internally to signal the end of a lyrics block to ensure extenders are completed correctly when a `Lyrics` context ends before its associated `Voice` context.

Event classes: `completize-extender-event` (page 47), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Extender_engraver` (page 294).

Properties:

`name` (symbol):

```
'CompletizeExtenderEvent
```

Name of this music object.

`types` (list):

```
'(completize-extender-event event)
```

The types of this music object; determines by what engraver this music expression is processed.

1.1.19 ContextChange

Change staves in Piano staff.

Syntax: `\change Staff = new-id`

Properties:

`iterator-ctor` (procedure):

```
ly:change-iterator::constructor
```

Function to construct a `music-event-iterator` object for this music.

`name` (symbol):

```
'ContextChange
```

Name of this music object.

`types` (list):

```
'(translator-change-instruction)
```

The types of this music object; determines by what engraver this music expression is processed.

1.1.20 ContextSpeccedMusic

Interpret the argument music within a specific context.

Properties:

`iterator-ctor` (procedure):

```
ly:context-specced-music-iterator::constructor
```

Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):

`ly:music-wrapper::length-callback`

How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):

`'ContextSpeccedMusic`

Name of this music object.

`start-callback` (procedure):

`ly:music-wrapper::start-callback`

Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):

`'(context-specification music-wrapper-music)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.21 CrescendoEvent

Begin or end a crescendo.

Syntax: *note*`\<` ... *note*`\!`

An alternative syntax is *note*`\cr` ... *note*`\endcr`.

Event classes: `crescendo-event` (page 47), `music-event` (page 50), `span-dynamic-event` (page 52), `span-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Dynamic_engraver` (page 293), and `Dynamic_performer` (page 293).

Properties:

`name` (symbol):

`'CrescendoEvent`

Name of this music object.

`types` (list):

```
'(post-event
   span-event
   span-dynamic-event
   crescendo-event
   event)
```

The types of this music object; determines by what engraver this music expression is processed.

1.1.22 DecrescendoEvent

Begin or end a decrescendo.

Syntax: *note*`\>` ... *note*`\!`

An alternative syntax is *note*`\decr` ... *note*`\enddecr`.

Event classes: `decrescendo-event` (page 47), `music-event` (page 50), `span-dynamic-event` (page 52), `span-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Dynamic_engraver` (page 293), and `Dynamic_performer` (page 293).

Properties:

`name` (symbol):

`'DecrescendoEvent`

Name of this music object.

`types` (list):

```
'(post-event
  span-event
  span-dynamic-event
  decrescendo-event
  event)
```

The types of this music object; determines by what engraver this music expression is processed.

1.1.23 DoublePercentEvent

Used internally to signal double percent repeats.

Event classes: `double-percent-event` (page 47), `music-event` (page 50), `rhythmic-event` (page 51), and `StreamEvent` (page 53).

Accepted by: `Double_percent_repeat_engraver` (page 291).

Properties:

`name` (symbol):

```
'DoublePercentEvent
```

Name of this music object.

`types` (list):

```
'(event double-percent-event rhythmic-event)
```

The types of this music object; determines by what engraver this music expression is processed.

1.1.24 DurationLineEvent

Initiate a duration line.

Syntax: *note*`\-`

Event classes: `duration-line-event` (page 47), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Duration_line_engraver` (page 292).

Properties:

`name` (symbol):

```
'DurationLineEvent
```

Name of this music object.

`types` (list):

```
'(duration-line-event post-event event)
```

The types of this music object; determines by what engraver this music expression is processed.

1.1.25 EpisemaEvent

Begin or end an episema.

Event classes: `episema-event` (page 47), `music-event` (page 50), `span-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Episema_engraver` (page 294).

Properties:

`name` (symbol):

```
'EpisemaEvent
```

Name of this music object.

`types` (list):
`'(post-event span-event event episema-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.26 Event

Atomic music event.

Properties:

`name` (symbol):
`'Event`
Name of this music object.

`types` (list):
`'(event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.27 EventChord

Explicitly entered chords.

When iterated, `elements` are converted to events at the current timestep, followed by any `articulations`. Per-chord postevents attached by the parser just follow any rhythmic events in `elements` instead of utilizing `articulations`.

An unexpanded chord repetition '`q`' is recognizable by having its duration stored in `duration`.

Properties:

`iterator-ctor` (procedure):
`ly:event-chord-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:music-sequence::event-chord-length-callback`
How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'EventChord`
Name of this music object.

`to-relative-callback` (procedure):
`ly:music-sequence::event-chord-relative-callback`
How to transform a piece of music to relative pitches.

`types` (list):
`'(event-chord simultaneous-music)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.28 ExtenderEvent

Extend lyrics.

Event classes: `extender-event` (page 48), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Extender_engraver` (page 294).

Properties:

`name` (symbol):
`'ExtenderEvent`

Name of this music object.

`types` (list):
`'(post-event extender-event event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.29 `FineEvent`

End the performance, not necessarily at the written end of the music.

Event classes: `fine-event` (page 48), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Jump_engraver` (page 300), and `Repeat_acknowledge_engraver` (page 313).

Properties:

`iterator-ctor` (procedure):
`ly:fine-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'FineEvent`

Name of this music object.

`types` (list):
`'(fine-event event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.30 `FingerGlideEvent`

Initiate a line connecting two equal fingerings. This line represents a finger gliding on a string.

Syntax: *note*`\glide-`*finger*

Event classes: `finger-glide-event` (page 48), `music-event` (page 50), `span-event` (page 52), and `StreamEvent` (page 53).

Not accepted by any engraver or performer.

Properties:

`name` (symbol):
`'FingerGlideEvent`

Name of this music object.

`types` (list):
`'(finger-glide-event post-event event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.31 FingeringEvent

Specify what finger to use for this note.

Event classes: `fingering-event` (page 48), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Fingering_engraver` (page 295), `Fretboard_engraver` (page 296), and `Tab_note_heads_engraver` (page 320).

Properties:

`name` (symbol):
`'FingeringEvent`

Name of this music object.

`types` (list):
`'(post-event fingering-event event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.32 FootnoteEvent

Footnote a grob.

Event classes: `footnote-event` (page 48), `music-event` (page 50), and `StreamEvent` (page 53).

Not accepted by any engraver or performer.

Properties:

`name` (symbol):
`'FootnoteEvent`

Name of this music object.

`types` (list):
`'(event footnote-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.33 GlissandoEvent

Start a glissando on this note.

Event classes: `glissando-event` (page 48), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Glissando_engraver` (page 297).

Properties:

`name` (symbol):
`'GlissandoEvent`

Name of this music object.

`types` (list):
`'(post-event glissando-event event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.34 GraceMusic

Interpret the argument as grace notes.

Properties:

`iterator-ctor` (procedure):
`ly:grace-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`length` (moment):
`#<Mom 0>`
The endpoint of this music. This property is unhappily named in that it does not account for any initial grace notes: the full length of the music is `length` minus the start time. A value of `INF-MOMENT` indicates indefinite length.

`name` (symbol):
`'GraceMusic`
Name of this music object.

`start-callback` (procedure):
`ly:grace-music::start-callback`
Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):
`'(grace-music music-wrapper-music)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.35 HarmonicEvent

Mark a note as harmonic.

Event classes: `harmonic-event` (page 48), `music-event` (page 50), and `StreamEvent` (page 53).

Not accepted by any engraver or performer.

Properties:

`name` (symbol):
`'HarmonicEvent`
Name of this music object.

`types` (list):
`'(post-event event harmonic-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.36 HyphenEvent

A hyphen between lyric syllables.

Event classes: `hyphen-event` (page 48), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Hyphen_engraver` (page 300).

Properties:

`name` (symbol):
`'HyphenEvent`
Name of this music object.

`types` (list):
`'(post-event hyphen-event event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.37 KeyChangeEvent

Change the key signature.

Syntax: `\key` *name scale*

Event classes: `key-change-event` (page 48), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Key_engraver` (page 301), and `Key_performer` (page 302).

Properties:

`name` (symbol):
`'KeyChangeEvent`
Name of this music object.

`to-relative-callback` (procedure):
`#<procedure #f (x p)>`
How to transform a piece of music to relative pitches.

`types` (list):
`'(key-change-event event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.38 LabelEvent

Place a bookmarking label.

Event classes: `label-event` (page 48), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Paper_column_engraver` (page 310).

Properties:

`name` (symbol):
`'LabelEvent`
Name of this music object.

`types` (list):
`'(label-event event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.39 LaissezVibrerEvent

Don't damp this chord.

Syntax: *note*`\laissezVibrer`

Event classes: `laissez-vibrer-event` (page 48), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Laissez_vibrer_engraver` (page 302).

Properties:

`name` (symbol):
`'LaissezVibrerEvent`

Name of this music object.

`types` (list):
`'(post-event event laissez-vibrer-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.40 LigatureEvent

Start or end a ligature.

Event classes: `ligature-event` (page 49), `music-event` (page 50), `span-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Kievan_ligature_engraver` (page 302), `Ligature_bracket_engraver` (page 303), `Mensural_ligature_engraver` (page 305), and `Vaticana_ligature_engraver` (page 325).

Properties:

`name` (symbol):
`'LigatureEvent`
Name of this music object.

`types` (list):
`'(span-event ligature-event event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.41 LineBreakEvent

Allow, forbid or force a line break.

Event classes: `break-event` (page 47), `line-break-event` (page 49), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Page_turn_engraver` (page 309), and `Paper_column_engraver` (page 310).

Properties:

`name` (symbol):
`'LineBreakEvent`
Name of this music object.

`types` (list):
`'(line-break-event break-event event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.42 LyricCombineMusic

Align lyrics to the start of notes.

Syntax: `\lyricsto` *voicename lyrics*

Properties:

`iterator-ctor` (procedure):
`ly:lyric-combine-music-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`length` (moment):
`#<Mom infinity>`

The endpoint of this music. This property is unhappily named in that it does not account for any initial grace notes: the full length of the music is `length` minus the start time. A value of `INF-MOMENT` indicates indefinite length.

`name` (symbol):
`'LyricCombineMusic`

Name of this music object.

`types` (list):
`'(lyric-combine-music)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.43 LyricEvent

A lyric syllable. Must be entered in lyrics mode, i.e., `\lyrics { twinkle4 twinkle4 }` .

Event classes: `lyric-event` (page 49), `music-event` (page 50), `rhythmic-event` (page 51), and `StreamEvent` (page 53).

Accepted by: `Lyric_engraver` (page 303), and `Lyric_performer` (page 303).

Properties:

`iterator-ctor` (procedure):
`ly:rhythmic-music-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'LyricEvent`

Name of this music object.

`types` (list):
`'(rhythmic-event lyric-event event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.44 MarkEvent

Insert a rehearsal mark.

Syntax: `\mark` *marker*

Example: `\mark "A"`

Event classes: `mark-event` (page 49), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Mark_engraver` (page 303).

Properties:

`name` (symbol):
`'MarkEvent`

Name of this music object.

`types` (list):
`'(mark-event event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.45 MeasureCounterEvent

Used to signal the start and end of a measure count.

Event classes: `measure-counter-event` (page 49), `music-event` (page 50), `span-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Measure_counter_engraver` (page 304).

Properties:

`name` (symbol):
```
'MeasureCounterEvent
```
Name of this music object.

`types` (list):
```
'(measure-counter-event span-event event)
```
The types of this music object; determines by what engraver this music expression is processed.

1.1.46 MeasureSpannerEvent

Used to signal the start and end of a measure spanner.

Event classes: `measure-spanner-event` (page 49), `music-event` (page 50), `span-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Measure_spanner_engraver` (page 304).

Properties:

`name` (symbol):
```
'MeasureSpannerEvent
```
Name of this music object.

`types` (list):
```
'(measure-spanner-event span-event event)
```
The types of this music object; determines by what engraver this music expression is processed.

1.1.47 MultiMeasureArticulationEvent

Articulations on multi-measure rests.

Event classes: `multi-measure-articulation-event` (page 49), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Multi_measure_rest_engraver` (page 306).

Properties:

`name` (symbol):
```
'MultiMeasureArticulationEvent
```
Name of this music object.

`types` (list):
```
'(post-event
   event
   multi-measure-articulation-event)
```
The types of this music object; determines by what engraver this music expression is processed.

1.1.48 MultiMeasureRestEvent

Used internally by `MultiMeasureRestMusic` to signal rests.

Event classes: `multi-measure-rest-event` (page 49), `music-event` (page 50), `rhythmic-event` (page 51), and `StreamEvent` (page 53).

Accepted by: `Multi_measure_rest_engraver` (page 306).

Properties:

`iterator-ctor` (procedure):
`ly:rhythmic-music-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'MultiMeasureRestEvent`

Name of this music object.

`types` (list):
`'(event rhythmic-event multi-measure-rest-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.49 MultiMeasureRestMusic

Rests that may be compressed into multi-measure rests.

Syntax: `R2.*4` for 4 measures in 3/4 time.

Properties:

`elements-callback` (procedure):
`mm-rest-child-list`

Return a list of children, for use by a sequential iterator. Takes a single music parameter.

`iterator-ctor` (procedure):
`ly:sequential-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'MultiMeasureRestMusic`

Name of this music object.

`types` (list):
`'(multi-measure-rest)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.50 MultiMeasureTextEvent

Texts on multi-measure rests.

Syntax: `R-\markup { \roman "bla" }`

Note the explicit font switch.

Event classes: `multi-measure-text-event` (page 50), `music-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Multi_measure_rest_engraver` (page 306).

Properties:

`name` (symbol):
`'MultiMeasureTextEvent`

Name of this music object.

`types` (list):
`'(post-event event multi-measure-text-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.51 `Music`

Generic type for music expressions.

Properties:

`name` (symbol):
`'Music`

Name of this music object.

`types` (list):
`'()`

The types of this music object; determines by what engraver this music expression is processed.

1.1.52 `NoteEvent`

A note.

Outside of chords, any events in `articulations` with a listener are broadcast like chord articulations, the others are retained.

For iteration inside of chords, See Section 1.1.27 [`EventChord`], page 11.

Event classes: `melodic-event` (page 49), `music-event` (page 50), `note-event` (page 50), `rhythmic-event` (page 51), and `StreamEvent` (page 53).

Accepted by: `Bend_spanner_engraver` (page 285), `Chord_name_engraver` (page 286), `Completion_heads_engraver` (page 288), `Drum_note_performer` (page 292), `Drum_notes_engraver` (page 292), `Finger_glide_engraver` (page 295), `Fretboard_engraver` (page 296), `Note_heads_engraver` (page 308), `Note_name_engraver` (page 308), `Note_performer` (page 308), `Part_combine_engraver` (page 310), `Phrasing_slur_engraver` (page 311), `Slur_engraver` (page 317), and `Tab_note_heads_engraver` (page 320).

Properties:

`iterator-ctor` (procedure):
`ly:rhythmic-music-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'NoteEvent`

Name of this music object.

`types` (list):
`'(event note-event rhythmic-event melodic-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.53 NoteGroupingEvent

Start or stop grouping brackets.

Event classes: `music-event` (page 50), `note-grouping-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Horizontal_bracket_engraver` (page 299).

Properties:

`name` (symbol):
`'NoteGroupingEvent`

Name of this music object.

`types` (list):
`'(post-event event note-grouping-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.54 OttavaMusic

Start or stop an ottava bracket.

Properties:

`elements-callback` (procedure):
`make-ottava-set`

Return a list of children, for use by a sequential iterator. Takes a single music parameter.

`iterator-ctor` (procedure):
`ly:sequential-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'OttavaMusic`

Name of this music object.

`types` (list):
`'(ottava-music)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.55 OverrideProperty

Extend the definition of a graphical object.

Syntax: `\override` [*context* `.`] *object property* `=` *value*

Properties:

`iterator-ctor` (procedure):
`ly:push-property-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'OverrideProperty`

Name of this music object.

`types` (list):
`'(layout-instruction-event override-property-event)`
The types of this music object; determines by what engraver this music expression is processed.

`untransposable` (boolean):
`#t`
If set, this music is not transposed.

1.1.56 PageBreakEvent

Allow, forbid or force a page break.

Event classes: `break-event` (page 47), `music-event` (page 50), `page-break-event` (page 50), and `StreamEvent` (page 53).

Accepted by: `Page_turn_engraver` (page 309), and `Paper_column_engraver` (page 310).

Properties:

`name` (symbol):
`'PageBreakEvent`
Name of this music object.

`types` (list):
`'(break-event page-break-event event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.57 PageTurnEvent

Allow, forbid or force a page turn.

Event classes: `break-event` (page 47), `music-event` (page 50), `page-turn-event` (page 51), and `StreamEvent` (page 53).

Accepted by: `Page_turn_engraver` (page 309), and `Paper_column_engraver` (page 310).

Properties:

`name` (symbol):
`'PageTurnEvent`
Name of this music object.

`types` (list):
`'(break-event page-turn-event event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.58 PartCombineMusic

Combine two parts on a staff, either merged or as separate voices.

Properties:

`iterator-ctor` (procedure):
`ly:part-combine-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:music-sequence::maximum-length-callback`
How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'PartCombineMusic`

Name of this music object.

`start-callback` (procedure):
`ly:music-sequence::minimum-start-callback`

Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):
`'(part-combine-music)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.59 PartCombinePartMusic

A part to be combined with other parts on a staff.

Properties:

`iterator-ctor` (procedure):
`ly:part-combine-part-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:music-wrapper::length-callback`

How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'PartCombinePartMusic`

Name of this music object.

`start-callback` (procedure):
`ly:music-wrapper::start-callback`

Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):
`'(part-combine-part-music music-wrapper-music)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.60 PartialSet

Create an anacrusis or upbeat (partial measure).

Properties:

`iterator-ctor` (procedure):
`ly:partial-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:music-sequence::cumulative-length-callback`

How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'PartialSet`

Name of this music object.

`types` (list):
`'(partial-set)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.61 PercentEvent

Used internally to signal percent repeats.

Event classes: `music-event` (page 50), `percent-event` (page 51), and `StreamEvent` (page 53).

Accepted by: `Percent_repeat_engraver` (page 311).

Properties:

`name` (symbol):
`'PercentEvent`

Name of this music object.

`types` (list):
`'(event percent-event rhythmic-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.62 PercentRepeatedMusic

Repeats encoded by percents and slashes.

Properties:

`elements-callback` (procedure):
`make-percent-set`

Return a list of children, for use by a sequential iterator. Takes a single music parameter.

`iterator-ctor` (procedure):
`ly:percent-repeat-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:calculated-sequential-music::length`

How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'PercentRepeatedMusic`

Name of this music object.

`start-callback` (procedure):
`ly:calculated-sequential-music::start`

Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):

`'(repeated-music percent-repeated-music)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.63 PesOrFlexaEvent

Within a ligature, mark the previous and the following note to form a pes (if melody goes up) or a flexa (if melody goes down).

Event classes: `music-event` (page 50), `pes-or-flexa-event` (page 51), and `StreamEvent` (page 53).

Accepted by: `Vaticana_ligature_engraver` (page 325).

Properties:

`name` (symbol):

`'PesOrFlexaEvent`

Name of this music object.

`types` (list):

`'(pes-or-flexa-event event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.64 PhrasingSlurEvent

Start or end phrasing slur.

Syntax: *note*`\(` and *note*`\)`

Event classes: `music-event` (page 50), `phrasing-slur-event` (page 51), `span-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Phrasing_slur_engraver` (page 311).

Properties:

`name` (symbol):

`'PhrasingSlurEvent`

Name of this music object.

`types` (list):

`'(post-event span-event event phrasing-slur-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.65 PostEvents

Container for several postevents.

This can be used to package several events into a single one. Should not be seen outside of the parser.

Properties:

`name` (symbol):

`'PostEvents`

Name of this music object.

`types` (list):

`'(post-event post-event-wrapper)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.66 PropertySet

Set a context property.

Syntax: `\set` *`context.prop`* `=` *`scheme-val`*

Properties:

`iterator-ctor` (procedure):
`ly:property-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'PropertySet`
Name of this music object.

`types` (list):
`'(layout-instruction-event)`
The types of this music object; determines by what engraver this music expression is processed.

`untransposable` (boolean):
`#t`
If set, this music is not transposed.

1.1.67 PropertyUnset

Restore the default setting for a context property. See Section 1.1.66 [PropertySet], page 26.

Syntax: `\unset` *`context.prop`*

Properties:

`iterator-ctor` (procedure):
`ly:property-unset-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'PropertyUnset`
Name of this music object.

`types` (list):
`'(layout-instruction-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.68 QuoteMusic

Quote preprocessed snippets of music.

Properties:

`iterator-ctor` (procedure):
`ly:music-wrapper-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:music-wrapper::length-callback`
How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'QuoteMusic`
Name of this music object.

`start-callback` (procedure):
`ly:music-wrapper::start-callback`
Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):
`'(music-wrapper-music)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.69 `RelativeOctaveCheck`

Check if a pitch is in the correct octave.

Properties:

`name` (symbol):
`'RelativeOctaveCheck`
Name of this music object.

`to-relative-callback` (procedure):
`ly:relative-octave-check::relative-callback`
How to transform a piece of music to relative pitches.

`types` (list):
`'(relative-octave-check)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.70 `RelativeOctaveMusic`

Music in which the assignment of octaves is complete.

Properties:

`iterator-ctor` (procedure):
`ly:music-wrapper-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:music-wrapper::length-callback`
How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'RelativeOctaveMusic`
Name of this music object.

`start-callback` (procedure):
`ly:music-wrapper::start-callback`
Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`to-relative-callback` (procedure):
`ly:relative-octave-music::relative-callback`
How to transform a piece of music to relative pitches.

`types` (list):
`'(music-wrapper-music relative-octave-music)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.71 RepeatSlashEvent

Used internally to signal beat repeats.

Event classes: `music-event` (page 50), `repeat-slash-event` (page 51), `rhythmic-event` (page 51), and `StreamEvent` (page 53).

Accepted by: `Slash_repeat_engraver` (page 316).

Properties:

`name` (symbol):
`'RepeatSlashEvent`
Name of this music object.

`types` (list):
`'(event repeat-slash-event rhythmic-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.72 RepeatTieEvent

Ties for starting a second volta bracket.

Event classes: `music-event` (page 50), `repeat-tie-event` (page 51), and `StreamEvent` (page 53).

Accepted by: `Repeat_tie_engraver` (page 314).

Properties:

`name` (symbol):
`'RepeatTieEvent`
Name of this music object.

`types` (list):
`'(post-event event repeat-tie-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.73 RestEvent

A Rest.

Syntax: `r4` for a quarter rest.

Event classes: `music-event` (page 50), `rest-event` (page 51), `rhythmic-event` (page 51), and `StreamEvent` (page 53).

Accepted by: `Chord_name_engraver` (page 286), `Completion_rest_engraver` (page 289), `Figured_bass_engraver` (page 294), and `Rest_engraver` (page 315).

Properties:

`iterator-ctor` (procedure):
`ly:rhythmic-music-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'RestEvent`
Name of this music object.

`types` (list):
`'(event rhythmic-event rest-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.74 RevertProperty

The opposite of Section 1.1.55 [OverrideProperty], page 21: remove a previously added property from a graphical object definition.

Properties:

`iterator-ctor` (procedure):
`ly:pop-property-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'RevertProperty`
Name of this music object.

`types` (list):
`'(layout-instruction-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.75 ScriptEvent

Add an articulation mark to a note.

Event classes: `music-event` (page 50), `script-event` (page 52), and `StreamEvent` (page 53).

Not accepted by any engraver or performer.

Properties:

`name` (symbol):
`'ScriptEvent`
Name of this music object.

`types` (list):
`'(event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.76 SectionEvent

Add a section division, which is typically written as a thin double bar line.

Event classes: `music-event` (page 50), `section-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Repeat_acknowledge_engraver` (page 313).

Properties:

`name` (symbol):
`'SectionEvent`
Name of this music object.

`types` (list):
`'(section-event event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.77 SegnoEvent

Add a segno mark or bar line.

Event classes: `music-event` (page 50), `segno-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Repeat_acknowledge_engraver` (page 313).

Properties:

`name` (symbol):
`'SegnoEvent`
Name of this music object.

`types` (list):
`'(segno-event event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.78 SequentialAlternativeMusic

Repeat alternatives in sequence.

Syntax: `\alternative { alternatives }`

Properties:

`elements-callback` (procedure):
`#<procedure #f (m)>`
Return a list of children, for use by a sequential iterator. Takes a single music parameter.

`iterator-ctor` (procedure):
`ly:alternative-sequence-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:music-sequence::cumulative-length-callback`
How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'SequentialAlternativeMusic`
Name of this music object.

`start-callback` (procedure):
`ly:music-sequence::first-start-callback`
Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):
`'(sequential-music sequential-alternative-music)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.79 SequentialMusic

Music expressions concatenated.

Syntax: `\sequential { ... }` or simply `{ ... }`

Properties:

`elements-callback` (procedure):
`#<procedure #f (m)>`
Return a list of children, for use by a sequential iterator. Takes a single music parameter.

`iterator-ctor` (procedure):
`ly:sequential-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:music-sequence::cumulative-length-callback`
How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'SequentialMusic`
Name of this music object.

`start-callback` (procedure):
`ly:music-sequence::first-start-callback`
Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):
`'(sequential-music)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.80 SimultaneousMusic

Music playing together.

Syntax: `\simultaneous { ... }` or `<< ... >>`

Properties:

`iterator-ctor` (procedure):
`ly:simultaneous-music-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:music-sequence::maximum-length-callback`
How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'SimultaneousMusic`
Name of this music object.

`start-callback` (procedure):
`ly:music-sequence::minimum-start-callback`
Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`to-relative-callback` (procedure):
`ly:music-sequence::simultaneous-relative-callback`
How to transform a piece of music to relative pitches.

`types` (list):
`'(simultaneous-music)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.81 SkipEvent

Filler that takes up duration, but does not print anything.

Syntax: `s4` for a skip equivalent to a quarter rest.

Event classes: `music-event` (page 50), `rhythmic-event` (page 51), `skip-event` (page 52), and `StreamEvent` (page 53).

Not accepted by any engraver or performer.

Properties:

`iterator-ctor` (procedure):
`ly:rhythmic-music-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'SkipEvent`
Name of this music object.

`types` (list):
`'(event rhythmic-event skip-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.82 SkipMusic

Filler that takes up duration, does not print anything, and also does not create staves or voices implicitly.

Syntax: `\skip` *duration*

Properties:

`iterator-ctor` (procedure):
`ly:simple-music-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:music-duration-length`
How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'SkipMusic`
Name of this music object.

`types` (list):
`'(event skip-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.83 SlurEvent

Start or end slur.

Syntax: *note*`(` and *note*`)`

Event classes: `music-event` (page 50), `slur-event` (page 52), `span-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Slur_engraver` (page 317), and `Slur_performer` (page 317).

Properties:

`name` (symbol):
`'SlurEvent`
Name of this music object.

`types` (list):
`'(post-event span-event event slur-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.84 SoloOneEvent

Print 'Solo 1'.

Event classes: `music-event` (page 50), `part-combine-event` (page 51), `solo-one-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Part_combine_engraver` (page 310).

Properties:

`name` (symbol):
`'SoloOneEvent`
Name of this music object.

`part-combine-status` (symbol):
`'solo1`
Change to what kind of state? Options are `solo1`, `solo2` and `unisono`.

`types` (list):
`'(event part-combine-event solo-one-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.85 SoloTwoEvent

Print 'Solo 2'.

Event classes: `music-event` (page 50), `part-combine-event` (page 51), `solo-two-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Part_combine_engraver` (page 310).

Properties:

`name` (symbol):
`'SoloTwoEvent`
Name of this music object.

`part-combine-status` (symbol):
`'solo2`
Change to what kind of state? Options are `solo1`, `solo2` and `unisono`.

`types` (list):
`'(event part-combine-event solo-two-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.86 SostenutoEvent

Depress or release sostenuto pedal.

Event classes: `music-event` (page 50), `pedal-event` (page 51), `sostenuto-event` (page 52), `span-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Piano_pedal_engraver` (page 312), and `Piano_pedal_performer` (page 312).

Properties:

`name` (symbol):
`'SostenutoEvent`
Name of this music object.

`types` (list):
`'(post-event event pedal-event sostenuto-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.87 SpacingSectionEvent

Start a new spacing section.

Event classes: `music-event` (page 50), `spacing-section-event` (page 52), and `StreamEvent` (page 53).

Accepted by: `Spacing_engraver` (page 317).

Properties:

`name` (symbol):
`'SpacingSectionEvent`
Name of this music object.

`types` (list):
`'(event spacing-section-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.88 SpanEvent

Event for anything that is started at a different time than stopped.

Event classes: `music-event` (page 50), `span-event` (page 52), and `StreamEvent` (page 53).

Not accepted by any engraver or performer.

Properties:

`name` (symbol):
`'SpanEvent`
Name of this music object.

`types` (list):
`'(event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.89 StaffSpanEvent

Start or stop a staff symbol.

Event classes: music-event (page 50), span-event (page 52), staff-span-event (page 53), and StreamEvent (page 53).

Accepted by: Staff_symbol_engraver (page 319).

Properties:

name (symbol):
'StaffSpanEvent
Name of this music object.

types (list):
'(event span-event staff-span-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.90 StringNumberEvent

Specify on which string to play this note.

Syntax: *number*

Event classes: music-event (page 50), StreamEvent (page 53), and string-number-event (page 53).

Accepted by: Bend_spanner_engraver (page 285), Fretboard_engraver (page 296), and Tab_note_heads_engraver (page 320).

Properties:

name (symbol):
'StringNumberEvent
Name of this music object.

types (list):
'(post-event string-number-event event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.91 StrokeFingerEvent

Specify with which finger to pluck a string.

Syntax: \rightHandFinger *text*

Event classes: music-event (page 50), StreamEvent (page 53), and stroke-finger-event (page 53).

Not accepted by any engraver or performer.

Properties:

name (symbol):
'StrokeFingerEvent
Name of this music object.

types (list):
'(post-event stroke-finger-event event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.92 SustainEvent

Depress or release sustain pedal.

Event classes: `music-event` (page 50), `pedal-event` (page 51), `span-event` (page 52), `StreamEvent` (page 53), and `sustain-event` (page 54).

Accepted by: `Piano_pedal_engraver` (page 312), and `Piano_pedal_performer` (page 312).

Properties:

`name` (symbol):
`'SustainEvent`

Name of this music object.

`types` (list):
`'(post-event event pedal-event sustain-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.93 TempoChangeEvent

A metronome mark or tempo indication.

Event classes: `music-event` (page 50), `StreamEvent` (page 53), and `tempo-change-event` (page 54).

Accepted by: `Metronome_mark_engraver` (page 305).

Properties:

`name` (symbol):
`'TempoChangeEvent`

Name of this music object.

`types` (list):
`'(event tempo-change-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.94 TextScriptEvent

Print text.

Event classes: `music-event` (page 50), `script-event` (page 52), `StreamEvent` (page 53), and `text-script-event` (page 54).

Accepted by: `Text_engraver` (page 321).

Properties:

`name` (symbol):
`'TextScriptEvent`

Name of this music object.

`types` (list):
`'(post-event script-event text-script-event event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.95 TextSpanEvent

Start a text spanner, for example, an octavation.

Event classes: music-event (page 50), span-event (page 52), StreamEvent (page 53), and text-span-event (page 54).

Accepted by: Text_spanner_engraver (page 322).

Properties:

name (symbol):
'TextSpanEvent

Name of this music object.

types (list):
'(post-event span-event event text-span-event)

The types of this music object; determines by what engraver this music expression is processed.

1.1.96 TieEvent

A tie.

Syntax: *note*-~

Event classes: music-event (page 50), StreamEvent (page 53), and tie-event (page 54).

Accepted by: Note_performer (page 308), Tie_engraver (page 322), and Tie_performer (page 322).

Properties:

name (symbol):
'TieEvent

Name of this music object.

types (list):
'(post-event tie-event event)

The types of this music object; determines by what engraver this music expression is processed.

1.1.97 TimeScaledMusic

Multiply durations, as in tuplets.

Syntax: \times *fraction music*, e.g., \times 2/3 { ... } for triplets.

Properties:

iterator-ctor (procedure):
ly:tuplet-iterator::constructor

Function to construct a music-event-iterator object for this music.

length-callback (procedure):
ly:music-wrapper::length-callback

How to compute the duration of this music. This property can only be defined as initializer in scm/define-music-types.scm.

name (symbol):
'TimeScaledMusic

Name of this music object.

`start-callback` (procedure):
`ly:music-wrapper::start-callback`
Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):
`'(time-scaled-music)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.98 TimeSignatureEvent

An event created when setting a new time signature

Event classes: `music-event` (page 50), `StreamEvent` (page 53), and `time-signature-event` (page 54).

Accepted by: `Time_signature_engraver` (page 323).

Properties:

`name` (symbol):
`'TimeSignatureEvent`
Name of this music object.

`types` (list):
`'(event time-signature-event)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.99 TimeSignatureMusic

Set a new time signature

Properties:

`elements-callback` (procedure):
`make-time-signature-set`
Return a list of children, for use by a sequential iterator. Takes a single music parameter.

`iterator-ctor` (procedure):
`ly:sequential-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`name` (symbol):
`'TimeSignatureMusic`
Name of this music object.

`types` (list):
`'(time-signature-music)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.100 TransposedMusic

Music that has been transposed.

Properties:

`iterator-ctor` (procedure):
`ly:music-wrapper-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:music-wrapper::length-callback`

How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'TransposedMusic`

Name of this music object.

`start-callback` (procedure):
`ly:music-wrapper::start-callback`

Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`to-relative-callback` (procedure):
`ly:relative-octave-music::no-relative-callback`

How to transform a piece of music to relative pitches.

`types` (list):
`'(music-wrapper-music transposed-music)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.101 TremoloEvent

Unmeasured tremolo.

Event classes: `music-event` (page 50), `StreamEvent` (page 53), and `tremolo-event` (page 54).

Accepted by: `Stem_engraver` (page 319).

Properties:

`name` (symbol):
`'TremoloEvent`

Name of this music object.

`types` (list):
`'(post-event event tremolo-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.102 TremoloRepeatedMusic

Repeated notes denoted by tremolo beams.

Properties:

`elements-callback` (procedure):
`make-tremolo-set`

Return a list of children, for use by a sequential iterator. Takes a single music parameter.

`iterator-ctor` (procedure):
`ly:sequential-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:calculated-sequential-music::length`

How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'TremoloRepeatedMusic`

Name of this music object.

`start-callback` (procedure):
`ly:calculated-sequential-music::start`

Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):
`'(repeated-music tremolo-repeated-music)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.103 TremoloSpanEvent

Tremolo over two stems.

Event classes: `music-event` (page 50), `span-event` (page 52), `StreamEvent` (page 53), and `tremolo-span-event` (page 54).

Accepted by: `Chord_tremolo_engraver` (page 287).

Properties:

`name` (symbol):
`'TremoloSpanEvent`

Name of this music object.

`types` (list):
`'(event span-event tremolo-span-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.104 TrillSpanEvent

Start a trill spanner.

Event classes: `music-event` (page 50), `span-event` (page 52), `StreamEvent` (page 53), and `trill-span-event` (page 54).

Accepted by: `Trill_spanner_engraver` (page 324).

Properties:

`name` (symbol):
`'TrillSpanEvent`

Name of this music object.

`types` (list):
`'(post-event span-event event trill-span-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.105 TupletSpanEvent

Used internally to signal where tuplet brackets start and stop.

Event classes: music-event (page 50), span-event (page 52), StreamEvent (page 53), and tuplet-span-event (page 54).

Accepted by: Stem_engraver (page 319), and Tuplet_engraver (page 325).

Properties:

name (symbol):
'TupletSpanEvent

Name of this music object.

types (list):
'(tuplet-span-event span-event event post-event)

The types of this music object; determines by what engraver this music expression is processed.

1.1.106 UnaCordaEvent

Depress or release una-corda pedal.

Event classes: music-event (page 50), pedal-event (page 51), span-event (page 52), StreamEvent (page 53), and una-corda-event (page 54).

Accepted by: Piano_pedal_engraver (page 312), and Piano_pedal_performer (page 312).

Properties:

name (symbol):
'UnaCordaEvent

Name of this music object.

types (list):
'(post-event event pedal-event una-corda-event)

The types of this music object; determines by what engraver this music expression is processed.

1.1.107 UnfoldedRepeatedMusic

Repeated music which is fully written (and played) out.

Properties:

elements-callback (procedure):
make-unfolded-set

Return a list of children, for use by a sequential iterator. Takes a single music parameter.

iterator-ctor (procedure):
ly:sequential-iterator::constructor

Function to construct a music-event-iterator object for this music.

length-callback (procedure):
ly:calculated-sequential-music::length

How to compute the duration of this music. This property can only be defined as initializer in scm/define-music-types.scm.

`name` (symbol):
`'UnfoldedRepeatedMusic`

Name of this music object.

`start-callback` (procedure):
`ly:calculated-sequential-music::start`

Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):
`'(repeated-music unfolded-repeated-music)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.108 UnfoldedSpeccedMusic

Music that appears once repeated music is unfolded.

Properties:

`iterator-ctor` (procedure):
`ly:music-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`length` (moment):
`#<Mom 0>`

The endpoint of this music. This property is unhappily named in that it does not account for any initial grace notes: the full length of the music is `length` minus the start time. A value of `INF-MOMENT` indicates indefinite length.

`name` (symbol):
`'UnfoldedSpeccedMusic`

Name of this music object.

`types` (list):
`'(unfolded-specification music-wrapper-music)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.109 UnisonoEvent

Print 'a 2'.

Event classes: `music-event` (page 50), `part-combine-event` (page 51), `StreamEvent` (page 53), and `unisono-event` (page 55).

Accepted by: `Part_combine_engraver` (page 310).

Properties:

`name` (symbol):
`'UnisonoEvent`

Name of this music object.

`part-combine-status` (symbol):
`'unisono`

Change to what kind of state? Options are `solo1`, `solo2` and `unisono`.

`types` (list):
`'(event part-combine-event unisono-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.110 UnrelativableMusic

Music that cannot be converted from relative to absolute notation. For example, transposed music.

Properties:

`iterator-ctor` (procedure):
`ly:music-wrapper-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:music-wrapper::length-callback`

How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'UnrelativableMusic`

Name of this music object.

`start-callback` (procedure):
`ly:music-wrapper::start-callback`

Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`to-relative-callback` (procedure):
`ly:relative-octave-music::no-relative-callback`

How to transform a piece of music to relative pitches.

`types` (list):
`'(music-wrapper-music unrelativable-music)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.111 VoiceSeparator

Separate polyphonic voices in simultaneous music.

Syntax: `\\`

Properties:

`name` (symbol):
`'VoiceSeparator`

Name of this music object.

`types` (list):
`'(separator)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.112 VoltaRepeatedMusic

Repeats with alternatives placed sequentially.

Properties:

`elements-callback` (procedure):
`make-volta-set`

Return a list of children, for use by a sequential iterator. Takes a single music parameter.

`folded-repeat-type` (symbol):
`'volta`

Type of folded repeat music.

`iterator-ctor` (procedure):
`ly:volta-repeat-iterator::constructor`

Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:calculated-sequential-music::length`

How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'VoltaRepeatedMusic`

Name of this music object.

`start-callback` (procedure):
`ly:calculated-sequential-music::start`

Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):
`'(repeated-music volta-repeated-music)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.113 VoltaSpanEvent

Used internally to signal where volta brackets start and stop.

Event classes: `music-event` (page 50), `span-event` (page 52), `StreamEvent` (page 53), and `volta-span-event` (page 55).

Accepted by: `Repeat_acknowledge_engraver` (page 313), and `Volta_engraver` (page 326).

Properties:

`name` (symbol):
`'VoltaSpanEvent`

Name of this music object.

`types` (list):
`'(volta-span-event span-event event post-event)`

The types of this music object; determines by what engraver this music expression is processed.

1.1.114 VoltaSpeccedMusic

Music for a specific volta within repeated music.

Properties:

`iterator-ctor` (procedure):
`ly:volta-specced-music-iterator::constructor`
Function to construct a `music-event-iterator` object for this music.

`length-callback` (procedure):
`ly:music-wrapper::length-callback`
How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`name` (symbol):
`'VoltaSpeccedMusic`
Name of this music object.

`start-callback` (procedure):
`ly:music-wrapper::start-callback`
Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`types` (list):
`'(volta-specification music-wrapper-music)`
The types of this music object; determines by what engraver this music expression is processed.

1.1.115 VowelTransitionEvent

A vowel transition between lyric syllables.

Event classes: `music-event` (page 50), `StreamEvent` (page 53), and `vowel-transition-event` (page 55).

Accepted by: `Hyphen_engraver` (page 300).

Properties:

`name` (symbol):
`'VowelTransitionEvent`
Name of this music object.

`types` (list):
`'(post-event vowel-transition-event event)`
The types of this music object; determines by what engraver this music expression is processed.

1.2 Music classes

1.2.1 absolute-dynamic-event

Music event type `absolute-dynamic-event` is in music objects of type `AbsoluteDynamicEvent` (page 2).

Accepted by: `Dynamic_engraver` (page 293), and `Dynamic_performer` (page 293).

1.2.2 alternative-event

Music event type `alternative-event` is in music objects of type `AlternativeEvent` (page 2).

Accepted by: `Timing_translator` (page 323).

1.2.3 annotate-output-event

Music event type `annotate-output-event` is in music objects of type `AnnotateOutputEvent` (page 2).

Accepted by: `Balloon_engraver` (page 283).

1.2.4 apply-output-event

Music event type `apply-output-event` is in music objects of type `ApplyOutputEvent` (page 3).

Accepted by: `Output_property_engraver` (page 309).

1.2.5 arpeggio-event

Music event type `arpeggio-event` is in music objects of type `ArpeggioEvent` (page 3).

Accepted by: `Arpeggio_engraver` (page 281).

1.2.6 articulation-event

Music event type `articulation-event` is in music objects of type `ArticulationEvent` (page 4).

Accepted by: `Note_performer` (page 308), and `Script_engraver` (page 315).

1.2.7 bass-figure-event

Music event type `bass-figure-event` is in music objects of type `BassFigureEvent` (page 5).

Accepted by: `Figured_bass_engraver` (page 294).

1.2.8 beam-event

Music event type `beam-event` is in music objects of type `BeamEvent` (page 5).

Accepted by: `Beam_engraver` (page 284), `Beam_performer` (page 285), and `Grace_beam_engraver` (page 298).

1.2.9 beam-forbid-event

Music event type `beam-forbid-event` is in music objects of type `BeamForbidEvent` (page 6).

Accepted by: `Auto_beam_engraver` (page 281), and `Grace_auto_beam_engraver` (page 297).

1.2.10 bend-after-event

Music event type `bend-after-event` is in music objects of type `BendAfterEvent` (page 6).

Accepted by: `Bend_engraver` (page 285).

1.2.11 bend-span-event

Music event type `bend-span-event` is in music objects of type `BendSpanEvent` (page 6).

Accepted by: `Bend_spanner_engraver` (page 285).

1.2.12 break-dynamic-span-event

Music event type `break-dynamic-span-event` is in music objects of type `BreakDynamicSpanEvent` (page 7).

Not accepted by any engraver or performer.

1.2.13 break-event

Music event type `break-event` is in music objects of type `LineBreakEvent` (page 16), `PageBreakEvent` (page 22), and `PageTurnEvent` (page 22).

Accepted by: `Page_turn_engraver` (page 309), and `Paper_column_engraver` (page 310).

1.2.14 break-span-event

Music event type `break-span-event` is in music objects of type `BreakDynamicSpanEvent` (page 7).

Accepted by: `Dynamic_engraver` (page 293).

1.2.15 breathing-event

Music event type `breathing-event` is in music objects of type `BreathingEvent` (page 7).

Accepted by: `Breathing_sign_engraver` (page 286), and `Note_performer` (page 308).

1.2.16 cluster-note-event

Music event type `cluster-note-event` is in music objects of type `ClusterNoteEvent` (page 7).

Accepted by: `Cluster_spanner_engraver` (page 288).

1.2.17 completize-extender-event

Music event type `completize-extender-event` is in music objects of type `CompletizeExtenderEvent` (page 8).

Accepted by: `Extender_engraver` (page 294).

1.2.18 crescendo-event

Music event type `crescendo-event` is in music objects of type `CrescendoEvent` (page 9).

Accepted by: `Dynamic_performer` (page 293).

1.2.19 decrescendo-event

Music event type `decrescendo-event` is in music objects of type `DecrescendoEvent` (page 9).

Accepted by: `Dynamic_performer` (page 293).

1.2.20 double-percent-event

Music event type `double-percent-event` is in music objects of type `DoublePercentEvent` (page 10).

Accepted by: `Double_percent_repeat_engraver` (page 291).

1.2.21 duration-line-event

Music event type `duration-line-event` is in music objects of type `DurationLineEvent` (page 10).

Accepted by: `Duration_line_engraver` (page 292).

1.2.22 dynamic-event

Music event type `dynamic-event` is in music objects of type `AbsoluteDynamicEvent` (page 2).

Not accepted by any engraver or performer.

1.2.23 episema-event

Music event type `episema-event` is in music objects of type `EpisemaEvent` (page 10).

Accepted by: `Episema_engraver` (page 294).

1.2.24 extender-event

Music event type `extender-event` is in music objects of type `ExtenderEvent` (page 11).

Accepted by: `Extender_engraver` (page 294).

1.2.25 fine-event

Music event type `fine-event` is in music objects of type `FineEvent` (page 12).

Accepted by: `Jump_engraver` (page 300), and `Repeat_acknowledge_engraver` (page 313).

1.2.26 finger-glide-event

Music event type `finger-glide-event` is in music objects of type `FingerGlideEvent` (page 12).

Not accepted by any engraver or performer.

1.2.27 fingering-event

Music event type `fingering-event` is in music objects of type `FingeringEvent` (page 13).

Accepted by: `Fingering_engraver` (page 295), `Fretboard_engraver` (page 296), and `Tab_note_heads_engraver` (page 320).

1.2.28 footnote-event

Music event type `footnote-event` is in music objects of type `FootnoteEvent` (page 13).

Not accepted by any engraver or performer.

1.2.29 glissando-event

Music event type `glissando-event` is in music objects of type `GlissandoEvent` (page 13).

Accepted by: `Glissando_engraver` (page 297).

1.2.30 harmonic-event

Music event type `harmonic-event` is in music objects of type `HarmonicEvent` (page 14).

Not accepted by any engraver or performer.

1.2.31 hyphen-event

Music event type `hyphen-event` is in music objects of type `HyphenEvent` (page 14).

Accepted by: `Hyphen_engraver` (page 300).

1.2.32 key-change-event

Music event type `key-change-event` is in music objects of type `KeyChangeEvent` (page 15).

Accepted by: `Key_engraver` (page 301), and `Key_performer` (page 302).

1.2.33 label-event

Music event type `label-event` is in music objects of type `LabelEvent` (page 15).

Accepted by: `Paper_column_engraver` (page 310).

1.2.34 laissez-vibrer-event

Music event type `laissez-vibrer-event` is in music objects of type `LaissezVibrerEvent` (page 15).

Accepted by: `Laissez_vibrer_engraver` (page 302).

1.2.35 layout-instruction-event

Music event type `layout-instruction-event` is in music objects of type `ApplyOutputEvent` (page 3).

Not accepted by any engraver or performer.

1.2.36 ligature-event

Music event type `ligature-event` is in music objects of type `LigatureEvent` (page 16).

Accepted by: `Kievan_ligature_engraver` (page 302), `Ligature_bracket_engraver` (page 303), `Mensural_ligature_engraver` (page 305), and `Vaticana_ligature_engraver` (page 325).

1.2.37 line-break-event

Music event type `line-break-event` is in music objects of type `LineBreakEvent` (page 16).

Not accepted by any engraver or performer.

1.2.38 lyric-event

Music event type `lyric-event` is in music objects of type `LyricEvent` (page 17).

Accepted by: `Lyric_engraver` (page 303), and `Lyric_performer` (page 303).

1.2.39 mark-event

Music event type `mark-event` is in music objects of type `MarkEvent` (page 17).

Accepted by: `Mark_engraver` (page 303).

1.2.40 measure-counter-event

Music event type `measure-counter-event` is in music objects of type `MeasureCounterEvent` (page 18).

Accepted by: `Measure_counter_engraver` (page 304).

1.2.41 measure-spanner-event

Music event type `measure-spanner-event` is in music objects of type `MeasureSpannerEvent` (page 18).

Accepted by: `Measure_spanner_engraver` (page 304).

1.2.42 melodic-event

Music event type `melodic-event` is in music objects of type `ClusterNoteEvent` (page 7), and `NoteEvent` (page 20).

Not accepted by any engraver or performer.

1.2.43 multi-measure-articulation-event

Music event type `multi-measure-articulation-event` is in music objects of type `MultiMeasureArticulationEvent` (page 18).

Accepted by: `Multi_measure_rest_engraver` (page 306).

1.2.44 multi-measure-rest-event

Music event type `multi-measure-rest-event` is in music objects of type `MultiMeasureRestEvent` (page 19).

Accepted by: `Multi_measure_rest_engraver` (page 306).

1.2.45 multi-measure-text-event

Music event type multi-measure-text-event is in music objects of type MultiMeasureTextEvent (page 19).

Accepted by: Multi_measure_rest_engraver (page 306).

1.2.46 music-event

Music event type music-event is in music objects of type AbsoluteDynamicEvent (page 2), AlternativeEvent (page 2), AnnotateOutputEvent (page 2), ApplyOutputEvent (page 3), ArpeggioEvent (page 3), ArticulationEvent (page 4), BassFigureEvent (page 5), BeamEvent (page 5), BeamForbidEvent (page 6), BendAfterEvent (page 6), BendSpanEvent (page 6), BreakDynamicSpanEvent (page 7), BreathingEvent (page 7), ClusterNoteEvent (page 7), CompletizeExtenderEvent (page 8), CrescendoEvent (page 9), DecrescendoEvent (page 9), DoublePercentEvent (page 10), DurationLineEvent (page 10), EpisemaEvent (page 10), ExtenderEvent (page 11), FineEvent (page 12), FingerGlideEvent (page 12), FingeringEvent (page 13), FootnoteEvent (page 13), GlissandoEvent (page 13), HarmonicEvent (page 14), HyphenEvent (page 14), KeyChangeEvent (page 15), LabelEvent (page 15), LaissezVibrerEvent (page 15), LigatureEvent (page 16), LineBreakEvent (page 16), LyricEvent (page 17), MarkEvent (page 17), MeasureCounterEvent (page 18), MeasureSpannerEvent (page 18), MultiMeasureArticulationEvent (page 18), MultiMeasureRestEvent (page 19), MultiMeasureTextEvent (page 19), NoteEvent (page 20), NoteGroupingEvent (page 21), PageBreakEvent (page 22), PageTurnEvent (page 22), PercentEvent (page 24), PesOrFlexaEvent (page 25), PhrasingSlurEvent (page 25), RepeatSlashEvent (page 28), RepeatTieEvent (page 28), RestEvent (page 28), ScriptEvent (page 29), SectionEvent (page 29), SegnoEvent (page 30), SkipEvent (page 32), SlurEvent (page 33), SoloOneEvent (page 33), SoloTwoEvent (page 33), SostenutoEvent (page 34), SpacingSectionEvent (page 34), SpanEvent (page 34), StaffSpanEvent (page 35), StringNumberEvent (page 35), StrokeFingerEvent (page 35), SustainEvent (page 36), TempoChangeEvent (page 36), TextScriptEvent (page 36), TextSpanEvent (page 37), TieEvent (page 37), TimeSignatureEvent (page 38), TremoloEvent (page 39), TremoloSpanEvent (page 40), TrillSpanEvent (page 40), TupletSpanEvent (page 41), UnaCordaEvent (page 41), UnisonoEvent (page 42), VoltaSpanEvent (page 44), and VowelTransitionEvent (page 45).

Not accepted by any engraver or performer.

1.2.47 note-event

Music event type note-event is in music objects of type NoteEvent (page 20).

Accepted by: Bend_spanner_engraver (page 285), Chord_name_engraver (page 286), Completion_heads_engraver (page 288), Drum_note_performer (page 292), Drum_notes_engraver (page 292), Finger_glide_engraver (page 295), Fretboard_engraver (page 296), Note_heads_engraver (page 308), Note_name_engraver (page 308), Note_performer (page 308), Part_combine_engraver (page 310), Phrasing_slur_engraver (page 311), Slur_engraver (page 317), and Tab_note_heads_engraver (page 320).

1.2.48 note-grouping-event

Music event type note-grouping-event is in music objects of type NoteGroupingEvent (page 21).

Accepted by: Horizontal_bracket_engraver (page 299).

1.2.49 page-break-event

Music event type page-break-event is in music objects of type PageBreakEvent (page 22).

Not accepted by any engraver or performer.

1.2.50 page-turn-event

Music event type `page-turn-event` is in music objects of type `PageTurnEvent` (page 22).

Not accepted by any engraver or performer.

1.2.51 part-combine-event

Music event type `part-combine-event` is in music objects of type `SoloOneEvent` (page 33), `SoloTwoEvent` (page 33), and `UnisonoEvent` (page 42).

Accepted by: `Part_combine_engraver` (page 310).

1.2.52 pedal-event

Music event type `pedal-event` is in music objects of type `SostenutoEvent` (page 34), `SustainEvent` (page 36), and `UnaCordaEvent` (page 41).

Not accepted by any engraver or performer.

1.2.53 percent-event

Music event type `percent-event` is in music objects of type `PercentEvent` (page 24).

Accepted by: `Percent_repeat_engraver` (page 311).

1.2.54 pes-or-flexa-event

Music event type `pes-or-flexa-event` is in music objects of type `PesOrFlexaEvent` (page 25).

Accepted by: `Vaticana_ligature_engraver` (page 325).

1.2.55 phrasing-slur-event

Music event type `phrasing-slur-event` is in music objects of type `PhrasingSlurEvent` (page 25).

Accepted by: `Phrasing_slur_engraver` (page 311).

1.2.56 repeat-slash-event

Music event type `repeat-slash-event` is in music objects of type `RepeatSlashEvent` (page 28).

Accepted by: `Slash_repeat_engraver` (page 316).

1.2.57 repeat-tie-event

Music event type `repeat-tie-event` is in music objects of type `RepeatTieEvent` (page 28).

Accepted by: `Repeat_tie_engraver` (page 314).

1.2.58 rest-event

Music event type `rest-event` is in music objects of type `RestEvent` (page 28).

Accepted by: `Chord_name_engraver` (page 286), `Completion_rest_engraver` (page 289), `Figured_bass_engraver` (page 294), and `Rest_engraver` (page 315).

1.2.59 rhythmic-event

Music event type `rhythmic-event` is in music objects of type `BassFigureEvent` (page 5), `ClusterNoteEvent` (page 7), `DoublePercentEvent` (page 10), `LyricEvent` (page 17), `MultiMeasureRestEvent` (page 19), `NoteEvent` (page 20), `RepeatSlashEvent` (page 28), `RestEvent` (page 28), and `SkipEvent` (page 32).

Not accepted by any engraver or performer.

1.2.60 script-event

Music event type `script-event` is in music objects of type `ArticulationEvent` (page 4), `ScriptEvent` (page 29), and `TextScriptEvent` (page 36).

Not accepted by any engraver or performer.

1.2.61 section-event

Music event type `section-event` is in music objects of type `SectionEvent` (page 29).

Accepted by: `Repeat_acknowledge_engraver` (page 313).

1.2.62 segno-event

Music event type `segno-event` is in music objects of type `SegnoEvent` (page 30).

Accepted by: `Repeat_acknowledge_engraver` (page 313).

1.2.63 skip-event

Music event type `skip-event` is in music objects of type `SkipEvent` (page 32).

Not accepted by any engraver or performer.

1.2.64 slur-event

Music event type `slur-event` is in music objects of type `SlurEvent` (page 33).

Accepted by: `Slur_engraver` (page 317), and `Slur_performer` (page 317).

1.2.65 solo-one-event

Music event type `solo-one-event` is in music objects of type `SoloOneEvent` (page 33).

Not accepted by any engraver or performer.

1.2.66 solo-two-event

Music event type `solo-two-event` is in music objects of type `SoloTwoEvent` (page 33).

Not accepted by any engraver or performer.

1.2.67 sostenuto-event

Music event type `sostenuto-event` is in music objects of type `SostenutoEvent` (page 34).

Accepted by: `Piano_pedal_engraver` (page 312), and `Piano_pedal_performer` (page 312).

1.2.68 spacing-section-event

Music event type `spacing-section-event` is in music objects of type `SpacingSectionEvent` (page 34).

Accepted by: `Spacing_engraver` (page 317).

1.2.69 span-dynamic-event

Music event type `span-dynamic-event` is in music objects of type `CrescendoEvent` (page 9), and `DecrescendoEvent` (page 9).

Accepted by: `Dynamic_engraver` (page 293).

1.2.70 span-event

Music event type `span-event` is in music objects of type `BeamEvent` (page 5), `BendSpanEvent` (page 6), `CrescendoEvent` (page 9), `DecrescendoEvent` (page 9), `EpisemaEvent` (page 10), `FingerGlideEvent` (page 12), `LigatureEvent` (page 16), `MeasureCounterEvent` (page 18),

MeasureSpannerEvent (page 18), PhrasingSlurEvent (page 25), SlurEvent (page 33), SostenutoEvent (page 34), SpanEvent (page 34), StaffSpanEvent (page 35), SustainEvent (page 36), TextSpanEvent (page 37), TremoloSpanEvent (page 40), TrillSpanEvent (page 40), TupletSpanEvent (page 41), UnaCordaEvent (page 41), and VoltaSpanEvent (page 44).

Not accepted by any engraver or performer.

1.2.71 staff-span-event

Music event type staff-span-event is in music objects of type StaffSpanEvent (page 35).

Accepted by: Staff_symbol_engraver (page 319).

1.2.72 StreamEvent

Music event type StreamEvent is in music objects of type AbsoluteDynamicEvent (page 2), AlternativeEvent (page 2), AnnotateOutputEvent (page 2), ApplyOutputEvent (page 3), ArpeggioEvent (page 3), ArticulationEvent (page 4), BassFigureEvent (page 5), BeamEvent (page 5), BeamForbidEvent (page 6), BendAfterEvent (page 6), BendSpanEvent (page 6), BreakDynamicSpanEvent (page 7), BreathingEvent (page 7), ClusterNoteEvent (page 7), CompletizeExtenderEvent (page 8), CrescendoEvent (page 9), DecrescendoEvent (page 9), DoublePercentEvent (page 10), DurationLineEvent (page 10), EpisemaEvent (page 10), ExtenderEvent (page 11), FineEvent (page 12), FingerGlideEvent (page 12), FingeringEvent (page 13), FootnoteEvent (page 13), GlissandoEvent (page 13), HarmonicEvent (page 14), HyphenEvent (page 14), KeyChangeEvent (page 15), LabelEvent (page 15), LaissezVibrerEvent (page 15), LigatureEvent (page 16), LineBreakEvent (page 16), LyricEvent (page 17), MarkEvent (page 17), MeasureCounterEvent (page 18), MeasureSpannerEvent (page 18), MultiMeasureArticulationEvent (page 18), MultiMeasureRestEvent (page 19), MultiMeasureTextEvent (page 19), NoteEvent (page 20), NoteGroupingEvent (page 21), PageBreakEvent (page 22), PageTurnEvent (page 22), PercentEvent (page 24), PesOrFlexaEvent (page 25), PhrasingSlurEvent (page 25), RepeatSlashEvent (page 28), RepeatTieEvent (page 28), RestEvent (page 28), ScriptEvent (page 29), SectionEvent (page 29), SegnoEvent (page 30), SkipEvent (page 32), SlurEvent (page 33), SoloOneEvent (page 33), SoloTwoEvent (page 33), SostenutoEvent (page 34), SpacingSectionEvent (page 34), SpanEvent (page 34), StaffSpanEvent (page 35), StringNumberEvent (page 35), StrokeFingerEvent (page 35), SustainEvent (page 36), TempoChangeEvent (page 36), TextScriptEvent (page 36), TextSpanEvent (page 37), TieEvent (page 37), TimeSignatureEvent (page 38), TremoloEvent (page 39), TremoloSpanEvent (page 40), TrillSpanEvent (page 40), TupletSpanEvent (page 41), UnaCordaEvent (page 41), UnisonoEvent (page 42), VoltaSpanEvent (page 44), and VowelTransitionEvent (page 45).

Not accepted by any engraver or performer.

1.2.73 string-number-event

Music event type string-number-event is in music objects of type StringNumberEvent (page 35).

Accepted by: Bend_spanner_engraver (page 285), Fretboard_engraver (page 296), and Tab_note_heads_engraver (page 320).

1.2.74 stroke-finger-event

Music event type stroke-finger-event is in music objects of type StrokeFingerEvent (page 35).

Not accepted by any engraver or performer.

1.2.75 sustain-event

Music event type `sustain-event` is in music objects of type `SustainEvent` (page 36).

Accepted by: `Piano_pedal_engraver` (page 312), and `Piano_pedal_performer` (page 312).

1.2.76 tempo-change-event

Music event type `tempo-change-event` is in music objects of type `TempoChangeEvent` (page 36).

Accepted by: `Metronome_mark_engraver` (page 305).

1.2.77 text-script-event

Music event type `text-script-event` is in music objects of type `TextScriptEvent` (page 36).

Accepted by: `Text_engraver` (page 321).

1.2.78 text-span-event

Music event type `text-span-event` is in music objects of type `TextSpanEvent` (page 37).

Accepted by: `Text_spanner_engraver` (page 322).

1.2.79 tie-event

Music event type `tie-event` is in music objects of type `TieEvent` (page 37).

Accepted by: `Note_performer` (page 308), `Tie_engraver` (page 322), and `Tie_performer` (page 322).

1.2.80 time-signature-event

Music event type `time-signature-event` is in music objects of type `TimeSignatureEvent` (page 38).

Accepted by: `Time_signature_engraver` (page 323).

1.2.81 tremolo-event

Music event type `tremolo-event` is in music objects of type `TremoloEvent` (page 39).

Accepted by: `Stem_engraver` (page 319).

1.2.82 tremolo-span-event

Music event type `tremolo-span-event` is in music objects of type `TremoloSpanEvent` (page 40).

Accepted by: `Chord_tremolo_engraver` (page 287).

1.2.83 trill-span-event

Music event type `trill-span-event` is in music objects of type `TrillSpanEvent` (page 40).

Accepted by: `Trill_spanner_engraver` (page 324).

1.2.84 tuplet-span-event

Music event type `tuplet-span-event` is in music objects of type `TupletSpanEvent` (page 41).

Accepted by: `Stem_engraver` (page 319), and `Tuplet_engraver` (page 325).

1.2.85 una-corda-event

Music event type `una-corda-event` is in music objects of type `UnaCordaEvent` (page 41).

Accepted by: `Piano_pedal_engraver` (page 312), and `Piano_pedal_performer` (page 312).

1.2.86 unisono-event

Music event type `unisono-event` is in music objects of type `UnisonoEvent` (page 42).

Not accepted by any engraver or performer.

1.2.87 volta-span-event

Music event type `volta-span-event` is in music objects of type `VoltaSpanEvent` (page 44).

Accepted by: `Repeat_acknowledge_engraver` (page 313), and `Volta_engraver` (page 326).

1.2.88 vowel-transition-event

Music event type `vowel-transition-event` is in music objects of type `VowelTransitionEvent` (page 45).

Accepted by: `Hyphen_engraver` (page 300).

1.3 Music properties

`absolute-octave` (integer)
: The absolute octave for an octave check note.

`alteration` (number)
: Alteration for figured bass.

`alternative-dir` (direction)
: Indicates if an AlternativeMusic is the First (-1), Middle (0), or Last (1) of group of alternate endings.

`alternative-increment` (integer)
: The number of times an alternative's lettering should be incremented.

`articulation-type` (string)
: Key for script definitions alist.

  TODO: Consider making type into symbol.

`articulations` (list of music objects)
: Articulation events specifically for this note.

`associated-context` (string)
: Name of the context associated with this `\lyricsto` section.

`associated-context-type` (symbol)
: Type of the context associated with this `\lyricsto` section.

`augmented` (boolean)
: This figure is for an augmented figured bass (with `+` sign).

`augmented-slash` (boolean)
: This figure is for an augmented figured bass (back-slashed number).

`automatically-numbered` (boolean)
: Should a footnote be automatically numbered?

`autosplit-end` (boolean)
: Duration of event was truncated by automatic splitting in `Completion_heads_engraver`.

`bass` (boolean)
: Set if this note is a bass note in a chord.

`beat-structure` (list)
: A beatStructure to be used in autobeaming.

`bracket-start` (boolean)
: Start a bracket here.

  TODO: Use SpanEvents?

`bracket-stop` (boolean)
: Stop a bracket here.

`break-penalty` (number)
: Penalty for line break hint.

`break-permission` (symbol)
: Whether to allow, forbid or force a line break.

`cautionary` (boolean)
: If set, this alteration needs a cautionary accidental.

`change-to-id` (string)
: Name of the context to change to.

`change-to-type` (symbol)
: Type of the context to change to.

`class` (symbol)
: The class name of an event class.

`context` (context)
: The context to which an event is sent.

`context-change-list` (list)
: Context changes for `\autoChange` or `\partCombine`.

`context-id` (string)
: Name of context.

`context-type` (symbol)
: Type of context.

`create-new` (boolean)
: Create a fresh context.

`delta-step` (number)
: How much should a fall change pitch?

`denominator` (integer)
: Denominator in a time signature.

`digit` (integer)
: Digit for fingering.

`diminished` (boolean)
: This bass figure should be slashed.

`direction` (direction)
: Print this up or down?

`drum-type` (symbol)
: Which percussion instrument to play this note on.

`duration` (duration)
: Duration of this note or lyric.

`element` (music)
: The single child of a Music_wrapper music object, or the body of a repeat.

`elements` (list of music objects)
: A list of elements for sequential of simultaneous music, or the alternatives of repeated music.

`elements-callback` (procedure)
: Return a list of children, for use by a sequential iterator. Takes a single music parameter.

`error-found` (boolean)
: If true, a parsing error was found in this expression.

`figure` (integer)
: A bass figure.

`folded-repeat-type` (symbol)
: Type of folded repeat music.

`footnote-text` (markup)
: Text to appear in a footnote.

`force-accidental` (boolean)
: If set, a cautionary accidental should always be printed on this note.

`grob-property` (symbol)
: The symbol of the grob property to set.

`grob-property-path` (list)
: A list of symbols, locating a nested grob property, e.g., `(beamed-lengths details)`.

`grob-value` (any type)
: The value of the grob property to set.

`id` (symbol)
: The ID of an event.

`input-tag` (any type)
: Arbitrary marker to relate input and output.

`inversion` (boolean)
: If set, this chord note is inverted.

`iterator-ctor` (procedure)
: Function to construct a `music-event-iterator` object for this music.

`label` (integer or markup)
: Label of a mark.

`last-pitch` (pitch)
: The last pitch after relativization.

`length` (moment)
: The endpoint of this music. This property is unhappily named in that it does not account for any initial grace notes: the full length of the music is `length` minus the start time. A value of `INF-MOMENT` indicates indefinite length.

`length-callback` (procedure)
: How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`.

`line-break-permission` (symbol)
: When the music is at top-level, whether to allow, forbid or force a line break.

`metronome-count` (number or pair)
: How many beats in a minute?

`midi-extra-velocity` (integer)
: How much louder or softer should this note be in MIDI output? The default is 0.

`midi-length` (procedure)
: Function to determine how long to play a note in MIDI. It should take a moment (the written length of the note) and a context, and return a moment (the length to play the note).

`moment` (moment)
: The moment at which an event happens.

`music-cause` (music)
: The music object that is the cause of an event.

`name` (symbol)
: Name of this music object.

`no-continuation` (boolean)
: If set, disallow continuation lines.

`numerator` (integer)
: Numerator of a time signature.

`octavation` (integer)
: This pitch was octavated by how many octaves? For chord inversions, this is negative.

`once` (boolean)
: Apply this operation only during one time step?

`ops` (any type)
: The operations to apply during the creation of a context.

`origin` (input location)
: Where was this piece of music defined?

`ottava-number` (integer)
: The octavation for `\ottava`.

`page-break-permission` (symbol)
: When the music is at top-level, whether to allow, forbid or force a page break.

`page-label` (symbol)
: The label of a page marker.

`page-marker` (boolean)
: If true, and the music expression is found at top-level, a page marker object is instanciated instead of a score.

`page-turn-permission` (symbol)
: When the music is at top-level, whether to allow, forbid or force a page turn.

`parenthesize` (boolean)
: Enclose resulting objects in parentheses?

`part-combine-status` (symbol)
: Change to what kind of state? Options are `solo1`, `solo2` and `unisono`.

`pitch` (pitch)
: The pitch of this note.

`pitch-alist` (list)
: A list of pitches jointly forming the scale of a key signature.

`pop-first` (boolean)
: Do a revert before we try to do an override on some grob property.

`procedure` (procedure)
: The function to run with `\applycontext`. It must take a single argument, being the context.

`property-operations` (list)
: Do these operations for instantiating the context.

`property-path` (symbol)
: The path of a property.

`quoted-context-id` (string)
: The ID of the context to direct quotes to, e.g., `cue`.

`quoted-context-type` (symbol)
: The name of the context to direct quotes to, e.g., `Voice`.

`quoted-events` (vector)
: A vector of with `moment` and `event-list` entries.

`quoted-music-clef` (string)
: The clef of the voice to quote.

`quoted-music-name` (string)
: The name of the voice to quote.

`quoted-transposition` (pitch)
: The pitch used for the quote, overriding `\transposition`.

`quoted-voice-direction` (direction)
: Should the quoted voice be up-stem or down-stem?

`repeat-count` (integer)
: Do a `\repeat` how often?

`search-direction` (direction)
: Limits the scope of `\context` searches.

`slash-count` (integer)
: The number of slashes in a single-beat repeat. If zero, signals a beat containing varying durations.

`span-direction` (direction)
: Does this start or stop a spanner?

`span-text` (markup)
: The displayed text for dynamic text spanners (e.g., cresc.)

`span-type` (symbol)
: What kind of dynamic spanner should be created? Options are `'text` and `'hairpin`.

`spanner-id` (index or symbol)
: Identifier to distinguish concurrent spanners.

`start-callback` (procedure)
: Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.

`string-number` (integer)
: The number of the string in a `StringNumberEvent`.

`symbol` (symbol)
: Grob name to perform an override or revert on.

`tags` (list)
: List of symbols that for denoting extra details, e.g., `\tag #'part ...` could tag a piece of music as only being active in a part.

`tempo-unit` (duration)
: The unit for the metronome count.

`text` (markup)
: Markup expression to be printed.

`to-relative-callback` (procedure)
: How to transform a piece of music to relative pitches.

`tonic` (pitch)
: Base of the scale.

`tremolo-type` (integer)
: Speed of tremolo, e.g., 16 for `c4:16`.

`trill-pitch` (pitch)
: Pitch of other note of the trill.

`tweaks` (list)
: An alist of properties to override in the backend for the grob made of this event.

`type` (symbol)
: The type of this music object. Determines iteration in some cases.

`types` (list)
: The types of this music object; determines by what engraver this music expression is processed.

`untransposable` (boolean)
: If set, this music is not transposed.

`value` (any type)
: Assignment value for a translation property.

`void` (boolean)
: If this property is `#t`, then the music expression is to be discarded by the toplevel music handler.

`volta-numbers` (number list)
: Volte to which this music applies.

`what` (symbol)
: What to change for auto-change.

  FIXME: Naming.

`X-offset` (number)
: Offset of resulting grob; only used for balloon texts.

`Y-offset` (number)
: Offset of resulting grob; only used for balloon texts.

2 Translation

2.1 Contexts

2.1.1 ChoirStaff

Identical to `StaffGroup` except that the contained staves are not connected vertically.

This context creates the following layout object(s): `InstrumentName` (page 413), `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), `SystemStartSquare` (page 484), and `VerticalAlignment` (page 504).

This context sets the following properties:

- Set translator property `instrumentName` to `'()`.
- Set translator property `localAlterations` to `'()`.
- Set translator property `shortInstrumentName` to `'()`.
- Set translator property `shortVocalName` to `'()`.
- Set translator property `systemStartDelimiter` to `'SystemStartBracket`.
- Set translator property `topLevelAlignment` to `#f`.
- Set translator property `vocalName` to `'()`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `Staff` (page 217).

Context `ChoirStaff` can contain `ChoirStaff` (page 61), `ChordNames` (page 62), `DrumStaff` (page 75), `Dynamics` (page 91), `FiguredBass` (page 94), `GrandStaff` (page 98), `Lyrics` (page 141), `OneStaff` (page 169), `PianoStaff` (page 191), `RhythmicStaff` (page 193), `Staff` (page 217), and `StaffGroup` (page 227).

This context is built from the following engraver(s):

`Instrument_name_engraver` (page 300)

Create a system start text for instrument or vocal names.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

`shortInstrumentName` (markup)
: See `instrumentName`.

`shortVocalName` (markup)
: Name of a vocal line, short version.

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s): `InstrumentName` (page 413).

`System_start_delimiter_engraver` (page 320)
: Create a system start delimiter (i.e., a `SystemStartBar`, `SystemStartBrace`, `SystemStartBracket` or `SystemStartSquare` spanner).

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `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.

  This engraver creates the following layout object(s): `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), and `SystemStartSquare` (page 484).

`Vertical_align_engraver` (page 325)
: Catch groups (staves, lyrics lines, etc.) and stack them vertically.

  Properties (read)

  `alignAboveContext` (string)
  : Where to insert newly created context in vertical alignment.

  `alignBelowContext` (string)
  : Where to insert newly created context in vertical alignment.

  `hasAxisGroup` (boolean)
  : True if the current context is contained in an axis group.

  This engraver creates the following layout object(s): `VerticalAlignment` (page 504).

2.1.2 ChordNames

Typesets chord names.

This context also accepts commands for the following context(s): `Staff` (page 217).

This context creates the following layout object(s): `ChordName` (page 371), `StaffSpacing` (page 470), and `VerticalAxisGroup` (page 505).

This context sets the following properties:

- Set grob property `font-size` in `ParenthesesItem` (page 451), to `1.5`.
- Set grob property `nonstaff-nonstaff-spacing.padding` in `VerticalAxisGroup` (page 505), to `0.5`.
- Set grob property `nonstaff-relatedstaff-spacing.padding` in `VerticalAxisGroup` (page 505), to `0.5`.
- Set grob property `remove-empty` in `VerticalAxisGroup` (page 505), to `#t`.
- Set grob property `remove-first` in `VerticalAxisGroup` (page 505), to `#t`.
- Set grob property `staff-affinity` in `VerticalAxisGroup` (page 505), to `-1`.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

`Axis_group_engraver` (page 282)
: Group all objects created in this context in a `VerticalAxisGroup` spanner.

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `hasAxisGroup` (boolean)
  : True if the current context is contained in an axis group.

  `keepAliveInterfaces` (list)
  : A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

  Properties (write)

  `hasAxisGroup` (boolean)
  : True if the current context is contained in an axis group.

  This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Chord_name_engraver` (page 286)
: Catch note and rest events and generate the appropriate chordname.

  Music types accepted: `note-event` (page 50), and `rest-event` (page 51),

  Properties (read)

  `chordChanges` (boolean)
  : Only show changes in chords scheme?

  `chordNameExceptions` (list)
  : An alist of chord exceptions. Contains `(`*`chord . markup`*`)` entries.

  `chordNameExceptions` (list)
  : An alist of chord exceptions. Contains `(`*`chord . markup`*`)` entries.

  `chordNameFunction` (procedure)
  : The function that converts lists of pitches to chord names.

  `chordNoteNamer` (procedure)
  : A function that converts from a pitch object to a text markup. Used for single pitches.

  `chordRootNamer` (procedure)
  : A function that converts from a pitch object to a text markup. Used for chords.

  `lastChord` (markup)
  : Last chord, used for detecting chord changes.

  `majorSevenSymbol` (markup)
  : How should the major 7th be formatted in a chord name?

`noChordSymbol` (markup)
: Markup to be displayed for rests in a ChordNames context.

Properties (write)

`lastChord` (markup)
: Last chord, used for detecting chord changes.

This engraver creates the following layout object(s): `ChordName` (page 371).

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Separating_line_group_engraver` (page 316)
: Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)
: Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)
: True if the current `CommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 470).

2.1.3 `CueVoice`

Corresponds to a voice on a staff. This context handles the conversion of dynamic signs, stems, beams, super- and subscripts, slurs, ties, and rests.

You have to instantiate this explicitly if you want to have multiple voices on the same staff.

This context also accepts commands for the following context(s): `Voice` (page 268).

This context creates the following layout object(s): `Arpeggio` (page 351), `Beam` (page 362), `BendAfter` (page 364), `BreathingSign` (page 369), `ClusterSpanner` (page 376), `ClusterSpannerBeacon` (page 376), `CombineTextScript` (page 377), `Dots` (page 386), `DoublePercentRepeat` (page 387), `DoublePercentRepeatCounter` (page 388), `DoubleRepeatSlash` (page 390), `DynamicLineSpanner` (page 392), `DynamicText` (page 394), `DynamicTextSpanner` (page 395), `FingerGlideSpanner` (page 398), `Fingering` (page 399), `Flag` (page 401), `Glissando` (page 406), `Hairpin` (page 409), `InstrumentSwitch` (page 413), `LaissezVibrerTie` (page 423), `LaissezVibrerTieColumn` (page 424), `LigatureBracket` (page 427), `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), `MultiMeasureRestText` (page 442), `NoteColumn` (page 445), `NoteHead` (page 446), `NoteSpacing` (page 448), `PercentRepeat` (page 451), `PercentRepeatCounter` (page 452), `PhrasingSlur` (page 453), `RepeatSlash` (page 458), `RepeatTie` (page 459), `RepeatTieColumn` (page 460), `Rest` (page 460), `Script` (page 461), `ScriptColumn` (page 463), `Slur` (page 463), `Stem` (page 472), `StemStub` (page 474), `StemTremolo` (page 475), `StringNumber` (page 476), `StrokeFinger` (page 477), `TextScript` (page 487), `TextSpanner` (page 489), `Tie` (page 490), `TieColumn` (page 492), `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), `TrillPitchHead` (page 497), `TrillSpanner` (page 498), `TupletBracket` (page 499), `TupletNumber` (page 500), and `VoiceFollower` (page 507).

This context sets the following properties:

- Set grob property `beam-thickness` in `Beam` (page 362), to `0.35`.
- Set grob property `beam-thickness` in `StemTremolo` (page 475), to `0.35`.
- Set grob property `ignore-ambitus` in `NoteHead` (page 446), to `#t`.
- Set grob property `length-fraction` in `Beam` (page 362), to `0.629960524947437`.
- Set grob property `length-fraction` in `Stem` (page 472), to `0.629960524947437`.
- Set translator property `fontSize` to `-4`.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

`Arpeggio_engraver` (page 281)

Generate an Arpeggio symbol.

Music types accepted: `arpeggio-event` (page 46),

This engraver creates the following layout object(s): `Arpeggio` (page 351).

`Auto_beam_engraver` (page 281)

Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.124 [`Stem_engraver`], page 319, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)

If set to true then beams are generated automatically.

`baseMoment` (moment)

Smallest unit of time that will stand on its own as a subdivided section.

`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.

`subdivideBeams` (boolean)

If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Beam_engraver` (page 284)

Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `Beam` (page 362).

`Bend_engraver` (page 285)
: Create fall spanners.

Music types accepted: `bend-after-event` (page 46),

This engraver creates the following layout object(s): `BendAfter` (page 364).

`Breathing_sign_engraver` (page 286)
: Create a breathing sign.

Music types accepted: `breathing-event` (page 47),

This engraver creates the following layout object(s): `BreathingSign` (page 369).

`Chord_tremolo_engraver` (page 287)
: Generate beams for tremolo repeats.

Music types accepted: `tremolo-span-event` (page 54),

This engraver creates the following layout object(s): `Beam` (page 362).

`Cluster_spanner_engraver` (page 288)
: Engrave a cluster using `Spanner` notation.

Music types accepted: `cluster-note-event` (page 47),

This engraver creates the following layout object(s): `ClusterSpanner` (page 376), and `ClusterSpannerBeacon` (page 376).

`Dots_engraver` (page 291)
: Create Section 3.1.36 [`Dots`], page 386, objects for Section 3.2.103 [`rhythmic-head-interface`], page 567s.

This engraver creates the following layout object(s): `Dots` (page 386).

`Double_percent_repeat_engraver` (page 291)
: Make double measure repeats.

Music types accepted: `double-percent-event` (page 47),

Properties (read)

`countPercentRepeats` (boolean)
: If set, produce counters for percent repeats.

`measureLength` (moment)
: Length of one measure in the current time signature.

`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.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 387), and `DoublePercentRepeatCounter` (page 388).

`Dynamic_align_engraver` (page 293)
: Align hairpins and dynamic texts on a horizontal line.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `DynamicLineSpanner` (page 392).

`Dynamic_engraver` (page 293)
: Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 45), `break-span-event` (page 47), and `span-dynamic-event` (page 52),

Properties (read)

`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.`'.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`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.`'.

This engraver creates the following layout object(s): `DynamicText` (page 394), `DynamicTextSpanner` (page 395), and `Hairpin` (page 409).

`Finger_glide_engraver` (page 295)
: Engraver to print a line between two `Fingering` grobs.

Music types accepted: `note-event` (page 50),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 398).

`Fingering_engraver` (page 295)
Create fingering scripts.

Music types accepted: `fingering-event` (page 48),

This engraver creates the following layout object(s): `Fingering` (page 399).

`Font_size_engraver` (page 296)
Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
The relative size of all grobs in a context.

`Forbid_line_break_engraver` (page 296)
Forbid line breaks when note heads are still playing at some point.

Properties (read)

`busyGrobs` (list)
A queue of (*end-moment . grob*) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

`Glissando_engraver` (page 297)
Engrave glissandi.

Music types accepted: `glissando-event` (page 48),

Properties (read)

`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.

This engraver creates the following layout object(s): `Glissando` (page 406).

`Grace_auto_beam_engraver` (page 297)
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeaming, just like setting the context property '`autoBeaming`' to `##f`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_beam_engraver` (page 298)
: Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

  Music types accepted: `beam-event` (page 46),

  Properties (read)

  `baseMoment` (moment)
  : Smallest unit of time that will stand on its own as a subdivided section.

  `beamMelismaBusy` (boolean)
  : Signal if a beam is present.

  `beatStructure` (list)
  : List of `baseMoment`s that are combined to make beats.

  `subdivideBeams` (boolean)
  : If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

  This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_engraver` (page 298)
: Set font size and other properties for grace notes.

  Properties (read)

  `graceSettings` (list)
  : Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`Grob_pq_engraver` (page 299)
: Administrate when certain grobs (e.g., note heads) stop playing.

  Properties (read)

  `busyGrobs` (list)
  : A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

  Properties (write)

  `busyGrobs` (list)
  : A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_switch_engraver` (page 300)
: Create a cue text for taking instrument.

  Properties (read)

  `instrumentCueName` (markup)
  : The name to print if another instrument is to be taken.

  This engraver creates the following layout object(s): `InstrumentSwitch` (page 413).

`Laissez_vibrer_engraver` (page 302)
: Create laissez vibrer items.

Music types accepted: `laissez-vibrer-event` (page 48),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 423), and `LaissezVibrerTieColumn` (page 424).

`Ligature_bracket_engraver` (page 303)

Handle `Ligature_events` by engraving `Ligature` brackets.

Music types accepted: `ligature-event` (page 49),

This engraver creates the following layout object(s): `LigatureBracket` (page 427).

`Multi_measure_rest_engraver` (page 306)

Engrave multi-measure rests that are produced with '`R`'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the Section 3.1.80 [`MultiMeasureRest`], page 438.

Music types accepted: `multi-measure-articulation-event` (page 49), `multi-measure-rest-event` (page 49), and `multi-measure-text-event` (page 50),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`measureStartNow` (boolean)
: True at the beginning of a measure.

`restNumberThreshold` (number)
: If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), and `MultiMeasureRestText` (page 442).

`New_fingering_engraver` (page 307)

Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

`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.

`harmonicDots` (boolean)
: If set, harmonic notes in dotted chords get dots.

`stringNumberOrientations` (list)
: See `fingeringOrientations`.

`strokeFingerOrientations` (list)
: See `fingeringOrientations`.

This engraver creates the following layout object(s): `Fingering` (page 399), `Script` (page 461), `StringNumber` (page 476), and `StrokeFinger` (page 477).

`Note_head_line_engraver` (page 307)
Engrave a line between two note heads in a staff switch if `followVoice` is set.

Properties (read)

`followVoice` (boolean)
If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s): `VoiceFollower` (page 507).

`Note_heads_engraver` (page 308)
Generate note heads.

Music types accepted: `note-event` (page 50),

Properties (read)

`middleCPosition` (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

`staffLineLayoutFunction` (procedure)
Layout of staff lines, `traditional`, or `semitone`.

This engraver creates the following layout object(s): `NoteHead` (page 446).

`Note_spacing_engraver` (page 309)
Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s): `NoteSpacing` (page 448).

`Output_property_engraver` (page 309)
Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Part_combine_engraver` (page 310)
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted: `note-event` (page 50), and `part-combine-event` (page 51),

Properties (read)

`aDueText` (markup)
Text to print at a unisono passage.

`partCombineTextsOnNote` (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.

`printPartCombineTexts` (boolean)
Set ‘Solo’ and ‘A due’ texts in the part combiner?

`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.

This engraver creates the following layout object(s): `CombineTextScript` (page 377).

`Percent_repeat_engraver` (page 311)
Make whole measure repeats.

Music types accepted: `percent-event` (page 51),

Properties (read)

`countPercentRepeats` (boolean)
If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

This engraver creates the following layout object(s): `PercentRepeat` (page 451), and `PercentRepeatCounter` (page 452).

`Phrasing_slur_engraver` (page 311)
Print phrasing slurs. Similar to Section 2.2.111 [`Slur_engraver`], page 317.

Music types accepted: `note-event` (page 50), and `phrasing-slur-event` (page 51),

This engraver creates the following layout object(s): `PhrasingSlur` (page 453).

`Pitched_trill_engraver` (page 313)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), and `TrillPitchHead` (page 497).

`Repeat_tie_engraver` (page 314)
Create repeat ties.

Music types accepted: `repeat-tie-event` (page 51),

This engraver creates the following layout object(s): `RepeatTie` (page 459), and `RepeatTieColumn` (page 460).

`Rest_engraver` (page 315)
Engrave rests.

Music types accepted: `rest-event` (page 51),

Properties (read)

`middleCPosition` (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

This engraver creates the following layout object(s): `Rest` (page 460).

`Rhythmic_column_engraver` (page 315)
: Generate `NoteColumn`, an object that groups stems, note heads, and rests.

  This engraver creates the following layout object(s): `NoteColumn` (page 445).

`Script_column_engraver` (page 315)
: Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

  This engraver creates the following layout object(s): `ScriptColumn` (page 463).

`Script_engraver` (page 315)
: Handle note scripted articulations.

  Music types accepted: `articulation-event` (page 46),

  Properties (read)

  `scriptDefinitions` (list)
  : The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See `scm/script.scm` for more information.

  This engraver creates the following layout object(s): `Script` (page 461).

`Slash_repeat_engraver` (page 316)
: Make beat repeats.

  Music types accepted: `repeat-slash-event` (page 51),

  This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 390), and `RepeatSlash` (page 458).

`Slur_engraver` (page 317)
: Build slur grobs from slur events.

  Music types accepted: `note-event` (page 50), and `slur-event` (page 52),

  Properties (read)

  `doubleSlurs` (boolean)
  : If set, two slurs are created for every slurred note, one above and one below the chord.

  `slurMelismaBusy` (boolean)
  : Signal if a slur is present.

  This engraver creates the following layout object(s): `Slur` (page 463).

`Spanner_break_forbid_engraver` (page 318)
: Forbid breaks in certain spanners.

`Stem_engraver` (page 319)
: Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

  Music types accepted: `tremolo-event` (page 54), and `tuplet-span-event` (page 54),

  Properties (read)

  `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`.

`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`.

This engraver creates the following layout object(s): `Flag` (page 401), `Stem` (page 472), `StemStub` (page 474), and `StemTremolo` (page 475).

`Text_engraver` (page 321)
: Create text scripts.

  Music types accepted: `text-script-event` (page 54),

  This engraver creates the following layout object(s): `TextScript` (page 487).

`Text_spanner_engraver` (page 322)
: Create text spanner from an event.

  Music types accepted: `text-span-event` (page 54),

  Properties (read)

  `currentMusicalColumn` (graphical (layout) object)
  : Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

  This engraver creates the following layout object(s): `TextSpanner` (page 489).

`Tie_engraver` (page 322)
: Generate ties between note heads of equal pitch.

  Music types accepted: `tie-event` (page 54),

  Properties (read)

  `skipTypesetting` (boolean)
  : If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

  `tieWaitForNote` (boolean)
  : If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

  Properties (write)

  `tieMelismaBusy` (boolean)
  : Signal whether a tie is present.

  This engraver creates the following layout object(s): `Tie` (page 490), and `TieColumn` (page 492).

`Trill_spanner_engraver` (page 324)
: Create trill spanner from an event.

  Music types accepted: `trill-span-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TrillSpanner` (page 498).

`Tuplet_engraver` (page 325)
: Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 54),

Properties (read)

`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.

This engraver creates the following layout object(s): `TupletBracket` (page 499), and `TupletNumber` (page 500).

2.1.4 Devnull

Silently discards all musical information given to this context.

This context also accepts commands for the following context(s): `Staff` (page 217), and `Voice` (page 268).

This context creates the following layout object(s): none.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

2.1.5 DrumStaff

Handles typesetting for percussion.

This context also accepts commands for the following context(s): `Staff` (page 217).

This context creates the following layout object(s): `BarLine` (page 354), `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureAlignmentPositioning` (page 360), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), `BassFigureLine` (page 362), `Clef` (page 372), `ClefModifier` (page 374), `CueClef` (page 378), `CueEndClef` (page 381), `DotColumn` (page 386), `FingeringColumn` (page 401), `InstrumentName` (page 413), `LedgerLineSpanner` (page 424), `NoteCollision` (page 445), `RestCollision` (page 461), `ScriptRow` (page 463), `SostenutoPedalLineSpanner` (page 466), `StaffSpacing` (page 470), `StaffSymbol` (page 471), `SustainPedalLineSpanner` (page 480), `TimeSignature` (page 492), `UnaCordaPedalLineSpanner` (page 503), and `VerticalAxisGroup` (page 505).

This context sets the following properties:

- Set grob property `staff-padding` in `Script` (page 461), to `0.75`.
- Set translator property `clefGlyph` to `"clefs.percussion"`.

- Set translator property `clefPosition` to `0`.
- Set translator property `createSpacing` to `#t`.
- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localAlterations` to `'()`.
- Set translator property `ottavationMarkups` to:

```
'((4 . "29")
  (3 . "22")
  (2 . "15")
  (1 . "8")
  (-1 . "8")
  (-2 . "15")
  (-3 . "22")
  (-4 . "29"))
```

- Set translator property `shortInstrumentName` to `'()`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `DrumVoice` (page 81).

Context `DrumStaff` can contain `CueVoice` (page 64), `DrumVoice` (page 81), and `NullVoice` (page 167).

This context is built from the following engraver(s):

`Axis_group_engraver` (page 282)

Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Bar_engraver` (page 283)

Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

`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`.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `BarLine` (page 354).

`Clef_engraver` (page 287)
: Determine and set reference point for pitches.

Properties (read)

`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.

`clefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`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.

This engraver creates the following layout object(s): `Clef` (page 372), and `ClefModifier` (page 374).

`Collision_engraver` (page 288)
: Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s): `NoteCollision` (page 445).

`Cue_clef_engraver` (page 290)
: Determine and set reference point for pitches in cued voices.

Properties (read)

`clefTransposition` (integer)
: Add this much extra transposition. Values of 7 and -7 are common.

`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.

`cueClefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitCueClefVisibility` (vector)
: '`break-visibility`' function for cue clef changes.

`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`.

This engraver creates the following layout object(s): `ClefModifier` (page 374), `CueClef` (page 378), and `CueEndClef` (page 381).

`Dot_column_engraver` (page 291)
: Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s): `DotColumn` (page 386).

`Figured_bass_engraver` (page 294)
: Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 46), and `rest-event` (page 51),

Properties (read)

`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.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s): `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), and `BassFigureLine` (page 362).

`Figured_bass_position_engraver` (page 295)
: Position figured bass alignments over notes.

  This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 360).

`Fingering_column_engraver` (page 295)
: Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

  This engraver creates the following layout object(s): `FingeringColumn` (page 401).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

  Properties (read)

  `fontSize` (number)
  : The relative size of all grobs in a context.

`Grob_pq_engraver` (page 299)
: Administrate when certain grobs (e.g., note heads) stop playing.

  Properties (read)

  `busyGrobs` (list)
  : A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

  Properties (write)

  `busyGrobs` (list)
  : A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_name_engraver` (page 300)
: Create a system start text for instrument or vocal names.

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `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.

  `shortInstrumentName` (markup)
  : See `instrumentName`.

  `shortVocalName` (markup)
  : Name of a vocal line, short version.

  `vocalName` (markup)
  : Name of a vocal line.

  This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Ledger_line_engraver` (page 303)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

  This engraver creates the following layout object(s): `LedgerLineSpanner` (page 424).

`Merge_mmrest_numbers_engraver` (page 305)
: Engraver to merge multi-measure rest numbers in multiple voices.

  This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

  Music types accepted: `apply-output-event` (page 46),

`Piano_pedal_align_engraver` (page 311)
: Align piano pedal symbols and brackets.

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 466), `SustainPedalLineSpanner` (page 480), and `UnaCordaPedalLineSpanner` (page 503).

`Pure_from_neighbor_engraver` (page 313)
: Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 315)
: Handle collisions of rests.

  Properties (read)

  `busyGrobs` (list)
  : A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

  This engraver creates the following layout object(s): `RestCollision` (page 461).

`Script_row_engraver` (page 316)
: Determine order in horizontal side position elements.

  This engraver creates the following layout object(s): `ScriptRow` (page 463).

`Separating_line_group_engraver` (page 316)
: Generate objects for computing spacing parameters.

  Properties (read)

  `createSpacing` (boolean)
  : Create `StaffSpacing` objects? Should be set for staves.

  Properties (write)

  `hasStaffSpacing` (boolean)
  : True if the current `CommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 470).

`Staff_collecting_engraver` (page 318)
Maintain the `stavesFound` variable.

Properties (read)

`stavesFound` (list of grobs)
A list of all staff-symbols found.

Properties (write)

`stavesFound` (list of grobs)
A list of all staff-symbols found.

`Staff_symbol_engraver` (page 319)
Create the constellation of five (default) staff lines.

Music types accepted: `staff-span-event` (page 53),

This engraver creates the following layout object(s): `StaffSymbol` (page 471).

`Time_signature_engraver` (page 323)
Create a Section 3.1.133 [`TimeSignature`], page 492, whenever `timeSignatureFraction` changes.

Music types accepted: `time-signature-event` (page 54),

Properties (read)

`initialTimeSignatureVisibility` (vector)
break visibility for the initial time signature.

`partialBusy` (boolean)
Signal that \partial acts at the current timestep.

`timeSignatureFraction` (fraction, as pair)
A pair of numbers, signifying the time signature. For example, `'(4 . 4)` is a 4/4 time signature.

This engraver creates the following layout object(s): `TimeSignature` (page 492).

2.1.6 DrumVoice

A voice on a percussion staff.

This context also accepts commands for the following context(s): `Voice` (page 268).

This context creates the following layout object(s): `Beam` (page 362), `BendAfter` (page 364), `BreathingSign` (page 369), `CombineTextScript` (page 377), `Dots` (page 386), `DoublePercentRepeat` (page 387), `DoublePercentRepeatCounter` (page 388), `DoubleRepeatSlash` (page 390), `DynamicLineSpanner` (page 392), `DynamicText` (page 394), `DynamicTextSpanner` (page 395), `FingerGlideSpanner` (page 398), `Flag` (page 401), `Hairpin` (page 409), `InstrumentSwitch` (page 413), `LaissezVibrerTie` (page 423), `LaissezVibrerTieColumn` (page 424), `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), `MultiMeasureRestText` (page 442), `NoteColumn` (page 445), `NoteHead` (page 446), `NoteSpacing` (page 448), `PercentRepeat` (page 451), `PercentRepeatCounter` (page 452), `PhrasingSlur` (page 453), `RepeatSlash` (page 458), `RepeatTie` (page 459), `RepeatTieColumn` (page 460), `Rest` (page 460), `Script` (page 461), `ScriptColumn` (page 463), `Slur` (page 463), `Stem` (page 472), `StemStub` (page 474), `StemTremolo` (page 475), `TextScript` (page 487),

`TextSpanner` (page 489), `Tie` (page 490), `TieColumn` (page 492), `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), `TrillPitchHead` (page 497), `TrillSpanner` (page 498), `TupletBracket` (page 499), and `TupletNumber` (page 500).

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

`Auto_beam_engraver` (page 281)

Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.124 [`Stem_engraver`], page 319, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
: If set to true then beams are generated automatically.

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`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.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Beam_engraver` (page 284)

Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `Beam` (page 362).

`Bend_engraver` (page 285)
Create fall spanners.

Music types accepted: `bend-after-event` (page 46),

This engraver creates the following layout object(s): `BendAfter` (page 364).

`Breathing_sign_engraver` (page 286)
Create a breathing sign.

Music types accepted: `breathing-event` (page 47),

This engraver creates the following layout object(s): `BreathingSign` (page 369).

`Chord_tremolo_engraver` (page 287)
Generate beams for tremolo repeats.

Music types accepted: `tremolo-span-event` (page 54),

This engraver creates the following layout object(s): `Beam` (page 362).

`Dots_engraver` (page 291)
Create Section 3.1.36 [`Dots`], page 386, objects for Section 3.2.103 [`rhythmic-head-interface`], page 567s.

This engraver creates the following layout object(s): `Dots` (page 386).

`Double_percent_repeat_engraver` (page 291)
Make double measure repeats.

Music types accepted: `double-percent-event` (page 47),

Properties (read)

`countPercentRepeats` (boolean)
If set, produce counters for percent repeats.

`measureLength` (moment)
Length of one measure in the current time signature.

`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.

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 387), and `DoublePercentRepeatCounter` (page 388).

`Drum_notes_engraver` (page 292)
Generate drum note heads.

Music types accepted: `note-event` (page 50),

Properties (read)

`drumStyleTable` (hash table)
A hash table which maps drums to layout settings. Predefined values: '`drums-style`', '`agostini-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.

This engraver creates the following layout object(s): NoteHead (page 446), and Script (page 461).

Dynamic_align_engraver (page 293)

Align hairpins and dynamic texts on a horizontal line.

Properties (read)

currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): DynamicLineSpanner (page 392).

Dynamic_engraver (page 293)

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: absolute-dynamic-event (page 45), break-span-event (page 47), and span-dynamic-event (page 52),

Properties (read)

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.’.

currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

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.’.

This engraver creates the following layout object(s): DynamicText (page 394), DynamicTextSpanner (page 395), and Hairpin (page 409).

Finger_glide_engraver (page 295)

Engraver to print a line between two Fingering grobs.

Music types accepted: note-event (page 50),

This engraver creates the following layout object(s): FingerGlideSpanner (page 398).

`Font_size_engraver` (page 296)
Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
The relative size of all grobs in a context.

`Forbid_line_break_engraver` (page 296)
Forbid line breaks when note heads are still playing at some point.

Properties (read)

`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

`Grace_auto_beam_engraver` (page 297)
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeaming, just like setting the context property '`autoBeaming`' to `##f`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_beam_engraver` (page 298)
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatStructure` (list)
List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_engraver` (page 298)
Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
: Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`Grob_pq_engraver` (page 299)
: Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Grob_pq_engraver` (page 299)
: Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_switch_engraver` (page 300)
: Create a cue text for taking instrument.

Properties (read)

`instrumentCueName` (markup)
: The name to print if another instrument is to be taken.

This engraver creates the following layout object(s): `InstrumentSwitch` (page 413).

`Laissez_vibrer_engraver` (page 302)
: Create laissez vibrer items.

Music types accepted: `laissez-vibrer-event` (page 48),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 423), and `LaissezVibrerTieColumn` (page 424).

`Multi_measure_rest_engraver` (page 306)
: Engrave multi-measure rests that are produced with '`R`'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the Section 3.1.80 [`MultiMeasureRest`], page 438.

Music types accepted: `multi-measure-articulation-event` (page 49), `multi-measure-rest-event` (page 49), and `multi-measure-text-event` (page 50),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`measureStartNow` (boolean)
: True at the beginning of a measure.

`restNumberThreshold` (number)
: If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), and `MultiMeasureRestText` (page 442).

`Note_spacing_engraver` (page 309)
: Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s): `NoteSpacing` (page 448).

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Part_combine_engraver` (page 310)
: Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted: `note-event` (page 50), and `part-combine-event` (page 51),

Properties (read)

`aDueText` (markup)
: Text to print at a unisono passage.

`partCombineTextsOnNote` (boolean)
: Print part-combine texts only on the next note rather than immediately on rests or skips.

`printPartCombineTexts` (boolean)
: Set ‘Solo’ and ‘A due’ texts in the part combiner?

`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.

This engraver creates the following layout object(s): `CombineTextScript` (page 377).

`Percent_repeat_engraver` (page 311)
Make whole measure repeats.

Music types accepted: `percent-event` (page 51),

Properties (read)

`countPercentRepeats` (boolean)
If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

This engraver creates the following layout object(s): `PercentRepeat` (page 451), and `PercentRepeatCounter` (page 452).

`Phrasing_slur_engraver` (page 311)
Print phrasing slurs. Similar to Section 2.2.111 [`Slur_engraver`], page 317.

Music types accepted: `note-event` (page 50), and `phrasing-slur-event` (page 51),

This engraver creates the following layout object(s): `PhrasingSlur` (page 453).

`Pitched_trill_engraver` (page 313)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), and `TrillPitchHead` (page 497).

`Repeat_tie_engraver` (page 314)
Create repeat ties.

Music types accepted: `repeat-tie-event` (page 51),

This engraver creates the following layout object(s): `RepeatTie` (page 459), and `RepeatTieColumn` (page 460).

`Rest_engraver` (page 315)
Engrave rests.

Music types accepted: `rest-event` (page 51),

Properties (read)

`middleCPosition` (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

This engraver creates the following layout object(s): `Rest` (page 460).

`Rhythmic_column_engraver` (page 315)
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 445).

`Script_column_engraver` (page 315)
: Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

  This engraver creates the following layout object(s): `ScriptColumn` (page 463).

`Script_engraver` (page 315)
: Handle note scripted articulations.

  Music types accepted: `articulation-event` (page 46),

  Properties (read)

  `scriptDefinitions` (list)
  : The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See `scm/script.scm` for more information.

  This engraver creates the following layout object(s): `Script` (page 461).

`Slash_repeat_engraver` (page 316)
: Make beat repeats.

  Music types accepted: `repeat-slash-event` (page 51),

  This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 390), and `RepeatSlash` (page 458).

`Slur_engraver` (page 317)
: Build slur grobs from slur events.

  Music types accepted: `note-event` (page 50), and `slur-event` (page 52),

  Properties (read)

  `doubleSlurs` (boolean)
  : If set, two slurs are created for every slurred note, one above and one below the chord.

  `slurMelismaBusy` (boolean)
  : Signal if a slur is present.

  This engraver creates the following layout object(s): `Slur` (page 463).

`Spanner_break_forbid_engraver` (page 318)
: Forbid breaks in certain spanners.

`Stem_engraver` (page 319)
: Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

  Music types accepted: `tremolo-event` (page 54), and `tuplet-span-event` (page 54),

  Properties (read)

  `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`.

`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`.

This engraver creates the following layout object(s): `Flag` (page 401), `Stem` (page 472), `StemStub` (page 474), and `StemTremolo` (page 475).

`Text_engraver` (page 321)
: Create text scripts.

  Music types accepted: `text-script-event` (page 54),

  This engraver creates the following layout object(s): `TextScript` (page 487).

`Text_spanner_engraver` (page 322)
: Create text spanner from an event.

  Music types accepted: `text-span-event` (page 54),

  Properties (read)

  `currentMusicalColumn` (graphical (layout) object)
  : Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

  This engraver creates the following layout object(s): `TextSpanner` (page 489).

`Tie_engraver` (page 322)
: Generate ties between note heads of equal pitch.

  Music types accepted: `tie-event` (page 54),

  Properties (read)

  `skipTypesetting` (boolean)
  : If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

  `tieWaitForNote` (boolean)
  : If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

  Properties (write)

  `tieMelismaBusy` (boolean)
  : Signal whether a tie is present.

  This engraver creates the following layout object(s): `Tie` (page 490), and `TieColumn` (page 492).

`Trill_spanner_engraver` (page 324)
: Create trill spanner from an event.

  Music types accepted: `trill-span-event` (page 54),

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TrillSpanner` (page 498).

`Tuplet_engraver` (page 325)
Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 54),

Properties (read)

`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.

This engraver creates the following layout object(s): `TupletBracket` (page 499), and `TupletNumber` (page 500).

2.1.7 Dynamics

Holds a single line of dynamics, which will be centered between the staves surrounding this context.

This context also accepts commands for the following context(s): `Voice` (page 268).

This context creates the following layout object(s): `BarLine` (page 354), `DynamicLineSpanner` (page 392), `DynamicText` (page 394), `DynamicTextSpanner` (page 395), `Hairpin` (page 409), `PianoPedalBracket` (page 455), `Script` (page 461), `SostenutoPedal` (page 465), `SustainPedal` (page 479), `TextScript` (page 487), `TextSpanner` (page 489), `UnaCordaPedal` (page 501), and `VerticalAxisGroup` (page 505).

This context sets the following properties:

- Set grob property `font-shape` in `TextScript` (page 487), to `'italic`.
- Set grob property `nonstaff-relatedstaff-spacing` in `VerticalAxisGroup` (page 505), to:
  `'((basic-distance . 5) (padding . 0.5))`
- Set grob property `outside-staff-priority` in `DynamicLineSpanner` (page 392), to `#f`.
- Set grob property `outside-staff-priority` in `DynamicText` (page 394), to `#f`.
- Set grob property `outside-staff-priority` in `Hairpin` (page 409), to `#f`.
- Set grob property `staff-affinity` in `VerticalAxisGroup` (page 505), to `0`.
- Set grob property `Y-offset` in `DynamicLineSpanner` (page 392), to `0`.
- Set translator property `pedalSustainStrings` to:
  `'("Ped." "*Ped." "*")`
- Set translator property `pedalUnaCordaStrings` to:
  `'("una corda" "" "tre corde")`

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

`Axis_group_engraver` (page 282)
Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Bar_engraver` (page 283)
: Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

`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`.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `BarLine` (page 354).

`Dynamic_align_engraver` (page 293)
: Align hairpins and dynamic texts on a horizontal line.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `DynamicLineSpanner` (page 392).

`Dynamic_engraver` (page 293)
: Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 45), `break-span-event` (page 47), and `span-dynamic-event` (page 52),

Properties (read)

`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.`'.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`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.`'.

This engraver creates the following layout object(s): `DynamicText` (page 394), `DynamicTextSpanner` (page 395), and `Hairpin` (page 409).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
: The relative size of all grobs in a context.

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Piano_pedal_engraver` (page 312)
: Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 52), `sustain-event` (page 54), and `una-corda-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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`.

This engraver creates the following layout object(s): `PianoPedalBracket` (page 455), `SostenutoPedal` (page 465), `SustainPedal` (page 479), and `UnaCordaPedal` (page 501).

`Script_engraver` (page 315)
: Handle note scripted articulations.

Music types accepted: `articulation-event` (page 46),

Properties (read)

`scriptDefinitions` (list)
: The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See `scm/script.scm` for more information.

This engraver creates the following layout object(s): `Script` (page 461).

`Text_engraver` (page 321)
: Create text scripts.

Music types accepted: `text-script-event` (page 54),

This engraver creates the following layout object(s): `TextScript` (page 487).

`Text_spanner_engraver` (page 322)
: Create text spanner from an event.

Music types accepted: `text-span-event` (page 54),

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TextSpanner` (page 489).

2.1.8 FiguredBass

A context for printing a figured bass line.

This context creates the following layout object(s): `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), `BassFigureLine` (page 362), `StaffSpacing` (page 470), and `VerticalAxisGroup` (page 505).

This context sets the following properties:

- Set grob property `nonstaff-nonstaff-spacing.padding` in `VerticalAxisGroup` (page 505), to `0.5`.
- Set grob property `nonstaff-relatedstaff-spacing.padding` in `VerticalAxisGroup` (page 505), to `0.5`.

- Set grob property `remove-empty` in `VerticalAxisGroup` (page 505), to `#t`.
- Set grob property `remove-first` in `VerticalAxisGroup` (page 505), to `#t`.
- Set grob property `staff-affinity` in `VerticalAxisGroup` (page 505), to `1`.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

`Axis_group_engraver` (page 282)

Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Figured_bass_engraver` (page 294)

Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 46), and `rest-event` (page 51),

Properties (read)

`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.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s): `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), and `BassFigureLine` (page 362).

`Separating_line_group_engraver` (page 316)
Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)
Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)
True if the current `CommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 470).

2.1.9 FretBoards

A context for displaying fret diagrams.

This context also accepts commands for the following context(s): `Staff` (page 217).

This context creates the following layout object(s): `FretBoard` (page 404), `InstrumentName` (page 413), `StaffSpacing` (page 470), and `VerticalAxisGroup` (page 505).

This context sets the following properties:

- Set translator property `handleNegativeFrets` to `'recalculate`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `predefinedDiagramTable` to `#<hash-table 0/113>`.
- Set translator property `restrainOpenStrings` to `#f`.
- Set translator property `shortInstrumentName` to `'()`.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

`Axis_group_engraver` (page 282)
Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Font_size_engraver` (page 296)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
The relative size of all grobs in a context.

`Fretboard_engraver` (page 296)

Generate fret diagram from one or more events of type `NoteEvent`.

Music types accepted: `fingering-event` (page 48), `note-event` (page 50), and `string-number-event` (page 53),

Properties (read)

`chordChanges` (boolean)
Only show changes in chords scheme?

`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.

`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.

`maximumFretStretch` (number)
Don't allocate frets further than this from specified frets.

`minimumFret` (number)
The tablature auto string-selecting mechanism selects the highest string with a fret at least `minimumFret`.

`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.

`predefinedDiagramTable` (hash table)
The hash table of predefined fret diagrams to use in FretBoards.

`stringTunings` (list)
The tablature strings tuning. It is a list of the pitches of each string (starting with the lowest numbered one).

`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.

This engraver creates the following layout object(s): `FretBoard` (page 404).

`Instrument_name_engraver` (page 300)

Create a system start text for instrument or vocal names.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

`shortInstrumentName` (markup)
See `instrumentName`.

`shortVocalName` (markup)
Name of a vocal line, short version.

`vocalName` (markup)
Name of a vocal line.

This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Output_property_engraver` (page 309)
Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Separating_line_group_engraver` (page 316)
Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)
Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)
True if the current `CommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 470).

2.1.10 `Global`

Hard coded entry point for LilyPond. Cannot be tuned.

This context creates the following layout object(s): none.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `Score` (page 196).

Context `Global` can contain `Score` (page 196).

2.1.11 `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.

This context creates the following layout object(s): `Arpeggio` (page 351), `InstrumentName` (page 413), `SpanBar` (page 468), `SpanBarStub` (page 469), `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), `SystemStartSquare` (page 484), and `VerticalAlignment` (page 504).

This context sets the following properties:

- Set grob property `extra-spacing-width` in `DynamicText` (page 394), to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localAlterations` to `'()`.

- Set translator property `shortInstrumentName` to `'()`.
- Set translator property `systemStartDelimiter` to `'SystemStartBrace`.
- Set translator property `topLevelAlignment` to `#f`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `Staff` (page 217).

Context `GrandStaff` can contain `ChordNames` (page 62), `DrumStaff` (page 75), `Dynamics` (page 91), `FiguredBass` (page 94), `Lyrics` (page 141), `RhythmicStaff` (page 193), `Staff` (page 217), and `TabStaff` (page 229).

This context is built from the following engraver(s):

`Instrument_name_engraver` (page 300)
: Create a system start text for instrument or vocal names.

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `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.

  `shortInstrumentName` (markup)
  : See `instrumentName`.

  `shortVocalName` (markup)
  : Name of a vocal line, short version.

  `vocalName` (markup)
  : Name of a vocal line.

  This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Span_arpeggio_engraver` (page 317)
: Make arpeggios that span multiple staves.

  Properties (read)

  `connectArpeggios` (boolean)
  : If set, connect arpeggios across piano staff.

  This engraver creates the following layout object(s): `Arpeggio` (page 351).

`Span_bar_engraver` (page 318)
: Make cross-staff bar lines: It catches all normal bar lines and draws a single span bar across them.

  This engraver creates the following layout object(s): `SpanBar` (page 468).

`Span_bar_stub_engraver` (page 318)
: Make stubs for span bars in all contexts that the span bars cross.

  This engraver creates the following layout object(s): `SpanBarStub` (page 469).

`System_start_delimiter_engraver` (page 320)
: Create a system start delimiter (i.e., a `SystemStartBar`, `SystemStartBrace`, `SystemStartBracket` or `SystemStartSquare` spanner).

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

This engraver creates the following layout object(s): `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), and `SystemStartSquare` (page 484).

`Vertical_align_engraver` (page 325)
: Catch groups (staves, lyrics lines, etc.) and stack them vertically.

Properties (read)

`alignAboveContext` (string)
: Where to insert newly created context in vertical alignment.

`alignBelowContext` (string)
: Where to insert newly created context in vertical alignment.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAlignment` (page 504).

2.1.12 GregorianTranscriptionStaff

Handles clefs, bar lines, keys, accidentals. It can contain `Voice` contexts.

This context also accepts commands for the following context(s): `Staff` (page 217).

This context creates the following layout object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), `AccidentalSuggestion` (page 345), `BarLine` (page 354), `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureAlignmentPositioning` (page 360), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), `BassFigureLine` (page 362), `Clef` (page 372), `ClefModifier` (page 374), `CueClef` (page 378), `CueEndClef` (page 381), `DotColumn` (page 386), `FingeringColumn` (page 401), `InstrumentName` (page 413), `KeyCancellation` (page 417), `KeySignature` (page 419), `LedgerLineSpanner` (page 424), `NoteCollision` (page 445), `OttavaBracket` (page 448), `PianoPedalBracket` (page 455), `RestCollision` (page 461), `ScriptRow` (page 463), `SostenutoPedal` (page 465), `SostenutoPedalLineSpanner` (page 466), `StaffSpacing` (page 470), `StaffSymbol` (page 471), `SustainPedal` (page 479), `SustainPedalLineSpanner` (page 480), `TimeSignature` (page 492), `UnaCordaPedal` (page 501), `UnaCordaPedalLineSpanner` (page 503), and `VerticalAxisGroup` (page 505).

This context sets the following properties:

- Set grob property `hair-thickness` in `BarLine` (page 354), to `1.9`.

- Set grob property `thick-thickness` in `BarLine` (page 354), to `1.9`.
- Set translator property `createSpacing` to `#t`.
- Set translator property `defaultBarType` to `""`.
- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localAlterations` to `'()`.
- Set translator property `ottavationMarkups` to:

```
'((4 . "29")
 (3 . "22")
 (2 . "15")
 (1 . "8")
 (-1 . "8")
 (-2 . "15")
 (-3 . "22")
 (-4 . "29"))
```

- Set translator property `shortInstrumentName` to `'()`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `GregorianTranscriptionVoice` (page 110).

Context `GregorianTranscriptionStaff` can contain `CueVoice` (page 64), `GregorianTranscriptionVoice` (page 110), and `NullVoice` (page 167).

This context is built from the following engraver(s):

`Accidental_engraver` (page 279)

Make accidentals. Catch note heads, ties and notices key-change events. This engraver usually lives at Staff level, but reads the settings for Accidental at `Voice` level, so you can `\override` them at `Voice`.

Properties (read)

`accidentalGrouping` (symbol)

If set to `'voice`, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

`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.

`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.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`harmonicAccidentals` (boolean)
: If set, harmonic notes in chords get accidentals.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`localAlterations` (list)
: The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber . measureposition`*`))` pairs.

Properties (write)

`localAlterations` (list)
: The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber . measureposition`*`))` pairs.

This engraver creates the following layout object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), and `AccidentalSuggestion` (page 345).

`Axis_group_engraver` (page 282)
Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Bar_engraver` (page 283)
Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

`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`.

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `BarLine` (page 354).

`Clef_engraver` (page 287)
Determine and set reference point for pitches.

Properties (read)

`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.

`clefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`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.

This engraver creates the following layout object(s): `Clef` (page 372), and `ClefModifier` (page 374).

`Collision_engraver` (page 288)
: Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s): `NoteCollision` (page 445).

`Cue_clef_engraver` (page 290)
: Determine and set reference point for pitches in cued voices.

Properties (read)

`clefTransposition` (integer)
: Add this much extra transposition. Values of 7 and -7 are common.

`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.

`cueClefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitCueClefVisibility` (vector)
: '`break-visibility`' function for cue clef changes.

`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`.

This engraver creates the following layout object(s): `ClefModifier` (page 374), `CueClef` (page 378), and `CueEndClef` (page 381).

`Dot_column_engraver` (page 291)
: Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s): `DotColumn` (page 386).

`Figured_bass_engraver` (page 294)
Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 46), and `rest-event` (page 51),

Properties (read)

`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.

`ignoreFiguredBassRest` (boolean)
Don't swallow rest events.

`implicitBassFigures` (list)
A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s): `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), and `BassFigureLine` (page 362).

`Figured_bass_position_engraver` (page 295)
Position figured bass alignments over notes.

This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 360).

`Fingering_column_engraver` (page 295)
Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `FingeringColumn` (page 401).

`Font_size_engraver` (page 296)
Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
The relative size of all grobs in a context.

`Grob_pq_engraver` (page 299)
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
A queue of (*`end-moment . grob`*) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`busyGrobs` (list)
: A queue of `(end-moment . grob)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_name_engraver` (page 300)
: Create a system start text for instrument or vocal names.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

`shortInstrumentName` (markup)
: See `instrumentName`.

`shortVocalName` (markup)
: Name of a vocal line, short version.

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Key_engraver` (page 301)
: Engrave a key signature.

Music types accepted: `key-change-event` (page 48),

Properties (read)

`createKeyOnClefChange` (boolean)
: Print a key signature whenever the clef is changed.

`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.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`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).

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`middleCClefPosition` (number)
: The position of the middle C, as determined only by the clef. This can be calculated by looking at `clefPosition` and `clefGlyph`.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

Properties (write)

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`tonic` (pitch)
: The tonic of the current scale.

This engraver creates the following layout object(s): `KeyCancellation` (page 417), and `KeySignature` (page 419).

`Ledger_line_engraver` (page 303)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 424).

`Merge_mmrest_numbers_engraver` (page 305)
: Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Ottava_spanner_engraver` (page 309)
: Create a text spanner when the ottavation property changes.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`middleCOffset` (number)
: The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

`ottavation` (markup)
: If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s): `OttavaBracket` (page 448).

`Output_property_engraver` (page 309)
Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Piano_pedal_align_engraver` (page 311)
Align piano pedal symbols and brackets.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 466), `SustainPedalLineSpanner` (page 480), and `UnaCordaPedalLineSpanner` (page 503).

`Piano_pedal_engraver` (page 312)
Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 52), `sustain-event` (page 54), and `una-corda-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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`.

This engraver creates the following layout object(s): `PianoPedalBracket` (page 455), `SostenutoPedal` (page 465), `SustainPedal` (page 479), and `UnaCordaPedal` (page 501).

`Pure_from_neighbor_engraver` (page 313)
Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 315)
Handle collisions of rests.

Properties (read)

`busyGrobs` (list)
A queue of `(end-moment . grob)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s): `RestCollision` (page 461).

`Script_row_engraver` (page 316)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 463).

`Separating_line_group_engraver` (page 316)
Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)
Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)
True if the current `CommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 470).

`Staff_collecting_engraver` (page 318)
Maintain the `stavesFound` variable.

Properties (read)

`stavesFound` (list of grobs)
A list of all staff-symbols found.

Properties (write)

`stavesFound` (list of grobs)
A list of all staff-symbols found.

`Staff_symbol_engraver` (page 319)
Create the constellation of five (default) staff lines.

Music types accepted: `staff-span-event` (page 53),

This engraver creates the following layout object(s): `StaffSymbol` (page 471).

`Time_signature_engraver` (page 323)
Create a Section 3.1.133 [`TimeSignature`], page 492, whenever `timeSignatureFraction` changes.

Music types accepted: `time-signature-event` (page 54),

Properties (read)

`initialTimeSignatureVisibility` (vector)
break visibility for the initial time signature.

`partialBusy` (boolean)
Signal that \partial acts at the current timestep.

`timeSignatureFraction` (fraction, as pair)
: A pair of numbers, signifying the time signature. For example, `'(4 . 4)` is a 4/4 time signature.

This engraver creates the following layout object(s): `TimeSignature` (page 492).

2.1.13 GregorianTranscriptionVoice

Corresponds to a voice on a staff. This context handles the conversion of dynamic signs, stems, beams, super- and subscripts, slurs, ties, and rests.

You have to instantiate this explicitly if you want to have multiple voices on the same staff.

This context also accepts commands for the following context(s): `Voice` (page 268).

This context creates the following layout object(s): `Arpeggio` (page 351), `Beam` (page 362), `BendAfter` (page 364), `BreathingSign` (page 369), `ClusterSpanner` (page 376), `ClusterSpannerBeacon` (page 376), `CombineTextScript` (page 377), `Dots` (page 386), `DoublePercentRepeat` (page 387), `DoublePercentRepeatCounter` (page 388), `DoubleRepeatSlash` (page 390), `DynamicLineSpanner` (page 392), `DynamicText` (page 394), `DynamicTextSpanner` (page 395), `Episema` (page 397), `FingerGlideSpanner` (page 398), `Fingering` (page 399), `Flag` (page 401), `Glissando` (page 406), `Hairpin` (page 409), `InstrumentSwitch` (page 413), `LaissezVibrerTie` (page 423), `LaissezVibrerTieColumn` (page 424), `LigatureBracket` (page 427), `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), `MultiMeasureRestText` (page 442), `NoteColumn` (page 445), `NoteHead` (page 446), `NoteSpacing` (page 448), `PercentRepeat` (page 451), `PercentRepeatCounter` (page 452), `PhrasingSlur` (page 453), `RepeatSlash` (page 458), `RepeatTie` (page 459), `RepeatTieColumn` (page 460), `Rest` (page 460), `Script` (page 461), `ScriptColumn` (page 463), `Slur` (page 463), `Stem` (page 472), `StemStub` (page 474), `StemTremolo` (page 475), `StringNumber` (page 476), `StrokeFinger` (page 477), `TextScript` (page 487), `TextSpanner` (page 489), `Tie` (page 490), `TieColumn` (page 492), `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), `TrillPitchHead` (page 497), `TrillSpanner` (page 498), `TupletBracket` (page 499), `TupletNumber` (page 500), and `VoiceFollower` (page 507).

This context sets the following properties:

- Set grob property `padding` in `Script` (page 461), to `0.5`.
- Set grob property `transparent` in `LigatureBracket` (page 427), to `#t`.
- Set translator property `autoBeaming` to `#f`.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

`Arpeggio_engraver` (page 281)
: Generate an Arpeggio symbol.

  Music types accepted: `arpeggio-event` (page 46),

  This engraver creates the following layout object(s): `Arpeggio` (page 351).

`Auto_beam_engraver` (page 281)
: Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.124 [`Stem_engraver`], page 319, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
: If set to true then beams are generated automatically.

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`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.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Beam_engraver` (page 284)
: Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `Beam` (page 362).

`Bend_engraver` (page 285)
: Create fall spanners.

Music types accepted: `bend-after-event` (page 46),

This engraver creates the following layout object(s): `BendAfter` (page 364).

`Breathing_sign_engraver` (page 286)
: Create a breathing sign.

  Music types accepted: `breathing-event` (page 47),

  This engraver creates the following layout object(s): `BreathingSign` (page 369).

`Chord_tremolo_engraver` (page 287)
: Generate beams for tremolo repeats.

  Music types accepted: `tremolo-span-event` (page 54),

  This engraver creates the following layout object(s): `Beam` (page 362).

`Cluster_spanner_engraver` (page 288)
: Engrave a cluster using `Spanner` notation.

  Music types accepted: `cluster-note-event` (page 47),

  This engraver creates the following layout object(s): `ClusterSpanner` (page 376), and `ClusterSpannerBeacon` (page 376).

`Dots_engraver` (page 291)
: Create Section 3.1.36 [`Dots`], page 386, objects for Section 3.2.103 [`rhythmic-head-interface`], page 567s.

  This engraver creates the following layout object(s): `Dots` (page 386).

`Double_percent_repeat_engraver` (page 291)
: Make double measure repeats.

  Music types accepted: `double-percent-event` (page 47),

  Properties (read)

  `countPercentRepeats` (boolean)
  : If set, produce counters for percent repeats.

  `measureLength` (moment)
  : Length of one measure in the current time signature.

  `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.

  Properties (write)

  `forbidBreak` (boolean)
  : If set to `#t`, prevent a line break at this point.

  This engraver creates the following layout object(s): `DoublePercentRepeat` (page 387), and `DoublePercentRepeatCounter` (page 388).

`Dynamic_align_engraver` (page 293)
: Align hairpins and dynamic texts on a horizontal line.

  Properties (read)

  `currentMusicalColumn` (graphical (layout) object)
  : Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

  This engraver creates the following layout object(s): `DynamicLineSpanner` (page 392).

`Dynamic_engraver` (page 293)
: Create hairpins, dynamic texts and dynamic text spanners.

  Music types accepted: `absolute-dynamic-event` (page 45), `break-span-event` (page 47), and `span-dynamic-event` (page 52),

  Properties (read)

  `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.`'.

  `currentMusicalColumn` (graphical (layout) object)
  : Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

  `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.`'.

  This engraver creates the following layout object(s): `DynamicText` (page 394), `DynamicTextSpanner` (page 395), and `Hairpin` (page 409).

`Episema_engraver` (page 294)
: Create an *Editio Vaticana*-style episema line.

  Music types accepted: `episema-event` (page 47),

  This engraver creates the following layout object(s): `Episema` (page 397).

`Finger_glide_engraver` (page 295)
: Engraver to print a line between two `Fingering` grobs.

  Music types accepted: `note-event` (page 50),

  This engraver creates the following layout object(s): `FingerGlideSpanner` (page 398).

`Fingering_engraver` (page 295)
: Create fingering scripts.

  Music types accepted: `fingering-event` (page 48),

  This engraver creates the following layout object(s): `Fingering` (page 399).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

  Properties (read)

  `fontSize` (number)
  : The relative size of all grobs in a context.

`Forbid_line_break_engraver` (page 296)
: Forbid line breaks when note heads are still playing at some point.

Properties (read)

`busyGrobs` (list)
: A queue of `(end-moment . grob)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

`Glissando_engraver` (page 297)
: Engrave glissandi.

Music types accepted: `glissando-event` (page 48),

Properties (read)

`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.

This engraver creates the following layout object(s): `Glissando` (page 406).

`Grace_auto_beam_engraver` (page 297)
: Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeaming, just like setting the context property '`autoBeaming`' to `##f`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
: If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_beam_engraver` (page 298)
: Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_engraver` (page 298)
Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`Grob_pq_engraver` (page 299)
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_switch_engraver` (page 300)
Create a cue text for taking instrument.

Properties (read)

`instrumentCueName` (markup)
The name to print if another instrument is to be taken.

This engraver creates the following layout object(s): `InstrumentSwitch` (page 413).

`Laissez_vibrer_engraver` (page 302)
Create laissez vibrer items.

Music types accepted: `laissez-vibrer-event` (page 48),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 423), and `LaissezVibrerTieColumn` (page 424).

`Ligature_bracket_engraver` (page 303)
Handle `Ligature_events` by engraving `Ligature` brackets.

Music types accepted: `ligature-event` (page 49),

This engraver creates the following layout object(s): `LigatureBracket` (page 427).

`Multi_measure_rest_engraver` (page 306)
Engrave multi-measure rests that are produced with '`R`'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the Section 3.1.80 [`MultiMeasureRest`], page 438.

Music types accepted: `multi-measure-articulation-event` (page 49), `multi-measure-rest-event` (page 49), and `multi-measure-text-event` (page 50),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`measureStartNow` (boolean)
: True at the beginning of a measure.

`restNumberThreshold` (number)
: If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), and `MultiMeasureRestText` (page 442).

`New_fingering_engraver` (page 307)
: Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

`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.

`harmonicDots` (boolean)
: If set, harmonic notes in dotted chords get dots.

`stringNumberOrientations` (list)
: See `fingeringOrientations`.

`strokeFingerOrientations` (list)
: See `fingeringOrientations`.

This engraver creates the following layout object(s): `Fingering` (page 399), `Script` (page 461), `StringNumber` (page 476), and `StrokeFinger` (page 477).

`Note_head_line_engraver` (page 307)
: Engrave a line between two note heads in a staff switch if `followVoice` is set.

Properties (read)

`followVoice` (boolean)
: If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s): `VoiceFollower` (page 507).

`Note_heads_engraver` (page 308)
: Generate note heads.

Music types accepted: `note-event` (page 50),

Properties (read)

`middleCPosition` (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

`staffLineLayoutFunction` (procedure)
: Layout of staff lines, `traditional`, or `semitone`.

This engraver creates the following layout object(s): `NoteHead` (page 446).

`Note_spacing_engraver` (page 309)
: Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s): `NoteSpacing` (page 448).

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Part_combine_engraver` (page 310)
: Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted: `note-event` (page 50), and `part-combine-event` (page 51),

Properties (read)

`aDueText` (markup)
: Text to print at a unisono passage.

`partCombineTextsOnNote` (boolean)
: Print part-combine texts only on the next note rather than immediately on rests or skips.

`printPartCombineTexts` (boolean)
: Set 'Solo' and 'A due' texts in the part combiner?

`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.

This engraver creates the following layout object(s): `CombineTextScript` (page 377).

`Percent_repeat_engraver` (page 311)
: Make whole measure repeats.

Music types accepted: `percent-event` (page 51),

Properties (read)

`countPercentRepeats` (boolean)
: If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

This engraver creates the following layout object(s): `PercentRepeat` (page 451), and `PercentRepeatCounter` (page 452).

`Phrasing_slur_engraver` (page 311)
Print phrasing slurs. Similar to Section 2.2.111 [`Slur_engraver`], page 317.

Music types accepted: `note-event` (page 50), and `phrasing-slur-event` (page 51),

This engraver creates the following layout object(s): `PhrasingSlur` (page 453).

`Pitched_trill_engraver` (page 313)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), and `TrillPitchHead` (page 497).

`Repeat_tie_engraver` (page 314)
Create repeat ties.

Music types accepted: `repeat-tie-event` (page 51),

This engraver creates the following layout object(s): `RepeatTie` (page 459), and `RepeatTieColumn` (page 460).

`Rest_engraver` (page 315)
Engrave rests.

Music types accepted: `rest-event` (page 51),

Properties (read)

`middleCPosition` (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

This engraver creates the following layout object(s): `Rest` (page 460).

`Rhythmic_column_engraver` (page 315)
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 445).

`Script_column_engraver` (page 315)
Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 463).

`Script_engraver` (page 315)
Handle note scripted articulations.

Music types accepted: `articulation-event` (page 46),

Properties (read)

`scriptDefinitions` (list)
The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See `scm/script.scm` for more information.

This engraver creates the following layout object(s): `Script` (page 461).

`Slash_repeat_engraver` (page 316)
Make beat repeats.

Music types accepted: `repeat-slash-event` (page 51),

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 390), and `RepeatSlash` (page 458).

`Slur_engraver` (page 317)
Build slur grobs from slur events.

Music types accepted: `note-event` (page 50), and `slur-event` (page 52),

Properties (read)

`doubleSlurs` (boolean)
If set, two slurs are created for every slurred note, one above and one below the chord.

`slurMelismaBusy` (boolean)
Signal if a slur is present.

This engraver creates the following layout object(s): `Slur` (page 463).

`Spanner_break_forbid_engraver` (page 318)
Forbid breaks in certain spanners.

`Stem_engraver` (page 319)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 54), and `tuplet-span-event` (page 54),

Properties (read)

`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`.

`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`.

This engraver creates the following layout object(s): `Flag` (page 401), `Stem` (page 472), `StemStub` (page 474), and `StemTremolo` (page 475).

`Text_engraver` (page 321)
Create text scripts.

Music types accepted: `text-script-event` (page 54),

This engraver creates the following layout object(s): `TextScript` (page 487).

`Text_spanner_engraver` (page 322)
Create text spanner from an event.

Music types accepted: `text-span-event` (page 54),

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TextSpanner` (page 489).

`Tie_engraver` (page 322)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 54),

Properties (read)

`skipTypesetting` (boolean)
If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

`tieWaitForNote` (boolean)
If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

`tieMelismaBusy` (boolean)
Signal whether a tie is present.

This engraver creates the following layout object(s): `Tie` (page 490), and `TieColumn` (page 492).

`Trill_spanner_engraver` (page 324)
Create trill spanner from an event.

Music types accepted: `trill-span-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TrillSpanner` (page 498).

`Tuplet_engraver` (page 325)
Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 54),

Properties (read)

`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.

This engraver creates the following layout object(s): `TupletBracket` (page 499), and `TupletNumber` (page 500).

2.1.14 KievanStaff

Same as `Staff` context, except that it is accommodated for typesetting a piece in Kievan style.

This context also accepts commands for the following context(s): `Staff` (page 217).

This context creates the following layout object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), `AccidentalSuggestion` (page 345), `BarLine` (page 354), `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureAlignmentPositioning` (page 360), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), `BassFigureLine` (page 362), `Clef` (page 372), `ClefModifier` (page 374), `CueClef` (page 378), `CueEndClef` (page 381), `DotColumn` (page 386), `FingeringColumn` (page 401), `InstrumentName` (page 413), `KeyCancellation` (page 417), `KeySignature` (page 419), `LedgerLineSpanner` (page 424), `NoteCollision` (page 445), `OttavaBracket` (page 448), `PianoPedalBracket` (page 455), `RestCollision` (page 461), `ScriptRow` (page 463), `SostenutoPedal` (page 465), `SostenutoPedalLineSpanner` (page 466), `StaffSpacing` (page 470), `StaffSymbol` (page 471), `SustainPedal` (page 479), `SustainPedalLineSpanner` (page 480), `UnaCordaPedal` (page 501), `UnaCordaPedalLineSpanner` (page 503), and `VerticalAxisGroup` (page 505).

This context sets the following properties:

- Set translator property `autoAccidentals` to:

```
'(Staff #<procedure #f (context pitch barnum measurepos)>
     #<procedure neo-modern-accidental-rule (context pitch barnum measurepos)>)
```

- Set translator property `autoCautionaries` to `'()`.
- Set translator property `clefGlyph` to `"clefs.kievan.do"`.
- Set translator property `clefPosition` to `0`.
- Set translator property `clefTransposition` to `0`.
- Set translator property `createSpacing` to `#t`.
- Set translator property `extraNatural` to `#f`.
- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localAlterations` to `'()`.
- Set translator property `middleCClefPosition` to `0`.
- Set translator property `middleCPosition` to `0`.
- Set translator property `ottavationMarkups` to:

```
'((4 . "29")
  (3 . "22")
  (2 . "15")
  (1 . "8")
```

```
(-1 . "8")
(-2 . "15")
(-3 . "22")
(-4 . "29"))
```

- Set translator property `printKeyCancellation` to `#f`.
- Set translator property `shortInstrumentName` to `'()`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `KievanVoice` (page 130).

Context `KievanStaff` can contain `CueVoice` (page 64), `KievanVoice` (page 130), and `NullVoice` (page 167).

This context is built from the following engraver(s):

`Accidental_engraver` (page 279)
: Make accidentals. Catch note heads, ties and notices key-change events. This engraver usually lives at Staff level, but reads the settings for Accidental at `Voice` level, so you can `\override` them at `Voice`.

  Properties (read)

  `accidentalGrouping` (symbol)
  : If set to `'voice`, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

  `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.

`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.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`harmonicAccidentals` (boolean)
: If set, harmonic notes in chords get accidentals.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`localAlterations` (list)
: The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber . measureposition`*`))` pairs.

Properties (write)

`localAlterations` (list)
: The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber . measureposition`*`))` pairs.

This engraver creates the following layout object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), and `AccidentalSuggestion` (page 345).

`Axis_group_engraver` (page 282)
: Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Bar_engraver` (page 283)
: Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

`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`.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `BarLine` (page 354).

`Clef_engraver` (page 287)
: Determine and set reference point for pitches.

Properties (read)

`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.

`clefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`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.

This engraver creates the following layout object(s): `Clef` (page 372), and `ClefModifier` (page 374).

`Collision_engraver` (page 288)
Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s): `NoteCollision` (page 445).

`Cue_clef_engraver` (page 290)
Determine and set reference point for pitches in cued voices.

Properties (read)

`clefTransposition` (integer)
Add this much extra transposition. Values of 7 and -7 are common.

`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.

`cueClefTranspositionStyle` (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitCueClefVisibility` (vector)
'`break-visibility`' function for cue clef changes.

`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`.

This engraver creates the following layout object(s): `ClefModifier` (page 374), `CueClef` (page 378), and `CueEndClef` (page 381).

`Dot_column_engraver` (page 291)
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s): `DotColumn` (page 386).

`Figured_bass_engraver` (page 294)
Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 46), and `rest-event` (page 51),

Properties (read)

`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.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s): `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), and `BassFigureLine` (page 362).

`Figured_bass_position_engraver` (page 295)
: Position figured bass alignments over notes.

This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 360).

`Fingering_column_engraver` (page 295)
: Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `FingeringColumn` (page 401).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
: The relative size of all grobs in a context.

`Grob_pq_engraver` (page 299)
: Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_name_engraver` (page 300)
: Create a system start text for instrument or vocal names.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

`shortInstrumentName` (markup)
: See `instrumentName`.

`shortVocalName` (markup)
: Name of a vocal line, short version.

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Key_engraver` (page 301)
: Engrave a key signature.

Music types accepted: `key-change-event` (page 48),

Properties (read)

`createKeyOnClefChange` (boolean)
: Print a key signature whenever the clef is changed.

`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.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`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).

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`middleCClefPosition` (number)
: The position of the middle C, as determined only by the clef. This can be calculated by looking at `clefPosition` and `clefGlyph`.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

Properties (write)

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`tonic` (pitch)
: The tonic of the current scale.

This engraver creates the following layout object(s): `KeyCancellation` (page 417), and `KeySignature` (page 419).

`Ledger_line_engraver` (page 303)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 424).

`Merge_mmrest_numbers_engraver` (page 305)
: Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Ottava_spanner_engraver` (page 309)
: Create a text spanner when the ottavation property changes.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`middleCOffset` (number)
: The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

`ottavation` (markup)
: If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s): `OttavaBracket` (page 448).

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Piano_pedal_align_engraver` (page 311)
: Align piano pedal symbols and brackets.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 466), `SustainPedalLineSpanner` (page 480), and `UnaCordaPedalLineSpanner` (page 503).

`Piano_pedal_engraver` (page 312)
: Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 52), `sustain-event` (page 54), and `una-corda-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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`.

This engraver creates the following layout object(s): `PianoPedalBracket` (page 455), `SostenutoPedal` (page 465), `SustainPedal` (page 479), and `UnaCordaPedal` (page 501).

`Pure_from_neighbor_engraver` (page 313)
: Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 315)
: Handle collisions of rests.

Properties (read)

`busyGrobs` (list)
: A queue of `(end-moment . grob)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s): `RestCollision` (page 461).

`Script_row_engraver` (page 316)
: Determine order in horizontal side position elements.

  This engraver creates the following layout object(s): `ScriptRow` (page 463).

`Separating_line_group_engraver` (page 316)
: Generate objects for computing spacing parameters.

  Properties (read)

  `createSpacing` (boolean)
  : Create `StaffSpacing` objects? Should be set for staves.

  Properties (write)

  `hasStaffSpacing` (boolean)
  : True if the current `CommandColumn` contains items that will affect spacing.

  This engraver creates the following layout object(s): `StaffSpacing` (page 470).

`Staff_collecting_engraver` (page 318)
: Maintain the `stavesFound` variable.

  Properties (read)

  `stavesFound` (list of grobs)
  : A list of all staff-symbols found.

  Properties (write)

  `stavesFound` (list of grobs)
  : A list of all staff-symbols found.

`Staff_symbol_engraver` (page 319)
: Create the constellation of five (default) staff lines.

  Music types accepted: `staff-span-event` (page 53),

  This engraver creates the following layout object(s): `StaffSymbol` (page 471).

2.1.15 KievanVoice

Same as `Voice` context, except that it is accommodated for typesetting a piece in Kievan style.

This context also accepts commands for the following context(s): `Voice` (page 268).

This context creates the following layout object(s): `Arpeggio` (page 351), `Beam` (page 362), `BendAfter` (page 364), `BreathingSign` (page 369), `ClusterSpanner` (page 376), `ClusterSpannerBeacon` (page 376), `CombineTextScript` (page 377), `Dots` (page 386), `DoublePercentRepeat` (page 387), `DoublePercentRepeatCounter` (page 388), `DoubleRepeatSlash` (page 390), `DynamicLineSpanner` (page 392), `DynamicText` (page 394), `DynamicTextSpanner` (page 395), `FingerGlideSpanner` (page 398), `Fingering` (page 399), `Flag` (page 401), `Glissando` (page 406), `Hairpin` (page 409), `InstrumentSwitch` (page 413), `KievanLigature` (page 422), `LaissezVibrerTie` (page 423), `LaissezVibrerTieColumn` (page 424), `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), `MultiMeasureRestText` (page 442), `NoteColumn` (page 445), `NoteHead` (page 446), `NoteSpacing` (page 448), `PercentRepeat` (page 451), `PercentRepeatCounter` (page 452), `PhrasingSlur` (page 453), `RepeatSlash` (page 458), `RepeatTie` (page 459), `RepeatTieColumn` (page 460), `Rest` (page 460), `Script` (page 461), `ScriptColumn` (page 463), `Slur` (page 463), `Stem` (page 472), `StemStub` (page 474), `StemTremolo` (page 475), `StringNumber` (page 476), `StrokeFinger` (page 477),

TextScript (page 487), TextSpanner (page 489), Tie (page 490), TieColumn (page 492), TrillPitchAccidental (page 495), TrillPitchGroup (page 496), TrillPitchHead (page 497), TrillSpanner (page 498), TupletBracket (page 499), TupletNumber (page 500), and VoiceFollower (page 507).

This context sets the following properties:

- Set grob property duration-log in NoteHead (page 446), to note-head::calc-kievan-duration-log.
- Set grob property glyph-name-alist in Accidental (page 342), to:
  ```
  '((-1/2 . "accidentals.kievanM1")
   (1/2 . "accidentals.kievan1"))
  ```
- Set grob property length in Stem (page 472), to 0.0.
- Set grob property positions in Beam (page 362), to beam::get-kievan-positions.
- Set grob property quantized-positions in Beam (page 362), to beam::get-kievan-quantized-positions.
- Set grob property stencil in Flag (page 401), to #f.
- Set grob property stencil in Slur (page 463), to #f.
- Set grob property stencil in Stem (page 472), to #f.
- Set grob property style in Dots (page 386), to 'kievan.
- Set grob property style in NoteHead (page 446), to 'kievan.
- Set grob property style in Rest (page 460), to 'mensural.
- Set grob property X-offset in Stem (page 472), to stem::kievan-offset-callback.
- Set translator property autoBeaming to #f.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

Arpeggio_engraver (page 281)

Generate an Arpeggio symbol.

Music types accepted: arpeggio-event (page 46),

This engraver creates the following layout object(s): Arpeggio (page 351).

Auto_beam_engraver (page 281)

Generate beams based on measure characteristics and observed Stems. Uses baseMoment, beatStructure, beamExceptions, measureLength, and measurePosition to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.124 [Stem_engraver], page 319, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 46),

Properties (read)

autoBeaming (boolean)

If set to true then beams are generated automatically.

baseMoment (moment)

Smallest unit of time that will stand on its own as a subdivided section.

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.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Beam_engraver` (page 284)
: Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `Beam` (page 362).

`Bend_engraver` (page 285)
: Create fall spanners.

Music types accepted: `bend-after-event` (page 46),

This engraver creates the following layout object(s): `BendAfter` (page 364).

`Breathing_sign_engraver` (page 286)
: Create a breathing sign.

Music types accepted: `breathing-event` (page 47),

This engraver creates the following layout object(s): `BreathingSign` (page 369).

`Chord_tremolo_engraver` (page 287)
: Generate beams for tremolo repeats.

Music types accepted: `tremolo-span-event` (page 54),

This engraver creates the following layout object(s): `Beam` (page 362).

`Cluster_spanner_engraver` (page 288)
: Engrave a cluster using `Spanner` notation.

Music types accepted: `cluster-note-event` (page 47),

This engraver creates the following layout object(s): `ClusterSpanner` (page 376), and `ClusterSpannerBeacon` (page 376).

`Dots_engraver` (page 291)

Create Section 3.1.36 [`Dots`], page 386, objects for Section 3.2.103 [`rhythmic-head-interface`], page 567s.

This engraver creates the following layout object(s): `Dots` (page 386).

`Double_percent_repeat_engraver` (page 291)

Make double measure repeats.

Music types accepted: `double-percent-event` (page 47),

Properties (read)

`countPercentRepeats` (boolean)
: If set, produce counters for percent repeats.

`measureLength` (moment)
: Length of one measure in the current time signature.

`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.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 387), and `DoublePercentRepeatCounter` (page 388).

`Dynamic_align_engraver` (page 293)

Align hairpins and dynamic texts on a horizontal line.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `DynamicLineSpanner` (page 392).

`Dynamic_engraver` (page 293)

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 45), `break-span-event` (page 47), and `span-dynamic-event` (page 52),

Properties (read)

`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.`'.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`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.`'.

This engraver creates the following layout object(s): `DynamicText` (page 394), `DynamicTextSpanner` (page 395), and `Hairpin` (page 409).

`Finger_glide_engraver` (page 295)
: Engraver to print a line between two `Fingering` grobs.

Music types accepted: `note-event` (page 50),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 398).

`Fingering_engraver` (page 295)
: Create fingering scripts.

Music types accepted: `fingering-event` (page 48),

This engraver creates the following layout object(s): `Fingering` (page 399).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
: The relative size of all grobs in a context.

`Forbid_line_break_engraver` (page 296)
: Forbid line breaks when note heads are still playing at some point.

Properties (read)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

`Glissando_engraver` (page 297)
: Engrave glissandi.

Music types accepted: `glissando-event` (page 48),

Properties (read)

`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.

This engraver creates the following layout object(s): `Glissando` (page 406).

`Grace_auto_beam_engraver` (page 297)
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeaming, just like setting the context property '`autoBeaming`' to `##f`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_beam_engraver` (page 298)
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatStructure` (list)
List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_engraver` (page 298)
Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`Grob_pq_engraver` (page 299)
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
A queue of (*`end-moment . grob`*) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

busyGrobs (list)
A queue of (*end-moment . grob*) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Instrument_switch_engraver (page 300)
Create a cue text for taking instrument.

Properties (read)

instrumentCueName (markup)
The name to print if another instrument is to be taken.

This engraver creates the following layout object(s): InstrumentSwitch (page 413).

Kievan_ligature_engraver (page 302)
Handle Kievan_ligature_events by glueing Kievan heads together.

Music types accepted: ligature-event (page 49),

This engraver creates the following layout object(s): KievanLigature (page 422).

Laissez_vibrer_engraver (page 302)
Create laissez vibrer items.

Music types accepted: laissez-vibrer-event (page 48),

This engraver creates the following layout object(s): LaissezVibrerTie (page 423), and LaissezVibrerTieColumn (page 424).

Multi_measure_rest_engraver (page 306)
Engrave multi-measure rests that are produced with 'R'. It reads measureStartNow and internalBarNumber to determine what number to print over the Section 3.1.80 [MultiMeasureRest], page 438.

Music types accepted: multi-measure-articulation-event (page 49), multi-measure-rest-event (page 49), and multi-measure-text-event (page 50),

Properties (read)

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

internalBarNumber (integer)
Contains the current barnumber. This property is used for internal timekeeping, among others by the Accidental_engraver.

measureStartNow (boolean)
True at the beginning of a measure.

restNumberThreshold (number)
If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): MultiMeasureRest (page 438), MultiMeasureRestNumber (page 439), MultiMeasureRestScript (page 441), and MultiMeasureRestText (page 442).

`New_fingering_engraver` (page 307)
: Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

  Properties (read)

  `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.

  `harmonicDots` (boolean)
  : If set, harmonic notes in dotted chords get dots.

  `stringNumberOrientations` (list)
  : See `fingeringOrientations`.

  `strokeFingerOrientations` (list)
  : See `fingeringOrientations`.

  This engraver creates the following layout object(s): `Fingering` (page 399), `Script` (page 461), `StringNumber` (page 476), and `StrokeFinger` (page 477).

`Note_head_line_engraver` (page 307)
: Engrave a line between two note heads in a staff switch if `followVoice` is set.

  Properties (read)

  `followVoice` (boolean)
  : If set, note heads are tracked across staff switches by a thin line.

  This engraver creates the following layout object(s): `VoiceFollower` (page 507).

`Note_heads_engraver` (page 308)
: Generate note heads.

  Music types accepted: `note-event` (page 50),

  Properties (read)

  `middleCPosition` (number)
  : The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

  `staffLineLayoutFunction` (procedure)
  : Layout of staff lines, `traditional`, or `semitone`.

  This engraver creates the following layout object(s): `NoteHead` (page 446).

`Note_spacing_engraver` (page 309)
: Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

  This engraver creates the following layout object(s): `NoteSpacing` (page 448).

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

  Music types accepted: `apply-output-event` (page 46),

`Part_combine_engraver` (page 310)
: Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

  Music types accepted: `note-event` (page 50), and `part-combine-event` (page 51),

  Properties (read)

  `aDueText` (markup)
  : Text to print at a unisono passage.

  `partCombineTextsOnNote` (boolean)
  : Print part-combine texts only on the next note rather than immediately on rests or skips.

  `printPartCombineTexts` (boolean)
  : Set 'Solo' and 'A due' texts in the part combiner?

  `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.

  This engraver creates the following layout object(s): `CombineTextScript` (page 377).

`Percent_repeat_engraver` (page 311)
: Make whole measure repeats.

  Music types accepted: `percent-event` (page 51),

  Properties (read)

  `countPercentRepeats` (boolean)
  : If set, produce counters for percent repeats.

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `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.

  This engraver creates the following layout object(s): `PercentRepeat` (page 451), and `PercentRepeatCounter` (page 452).

`Phrasing_slur_engraver` (page 311)
: Print phrasing slurs. Similar to Section 2.2.111 [`Slur_engraver`], page 317.

  Music types accepted: `note-event` (page 50), and `phrasing-slur-event` (page 51),

  This engraver creates the following layout object(s): `PhrasingSlur` (page 453).

`Pitched_trill_engraver` (page 313)
: Print the bracketed note head after a note head with trill.

  This engraver creates the following layout object(s): `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), and `TrillPitchHead` (page 497).

`Repeat_tie_engraver` (page 314)
: Create repeat ties.

  Music types accepted: `repeat-tie-event` (page 51),

  This engraver creates the following layout object(s): `RepeatTie` (page 459), and `RepeatTieColumn` (page 460).

`Rest_engraver` (page 315)
: Engrave rests.

  Music types accepted: `rest-event` (page 51),

  Properties (read)

  `middleCPosition` (number)
  : The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

  This engraver creates the following layout object(s): `Rest` (page 460).

`Rhythmic_column_engraver` (page 315)
: Generate `NoteColumn`, an object that groups stems, note heads, and rests.

  This engraver creates the following layout object(s): `NoteColumn` (page 445).

`Script_column_engraver` (page 315)
: Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

  This engraver creates the following layout object(s): `ScriptColumn` (page 463).

`Script_engraver` (page 315)
: Handle note scripted articulations.

  Music types accepted: `articulation-event` (page 46),

  Properties (read)

  `scriptDefinitions` (list)
  : The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See `scm/script.scm` for more information.

  This engraver creates the following layout object(s): `Script` (page 461).

`Slash_repeat_engraver` (page 316)
: Make beat repeats.

  Music types accepted: `repeat-slash-event` (page 51),

  This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 390), and `RepeatSlash` (page 458).

`Slur_engraver` (page 317)
: Build slur grobs from slur events.

  Music types accepted: `note-event` (page 50), and `slur-event` (page 52),

  Properties (read)

  `doubleSlurs` (boolean)
  : If set, two slurs are created for every slurred note, one above and one below the chord.

`slurMelismaBusy` (boolean)
Signal if a slur is present.

This engraver creates the following layout object(s): `Slur` (page 463).

`Spanner_break_forbid_engraver` (page 318)
Forbid breaks in certain spanners.

`Stem_engraver` (page 319)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 54), and `tuplet-span-event` (page 54),

Properties (read)

`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`.

`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`.

This engraver creates the following layout object(s): `Flag` (page 401), `Stem` (page 472), `StemStub` (page 474), and `StemTremolo` (page 475).

`Text_engraver` (page 321)
Create text scripts.

Music types accepted: `text-script-event` (page 54),

This engraver creates the following layout object(s): `TextScript` (page 487).

`Text_spanner_engraver` (page 322)
Create text spanner from an event.

Music types accepted: `text-span-event` (page 54),

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TextSpanner` (page 489).

`Tie_engraver` (page 322)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 54),

Properties (read)

`skipTypesetting` (boolean)
: If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

`tieWaitForNote` (boolean)
: If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

`tieMelismaBusy` (boolean)
: Signal whether a tie is present.

This engraver creates the following layout object(s): `Tie` (page 490), and `TieColumn` (page 492).

`Trill_spanner_engraver` (page 324)
: Create trill spanner from an event.

Music types accepted: `trill-span-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TrillSpanner` (page 498).

`Tuplet_engraver` (page 325)
: Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 54),

Properties (read)

`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.

This engraver creates the following layout object(s): `TupletBracket` (page 499), and `TupletNumber` (page 500).

2.1.16 Lyrics

Corresponds to a voice with lyrics. Handles the printing of a single line of lyrics.

This context creates the following layout object(s): `InstrumentName` (page 413), `LyricExtender` (page 428), `LyricHyphen` (page 428), `LyricSpace` (page 430), `LyricText` (page 430), `StanzaNumber` (page 472), `VerticalAxisGroup` (page 505), and `VowelTransition` (page 510).

This context sets the following properties:

- Set grob property `bar-extent` in `BarLine` (page 354), to:
  `'(-0.05 . 0.05)`

- Set grob property `font-size` in `InstrumentName` (page 413), to `1.0`.
- Set grob property `nonstaff-nonstaff-spacing` in `VerticalAxisGroup` (page 505), to:

```
'((basic-distance . 0)
 (minimum-distance . 2.8)
 (padding . 0.2)
 (stretchability . 0))
```

- Set grob property `nonstaff-relatedstaff-spacing` in `VerticalAxisGroup` (page 505), to:

```
'((basic-distance . 5.5)
 (padding . 0.5)
 (stretchability . 1))
```

- Set grob property `nonstaff-unrelatedstaff-spacing.padding` in `VerticalAxisGroup` (page 505), to `1.5`.
- Set grob property `remove-empty` in `VerticalAxisGroup` (page 505), to `#t`.
- Set grob property `remove-first` in `VerticalAxisGroup` (page 505), to `#t`.
- Set grob property `self-alignment-Y` in `InstrumentName` (page 413), to `#f`.
- Set grob property `staff-affinity` in `VerticalAxisGroup` (page 505), to `1`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `searchForVoice` to `#f`.
- Set translator property `shortInstrumentName` to `'()`.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

`Axis_group_engraver` (page 282)

Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Extender_engraver` (page 294)

Create lyric extenders.

Music types accepted: `completize-extender-event` (page 47), and `extender-event` (page 48),

Properties (read)

`extendersOverRests` (boolean)
: Whether to continue extenders as they cross a rest.

This engraver creates the following layout object(s): `LyricExtender` (page 428).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
: The relative size of all grobs in a context.

`Hyphen_engraver` (page 300)
: Create lyric hyphens, vowel transitions and distance constraints between words.

Music types accepted: `hyphen-event` (page 48), and `vowel-transition-event` (page 55),

This engraver creates the following layout object(s): `LyricHyphen` (page 428), `LyricSpace` (page 430), and `VowelTransition` (page 510).

`Instrument_name_engraver` (page 300)
: Create a system start text for instrument or vocal names.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

`shortInstrumentName` (markup)
: See `instrumentName`.

`shortVocalName` (markup)
: Name of a vocal line, short version.

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Lyric_engraver` (page 303)
: Engrave text for lyrics.

Music types accepted: `lyric-event` (page 49),

Properties (read)

`ignoreMelismata` (boolean)
: Ignore melismata for this Section “Lyrics” in *Internals Reference* line.

`lyricMelismaAlignment` (number)
: Alignment to use for a melisma syllable.

`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.

This engraver creates the following layout object(s): `LyricText` (page 430).

`Pure_from_neighbor_engraver` (page 313)
Coordinates items that get their pure heights from their neighbors.

`Stanza_number_engraver` (page 319)
Engrave stanza numbers.

Properties (read)

`stanza` (markup)
Stanza 'number' to print before the start of a verse. Use in `Lyrics` context.

This engraver creates the following layout object(s): `StanzaNumber` (page 472).

2.1.17 MensuralStaff

Same as `Staff` context, except that it is accommodated for typesetting a piece in mensural style.

This context also accepts commands for the following context(s): `Staff` (page 217).

This context creates the following layout object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), `AccidentalSuggestion` (page 345), `BarLine` (page 354), `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureAlignmentPositioning` (page 360), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), `BassFigureLine` (page 362), `Clef` (page 372), `ClefModifier` (page 374), `CueClef` (page 378), `CueEndClef` (page 381), `Custos` (page 384), `DotColumn` (page 386), `FingeringColumn` (page 401), `InstrumentName` (page 413), `KeyCancellation` (page 417), `KeySignature` (page 419), `LedgerLineSpanner` (page 424), `NoteCollision` (page 445), `OttavaBracket` (page 448), `PianoPedalBracket` (page 455), `RestCollision` (page 461), `ScriptRow` (page 463), `SostenutoPedal` (page 465), `SostenutoPedalLineSpanner` (page 466), `StaffSpacing` (page 470), `StaffSymbol` (page 471), `SustainPedal` (page 479), `SustainPedalLineSpanner` (page 480), `TimeSignature` (page 492), `UnaCordaPedal` (page 501), `UnaCordaPedalLineSpanner` (page 503), and `VerticalAxisGroup` (page 505).

This context sets the following properties:

- Set grob property `glyph-name-alist` in `AccidentalSuggestion` (page 345), to:

```
'((-1/2 . "accidentals.mensuralM1")
 (0 . "accidentals.vaticana0")
 (1/2 . "accidentals.mensural1"))
```

- Set grob property `glyph-name-alist` in `Accidental` (page 342), to:

```
'((-1/2 . "accidentals.mensuralM1")
 (0 . "accidentals.vaticana0")
 (1/2 . "accidentals.mensural1"))
```

- Set grob property `glyph-name-alist` in `KeySignature` (page 419), to:

```
'((-1/2 . "accidentals.mensuralM1")
 (0 . "accidentals.vaticana0")
 (1/2 . "accidentals.mensural1"))
```

- Set grob property `hair-thickness` in `BarLine` (page 354), to `0.6`.

- Set grob property `neutral-direction` in `Custos` (page 384), to `-1`.
- Set grob property `neutral-position` in `Custos` (page 384), to `3`.
- Set grob property `style` in `Custos` (page 384), to `'mensural`.
- Set grob property `style` in `TimeSignature` (page 492), to `'mensural`.
- Set grob property `thick-thickness` in `BarLine` (page 354), to `0.6`.
- Set grob property `thickness` in `StaffSymbol` (page 471), to `0.6`.
- Set translator property `autoAccidentals` to:
  `'(Staff #<procedure #f (context pitch barnum measurepos)>)`
- Set translator property `autoCautionaries` to `'()`.
- Set translator property `clefGlyph` to `"clefs.mensural.g"`.
- Set translator property `clefPosition` to `-2`.
- Set translator property `clefTransposition` to `0`.
- Set translator property `createSpacing` to `#t`.
- Set translator property `defaultBarType` to `""`.
- Set translator property `extraNatural` to `#f`.
- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localAlterations` to `'()`.
- Set translator property `middleCClefPosition` to `-6`.
- Set translator property `middleCPosition` to `-6`.
- Set translator property `ottavationMarkups` to:

```
'((4 . "29")
  (3 . "22")
  (2 . "15")
  (1 . "8")
  (-1 . "8")
  (-2 . "15")
  (-3 . "22")
  (-4 . "29"))
```

- Set translator property `printKeyCancellation` to `#f`.
- Set translator property `shortInstrumentName` to `'()`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `MensuralVoice` (page 154).

Context `MensuralStaff` can contain `CueVoice` (page 64), `MensuralVoice` (page 154), and `NullVoice` (page 167).

This context is built from the following engraver(s):

`Accidental_engraver` (page 279)

Make accidentals. Catch note heads, ties and notices key-change events. This engraver usually lives at Staff level, but reads the settings for Accidental at `Voice` level, so you can `\override` them at `Voice`.

Properties (read)

`accidentalGrouping` (symbol)

If set to `'voice`, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

`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.

`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.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`harmonicAccidentals` (boolean)
: If set, harmonic notes in chords get accidentals.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`localAlterations` (list)
The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*octave* `.` *name*`) . (`*alter* *barnumber* `.` *measureposition*`))` pairs.

Properties (write)

`localAlterations` (list)
The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*octave* `.` *name*`) . (`*alter* *barnumber* `.` *measureposition*`))` pairs.

This engraver creates the following layout object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), and `AccidentalSuggestion` (page 345).

`Axis_group_engraver` (page 282)
Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Bar_engraver` (page 283)
Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

`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`.

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `BarLine` (page 354).

`Clef_engraver` (page 287)
Determine and set reference point for pitches.

Properties (read)

`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.

`clefTranspositionStyle` (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitClefVisibility` (vector)
'`break-visibility`' function for clef changes.

`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.

This engraver creates the following layout object(s): `Clef` (page 372), and `ClefModifier` (page 374).

`Collision_engraver` (page 288)
Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s): `NoteCollision` (page 445).

`Cue_clef_engraver` (page 290)
Determine and set reference point for pitches in cued voices.

Properties (read)

`clefTransposition` (integer)
Add this much extra transposition. Values of 7 and -7 are common.

`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.

`cueClefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitCueClefVisibility` (vector)
: '`break-visibility`' function for cue clef changes.

`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`.

This engraver creates the following layout object(s): `ClefModifier` (page 374), `CueClef` (page 378), and `CueEndClef` (page 381).

`Custos_engraver` (page 290)
: Engrave custodes.

This engraver creates the following layout object(s): `Custos` (page 384).

`Dot_column_engraver` (page 291)
: Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s): `DotColumn` (page 386).

`Figured_bass_engraver` (page 294)
: Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 46), and `rest-event` (page 51),

Properties (read)

`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.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s): `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), and `BassFigureLine` (page 362).

`Figured_bass_position_engraver` (page 295)
Position figured bass alignments over notes.

This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 360).

`Fingering_column_engraver` (page 295)
Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `FingeringColumn` (page 401).

`Font_size_engraver` (page 296)
Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
The relative size of all grobs in a context.

`Grob_pq_engraver` (page 299)
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_name_engraver` (page 300)
Create a system start text for instrument or vocal names.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

`shortInstrumentName` (markup)
See `instrumentName`.

`shortVocalName` (markup)
Name of a vocal line, short version.

`vocalName` (markup)
Name of a vocal line.

This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Key_engraver` (page 301)

Engrave a key signature.

Music types accepted: `key-change-event` (page 48),

Properties (read)

`createKeyOnClefChange` (boolean)
: Print a key signature whenever the clef is changed.

`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.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`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).

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`middleCClefPosition` (number)
: The position of the middle C, as determined only by the clef. This can be calculated by looking at `clefPosition` and `clefGlyph`.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

Properties (write)

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`tonic` (pitch)
: The tonic of the current scale.

This engraver creates the following layout object(s): `KeyCancellation` (page 417), and `KeySignature` (page 419).

`Ledger_line_engraver` (page 303)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

  This engraver creates the following layout object(s): `LedgerLineSpanner` (page 424).

`Merge_mmrest_numbers_engraver` (page 305)
: Engraver to merge multi-measure rest numbers in multiple voices.

  This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Ottava_spanner_engraver` (page 309)
: Create a text spanner when the ottavation property changes.

  Properties (read)

  `currentMusicalColumn` (graphical (layout) object)
  : Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

  `middleCOffset` (number)
  : The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

  `ottavation` (markup)
  : If set, the text for an ottava spanner. Changing this creates a new text spanner.

  This engraver creates the following layout object(s): `OttavaBracket` (page 448).

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

  Music types accepted: `apply-output-event` (page 46),

`Piano_pedal_align_engraver` (page 311)
: Align piano pedal symbols and brackets.

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 466), `SustainPedalLineSpanner` (page 480), and `UnaCordaPedalLineSpanner` (page 503).

`Piano_pedal_engraver` (page 312)
: Engrave piano pedal symbols and brackets.

  Music types accepted: `sostenuto-event` (page 52), `sustain-event` (page 54), and `una-corda-event` (page 54),

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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`.

This engraver creates the following layout object(s): `PianoPedalBracket` (page 455), `SostenutoPedal` (page 465), `SustainPedal` (page 479), and `UnaCordaPedal` (page 501).

`Pure_from_neighbor_engraver` (page 313)
: Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 315)
: Handle collisions of rests.

Properties (read)

`busyGrobs` (list)
: A queue of `(end-moment . grob)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s): `RestCollision` (page 461).

`Script_row_engraver` (page 316)
: Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 463).

`Separating_line_group_engraver` (page 316)
: Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)
: Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)
: True if the current `CommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 470).

`Staff_collecting_engraver` (page 318)
: Maintain the `stavesFound` variable.

  Properties (read)

  `stavesFound` (list of grobs)
  : A list of all staff-symbols found.

  Properties (write)

  `stavesFound` (list of grobs)
  : A list of all staff-symbols found.

`Staff_symbol_engraver` (page 319)
: Create the constellation of five (default) staff lines.

  Music types accepted: `staff-span-event` (page 53),

  This engraver creates the following layout object(s): `StaffSymbol` (page 471).

`Time_signature_engraver` (page 323)
: Create a Section 3.1.133 [`TimeSignature`], page 492, whenever `timeSignatureFraction` changes.

  Music types accepted: `time-signature-event` (page 54),

  Properties (read)

  `initialTimeSignatureVisibility` (vector)
  : break visibility for the initial time signature.

  `partialBusy` (boolean)
  : Signal that \partial acts at the current timestep.

  `timeSignatureFraction` (fraction, as pair)
  : A pair of numbers, signifying the time signature. For example, `'(4 . 4)` is a 4/4 time signature.

  This engraver creates the following layout object(s): `TimeSignature` (page 492).

2.1.18 MensuralVoice

Same as `Voice` context, except that it is accommodated for typesetting a piece in mensural style.

This context also accepts commands for the following context(s): `Voice` (page 268).

This context creates the following layout object(s): `Arpeggio` (page 351), `Beam` (page 362), `BendAfter` (page 364), `BreathingSign` (page 369), `ClusterSpanner` (page 376), `ClusterSpannerBeacon` (page 376), `CombineTextScript` (page 377), `Dots` (page 386), `DoublePercentRepeat` (page 387), `DoublePercentRepeatCounter` (page 388), `DoubleRepeatSlash` (page 390), `DynamicLineSpanner` (page 392), `DynamicText` (page 394), `DynamicTextSpanner` (page 395), `FingerGlideSpanner` (page 398), `Fingering` (page 399), `Flag` (page 401), `Glissando` (page 406), `Hairpin` (page 409), `InstrumentSwitch` (page 413), `LaissezVibrerTie` (page 423), `LaissezVibrerTieColumn` (page 424), `MensuralLigature` (page 436), `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), `MultiMeasureRestText` (page 442), `NoteColumn` (page 445), `NoteHead` (page 446), `NoteSpacing` (page 448), `PercentRepeat` (page 451), `PercentRepeatCounter` (page 452), `PhrasingSlur` (page 453), `RepeatSlash` (page 458), `RepeatTie` (page 459), `RepeatTieColumn` (page 460), `Rest` (page 460), `Script` (page 461), `ScriptColumn` (page 463), `Stem` (page 472), `StemStub` (page 474), `StemTremolo` (page 475), `StringNumber` (page 476), `StrokeFinger` (page 477), `TextScript` (page 487), `TextSpanner`

(page 489), `Tie` (page 490), `TieColumn` (page 492), `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), `TrillPitchHead` (page 497), `TrillSpanner` (page 498), `TupletBracket` (page 499), `TupletNumber` (page 500), and `VoiceFollower` (page 507).

This context sets the following properties:

- Set grob property `style` in `Flag` (page 401), to `'mensural`.
- Set grob property `style` in `NoteHead` (page 446), to `'mensural`.
- Set grob property `style` in `Rest` (page 460), to `'mensural`.
- Set translator property `autoBeaming` to `#f`.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

`Arpeggio_engraver` (page 281)

Generate an Arpeggio symbol.

Music types accepted: `arpeggio-event` (page 46),

This engraver creates the following layout object(s): `Arpeggio` (page 351).

`Auto_beam_engraver` (page 281)

Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.124 [`Stem_engraver`], page 319, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)

If set to true then beams are generated automatically.

`baseMoment` (moment)

Smallest unit of time that will stand on its own as a subdivided section.

`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.

`subdivideBeams` (boolean)

If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Beam_engraver` (page 284)

Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `Beam` (page 362).

`Bend_engraver` (page 285)
: Create fall spanners.

Music types accepted: `bend-after-event` (page 46),

This engraver creates the following layout object(s): `BendAfter` (page 364).

`Breathing_sign_engraver` (page 286)
: Create a breathing sign.

Music types accepted: `breathing-event` (page 47),

This engraver creates the following layout object(s): `BreathingSign` (page 369).

`Chord_tremolo_engraver` (page 287)
: Generate beams for tremolo repeats.

Music types accepted: `tremolo-span-event` (page 54),

This engraver creates the following layout object(s): `Beam` (page 362).

`Cluster_spanner_engraver` (page 288)
: Engrave a cluster using `Spanner` notation.

Music types accepted: `cluster-note-event` (page 47),

This engraver creates the following layout object(s): `ClusterSpanner` (page 376), and `ClusterSpannerBeacon` (page 376).

`Dots_engraver` (page 291)
: Create Section 3.1.36 [`Dots`], page 386, objects for Section 3.2.103 [`rhythmic-head-interface`], page 567s.

This engraver creates the following layout object(s): `Dots` (page 386).

`Double_percent_repeat_engraver` (page 291)
: Make double measure repeats.

Music types accepted: `double-percent-event` (page 47),

Properties (read)

`countPercentRepeats` (boolean)
: If set, produce counters for percent repeats.

`measureLength` (moment)
: Length of one measure in the current time signature.

`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.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 387), and `DoublePercentRepeatCounter` (page 388).

`Dynamic_align_engraver` (page 293)
: Align hairpins and dynamic texts on a horizontal line.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `DynamicLineSpanner` (page 392).

`Dynamic_engraver` (page 293)
: Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 45), `break-span-event` (page 47), and `span-dynamic-event` (page 52),

Properties (read)

`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.`'.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`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.`'.

This engraver creates the following layout object(s): `DynamicText` (page 394), `DynamicTextSpanner` (page 395), and `Hairpin` (page 409).

`Finger_glide_engraver` (page 295)
: Engraver to print a line between two `Fingering` grobs.

Music types accepted: `note-event` (page 50),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 398).

`Fingering_engraver` (page 295)
Create fingering scripts.

Music types accepted: `fingering-event` (page 48),

This engraver creates the following layout object(s): `Fingering` (page 399).

`Font_size_engraver` (page 296)
Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
The relative size of all grobs in a context.

`Forbid_line_break_engraver` (page 296)
Forbid line breaks when note heads are still playing at some point.

Properties (read)

`busyGrobs` (list)
A queue of (*end-moment . grob*) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

`Glissando_engraver` (page 297)
Engrave glissandi.

Music types accepted: `glissando-event` (page 48),

Properties (read)

`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.

This engraver creates the following layout object(s): `Glissando` (page 406).

`Grace_auto_beam_engraver` (page 297)
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeaming, just like setting the context property '`autoBeaming`' to `##f`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_beam_engraver` (page 298)
: Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

  Music types accepted: `beam-event` (page 46),

  Properties (read)

  `baseMoment` (moment)
  : Smallest unit of time that will stand on its own as a subdivided section.

  `beamMelismaBusy` (boolean)
  : Signal if a beam is present.

  `beatStructure` (list)
  : List of `baseMoment`s that are combined to make beats.

  `subdivideBeams` (boolean)
  : If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

  This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_engraver` (page 298)
: Set font size and other properties for grace notes.

  Properties (read)

  `graceSettings` (list)
  : Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`Grob_pq_engraver` (page 299)
: Administrate when certain grobs (e.g., note heads) stop playing.

  Properties (read)

  `busyGrobs` (list)
  : A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

  Properties (write)

  `busyGrobs` (list)
  : A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_switch_engraver` (page 300)
: Create a cue text for taking instrument.

  Properties (read)

  `instrumentCueName` (markup)
  : The name to print if another instrument is to be taken.

  This engraver creates the following layout object(s): `InstrumentSwitch` (page 413).

`Laissez_vibrer_engraver` (page 302)
: Create laissez vibrer items.

Music types accepted: `laissez-vibrer-event` (page 48),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 423), and `LaissezVibrerTieColumn` (page 424).

`Mensural_ligature_engraver` (page 305)
: Handle `Mensural_ligature_events` by glueing special ligature heads together.

  Music types accepted: `ligature-event` (page 49),

  This engraver creates the following layout object(s): `MensuralLigature` (page 436).

`Multi_measure_rest_engraver` (page 306)
: Engrave multi-measure rests that are produced with '`R`'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the Section 3.1.80 [`MultiMeasureRest`], page 438.

  Music types accepted: `multi-measure-articulation-event` (page 49), `multi-measure-rest-event` (page 49), and `multi-measure-text-event` (page 50),

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `internalBarNumber` (integer)
  : Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

  `measureStartNow` (boolean)
  : True at the beginning of a measure.

  `restNumberThreshold` (number)
  : If a multimeasure rest has more measures than this, a number is printed.

  This engraver creates the following layout object(s): `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), and `MultiMeasureRestText` (page 442).

`New_fingering_engraver` (page 307)
: Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

  Properties (read)

  `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.

  `harmonicDots` (boolean)
  : If set, harmonic notes in dotted chords get dots.

  `stringNumberOrientations` (list)
  : See `fingeringOrientations`.

`strokeFingerOrientations` (list)
See `fingeringOrientations`.

This engraver creates the following layout object(s): `Fingering` (page 399), `Script` (page 461), `StringNumber` (page 476), and `StrokeFinger` (page 477).

`Note_head_line_engraver` (page 307)
Engrave a line between two note heads in a staff switch if `followVoice` is set.

Properties (read)

`followVoice` (boolean)
If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s): `VoiceFollower` (page 507).

`Note_heads_engraver` (page 308)
Generate note heads.

Music types accepted: `note-event` (page 50),

Properties (read)

`middleCPosition` (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

`staffLineLayoutFunction` (procedure)
Layout of staff lines, `traditional`, or `semitone`.

This engraver creates the following layout object(s): `NoteHead` (page 446).

`Note_spacing_engraver` (page 309)
Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s): `NoteSpacing` (page 448).

`Output_property_engraver` (page 309)
Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Part_combine_engraver` (page 310)
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted: `note-event` (page 50), and `part-combine-event` (page 51),

Properties (read)

`aDueText` (markup)
Text to print at a unisono passage.

`partCombineTextsOnNote` (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.

`printPartCombineTexts` (boolean)
Set ‘Solo’ and ‘A due’ texts in the part combiner?

`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.

This engraver creates the following layout object(s): `CombineTextScript` (page 377).

`Percent_repeat_engraver` (page 311)
: Make whole measure repeats.

Music types accepted: `percent-event` (page 51),

Properties (read)

`countPercentRepeats` (boolean)
: If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

This engraver creates the following layout object(s): `PercentRepeat` (page 451), and `PercentRepeatCounter` (page 452).

`Phrasing_slur_engraver` (page 311)
: Print phrasing slurs. Similar to Section 2.2.111 [`Slur_engraver`], page 317.

Music types accepted: `note-event` (page 50), and `phrasing-slur-event` (page 51),

This engraver creates the following layout object(s): `PhrasingSlur` (page 453).

`Pitched_trill_engraver` (page 313)
: Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), and `TrillPitchHead` (page 497).

`Repeat_tie_engraver` (page 314)
: Create repeat ties.

Music types accepted: `repeat-tie-event` (page 51),

This engraver creates the following layout object(s): `RepeatTie` (page 459), and `RepeatTieColumn` (page 460).

`Rest_engraver` (page 315)
: Engrave rests.

Music types accepted: `rest-event` (page 51),

Properties (read)

`middleCPosition` (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

This engraver creates the following layout object(s): `Rest` (page 460).

`Rhythmic_column_engraver` (page 315)
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 445).

`Script_column_engraver` (page 315)
Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 463).

`Script_engraver` (page 315)
Handle note scripted articulations.

Music types accepted: `articulation-event` (page 46),

Properties (read)

`scriptDefinitions` (list)
The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See `scm/script.scm` for more information.

This engraver creates the following layout object(s): `Script` (page 461).

`Slash_repeat_engraver` (page 316)
Make beat repeats.

Music types accepted: `repeat-slash-event` (page 51),

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 390), and `RepeatSlash` (page 458).

`Spanner_break_forbid_engraver` (page 318)
Forbid breaks in certain spanners.

`Stem_engraver` (page 319)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 54), and `tuplet-span-event` (page 54),

Properties (read)

`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`.

`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`.

This engraver creates the following layout object(s): `Flag` (page 401), `Stem` (page 472), `StemStub` (page 474), and `StemTremolo` (page 475).

`Text_engraver` (page 321)
Create text scripts.

Music types accepted: `text-script-event` (page 54),

This engraver creates the following layout object(s): `TextScript` (page 487).

`Text_spanner_engraver` (page 322)
Create text spanner from an event.

Music types accepted: `text-span-event` (page 54),

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TextSpanner` (page 489).

`Tie_engraver` (page 322)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 54),

Properties (read)

`skipTypesetting` (boolean)
If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

`tieWaitForNote` (boolean)
If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

`tieMelismaBusy` (boolean)
Signal whether a tie is present.

This engraver creates the following layout object(s): `Tie` (page 490), and `TieColumn` (page 492).

`Trill_spanner_engraver` (page 324)
Create trill spanner from an event.

Music types accepted: `trill-span-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TrillSpanner` (page 498).

`Tuplet_engraver` (page 325)

Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 54),

Properties (read)

`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.

This engraver creates the following layout object(s): `TupletBracket` (page 499), and `TupletNumber` (page 500).

2.1.19 NoteNames

A context for printing the names of notes.

This context also accepts commands for the following context(s): `Staff` (page 217).

This context creates the following layout object(s): `NoteName` (page 447), `StaffSpacing` (page 470), `Tie` (page 490), `TieColumn` (page 492), and `VerticalAxisGroup` (page 505).

This context sets the following properties:

- Set grob property `nonstaff-nonstaff-spacing` in `VerticalAxisGroup` (page 505), to:

```
'((basic-distance . 0)
 (minimum-distance . 2.8)
 (padding . 0.2)
 (stretchability . 0))
```

- Set grob property `nonstaff-relatedstaff-spacing` in `VerticalAxisGroup` (page 505), to:

```
'((basic-distance . 5.5)
 (padding . 0.5)
 (stretchability . 1))
```

- Set grob property `nonstaff-unrelatedstaff-spacing.padding` in `VerticalAxisGroup` (page 505), to `1.5`.
- Set grob property `staff-affinity` in `VerticalAxisGroup` (page 505), to `1`.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

`Axis_group_engraver` (page 282)

Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)

Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)

True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)

A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Note_name_engraver` (page 308)
Print pitches as words.

Music types accepted: `note-event` (page 50),

Properties (read)

`noteNameFunction` (procedure)
Function used to convert pitches into strings and markups.

`noteNameSeparator` (string)
String used to separate simultaneous NoteName objects.

`printAccidentalNames` (boolean or symbol)
Print accidentals in the `NoteNames` context.

`printNotesLanguage` (string)
Use a specific language in the `NoteNames` context.

`printOctaveNames` (boolean or symbol)
Print octave marks in the `NoteNames` context.

This engraver creates the following layout object(s): `NoteName` (page 447).

`Separating_line_group_engraver` (page 316)
Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)
Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)
True if the current `CommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 470).

`Tie_engraver` (page 322)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 54),

Properties (read)

`skipTypesetting` (boolean)
If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

`tieWaitForNote` (boolean)
If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

`tieMelismaBusy` (boolean)
Signal whether a tie is present.

This engraver creates the following layout object(s): `Tie` (page 490), and `TieColumn` (page 492).

2.1.20 `NullVoice`

For aligning lyrics without printing notes

This context also accepts commands for the following context(s): `Staff` (page 217), and `Voice` (page 268).

This context creates the following layout object(s): `Beam` (page 362), `NoteHead` (page 446), `Slur` (page 463), `Tie` (page 490), and `TieColumn` (page 492).

This context sets the following properties:

- Set grob property `no-ledgers` in `NoteHead` (page 446), to `#t`.
- Set grob property `stencil` in `Beam` (page 362), to `#f`.
- Set grob property `stencil` in `NoteHead` (page 446), to `#f`.
- Set grob property `stencil` in `Slur` (page 463), to `#f`.
- Set grob property `stencil` in `Tie` (page 490), to `#f`.
- Set grob property `X-extent` in `NoteHead` (page 446), to `#<procedure #f (g)>`.
- Set translator property `nullAccidentals` to `#t`.
- Set translator property `squashedPosition` to `0`.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

`Beam_engraver` (page 284)
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatStructure` (list)
List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grob_pq_engraver` (page 299)
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Note_heads_engraver` (page 308)
Generate note heads.

Music types accepted: `note-event` (page 50),

Properties (read)

`middleCPosition` (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

`staffLineLayoutFunction` (procedure)
Layout of staff lines, `traditional`, or `semitone`.

This engraver creates the following layout object(s): `NoteHead` (page 446).

`Pitch_squash_engraver` (page 312)
Set the vertical position of note heads to `squashedPosition`, if that property is set. This can be used to make a single-line staff demonstrating the rhythm of a melody.

Properties (read)

`squashedPosition` (integer)
Vertical position of squashing for Section "Pitch_squash_engraver" in *Internals Reference*.

`Slur_engraver` (page 317)
Build slur grobs from slur events.

Music types accepted: `note-event` (page 50), and `slur-event` (page 52),

Properties (read)

`doubleSlurs` (boolean)
If set, two slurs are created for every slurred note, one above and one below the chord.

`slurMelismaBusy` (boolean)
Signal if a slur is present.

This engraver creates the following layout object(s): `Slur` (page 463).

`Tie_engraver` (page 322)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 54),

Properties (read)

`skipTypesetting` (boolean)
: If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

`tieWaitForNote` (boolean)
: If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

`tieMelismaBusy` (boolean)
: Signal whether a tie is present.

This engraver creates the following layout object(s): `Tie` (page 490), and `TieColumn` (page 492).

2.1.21 OneStaff

Provides a common axis for the contained staves, making all of them appear in the same vertical space. This can be useful for typesetting staves of different types in immediate succession or for temporarily changing the character of one staff or overlaying it with a different one. Often used with `\stopStaff` and `\startStaff` for best results.

This context creates the following layout object(s): `VerticalAxisGroup` (page 505).

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `Staff` (page 217).

Context `OneStaff` can contain `ChordNames` (page 62), `DrumStaff` (page 75), `Dynamics` (page 91), `FiguredBass` (page 94), `FretBoards` (page 96), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `Lyrics` (page 141), `MensuralStaff` (page 144), `NoteNames` (page 165), `PetrucciStaff` (page 170), `RhythmicStaff` (page 193), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

This context is built from the following engraver(s):

`Axis_group_engraver` (page 282)
: Group all objects created in this context in a `VerticalAxisGroup` spanner.

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `hasAxisGroup` (boolean)
  : True if the current context is contained in an axis group.

  `keepAliveInterfaces` (list)
  : A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

  Properties (write)

  `hasAxisGroup` (boolean)
  : True if the current context is contained in an axis group.

  This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

2.1.22 PetrucciStaff

Same as `Staff` context, except that it is accommodated for typesetting a piece in Petrucci style.

This context also accepts commands for the following context(s): `Staff` (page 217).

This context creates the following layout object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), `AccidentalSuggestion` (page 345), `BarLine` (page 354), `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureAlignmentPositioning` (page 360), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), `BassFigureLine` (page 362), `Clef` (page 372), `ClefModifier` (page 374), `CueClef` (page 378), `CueEndClef` (page 381), `Custos` (page 384), `DotColumn` (page 386), `FingeringColumn` (page 401), `InstrumentName` (page 413), `KeyCancellation` (page 417), `KeySignature` (page 419), `LedgerLineSpanner` (page 424), `NoteCollision` (page 445), `OttavaBracket` (page 448), `PianoPedalBracket` (page 455), `RestCollision` (page 461), `ScriptRow` (page 463), `SostenutoPedal` (page 465), `SostenutoPedalLineSpanner` (page 466), `StaffSpacing` (page 470), `StaffSymbol` (page 471), `SustainPedal` (page 479), `SustainPedalLineSpanner` (page 480), `TimeSignature` (page 492), `UnaCordaPedal` (page 501), `UnaCordaPedalLineSpanner` (page 503), and `VerticalAxisGroup` (page 505).

This context sets the following properties:

- Set grob property `neutral-direction` in `Custos` (page 384), to `-1`.
- Set grob property `neutral-position` in `Custos` (page 384), to `3`.
- Set grob property `style` in `Custos` (page 384), to `'mensural`.
- Set grob property `thickness` in `StaffSymbol` (page 471), to `1.3`.
- Set translator property `autoAccidentals` to:

```
'(Staff #<procedure #f (context pitch barnum measurepos)>
     #<procedure neo-modern-accidental-rule (context pitch barnum measurepos)>)
```

- Set translator property `autoCautionaries` to `'()`.
- Set translator property `clefGlyph` to `"clefs.petrucci.g"`.
- Set translator property `clefPosition` to `-2`.
- Set translator property `clefTransposition` to `0`.
- Set translator property `createSpacing` to `#t`.
- Set translator property `extraNatural` to `#f`.
- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localAlterations` to `'()`.
- Set translator property `middleCClefPosition` to `-6`.
- Set translator property `middleCPosition` to `-6`.
- Set translator property `ottavationMarkups` to:

```
'((4 . "29")
  (3 . "22")
  (2 . "15")
  (1 . "8")
  (-1 . "8")
  (-2 . "15")
  (-3 . "22")
  (-4 . "29"))
```

- Set translator property `printKeyCancellation` to `#f`.

- Set translator property `shortInstrumentName` to `'()`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `PetrucciVoice` (page 180).

Context `PetrucciStaff` can contain `CueVoice` (page 64), `NullVoice` (page 167), and `PetrucciVoice` (page 180).

This context is built from the following engraver(s):

`Accidental_engraver` (page 279)
: Make accidentals. Catch note heads, ties and notices key-change events. This engraver usually lives at Staff level, but reads the settings for Accidental at `Voice` level, so you can `\override` them at `Voice`.

  Properties (read)

  `accidentalGrouping` (symbol)
  : If set to `'voice`, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

  `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.

`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.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`harmonicAccidentals` (boolean)
: If set, harmonic notes in chords get accidentals.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`localAlterations` (list)
: The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber . measureposition`*`))` pairs.

Properties (write)

`localAlterations` (list)
: The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber . measureposition`*`))` pairs.

This engraver creates the following layout object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), and `AccidentalSuggestion` (page 345).

`Axis_group_engraver` (page 282)
: Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Bar_engraver` (page 283)
: Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

`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`.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `BarLine` (page 354).

`Clef_engraver` (page 287)
: Determine and set reference point for pitches.

Properties (read)

`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.

`clefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`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.

This engraver creates the following layout object(s): `Clef` (page 372), and `ClefModifier` (page 374).

`Collision_engraver` (page 288)
: Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

  This engraver creates the following layout object(s): `NoteCollision` (page 445).

`Cue_clef_engraver` (page 290)
: Determine and set reference point for pitches in cued voices.

  Properties (read)

  `clefTransposition` (integer)
  : Add this much extra transposition. Values of 7 and -7 are common.

  `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.

  `cueClefTranspositionStyle` (symbol)
  : Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

  `explicitCueClefVisibility` (vector)
  : '`break-visibility`' function for cue clef changes.

  `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`.

  This engraver creates the following layout object(s): `ClefModifier` (page 374), `CueClef` (page 378), and `CueEndClef` (page 381).

`Custos_engraver` (page 290)
: Engrave custodes.

  This engraver creates the following layout object(s): `Custos` (page 384).

`Dot_column_engraver` (page 291)
: Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

  This engraver creates the following layout object(s): `DotColumn` (page 386).

`Figured_bass_engraver` (page 294)
: Make figured bass numbers.

  Music types accepted: `bass-figure-event` (page 46), and `rest-event` (page 51),

  Properties (read)

  `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.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s): `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), and `BassFigureLine` (page 362).

`Figured_bass_position_engraver` (page 295)
: Position figured bass alignments over notes.

This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 360).

`Fingering_column_engraver` (page 295)
: Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `FingeringColumn` (page 401).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
: The relative size of all grobs in a context.

`Grob_pq_engraver` (page 299)
: Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_name_engraver` (page 300)
: Create a system start text for instrument or vocal names.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

`shortInstrumentName` (markup)
: See `instrumentName`.

`shortVocalName` (markup)
: Name of a vocal line, short version.

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Key_engraver` (page 301)
: Engrave a key signature.

Music types accepted: `key-change-event` (page 48),

Properties (read)

`createKeyOnClefChange` (boolean)
: Print a key signature whenever the clef is changed.

`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.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`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).

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`middleCClefPosition` (number)
: The position of the middle C, as determined only by the clef. This can be calculated by looking at `clefPosition` and `clefGlyph`.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

Properties (write)

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`tonic` (pitch)
: The tonic of the current scale.

This engraver creates the following layout object(s): `KeyCancellation` (page 417), and `KeySignature` (page 419).

`Ledger_line_engraver` (page 303)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 424).

`Merge_mmrest_numbers_engraver` (page 305)
: Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Ottava_spanner_engraver` (page 309)
: Create a text spanner when the ottavation property changes.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`middleCOffset` (number)
: The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

`ottavation` (markup)
: If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s): `OttavaBracket` (page 448).

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Piano_pedal_align_engraver` (page 311)
: Align piano pedal symbols and brackets.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 466), `SustainPedalLineSpanner` (page 480), and `UnaCordaPedalLineSpanner` (page 503).

`Piano_pedal_engraver` (page 312)
: Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 52), `sustain-event` (page 54), and `una-corda-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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`.

This engraver creates the following layout object(s): `PianoPedalBracket` (page 455), `SostenutoPedal` (page 465), `SustainPedal` (page 479), and `UnaCordaPedal` (page 501).

`Pure_from_neighbor_engraver` (page 313)
: Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 315)
: Handle collisions of rests.

Properties (read)

`busyGrobs` (list)
: A queue of `(end-moment . grob)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s): `RestCollision` (page 461).

`Script_row_engraver` (page 316)
: Determine order in horizontal side position elements.

  This engraver creates the following layout object(s): `ScriptRow` (page 463).

`Separating_line_group_engraver` (page 316)
: Generate objects for computing spacing parameters.

  Properties (read)

  `createSpacing` (boolean)
  : Create `StaffSpacing` objects? Should be set for staves.

  Properties (write)

  `hasStaffSpacing` (boolean)
  : True if the current `CommandColumn` contains items that will affect spacing.

  This engraver creates the following layout object(s): `StaffSpacing` (page 470).

`Staff_collecting_engraver` (page 318)
: Maintain the `stavesFound` variable.

  Properties (read)

  `stavesFound` (list of grobs)
  : A list of all staff-symbols found.

  Properties (write)

  `stavesFound` (list of grobs)
  : A list of all staff-symbols found.

`Staff_symbol_engraver` (page 319)
: Create the constellation of five (default) staff lines.

  Music types accepted: `staff-span-event` (page 53),

  This engraver creates the following layout object(s): `StaffSymbol` (page 471).

`Time_signature_engraver` (page 323)
: Create a Section 3.1.133 [`TimeSignature`], page 492, whenever `timeSignatureFraction` changes.

  Music types accepted: `time-signature-event` (page 54),

  Properties (read)

  `initialTimeSignatureVisibility` (vector)
  : break visibility for the initial time signature.

  `partialBusy` (boolean)
  : Signal that \partial acts at the current timestep.

  `timeSignatureFraction` (fraction, as pair)
  : A pair of numbers, signifying the time signature. For example, `'(4 . 4)` is a 4/4 time signature.

  This engraver creates the following layout object(s): `TimeSignature` (page 492).

2.1.23 PetrucciVoice

Same as Voice context, except that it is accommodated for typesetting a piece in Petrucci style.

This context also accepts commands for the following context(s): Voice (page 268).

This context creates the following layout object(s): Arpeggio (page 351), Beam (page 362), BendAfter (page 364), BreathingSign (page 369), ClusterSpanner (page 376), ClusterSpannerBeacon (page 376), CombineTextScript (page 377), Dots (page 386), DoublePercentRepeat (page 387), DoublePercentRepeatCounter (page 388), DoubleRepeatSlash (page 390), DynamicLineSpanner (page 392), DynamicText (page 394), DynamicTextSpanner (page 395), FingerGlideSpanner (page 398), Fingering (page 399), Flag (page 401), Glissando (page 406), Hairpin (page 409), InstrumentSwitch (page 413), LaissezVibrerTie (page 423), LaissezVibrerTieColumn (page 424), MensuralLigature (page 436), MultiMeasureRest (page 438), MultiMeasureRestNumber (page 439), MultiMeasureRestScript (page 441), MultiMeasureRestText (page 442), NoteColumn (page 445), NoteHead (page 446), NoteSpacing (page 448), PercentRepeat (page 451), PercentRepeatCounter (page 452), PhrasingSlur (page 453), RepeatSlash (page 458), RepeatTie (page 459), RepeatTieColumn (page 460), Rest (page 460), Script (page 461), ScriptColumn (page 463), Slur (page 463), Stem (page 472), StemStub (page 474), StemTremolo (page 475), StringNumber (page 476), StrokeFinger (page 477), TextScript (page 487), TextSpanner (page 489), Tie (page 490), TieColumn (page 492), TrillPitchAccidental (page 495), TrillPitchGroup (page 496), TrillPitchHead (page 497), TrillSpanner (page 498), TupletBracket (page 499), TupletNumber (page 500), and VoiceFollower (page 507).

This context sets the following properties:

- Set grob property `length` in Stem (page 472), to `5`.
- Set grob property `style` in NoteHead (page 446), to `'petrucci`.
- Set grob property `style` in Rest (page 460), to `'mensural`.
- Set grob property `thickness` in Stem (page 472), to `1.7`.
- Set translator property `autoBeaming` to `#f`.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

`Arpeggio_engraver` (page 281)
: Generate an Arpeggio symbol.

  Music types accepted: `arpeggio-event` (page 46),

  This engraver creates the following layout object(s): Arpeggio (page 351).

`Auto_beam_engraver` (page 281)
: Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.124 [Stem_engraver], page 319, properties `stemLeftBeamCount` and `stemRightBeamCount`.

  Music types accepted: `beam-forbid-event` (page 46),

  Properties (read)

  `autoBeaming` (boolean)
  : If set to true then beams are generated automatically.

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`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.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Beam_engraver` (page 284)

Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `Beam` (page 362).

`Bend_engraver` (page 285)

Create fall spanners.

Music types accepted: `bend-after-event` (page 46),

This engraver creates the following layout object(s): `BendAfter` (page 364).

`Breathing_sign_engraver` (page 286)

Create a breathing sign.

Music types accepted: `breathing-event` (page 47),

This engraver creates the following layout object(s): `BreathingSign` (page 369).

`Chord_tremolo_engraver` (page 287)
: Generate beams for tremolo repeats.

  Music types accepted: `tremolo-span-event` (page 54),

  This engraver creates the following layout object(s): `Beam` (page 362).

`Cluster_spanner_engraver` (page 288)
: Engrave a cluster using `Spanner` notation.

  Music types accepted: `cluster-note-event` (page 47),

  This engraver creates the following layout object(s): `ClusterSpanner` (page 376), and `ClusterSpannerBeacon` (page 376).

`Dots_engraver` (page 291)
: Create Section 3.1.36 [`Dots`], page 386, objects for Section 3.2.103 [`rhythmic-head-interface`], page 567s.

  This engraver creates the following layout object(s): `Dots` (page 386).

`Double_percent_repeat_engraver` (page 291)
: Make double measure repeats.

  Music types accepted: `double-percent-event` (page 47),

  Properties (read)

  `countPercentRepeats` (boolean)
  : If set, produce counters for percent repeats.

  `measureLength` (moment)
  : Length of one measure in the current time signature.

  `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.

  Properties (write)

  `forbidBreak` (boolean)
  : If set to `#t`, prevent a line break at this point.

  This engraver creates the following layout object(s): `DoublePercentRepeat` (page 387), and `DoublePercentRepeatCounter` (page 388).

`Dynamic_align_engraver` (page 293)
: Align hairpins and dynamic texts on a horizontal line.

  Properties (read)

  `currentMusicalColumn` (graphical (layout) object)
  : Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

  This engraver creates the following layout object(s): `DynamicLineSpanner` (page 392).

`Dynamic_engraver` (page 293)
: Create hairpins, dynamic texts and dynamic text spanners.

  Music types accepted: `absolute-dynamic-event` (page 45), `break-span-event` (page 47), and `span-dynamic-event` (page 52),

Properties (read)

`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.`'.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`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.`'.

This engraver creates the following layout object(s): `DynamicText` (page 394), `DynamicTextSpanner` (page 395), and `Hairpin` (page 409).

`Finger_glide_engraver` (page 295)
: Engraver to print a line between two `Fingering` grobs.

Music types accepted: `note-event` (page 50),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 398).

`Fingering_engraver` (page 295)
: Create fingering scripts.

Music types accepted: `fingering-event` (page 48),

This engraver creates the following layout object(s): `Fingering` (page 399).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
: The relative size of all grobs in a context.

`Forbid_line_break_engraver` (page 296)
: Forbid line breaks when note heads are still playing at some point.

Properties (read)

`busyGrobs` (list)
: A queue of (*`end-moment . grob`*) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

`Glissando_engraver` (page 297)
Engrave glissandi.

Music types accepted: `glissando-event` (page 48),

Properties (read)

`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.

This engraver creates the following layout object(s): `Glissando` (page 406).

`Grace_auto_beam_engraver` (page 297)
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeaming, just like setting the context property '`autoBeaming`' to `##f`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_beam_engraver` (page 298)
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatStructure` (list)
List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_engraver` (page 298)
Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`Grob_pq_engraver` (page 299)
: Administrate when certain grobs (e.g., note heads) stop playing.

  Properties (read)

  `busyGrobs` (list)
  : A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

  Properties (write)

  `busyGrobs` (list)
  : A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_switch_engraver` (page 300)
: Create a cue text for taking instrument.

  Properties (read)

  `instrumentCueName` (markup)
  : The name to print if another instrument is to be taken.

  This engraver creates the following layout object(s): `InstrumentSwitch` (page 413).

`Laissez_vibrer_engraver` (page 302)
: Create laissez vibrer items.

  Music types accepted: `laissez-vibrer-event` (page 48),

  This engraver creates the following layout object(s): `LaissezVibrerTie` (page 423), and `LaissezVibrerTieColumn` (page 424).

`Mensural_ligature_engraver` (page 305)
: Handle `Mensural_ligature_events` by glueing special ligature heads together.

  Music types accepted: `ligature-event` (page 49),

  This engraver creates the following layout object(s): `MensuralLigature` (page 436).

`Multi_measure_rest_engraver` (page 306)
: Engrave multi-measure rests that are produced with '`R`'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the Section 3.1.80 [`MultiMeasureRest`], page 438.

  Music types accepted: `multi-measure-articulation-event` (page 49), `multi-measure-rest-event` (page 49), and `multi-measure-text-event` (page 50),

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `internalBarNumber` (integer)
  : Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`measureStartNow` (boolean)
: True at the beginning of a measure.

`restNumberThreshold` (number)
: If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), and `MultiMeasureRestText` (page 442).

`New_fingering_engraver` (page 307)
: Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

`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.

`harmonicDots` (boolean)
: If set, harmonic notes in dotted chords get dots.

`stringNumberOrientations` (list)
: See `fingeringOrientations`.

`strokeFingerOrientations` (list)
: See `fingeringOrientations`.

This engraver creates the following layout object(s): `Fingering` (page 399), `Script` (page 461), `StringNumber` (page 476), and `StrokeFinger` (page 477).

`Note_head_line_engraver` (page 307)
: Engrave a line between two note heads in a staff switch if `followVoice` is set.

Properties (read)

`followVoice` (boolean)
: If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s): `VoiceFollower` (page 507).

`Note_heads_engraver` (page 308)
: Generate note heads.

Music types accepted: `note-event` (page 50),

Properties (read)

`middleCPosition` (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

`staffLineLayoutFunction` (procedure)
: Layout of staff lines, `traditional`, or `semitone`.

This engraver creates the following layout object(s): `NoteHead` (page 446).

`Note_spacing_engraver` (page 309)
: Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

  This engraver creates the following layout object(s): `NoteSpacing` (page 448).

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

  Music types accepted: `apply-output-event` (page 46),

`Part_combine_engraver` (page 310)
: Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

  Music types accepted: `note-event` (page 50), and `part-combine-event` (page 51),

  Properties (read)

  `aDueText` (markup)
  : Text to print at a unisono passage.

  `partCombineTextsOnNote` (boolean)
  : Print part-combine texts only on the next note rather than immediately on rests or skips.

  `printPartCombineTexts` (boolean)
  : Set 'Solo' and 'A due' texts in the part combiner?

  `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.

  This engraver creates the following layout object(s): `CombineTextScript` (page 377).

`Percent_repeat_engraver` (page 311)
: Make whole measure repeats.

  Music types accepted: `percent-event` (page 51),

  Properties (read)

  `countPercentRepeats` (boolean)
  : If set, produce counters for percent repeats.

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `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.

  This engraver creates the following layout object(s): `PercentRepeat` (page 451), and `PercentRepeatCounter` (page 452).

`Phrasing_slur_engraver` (page 311)
: Print phrasing slurs. Similar to Section 2.2.111 [`Slur_engraver`], page 317.

Music types accepted: `note-event` (page 50), and `phrasing-slur-event` (page 51),

This engraver creates the following layout object(s): `PhrasingSlur` (page 453).

`Pitched_trill_engraver` (page 313)

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), and `TrillPitchHead` (page 497).

`Repeat_tie_engraver` (page 314)

Create repeat ties.

Music types accepted: `repeat-tie-event` (page 51),

This engraver creates the following layout object(s): `RepeatTie` (page 459), and `RepeatTieColumn` (page 460).

`Rest_engraver` (page 315)

Engrave rests.

Music types accepted: `rest-event` (page 51),

Properties (read)

`middleCPosition` (number)

The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

This engraver creates the following layout object(s): `Rest` (page 460).

`Rhythmic_column_engraver` (page 315)

Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 445).

`Script_column_engraver` (page 315)

Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 463).

`Script_engraver` (page 315)

Handle note scripted articulations.

Music types accepted: `articulation-event` (page 46),

Properties (read)

`scriptDefinitions` (list)

The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See `scm/script.scm` for more information.

This engraver creates the following layout object(s): `Script` (page 461).

`Slash_repeat_engraver` (page 316)

Make beat repeats.

Music types accepted: `repeat-slash-event` (page 51),

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 390), and `RepeatSlash` (page 458).

`Slur_engraver` (page 317)
: Build slur grobs from slur events.

  Music types accepted: `note-event` (page 50), and `slur-event` (page 52),

  Properties (read)

  `doubleSlurs` (boolean)
  : If set, two slurs are created for every slurred note, one above and one below the chord.

  `slurMelismaBusy` (boolean)
  : Signal if a slur is present.

  This engraver creates the following layout object(s): `Slur` (page 463).

`Spanner_break_forbid_engraver` (page 318)
: Forbid breaks in certain spanners.

`Stem_engraver` (page 319)
: Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

  Music types accepted: `tremolo-event` (page 54), and `tuplet-span-event` (page 54),

  Properties (read)

  `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`.

  `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`.

  This engraver creates the following layout object(s): `Flag` (page 401), `Stem` (page 472), `StemStub` (page 474), and `StemTremolo` (page 475).

`Text_engraver` (page 321)
: Create text scripts.

  Music types accepted: `text-script-event` (page 54),

  This engraver creates the following layout object(s): `TextScript` (page 487).

`Text_spanner_engraver` (page 322)
: Create text spanner from an event.

  Music types accepted: `text-span-event` (page 54),

  Properties (read)

  `currentMusicalColumn` (graphical (layout) object)
  : Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TextSpanner` (page 489).

`Tie_engraver` (page 322)

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 54),

Properties (read)

`skipTypesetting` (boolean)
: If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

`tieWaitForNote` (boolean)
: If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

`tieMelismaBusy` (boolean)
: Signal whether a tie is present.

This engraver creates the following layout object(s): `Tie` (page 490), and `TieColumn` (page 492).

`Trill_spanner_engraver` (page 324)

Create trill spanner from an event.

Music types accepted: `trill-span-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TrillSpanner` (page 498).

`Tuplet_engraver` (page 325)

Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 54),

Properties (read)

`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.

This engraver creates the following layout object(s): `TupletBracket` (page 499), and `TupletNumber` (page 500).

2.1.24 PianoStaff

Just like GrandStaff, but the staves are only removed together, never separately.

This context also accepts commands for the following context(s): GrandStaff (page 98).

This context creates the following layout object(s): Arpeggio (page 351), InstrumentName (page 413), SpanBar (page 468), SpanBarStub (page 469), SystemStartBar (page 482), SystemStartBrace (page 483), SystemStartBracket (page 483), SystemStartSquare (page 484), and VerticalAlignment (page 504).

This context sets the following properties:

- Set grob property extra-spacing-width in DynamicText (page 394), to #f.
- Set translator property instrumentName to '().
- Set translator property instrumentName to '().
- Set translator property localAlterations to '().
- Set translator property shortInstrumentName to '().
- Set translator property shortInstrumentName to '().
- Set translator property systemStartDelimiter to 'SystemStartBrace.
- Set translator property topLevelAlignment to #f.
- Set translator property topLevelAlignment to #f.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Staff (page 217).

Context PianoStaff can contain ChordNames (page 62), DrumStaff (page 75), Dynamics (page 91), FiguredBass (page 94), Lyrics (page 141), RhythmicStaff (page 193), Staff (page 217), and TabStaff (page 229).

This context is built from the following engraver(s):

Instrument_name_engraver (page 300)
: Create a system start text for instrument or vocal names.

  Properties (read)

  currentCommandColumn (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  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.

  shortInstrumentName (markup)
  : See instrumentName.

  shortVocalName (markup)
  : Name of a vocal line, short version.

  vocalName (markup)
  : Name of a vocal line.

  This engraver creates the following layout object(s): InstrumentName (page 413).

Keep_alive_together_engraver (page 301)
: This engraver collects all Hara_kiri_group_spanners that are created in contexts at or below its own. These spanners are then tied together so that one

will be removed only if all are removed. For example, if a `StaffGroup` uses this engraver, then the staves in the group will all be visible as long as there is a note in at least one of them.

`Span_arpeggio_engraver` (page 317)
: Make arpeggios that span multiple staves.

  Properties (read)

  `connectArpeggios` (boolean)
  : If set, connect arpeggios across piano staff.

  This engraver creates the following layout object(s): `Arpeggio` (page 351).

`Span_bar_engraver` (page 318)
: Make cross-staff bar lines: It catches all normal bar lines and draws a single span bar across them.

  This engraver creates the following layout object(s): `SpanBar` (page 468).

`Span_bar_stub_engraver` (page 318)
: Make stubs for span bars in all contexts that the span bars cross.

  This engraver creates the following layout object(s): `SpanBarStub` (page 469).

`System_start_delimiter_engraver` (page 320)
: Create a system start delimiter (i.e., a `SystemStartBar`, `SystemStartBrace`, `SystemStartBracket` or `SystemStartSquare` spanner).

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `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.

  This engraver creates the following layout object(s): `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), and `SystemStartSquare` (page 484).

`Vertical_align_engraver` (page 325)
: Catch groups (staves, lyrics lines, etc.) and stack them vertically.

  Properties (read)

  `alignAboveContext` (string)
  : Where to insert newly created context in vertical alignment.

  `alignBelowContext` (string)
  : Where to insert newly created context in vertical alignment.

  `hasAxisGroup` (boolean)
  : True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAlignment` (page 504).

`Vertical_align_engraver` (page 325)
Catch groups (staves, lyrics lines, etc.) and stack them vertically.

Properties (read)

`alignAboveContext` (string)
Where to insert newly created context in vertical alignment.

`alignBelowContext` (string)
Where to insert newly created context in vertical alignment.

`hasAxisGroup` (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAlignment` (page 504).

2.1.25 RhythmicStaff

A context like `Staff` but for printing rhythms. Pitches are ignored; the notes are printed on one line.

This context also accepts commands for the following context(s): `Staff` (page 217).

This context creates the following layout object(s): `BarLine` (page 354), `DotColumn` (page 386), `InstrumentName` (page 413), `LedgerLineSpanner` (page 424), `StaffSpacing` (page 470), `StaffSymbol` (page 471), `TimeSignature` (page 492), and `VerticalAxisGroup` (page 505).

This context sets the following properties:

- Set grob property `line-count` in `StaffSymbol` (page 471), to `1`.
- Set grob property `neutral-direction` in `Beam` (page 362), to `1`.
- Set grob property `neutral-direction` in `Stem` (page 472), to `1`.
- Set grob property `staff-padding` in `VoltaBracket` (page 507), to `3`.
- Set translator property `createSpacing` to `#t`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localAlterations` to `'()`.
- Set translator property `shortInstrumentName` to `'()`.
- Set translator property `squashedPosition` to `0`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `Voice` (page 268).

Context `RhythmicStaff` can contain `CueVoice` (page 64), `NullVoice` (page 167), and `Voice` (page 268).

This context is built from the following engraver(s):

`Axis_group_engraver` (page 282)
Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Bar_engraver` (page 283)
: Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

`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`.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `BarLine` (page 354).

`Dot_column_engraver` (page 291)
: Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s): `DotColumn` (page 386).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
: The relative size of all grobs in a context.

`Instrument_name_engraver` (page 300)
: Create a system start text for instrument or vocal names.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

`shortInstrumentName` (markup)
See `instrumentName`.

`shortVocalName` (markup)
Name of a vocal line, short version.

`vocalName` (markup)
Name of a vocal line.

This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Ledger_line_engraver` (page 303)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 424).

`Output_property_engraver` (page 309)
Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Pitch_squash_engraver` (page 312)
Set the vertical position of note heads to `squashedPosition`, if that property is set. This can be used to make a single-line staff demonstrating the rhythm of a melody.

Properties (read)

`squashedPosition` (integer)
Vertical position of squashing for Section "Pitch_squash_engraver" in *Internals Reference*.

`Separating_line_group_engraver` (page 316)
Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)
Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)
True if the current `CommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 470).

`Staff_symbol_engraver` (page 319)
Create the constellation of five (default) staff lines.

Music types accepted: `staff-span-event` (page 53),

This engraver creates the following layout object(s): `StaffSymbol` (page 471).

`Time_signature_engraver` (page 323)
Create a Section 3.1.133 [`TimeSignature`], page 492, whenever `timeSignatureFraction` changes.

Music types accepted: `time-signature-event` (page 54),

Properties (read)

`initialTimeSignatureVisibility` (vector)
: break visibility for the initial time signature.

`partialBusy` (boolean)
: Signal that \partial acts at the current timestep.

`timeSignatureFraction` (fraction, as pair)
: A pair of numbers, signifying the time signature. For example, `'(4 . 4)` is a 4/4 time signature.

This engraver creates the following layout object(s): `TimeSignature` (page 492).

2.1.26 Score

This is the top level notation context. No other context can contain a `Score` context. This context handles the administration of time signatures. It also makes sure that items such as clefs, time signatures, and key-signatures are aligned across staves.

You cannot explicitly instantiate a `Score` context (since it is not contained in any other context). It is instantiated automatically when an output definition (a `\score` or `\layout` block) is processed.

An alias for `Timing` is established by the `Timing_translator` in whatever context it is initialized, and the timing variables are then copied from wherever `Timing` had been previously established. The alias at `Score` level provides a target for initializing `Timing` variables in layout definitions before any `Timing_translator` has been run.

This context also accepts commands for the following context(s): `Timing` (page 196).

This context creates the following layout object(s): `BarNumber` (page 357), `BreakAlignGroup` (page 367), `BreakAlignment` (page 368), `FootnoteItem` (page 402), `FootnoteSpanner` (page 403), `GraceSpacing` (page 408), `JumpScript` (page 415), `LeftEdge` (page 425), `MetronomeMark` (page 436), `NonMusicalPaperColumn` (page 443), `PaperColumn` (page 450), `ParenthesesItem` (page 451), `RehearsalMark` (page 456), `SpacingSpanner` (page 467), `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), `SystemStartSquare` (page 484), `VerticalAlignment` (page 504), `VoltaBracket` (page 507), and `VoltaBracketSpanner` (page 509).

This context sets the following properties:

- Set translator property `additionalPitchPrefix` to `""`.
- Set translator property `aDueText` to `"a2"`.
- Set translator property `alternativeRestores` to:

  `'(measurePosition measureLength lastChord)`
- Set translator property `associatedVoiceType` to `'Voice`.
- Set translator property `autoAccidentals` to:

  `'(Staff #<procedure #f (context pitch barnum measurepos)>)`
- Set translator property `autoBeamCheck` to `default-auto-beam-check`.
- Set translator property `autoBeaming` to `#t`.
- Set translator property `autoCautionaries` to `'()`.
- Set translator property `automaticBars` to `#t`.
- Set translator property `barCheckSynchronize` to `#f`.
- Set translator property `barNumberFormatter` to `robust-bar-number-function`.

- Set translator property `barNumberVisibility` to `first-bar-number-invisible-and-no-parenthesized-bar-numbers`.
- Set translator property `beamHalfMeasure` to `#t`.
- Set translator property `chordNameExceptions` to:

```
'(((#<Pitch e' > #<Pitch gis' >)
  #<procedure line-markup (layout props args)>
  ("+"))
 ((#<Pitch ees' > #<Pitch ges' >)
  #<procedure line-markup (layout props args)>
  ((#<procedure line-markup (layout props args)>
    ((#<procedure fontsize-markup (layout props increment arg)>
     2
     "°")))))
 ((#<Pitch ees' > #<Pitch ges' > #<Pitch bes' >)
  #<procedure line-markup (layout props args)>
  ((#<procedure super-markup (layout props arg)>
    "ø")))
 ((#<Pitch ees' > #<Pitch ges' > #<Pitch beses' >)
  #<procedure concat-markup (layout props args)>
  ((#<procedure line-markup (layout props args)>
    ((#<procedure fontsize-markup (layout props increment arg)>
     2
     "°")))
   (#<procedure super-markup (layout props arg)>
    "7")))
 ((#<Pitch e' >
  #<Pitch g' >
  #<Pitch b' >
  #<Pitch fis'' >)
  #<procedure line-markup (layout props args)>
  ((#<procedure super-markup (layout props arg)>
    "lyd")))
 ((#<Pitch e' >
  #<Pitch g' >
  #<Pitch bes' >
  #<Pitch des'' >
  #<Pitch ees'' >
  #<Pitch fis'' >
  #<Pitch aes'' >)
  #<procedure line-markup (layout props args)>
  ((#<procedure super-markup (layout props arg)>
    "alt")))
 ((#<Pitch g' >)
  #<procedure line-markup (layout props args)>
  ((#<procedure super-markup (layout props arg)>
    "5")))
 ((#<Pitch g' > #<Pitch c'' >)
  #<procedure line-markup (layout props args)>
  ((#<procedure super-markup (layout props arg)>
    "5"))))
```

- Set translator property `chordNameFunction` to `ignatzek-chord-names`.

- Set translator property `chordNameLowercaseMinor` to `#f`.
- Set translator property `chordNameSeparator` to:

```
'(#<procedure hspace-markup (layout props amount)>
 0.5)
```

- Set translator property `chordNoteNamer` to `'()`.
- Set translator property `chordPrefixSpacer` to `0`.
- Set translator property `chordRootNamer` to `note-name->markup`.
- Set translator property `clefGlyph` to `"clefs.G"`.
- Set translator property `clefPosition` to `-2`.
- Set translator property `clefTranspositionFormatter` to `clef-transposition-markup`.
- Set translator property `completionFactor` to `unity-if-multimeasure`.
- Set translator property `crescendoSpanner` to `'hairpin`.
- Set translator property `cueClefTranspositionFormatter` to `clef-transposition-markup`.
- Set translator property `decrescendoSpanner` to `'hairpin`.
- Set translator property `defaultBarType` to `"|"`.
- Set translator property `doubleRepeatType` to `":..:"`.
- Set translator property `drumStyleTable` to `#<hash-table 29/61>`.
- Set translator property `endRepeatType` to `":|."`.
- Set translator property `explicitClefVisibility` to:

```
#(#t #t #t)
```

- Set translator property `explicitCueClefVisibility` to:

```
#(#f #t #t)
```

- Set translator property `explicitKeySignatureVisibility` to:

```
#(#t #t #t)
```

- Set translator property `extendersOverRests` to `#t`.
- Set translator property `extraNatural` to `#t`.
- Set translator property `figuredBassFormatter` to `format-bass-figure`.
- Set translator property `fineBarType` to `"|."`.
- Set translator property `fineText` to `"Fine"`.
- Set translator property `fingeringOrientations` to:

```
'(up down)
```

- Set translator property `firstClef` to `#t`.
- Set translator property `graceSettings` to:

```
'((Voice Stem direction 1)
  (Voice Slur direction -1)
  (Voice Stem font-size -3)
  (Voice Flag font-size -3)
  (Voice NoteHead font-size -3)
  (Voice TabNoteHead font-size -4)
  (Voice Dots font-size -3)
  (Voice Stem length-fraction 0.8)
  (Voice Stem no-stem-extend #t)
  (Voice Beam beam-thickness 0.384)
  (Voice Beam length-fraction 0.8)
```

```
(Voice Accidental font-size -4)
(Voice AccidentalCautionary font-size -4)
(Voice Script font-size -3)
(Voice Fingering font-size -8)
(Voice StringNumber font-size -8))
```

- Set translator property `harmonicAccidentals` to `#t`.
- Set translator property `highStringOne` to `#t`.
- Set translator property `initialTimeSignatureVisibility` to:

```
#(#f #t #t)
```

- Set translator property `instrumentTransposition` to `#<Pitch c' >`.
- Set translator property `keepAliveInterfaces` to:

```
'(bass-figure-interface
  chord-name-interface
  cluster-beacon-interface
  dynamic-interface
  fret-diagram-interface
  lyric-syllable-interface
  note-head-interface
  tab-note-head-interface
  lyric-interface
  percent-repeat-item-interface
  percent-repeat-interface
  stanza-number-interface)
```

- Set translator property `keyAlterationOrder` to:

```
'((6 . -1/2)
  (2 . -1/2)
  (5 . -1/2)
  (1 . -1/2)
  (4 . -1/2)
  (0 . -1/2)
  (3 . -1/2)
  (3 . 1/2)
  (0 . 1/2)
  (4 . 1/2)
  (1 . 1/2)
  (5 . 1/2)
  (2 . 1/2)
  (6 . 1/2)
  (6 . -1)
  (2 . -1)
  (5 . -1)
  (1 . -1)
  (4 . -1)
  (0 . -1)
  (3 . -1)
  (3 . 1)
  (0 . 1)
  (4 . 1)
  (1 . 1)
  (5 . 1)
```

```
(2 . 1)
(6 . 1))
```

- Set translator property `lyricMelismaAlignment` to `-1`.
- Set translator property `majorSevenSymbol` to:

```
'(#<procedure line-markup (layout props args)>
 ((#<procedure fontsize-markup (layout props increment arg)>
  -3
  (#<procedure triangle-markup (layout props filled)>
   #f))))
```

- Set translator property `markFormatter` to `format-mark-letters`.
- Set translator property `melismaBusyProperties` to:

```
'(melismaBusy
  slurMelismaBusy
  tieMelismaBusy
  beamMelismaBusy
  completionBusy)
```

- Set translator property `metronomeMarkFormatter` to `format-metronome-markup`.
- Set translator property `middleCClefPosition` to `-6`.
- Set translator property `middleCPosition` to `-6`.
- Set translator property `minorChordModifier` to:

```
'(#<procedure simple-markup (layout props str)>
 "m")
```

- Set translator property `noChordSymbol` to:

```
'(#<procedure simple-markup (layout props str)>
 "N.C.")
```

- Set translator property `noteNameFunction` to `note-name-markup`.
- Set translator property `noteNameSeparator` to `"/"`.
- Set translator property `noteToFretFunction` to `determine-frets`.
- Set translator property `partCombineTextsOnNote` to `#t`.
- Set translator property `pedalSostenutoStrings` to:

```
'("Sost. Ped." "*Sost. Ped." "*")
```

- Set translator property `pedalSostenutoStyle` to `'mixed`.
- Set translator property `pedalSustainStrings` to:

```
'("Ped." "*Ped." "*")
```

- Set translator property `pedalSustainStyle` to `'text`.
- Set translator property `pedalUnaCordaStrings` to:

```
'("una corda" "" "tre corde")
```

- Set translator property `pedalUnaCordaStyle` to `'text`.
- Set translator property `predefinedDiagramTable` to `#f`.
- Set translator property `printAccidentalNames` to `#t`.
- Set translator property `printKeyCancellation` to `#t`.
- Set translator property `printOctaveNames` to `#f`.
- Set translator property `printPartCombineTexts` to `#t`.
- Set translator property `quotedCueEventTypes` to:

```
'(note-event
```

```
rest-event
tie-event
beam-event
tuplet-span-event
tremolo-event)
```

- Set translator property `quotedEventTypes` to:

  `'(StreamEvent)`

- Set translator property `rehearsalMark` to `1`.
- Set translator property `repeatCountVisibility` to `all-repeat-counts-visible`.
- Set translator property `restNumberThreshold` to `1`.
- Set translator property `scriptDefinitions` to:

```
'(("accent"
  (avoid-slur . around)
  (padding . 0.2)
  (script-stencil feta "sforzato" . "sforzato")
  (side-relative-direction . -1))
 ("accentus"
  (script-stencil feta "uaccentus" . "uaccentus")
  (side-relative-direction . -1)
  (avoid-slur . ignore)
  (padding . 0.2)
  (quantize-position . #t)
  (script-priority . -100)
  (direction . 1))
 ("circulus"
  (script-stencil feta "circulus" . "circulus")
  (side-relative-direction . -1)
  (avoid-slur . ignore)
  (padding . 0.2)
  (quantize-position . #t)
  (script-priority . -100)
  (direction . 1))
 ("coda"
  (script-stencil feta "coda" . "coda")
  (padding . 0.2)
  (avoid-slur . outside)
  (direction . 1))
 ("comma"
  (script-stencil feta "lcomma" . "rcomma")
  (quantize-position . #t)
  (padding . 0.2)
  (avoid-slur . ignore)
  (direction . 1))
 ("downbow"
  (script-stencil feta "downbow" . "downbow")
  (padding . 0.2)
  (skyline-horizontal-padding . 0.2)
  (avoid-slur . around)
  (direction . 1)
  (script-priority . 150))
```

```
("downmordent"
 (script-stencil
  feta
  "downmordent"
  .
  "downmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("downprall"
 (script-stencil feta "downprall" . "downprall")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("espressivo"
 (avoid-slur . around)
 (padding . 0.2)
 (script-stencil feta "espr" . "espr")
 (side-relative-direction . -1))
("fermata"
 (script-stencil feta "dfermata" . "ufermata")
 (padding . 0.2)
 (avoid-slur . around)
 (script-priority . 4000)
 (direction . 1))
("flageolet"
 (script-stencil feta "flageolet" . "flageolet")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("halfopen"
 (avoid-slur . outside)
 (padding . 0.2)
 (script-stencil feta "halfopen" . "halfopen")
 (direction . 1))
("halfopenvertical"
 (avoid-slur . outside)
 (padding . 0.2)
 (script-stencil
  feta
  "halfopenvertical"
  .
  "halfopenvertical")
 (direction . 1))
("haydnturn"
 (script-stencil feta "haydnturn" . "haydnturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (direction . 1))
("henzelongfermata"
 (script-stencil
  feta
```

```
  "dhenzelongfermata"
  .
  "uhenzelongfermata")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("henzeshortfermata"
 (script-stencil
  feta
  "dhenzeshortfermata"
  .
  "uhenzeshortfermata")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("ictus"
 (script-stencil feta "ictus" . "ictus")
 (side-relative-direction . -1)
 (quantize-position . #t)
 (avoid-slur . ignore)
 (padding . 0.2)
 (script-priority . -100)
 (direction . -1))
("lheel"
 (script-stencil feta "upedalheel" . "upedalheel")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . -1))
("lineprall"
 (script-stencil feta "lineprall" . "lineprall")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("longfermata"
 (script-stencil
  feta
  "dlongfermata"
  .
  "ulongfermata")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("ltoe"
 (script-stencil feta "upedaltoe" . "upedaltoe")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . -1))
("marcato"
 (script-stencil feta "dmarcato" . "umarcato")
 (padding . 0.2)
 (avoid-slur . inside)
 (quantize-position . #t)
```

```
 (side-relative-direction . -1))
("mordent"
 (script-stencil feta "mordent" . "mordent")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("open"
 (avoid-slur . outside)
 (padding . 0.2)
 (script-stencil feta "open" . "open")
 (direction . 1))
("portato"
 (script-stencil feta "uportato" . "dportato")
 (avoid-slur . around)
 (padding . 0.45)
 (side-relative-direction . -1))
("prall"
 (script-stencil feta "prall" . "prall")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("pralldown"
 (script-stencil feta "pralldown" . "pralldown")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("prallmordent"
 (script-stencil
  feta
  "prallmordent"
  .
  "prallmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("prallprall"
 (script-stencil feta "prallprall" . "prallprall")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("prallup"
 (script-stencil feta "prallup" . "prallup")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("reverseturn"
 (script-stencil
  feta
  "reverseturn"
  .
  "reverseturn")
 (padding . 0.2)
```

```
 (avoid-slur . inside)
 (direction . 1))
("rheel"
 (script-stencil feta "dpedalheel" . "dpedalheel")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("rtoe"
 (script-stencil feta "dpedaltoe" . "dpedaltoe")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("segno"
 (script-stencil feta "segno" . "segno")
 (padding . 0.2)
 (avoid-slur . outside)
 (direction . 1))
("semicirculus"
 (script-stencil
  feta
  "dsemicirculus"
  .
  "dsemicirculus")
 (side-relative-direction . -1)
 (quantize-position . #t)
 (avoid-slur . ignore)
 (padding . 0.2)
 (script-priority . -100)
 (direction . 1))
("shortfermata"
 (script-stencil
  feta
  "dshortfermata"
  .
  "ushortfermata")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("signumcongruentiae"
 (script-stencil
  feta
  "dsignumcongruentiae"
  .
  "usignumcongruentiae")
 (padding . 0.2)
 (avoid-slur . outside)
 (direction . 1))
("slashturn"
 (script-stencil feta "slashturn" . "slashturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (direction . 1))
```

```
("snappizzicato"
 (script-stencil
  feta
  "snappizzicato"
  .
  "snappizzicato")
 (padding . 0.2)
 (avoid-slur . outside)
 (direction . 1))
("staccatissimo"
 (avoid-slur . inside)
 (quantize-position . #t)
 (script-stencil
  feta
  "dstaccatissimo"
  .
  "ustaccatissimo")
 (padding . 0.2)
 (skyline-horizontal-padding . 0.1)
 (side-relative-direction . -1)
 (toward-stem-shift . 1.0)
 (toward-stem-shift-in-column . 0.0))
("staccato"
 (script-stencil feta "staccato" . "staccato")
 (side-relative-direction . -1)
 (quantize-position . #t)
 (avoid-slur . inside)
 (toward-stem-shift . 1.0)
 (toward-stem-shift-in-column . 0.0)
 (padding . 0.2)
 (skyline-horizontal-padding . 0.1)
 (script-priority . -100))
("stopped"
 (script-stencil feta "stopped" . "stopped")
 (avoid-slur . inside)
 (padding . 0.2)
 (direction . 1))
("tenuto"
 (script-stencil feta "tenuto" . "tenuto")
 (quantize-position . #t)
 (avoid-slur . inside)
 (padding . 0.2)
 (side-relative-direction . -1))
("trill"
 (script-stencil feta "trill" . "trill")
 (direction . 1)
 (padding . 0.2)
 (avoid-slur . outside)
 (script-priority . 2000))
("turn"
 (script-stencil feta "turn" . "turn")
 (avoid-slur . inside)
```

```
 (padding . 0.2)
 (direction . 1))
("upbow"
 (script-stencil feta "upbow" . "upbow")
 (avoid-slur . around)
 (padding . 0.2)
 (direction . 1)
 (script-priority . 150))
("upmordent"
 (script-stencil feta "upmordent" . "upmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("upprall"
 (script-stencil feta "upprall" . "upprall")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("varcoda"
 (script-stencil feta "varcoda" . "varcoda")
 (padding . 0.2)
 (avoid-slur . outside)
 (direction . 1))
("varcomma"
 (script-stencil feta "lvarcomma" . "rvarcomma")
 (quantize-position . #t)
 (padding . 0.2)
 (avoid-slur . ignore)
 (direction . 1))
("verylongfermata"
 (script-stencil
  feta
  "dverylongfermata"
  .
  "uverylongfermata")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
("veryshortfermata"
 (script-stencil
  feta
  "dveryshortfermata"
  .
  "uveryshortfermata")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1)))
```

- Set translator property `sectionBarType` to `"||"`.
- Set translator property `slashChordSeparator` to:

```
'(#<procedure simple-markup (layout props str)>
 "/")
```

- Set translator property `soloIIText` to `"Solo II"`.
- Set translator property `soloText` to `"Solo"`.
- Set translator property `startRepeatType` to `".|:"`.
- Set translator property `stringNumberOrientations` to:

```
'(up down)
```

- Set translator property `stringOneTopmost` to `#t`.
- Set translator property `stringTunings` to:

```
'(#<Pitch e' >
 #<Pitch b >
 #<Pitch g >
 #<Pitch d >
 #<Pitch a, >
 #<Pitch e, >)
```

- Set translator property `strokeFingerOrientations` to:

```
'(right)
```

- Set translator property `subdivideBeams` to `#f`.
- Set translator property `suspendMelodyDecisions` to `#f`.
- Set translator property `systemStartDelimiter` to `'SystemStartBar`.
- Set translator property `tablatureFormat` to `fret-number-tablature-format`.
- Set translator property `tabStaffLineLayoutFunction` to `tablature-position-on-lines`.
- Set translator property `tieWaitForNote` to `#f`.
- Set translator property `timeSignatureFraction` to:

```
'(4 . 4)
```

- Set translator property `timeSignatureSettings` to:

```
'(((2 . 2) (beamExceptions (end (1/32 8 8 8 8))))
 ((3 . 2)
  (beamExceptions (end (1/32 8 8 8 8 8 8))))
 ((3 . 4)
  (beamExceptions (end (1/8 6) (1/12 3 3 3))))
 ((3 . 8) (beamExceptions (end (1/8 3))))
 ((4 . 2)
  (beamExceptions (end (1/16 4 4 4 4 4 4 4 4))))
 ((4 . 4)
  (beamExceptions (end (1/8 4 4) (1/12 3 3 3 3))))
 ((4 . 8) (beatStructure 2 2))
 ((6 . 4)
  (beamExceptions (end (1/16 4 4 4 4 4 4))))
 ((9 . 4)
  (beamExceptions (end (1/32 8 8 8 8 8 8 8 8))))
 ((12 . 4)
  (beamExceptions
   (end (1/32 8 8 8 8 8 8 8 8 8 8 8 8))))
 ((5 . 8) (beatStructure 3 2))
 ((8 . 8) (beatStructure 3 3 2)))
```

- Set translator property `timing` to `#t`.
- Set translator property `topLevelAlignment` to `#t`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `Staff` (page 217).

Context `Score` can contain `ChoirStaff` (page 61), `ChordNames` (page 62), `Devnull` (page 75), `DrumStaff` (page 75), `Dynamics` (page 91), `FiguredBass` (page 94), `FretBoards` (page 96), `GrandStaff` (page 98), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `Lyrics` (page 141), `MensuralStaff` (page 144), `NoteNames` (page 165), `OneStaff` (page 169), `PetrucciStaff` (page 170), `PianoStaff` (page 191), `RhythmicStaff` (page 193), `Staff` (page 217), `StaffGroup` (page 227), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

This context is built from the following engraver(s):

`Bar_number_engraver` (page 283)

A bar number may be created at any bar line, subject to the `barNumberVisibility` callback. By default, it is put on top of all staves and appears only at the left side of the staff. The staves are taken from `stavesFound`, which is maintained by Section 2.2.119 [`Staff_collecting_engraver`], page 318.

Properties (read)

`alternativeNumber` (integer)

When set, the index of the current `\alternative` element, starting from one. Not set outside of alternatives. Note the distinction from volta number: an alternative may pertain to multiple volte.

`alternativeNumberingStyle` (symbol)

The scheme and style for numbering bars in repeat alternatives. If not set (the default), bar numbers continue through alternatives. Can be set to `numbers` to reset the bar number at each alternative, or set to `numbers-with-letters` to reset and also include letter suffixes.

`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.

`currentBarNumber` (integer)
: Contains the current barnumber. This property is incremented at every bar line.

`measurePosition` (moment)
: How much of the current measure have we had. This can be set manually to create incomplete measures.

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

This engraver creates the following layout object(s): `BarNumber` (page 357).

`Beam_collision_engraver` (page 284)
: Help beams avoid colliding with notes and clefs in other voices.

`Break_align_engraver` (page 286)
: Align grobs with corresponding `break-align-symbols` into groups, and order the groups according to `breakAlignOrder`. The left edge of the alignment gets a separate group, with a symbol `left-edge`.

  This engraver creates the following layout object(s): `BreakAlignGroup` (page 367), `BreakAlignment` (page 368), and `LeftEdge` (page 425).

`Concurrent_hairpin_engraver` (page 289)
: Collect concurrent hairpins.

`Default_bar_line_engraver` (page 290)
: This engraver determines what kind of automatic bar lines should be produced, and sets `whichBar` accordingly. It should be at the same level as Section 2.2.136 [`Timing_translator`], page 323.

  Properties (read)

  `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.

`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.

`measureStartNow` (boolean)
True at the beginning of a measure.

Properties (write)

`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`.

`Footnote_engraver` (page 296)
Create footnote texts.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `FootnoteItem` (page 402), and `FootnoteSpanner` (page 403).

`Grace_spacing_engraver` (page 298)
Bookkeeping of shortest starting and playing notes in grace note runs.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `GraceSpacing` (page 408).

`Jump_engraver` (page 300)
Create `JumpScript` objects. It puts them outside all staves (which is taken from the property `stavesFound`). If moving this engraver to a different context, Section 2.2.119 [`Staff_collecting_engraver`], page 318, must move along, otherwise all marks end up on the same Y location.

Music types accepted: `fine-event` (page 48),

Properties (read)

`stavesFound` (list of grobs)
A list of all staff-symbols found.

This engraver creates the following layout object(s): `JumpScript` (page 415).

`Mark_engraver` (page 303)
: Create `RehearsalMark` objects. It puts them on top of all staves (which is taken from the property `stavesFound`). If moving this engraver to a different context, Section 2.2.119 [`Staff_collecting_engraver`], page 318, must move along, otherwise all marks end up on the same Y location.

  Music types accepted: `mark-event` (page 49),

  Properties (read)

  `markFormatter` (procedure)
  : A procedure taking as arguments the context and the rehearsal mark. It should return the formatted mark as a markup object.

  `rehearsalMark` (integer)
  : The last rehearsal mark printed.

  `stavesFound` (list of grobs)
  : A list of all staff-symbols found.

  This engraver creates the following layout object(s): `RehearsalMark` (page 456).

`Metronome_mark_engraver` (page 305)
: Engrave metronome marking. This delegates the formatting work to the function in the `metronomeMarkFormatter` property. The mark is put over all staves. The staves are taken from the `stavesFound` property, which is maintained by Section 2.2.119 [`Staff_collecting_engraver`], page 318.

  Music types accepted: `tempo-change-event` (page 54),

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `currentMusicalColumn` (graphical (layout) object)
  : Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

  `metronomeMarkFormatter` (procedure)
  : How to produce a metronome markup. Called with two arguments: a `TempoChangeEvent` and context.

  `stavesFound` (list of grobs)
  : A list of all staff-symbols found.

  `tempoHideNote` (boolean)
  : Hide the note = count in tempo marks.

  This engraver creates the following layout object(s): `MetronomeMark` (page 436).

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

  Music types accepted: `apply-output-event` (page 46),

`Paper_column_engraver` (page 310)
: Take care of generating columns.

This engraver decides whether a column is breakable. The default is that a column is always breakable. However, every `Bar_engraver` that does not have a barline at a certain point will set `forbidBreaks` in the score context to stop line breaks. In practice, this means that you can make a break point by creating a bar line (assuming that there are no beams or notes that prevent a break point).

Music types accepted: `break-event` (page 47), and `label-event` (page 48),

Properties (read)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

Properties (write)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `NonMusicalPaperColumn` (page 443), and `PaperColumn` (page 450).

`Parenthesis_engraver` (page 310)
: Parenthesize objects whose music cause has the `parenthesize` property.

This engraver creates the following layout object(s): `ParenthesesItem` (page 451).

`Repeat_acknowledge_engraver` (page 313)
: Acknowledge repeated music, and convert the contents of `repeatCommands` into an appropriate setting for `whichBar`.

Music types accepted: `fine-event` (page 48), `section-event` (page 52), `segno-event` (page 52), and `volta-span-event` (page 55),

Properties (read)

`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.

`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.

`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.

`fineBarType` (string)
: The bar line for `\fine`. See `whichBar` for information on available bar types.

`fineSegnoType` (string)
: Set the default bar line for a requested segno with fine. Default is '`|.S`'.

`fineStartRepeatSegnoType` (string)
: Set the default bar line for the combinations beginning of repeat with segno and fine. Default is '`|.S.|:`'.

`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.

`sectionBarType` (string)
: The bar line for `\section`. See `whichBar` for information on available bar types.

`segnoType` (string)
: Set the default bar line for a requested segno. Default is '`S`'.

`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.

`underlyingRepeatType` (string)
: Set the bar line to use at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno.

`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`.

Properties (write)

`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`.

`Spacing_engraver` (page 317)
: Make a `SpacingSpanner` and do bookkeeping of shortest starting and playing notes.

  Music types accepted: `spacing-section-event` (page 52),

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `currentMusicalColumn` (graphical (layout) object)
  : Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

  `proportionalNotationDuration` (moment)
  : Global override for shortest-playing duration. This is used for switching on proportional notation.

  This engraver creates the following layout object(s): `SpacingSpanner` (page 467).

`Staff_collecting_engraver` (page 318)
: Maintain the `stavesFound` variable.

  Properties (read)

  `stavesFound` (list of grobs)
  : A list of all staff-symbols found.

  Properties (write)

  `stavesFound` (list of grobs)
  : A list of all staff-symbols found.

`Stanza_number_align_engraver` (page 319)
: This engraver ensures that stanza numbers are neatly aligned.

`System_start_delimiter_engraver` (page 320)
: Create a system start delimiter (i.e., a `SystemStartBar`, `SystemStartBrace`, `SystemStartBracket` or `SystemStartSquare` spanner).

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `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.

  This engraver creates the following layout object(s): `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), and `SystemStartSquare` (page 484).

`Timing_translator` (page 323)
: This engraver adds the alias `Timing` to its containing context. Responsible for synchronizing timing information from staves. Normally in `Score`. In order

to create polyrhythmic music, this engraver should be removed from `Score` and placed in `Staff`.

Music types accepted: `alternative-event` (page 45),

Properties (read)

`alternativeNumberingStyle` (symbol)
: The scheme and style for numbering bars in repeat alternatives. If not set (the default), bar numbers continue through alternatives. Can be set to `numbers` to reset the bar number at each alternative, or set to `numbers-with-letters` to reset and also include letter suffixes.

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`currentBarNumber` (integer)
: Contains the current barnumber. This property is incremented at every bar line.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`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.

`timeSignatureFraction` (fraction, as pair)
: A pair of numbers, signifying the time signature. For example, `'(4 . 4)` is a 4/4 time signature.

Properties (write)

`alternativeNumber` (integer)
: When set, the index of the current `\alternative` element, starting from one. Not set outside of alternatives. Note the distinction from volta number: an alternative may pertain to multiple volte.

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`currentBarNumber` (integer)
: Contains the current barnumber. This property is incremented at every bar line.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`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.

`measureStartNow` (boolean)
: True at the beginning of a measure.

`timeSignatureFraction` (fraction, as pair)
: A pair of numbers, signifying the time signature. For example, `'(4 . 4)` is a 4/4 time signature.

`Tweak_engraver` (page 325)
: Read the `tweaks` property from the originating event, and set properties.

`Vertical_align_engraver` (page 325)
: Catch groups (staves, lyrics lines, etc.) and stack them vertically.

Properties (read)

`alignAboveContext` (string)
: Where to insert newly created context in vertical alignment.

`alignBelowContext` (string)
: Where to insert newly created context in vertical alignment.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAlignment` (page 504).

`Volta_engraver` (page 326)
: Make volta brackets.

Music types accepted: `volta-span-event` (page 55),

Properties (read)

`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.

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

`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.

This engraver creates the following layout object(s): `VoltaBracket` (page 507), and `VoltaBracketSpanner` (page 509).

2.1.27 `Staff`

Handles clefs, bar lines, keys, accidentals. It can contain `Voice` contexts.

This context creates the following layout object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344),

AccidentalSuggestion (page 345), BarLine (page 354), BassFigure (page 359), BassFigureAlignment (page 359), BassFigureAlignmentPositioning (page 360), BassFigureBracket (page 361), BassFigureContinuation (page 361), BassFigureLine (page 362), Clef (page 372), ClefModifier (page 374), CueClef (page 378), CueEndClef (page 381), DotColumn (page 386), FingeringColumn (page 401), InstrumentName (page 413), KeyCancellation (page 417), KeySignature (page 419), LedgerLineSpanner (page 424), NoteCollision (page 445), OttavaBracket (page 448), PianoPedalBracket (page 455), RestCollision (page 461), ScriptRow (page 463), SostenutoPedal (page 465), SostenutoPedalLineSpanner (page 466), StaffSpacing (page 470), StaffSymbol (page 471), SustainPedal (page 479), SustainPedalLineSpanner (page 480), TimeSignature (page 492), UnaCordaPedal (page 501), UnaCordaPedalLineSpanner (page 503), and VerticalAxisGroup (page 505).

This context sets the following properties:

- Set translator property createSpacing to #t.
- Set translator property ignoreFiguredBassRest to #f.
- Set translator property instrumentName to '().
- Set translator property localAlterations to '().
- Set translator property ottavationMarkups to:

```
'((4 . "29")
  (3 . "22")
  (2 . "15")
  (1 . "8")
  (-1 . "8")
  (-2 . "15")
  (-3 . "22")
  (-4 . "29"))
```

- Set translator property shortInstrumentName to '().

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Voice (page 268).

Context Staff can contain CueVoice (page 64), NullVoice (page 167), and Voice (page 268).

This context is built from the following engraver(s):

Accidental_engraver (page 279)
: Make accidentals. Catch note heads, ties and notices key-change events. This engraver usually lives at Staff level, but reads the settings for Accidental at Voice level, so you can \override them at Voice.

  Properties (read)

  accidentalGrouping (symbol)
  : If set to 'voice, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

  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.

`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.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`harmonicAccidentals` (boolean)
: If set, harmonic notes in chords get accidentals.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`localAlterations` (list)
: The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can

also contain `((`*octave* `.` *name*`) . (`*alter barnumber* `.` *measureposition*`))` pairs.

Properties (write)

`localAlterations` (list)
: The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*octave* `.` *name*`) . (`*alter barnumber* `.` *measureposition*`))` pairs.

This engraver creates the following layout object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), and `AccidentalSuggestion` (page 345).

`Axis_group_engraver` (page 282)
: Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Bar_engraver` (page 283)
: Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

`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`.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `BarLine` (page 354).

`Clef_engraver` (page 287)

Determine and set reference point for pitches.

Properties (read)

`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.

`clefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`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.

This engraver creates the following layout object(s): `Clef` (page 372), and `ClefModifier` (page 374).

`Collision_engraver` (page 288)

Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s): `NoteCollision` (page 445).

`Cue_clef_engraver` (page 290)

Determine and set reference point for pitches in cued voices.

Properties (read)

`clefTransposition` (integer)
: Add this much extra transposition. Values of 7 and -7 are common.

`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.

`cueClefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitCueClefVisibility` (vector)
: '`break-visibility`' function for cue clef changes.

`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`.

This engraver creates the following layout object(s): `ClefModifier` (page 374), `CueClef` (page 378), and `CueEndClef` (page 381).

`Dot_column_engraver` (page 291)
: Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s): `DotColumn` (page 386).

`Figured_bass_engraver` (page 294)
: Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 46), and `rest-event` (page 51),

Properties (read)

`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.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s): `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), and `BassFigureLine` (page 362).

`Figured_bass_position_engraver` (page 295)
: Position figured bass alignments over notes.

This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 360).

`Fingering_column_engraver` (page 295)
: Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `FingeringColumn` (page 401).

`Font_size_engraver` (page 296)
Put `fontSize` into `font-size` grob property.
Properties (read)
`fontSize` (number)
The relative size of all grobs in a context.

`Grob_pq_engraver` (page 299)
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)
`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).
Properties (write)
`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_name_engraver` (page 300)
Create a system start text for instrument or vocal names.
Properties (read)
`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
`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.
`shortInstrumentName` (markup)
See `instrumentName`.
`shortVocalName` (markup)
Name of a vocal line, short version.
`vocalName` (markup)
Name of a vocal line.
This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Key_engraver` (page 301)
Engrave a key signature.
Music types accepted: `key-change-event` (page 48),
Properties (read)
`createKeyOnClefChange` (boolean)
Print a key signature whenever the clef is changed.
`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.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`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).

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`middleCClefPosition` (number)
: The position of the middle C, as determined only by the clef. This can be calculated by looking at `clefPosition` and `clefGlyph`.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

Properties (write)

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`tonic` (pitch)
: The tonic of the current scale.

This engraver creates the following layout object(s): `KeyCancellation` (page 417), and `KeySignature` (page 419).

`Ledger_line_engraver` (page 303)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

  This engraver creates the following layout object(s): `LedgerLineSpanner` (page 424).

`Merge_mmrest_numbers_engraver` (page 305)
: Engraver to merge multi-measure rest numbers in multiple voices.

  This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Ottava_spanner_engraver` (page 309)
: Create a text spanner when the ottavation property changes.

  Properties (read)

  `currentMusicalColumn` (graphical (layout) object)
  : Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

  `middleCOffset` (number)
  : The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

  `ottavation` (markup)
  : If set, the text for an ottava spanner. Changing this creates a new text spanner.

  This engraver creates the following layout object(s): `OttavaBracket` (page 448).

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

  Music types accepted: `apply-output-event` (page 46),

`Piano_pedal_align_engraver` (page 311)
: Align piano pedal symbols and brackets.

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 466), `SustainPedalLineSpanner` (page 480), and `UnaCordaPedalLineSpanner` (page 503).

`Piano_pedal_engraver` (page 312)
: Engrave piano pedal symbols and brackets.

  Music types accepted: `sostenuto-event` (page 52), `sustain-event` (page 54), and `una-corda-event` (page 54),

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `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`.

This engraver creates the following layout object(s): `PianoPedalBracket` (page 455), `SostenutoPedal` (page 465), `SustainPedal` (page 479), and `UnaCordaPedal` (page 501).

`Pure_from_neighbor_engraver` (page 313)
: Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 315)
: Handle collisions of rests.

Properties (read)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s): `RestCollision` (page 461).

`Script_row_engraver` (page 316)
: Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 463).

`Separating_line_group_engraver` (page 316)
: Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)
: Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)
: True if the current `CommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 470).

`Staff_collecting_engraver` (page 318)
: Maintain the `stavesFound` variable.

Properties (read)

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

Properties (write)

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

`Staff_symbol_engraver` (page 319)
: Create the constellation of five (default) staff lines.

Music types accepted: `staff-span-event` (page 53),

This engraver creates the following layout object(s): `StaffSymbol` (page 471).

`Time_signature_engraver` (page 323)

Create a Section 3.1.133 [`TimeSignature`], page 492, whenever `timeSignatureFraction` changes.

Music types accepted: `time-signature-event` (page 54),

Properties (read)

`initialTimeSignatureVisibility` (vector)
break visibility for the initial time signature.

`partialBusy` (boolean)
Signal that \partial acts at the current timestep.

`timeSignatureFraction` (fraction, as pair)
A pair of numbers, signifying the time signature. For example, `'(4 . 4)` is a 4/4 time signature.

This engraver creates the following layout object(s): `TimeSignature` (page 492).

2.1.28 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.

This context creates the following layout object(s): `Arpeggio` (page 351), `InstrumentName` (page 413), `SpanBar` (page 468), `SpanBarStub` (page 469), `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), `SystemStartSquare` (page 484), and `VerticalAlignment` (page 504).

This context sets the following properties:

- Set grob property `extra-spacing-width` in `DynamicText` (page 394), to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `shortInstrumentName` to `'()`.
- Set translator property `systemStartDelimiter` to `'SystemStartBracket`.
- Set translator property `topLevelAlignment` to `#f`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `Staff` (page 217).

Context `StaffGroup` can contain `ChoirStaff` (page 61), `ChordNames` (page 62), `DrumStaff` (page 75), `FiguredBass` (page 94), `FretBoards` (page 96), `GrandStaff` (page 98), `Lyrics` (page 141), `OneStaff` (page 169), `PianoStaff` (page 191), `RhythmicStaff` (page 193), `Staff` (page 217), `StaffGroup` (page 227), and `TabStaff` (page 229).

This context is built from the following engraver(s):

`Instrument_name_engraver` (page 300)

Create a system start text for instrument or vocal names.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

`shortInstrumentName` (markup)
See `instrumentName`.

`shortVocalName` (markup)
Name of a vocal line, short version.

`vocalName` (markup)
Name of a vocal line.

This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Output_property_engraver` (page 309)
Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Span_arpeggio_engraver` (page 317)
Make arpeggios that span multiple staves.

Properties (read)

`connectArpeggios` (boolean)
If set, connect arpeggios across piano staff.

This engraver creates the following layout object(s): `Arpeggio` (page 351).

`Span_bar_engraver` (page 318)
Make cross-staff bar lines: It catches all normal bar lines and draws a single span bar across them.

This engraver creates the following layout object(s): `SpanBar` (page 468).

`Span_bar_stub_engraver` (page 318)
Make stubs for span bars in all contexts that the span bars cross.

This engraver creates the following layout object(s): `SpanBarStub` (page 469).

`System_start_delimiter_engraver` (page 320)
Create a system start delimiter (i.e., a `SystemStartBar`, `SystemStartBrace`, `SystemStartBracket` or `SystemStartSquare` spanner).

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

This engraver creates the following layout object(s): `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), and `SystemStartSquare` (page 484).

`Vertical_align_engraver` (page 325)
Catch groups (staves, lyrics lines, etc.) and stack them vertically.

Properties (read)

`alignAboveContext` (string)
: Where to insert newly created context in vertical alignment.

`alignBelowContext` (string)
: Where to insert newly created context in vertical alignment.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAlignment` (page 504).

2.1.29 TabStaff

Context for generating tablature. It accepts only `TabVoice` contexts and handles the line spacing, the tablature clef etc. properly.

This context also accepts commands for the following context(s): `Staff` (page 217).

This context creates the following layout object(s): `BarLine` (page 354), `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureAlignmentPositioning` (page 360), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), `BassFigureLine` (page 362), `Clef` (page 372), `ClefModifier` (page 374), `CueClef` (page 378), `CueEndClef` (page 381), `DotColumn` (page 386), `FingeringColumn` (page 401), `InstrumentName` (page 413), `LedgerLineSpanner` (page 424), `NoteCollision` (page 445), `PianoPedalBracket` (page 455), `RestCollision` (page 461), `ScriptRow` (page 463), `SostenutoPedal` (page 465), `SostenutoPedalLineSpanner` (page 466), `StaffSpacing` (page 470), `StaffSymbol` (page 471), `SustainPedal` (page 479), `SustainPedalLineSpanner` (page 480), `TimeSignature` (page 492), `UnaCordaPedal` (page 501), `UnaCordaPedalLineSpanner` (page 503), and `VerticalAxisGroup` (page 505).

This context sets the following properties:

- Set grob property `after-line-breaking` in `RepeatTie` (page 459), to `repeat-tie::handle-tab-note-head`.
- Set grob property `after-line-breaking` in `Tie` (page 490), to `tie::handle-tab-note-head`.
- Set grob property `avoid-note-head` in `Stem` (page 472), to `#t`.
- Set grob property `beam-thickness` in `Beam` (page 362), to `0.32`.
- Set grob property `beam-thickness` in `StemTremolo` (page 475), to `0.32`.
- Set grob property `beam-width` in `StemTremolo` (page 475), to `stem-tremolo::calc-tab-width`.
- Set grob property `bound-details.left` in `Glissando` (page 406), to:
  ```
  '((attach-dir . 1) (padding . 0.3))
  ```
- Set grob property `bound-details.right` in `Glissando` (page 406), to:
  ```
  '((attach-dir . -1) (padding . 0.3))
  ```
- Set grob property `details` in `Stem` (page 472), to:
  ```
  '((lengths 0 0 0 0 0 0)
    (beamed-lengths 0 0 0)
    (beamed-minimum-free-lengths 0 0 0)
    (beamed-extreme-minimum-free-lengths 0 0)
    (stem-shorten 0 0))
  ```

- Set grob property `extra-dy` in `Glissando` (page 406), to `glissando::calc-tab-extra-dy`.
- Set grob property `glyph-name` in `TabNoteHead` (page 485), to `tab-note-head::calc-glyph-name`.
- Set grob property `ignore-collision` in `NoteColumn` (page 445), to `#t`.
- Set grob property `length-fraction` in `Beam` (page 362), to `0.62`.
- Set grob property `length-fraction` in `StemTremolo` (page 475), to `#<procedure #f (grob)>`.
- Set grob property `no-stem-extend` in `Stem` (page 472), to `#t`.
- Set grob property `staff-space` in `StaffSymbol` (page 471), to `1.5`.
- Set grob property `stencil` in `Arpeggio` (page 351), to `#f`.
- Set grob property `stencil` in `Beam` (page 362), to `#f`.
- Set grob property `stencil` in `Clef` (page 372), to `clef::print-modern-tab-if-set`.
- Set grob property `stencil` in `Dots` (page 386), to `#f`.
- Set grob property `stencil` in `DynamicTextSpanner` (page 395), to `#f`.
- Set grob property `stencil` in `DynamicText` (page 394), to `#f`.
- Set grob property `stencil` in `Flag` (page 401), to `#f`.
- Set grob property `stencil` in `Glissando` (page 406), to `glissando::draw-tab-glissando`.
- Set grob property `stencil` in `Hairpin` (page 409), to `#f`.
- Set grob property `stencil` in `LaissezVibrerTie` (page 423), to `#f`.
- Set grob property `stencil` in `MultiMeasureRestNumber` (page 439), to `#f`.
- Set grob property `stencil` in `MultiMeasureRestScript` (page 441), to `#f`.
- Set grob property `stencil` in `MultiMeasureRestText` (page 442), to `#f`.
- Set grob property `stencil` in `MultiMeasureRest` (page 438), to `#f`.
- Set grob property `stencil` in `PhrasingSlur` (page 453), to `#f`.
- Set grob property `stencil` in `RepeatTie` (page 459), to `#f`.
- Set grob property `stencil` in `Rest` (page 460), to `#f`.
- Set grob property `stencil` in `Script` (page 461), to `#f`.
- Set grob property `stencil` in `Slur` (page 463), to `slur::draw-tab-slur`.
- Set grob property `stencil` in `StemTremolo` (page 475), to `#f`.
- Set grob property `stencil` in `Stem` (page 472), to `#f`.
- Set grob property `stencil` in `TabNoteHead` (page 485), to `tab-note-head::whiteout-if-style-set`.
- Set grob property `stencil` in `TextScript` (page 487), to `#f`.
- Set grob property `stencil` in `TextSpanner` (page 489), to `#f`.
- Set grob property `stencil` in `Tie` (page 490), to `#f`.
- Set grob property `stencil` in `TimeSignature` (page 492), to `#f`.
- Set grob property `stencil` in `TupletBracket` (page 499), to `#f`.
- Set grob property `stencil` in `TupletNumber` (page 500), to `#f`.
- Set grob property `style` in `Flag` (page 401), to `'no-flag`.
- Set translator property `autoBeaming` to `#f`.
- Set translator property `clefGlyph` to `"clefs.tab"`.
- Set translator property `clefPosition` to `0`.

- Set translator property `createSpacing` to `#t`.
- Set translator property `handleNegativeFrets` to `'recalculate`.
- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localAlterations` to `'()`.
- Set translator property `ottavationMarkups` to:

```
'((4 . "29")
 (3 . "22")
 (2 . "15")
 (1 . "8")
 (-1 . "8")
 (-2 . "15")
 (-3 . "22")
 (-4 . "29"))
```

- Set translator property `restrainOpenStrings` to `#f`.
- Set translator property `shortInstrumentName` to `'()`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `TabVoice` (page 237).

Context `TabStaff` can contain `CueVoice` (page 64), `NullVoice` (page 167), and `TabVoice` (page 237).

This context is built from the following engraver(s):

`Axis_group_engraver` (page 282)

Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Bar_engraver` (page 283)

Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

`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`.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `BarLine` (page 354).

`Clef_engraver` (page 287)
: Determine and set reference point for pitches.

Properties (read)

`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.

`clefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`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.

This engraver creates the following layout object(s): `Clef` (page 372), and `ClefModifier` (page 374).

`Collision_engraver` (page 288)
: Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s): `NoteCollision` (page 445).

`Cue_clef_engraver` (page 290)
: Determine and set reference point for pitches in cued voices.

Properties (read)

`clefTransposition` (integer)
: Add this much extra transposition. Values of 7 and -7 are common.

`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.

`cueClefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitCueClefVisibility` (vector)
: '`break-visibility`' function for cue clef changes.

`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`.

This engraver creates the following layout object(s): `ClefModifier` (page 374), `CueClef` (page 378), and `CueEndClef` (page 381).

`Dot_column_engraver` (page 291)
: Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s): `DotColumn` (page 386).

`Figured_bass_engraver` (page 294)
: Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 46), and `rest-event` (page 51),

Properties (read)

`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.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s): `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), and `BassFigureLine` (page 362).

`Figured_bass_position_engraver` (page 295)
: Position figured bass alignments over notes.

  This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 360).

`Fingering_column_engraver` (page 295)
: Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

  This engraver creates the following layout object(s): `FingeringColumn` (page 401).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

  Properties (read)

  `fontSize` (number)
  : The relative size of all grobs in a context.

`Grob_pq_engraver` (page 299)
: Administrate when certain grobs (e.g., note heads) stop playing.

  Properties (read)

  `busyGrobs` (list)
  : A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

  Properties (write)

  `busyGrobs` (list)
  : A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_name_engraver` (page 300)
: Create a system start text for instrument or vocal names.

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `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.

  `shortInstrumentName` (markup)
  : See `instrumentName`.

  `shortVocalName` (markup)
  : Name of a vocal line, short version.

  `vocalName` (markup)
  : Name of a vocal line.

  This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Ledger_line_engraver` (page 303)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

  This engraver creates the following layout object(s): `LedgerLineSpanner` (page 424).

`Merge_mmrest_numbers_engraver` (page 305)
: Engraver to merge multi-measure rest numbers in multiple voices.

  This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

  Music types accepted: `apply-output-event` (page 46),

`Piano_pedal_align_engraver` (page 311)
: Align piano pedal symbols and brackets.

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 466), `SustainPedalLineSpanner` (page 480), and `UnaCordaPedalLineSpanner` (page 503).

`Piano_pedal_engraver` (page 312)
: Engrave piano pedal symbols and brackets.

  Music types accepted: `sostenuto-event` (page 52), `sustain-event` (page 54), and `una-corda-event` (page 54),

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `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`.

This engraver creates the following layout object(s): `PianoPedalBracket` (page 455), `SostenutoPedal` (page 465), `SustainPedal` (page 479), and `UnaCordaPedal` (page 501).

`Pure_from_neighbor_engraver` (page 313)
Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 315)
Handle collisions of rests.

Properties (read)

`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s): `RestCollision` (page 461).

`Script_row_engraver` (page 316)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 463).

`Separating_line_group_engraver` (page 316)
Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)
Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)
True if the current `CommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 470).

`Staff_collecting_engraver` (page 318)
Maintain the `stavesFound` variable.

Properties (read)

`stavesFound` (list of grobs)
A list of all staff-symbols found.

Properties (write)

`stavesFound` (list of grobs)
A list of all staff-symbols found.

`Staff_symbol_engraver` (page 319)
Create the constellation of five (default) staff lines.

Music types accepted: `staff-span-event` (page 53),

This engraver creates the following layout object(s): `StaffSymbol` (page 471).

`Tab_staff_symbol_engraver` (page 321)
Create a tablature staff symbol, but look at `stringTunings` for the number of lines.

Properties (read)

`stringTunings` (list)
: The tablature strings tuning. It is a list of the pitches of each string (starting with the lowest numbered one).

This engraver creates the following layout object(s): `StaffSymbol` (page 471).

`Time_signature_engraver` (page 323)
: Create a Section 3.1.133 [`TimeSignature`], page 492, whenever `timeSignatureFraction` changes.

Music types accepted: `time-signature-event` (page 54),

Properties (read)

`initialTimeSignatureVisibility` (vector)
: break visibility for the initial time signature.

`partialBusy` (boolean)
: Signal that \partial acts at the current timestep.

`timeSignatureFraction` (fraction, as pair)
: A pair of numbers, signifying the time signature. For example, `'(4 . 4)` is a 4/4 time signature.

This engraver creates the following layout object(s): `TimeSignature` (page 492).

2.1.30 TabVoice

Context for drawing notes in a Tab staff.

This context also accepts commands for the following context(s): `Voice` (page 268).

This context creates the following layout object(s): `Arpeggio` (page 351), `Beam` (page 362), `BendAfter` (page 364), `BendSpanner` (page 365), `BreathingSign` (page 369), `ClusterSpanner` (page 376), `ClusterSpannerBeacon` (page 376), `CombineTextScript` (page 377), `Dots` (page 386), `DoublePercentRepeat` (page 387), `DoublePercentRepeatCounter` (page 388), `DoubleRepeatSlash` (page 390), `DynamicLineSpanner` (page 392), `DynamicText` (page 394), `DynamicTextSpanner` (page 395), `FingerGlideSpanner` (page 398), `Flag` (page 401), `Glissando` (page 406), `Hairpin` (page 409), `InstrumentSwitch` (page 413), `LaissezVibrerTie` (page 423), `LaissezVibrerTieColumn` (page 424), `LigatureBracket` (page 427), `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), `MultiMeasureRestText` (page 442), `NoteColumn` (page 445), `NoteSpacing` (page 448), `PercentRepeat` (page 451), `PercentRepeatCounter` (page 452), `PhrasingSlur` (page 453), `RepeatSlash` (page 458), `RepeatTie` (page 459), `RepeatTieColumn` (page 460), `Rest` (page 460), `Script` (page 461), `ScriptColumn` (page 463), `Slur` (page 463), `Stem` (page 472), `StemStub` (page 474), `StemTremolo` (page 475), `TabNoteHead` (page 485), `TextScript` (page 487), `TextSpanner` (page 489), `Tie` (page 490), `TieColumn` (page 492), `TrillSpanner` (page 498), `TupletBracket` (page 499), `TupletNumber` (page 500), and `VoiceFollower` (page 507).

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

`Arpeggio_engraver` (page 281)
: Generate an Arpeggio symbol.

Music types accepted: `arpeggio-event` (page 46),

This engraver creates the following layout object(s): `Arpeggio` (page 351).

`Auto_beam_engraver` (page 281)

Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.124 [`Stem_engraver`], page 319, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
: If set to true then beams are generated automatically.

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`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.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Beam_engraver` (page 284)

Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `Beam` (page 362).

`Bend_engraver` (page 285)
Create fall spanners.

Music types accepted: `bend-after-event` (page 46),

This engraver creates the following layout object(s): `BendAfter` (page 364).

`Bend_spanner_engraver` (page 285)
Engraver to print a BendSpanner.

Music types accepted: `bend-span-event` (page 46), `note-event` (page 50), and `string-number-event` (page 53),

Properties (read)

`stringFretFingerList` (list)
A list containg three entries. In `TabVoice` and `FretBoards` they determine the string, fret and finger to use

`supportNonIntegerFret` (boolean)
If set in `Score` the `TabStaff` will print micro-tones as '$2\frac{1}{2}$'

Properties (write)

`stringFretFingerList` (list)
A list containg three entries. In `TabVoice` and `FretBoards` they determine the string, fret and finger to use

`supportNonIntegerFret` (boolean)
If set in `Score` the `TabStaff` will print micro-tones as '$2\frac{1}{2}$'

This engraver creates the following layout object(s): `BendSpanner` (page 365).

`Breathing_sign_engraver` (page 286)
Create a breathing sign.

Music types accepted: `breathing-event` (page 47),

This engraver creates the following layout object(s): `BreathingSign` (page 369).

`Chord_tremolo_engraver` (page 287)
Generate beams for tremolo repeats.

Music types accepted: `tremolo-span-event` (page 54),

This engraver creates the following layout object(s): `Beam` (page 362).

`Cluster_spanner_engraver` (page 288)
Engrave a cluster using `Spanner` notation.

Music types accepted: `cluster-note-event` (page 47),

This engraver creates the following layout object(s): `ClusterSpanner` (page 376), and `ClusterSpannerBeacon` (page 376).

`Dots_engraver` (page 291)
Create Section 3.1.36 [`Dots`], page 386, objects for Section 3.2.103 [`rhythmic-head-interface`], page 567s.

This engraver creates the following layout object(s): `Dots` (page 386).

`Double_percent_repeat_engraver` (page 291)
Make double measure repeats.

Music types accepted: `double-percent-event` (page 47),

Properties (read)

`countPercentRepeats` (boolean)
If set, produce counters for percent repeats.

`measureLength` (moment)
Length of one measure in the current time signature.

`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.

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 387), and `DoublePercentRepeatCounter` (page 388).

`Dynamic_align_engraver` (page 293)
Align hairpins and dynamic texts on a horizontal line.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `DynamicLineSpanner` (page 392).

`Dynamic_engraver` (page 293)
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 45), `break-span-event` (page 47), and `span-dynamic-event` (page 52),

Properties (read)

`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.`'.

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`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.`'.

This engraver creates the following layout object(s): `DynamicText` (page 394), `DynamicTextSpanner` (page 395), and `Hairpin` (page 409).

`Finger_glide_engraver` (page 295)
: Engraver to print a line between two `Fingering` grobs.

Music types accepted: `note-event` (page 50),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 398).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
: The relative size of all grobs in a context.

`Forbid_line_break_engraver` (page 296)
: Forbid line breaks when note heads are still playing at some point.

Properties (read)

`busyGrobs` (list)
: A queue of (*`end-moment . grob`*) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

`Glissando_engraver` (page 297)
: Engrave glissandi.

Music types accepted: `glissando-event` (page 48),

Properties (read)

`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.

This engraver creates the following layout object(s): `Glissando` (page 406).

`Grace_auto_beam_engraver` (page 297)
: Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeaming, just like setting the context property '`autoBeaming`' to `##f`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
: If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_beam_engraver` (page 298)
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatStructure` (list)
List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_engraver` (page 298)
Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`Grob_pq_engraver` (page 299)
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_switch_engraver` (page 300)
Create a cue text for taking instrument.

Properties (read)

`instrumentCueName` (markup)
The name to print if another instrument is to be taken.

This engraver creates the following layout object(s): `InstrumentSwitch` (page 413).

`Laissez_vibrer_engraver` (page 302)
: Create laissez vibrer items.

  Music types accepted: `laissez-vibrer-event` (page 48),

  This engraver creates the following layout object(s): `LaissezVibrerTie` (page 423), and `LaissezVibrerTieColumn` (page 424).

`Ligature_bracket_engraver` (page 303)
: Handle `Ligature_events` by engraving `Ligature` brackets.

  Music types accepted: `ligature-event` (page 49),

  This engraver creates the following layout object(s): `LigatureBracket` (page 427).

`Multi_measure_rest_engraver` (page 306)
: Engrave multi-measure rests that are produced with 'R'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the Section 3.1.80 [`MultiMeasureRest`], page 438.

  Music types accepted: `multi-measure-articulation-event` (page 49), `multi-measure-rest-event` (page 49), and `multi-measure-text-event` (page 50),

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `internalBarNumber` (integer)
  : Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

  `measureStartNow` (boolean)
  : True at the beginning of a measure.

  `restNumberThreshold` (number)
  : If a multimeasure rest has more measures than this, a number is printed.

  This engraver creates the following layout object(s): `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), and `MultiMeasureRestText` (page 442).

`Note_head_line_engraver` (page 307)
: Engrave a line between two note heads in a staff switch if `followVoice` is set.

  Properties (read)

  `followVoice` (boolean)
  : If set, note heads are tracked across staff switches by a thin line.

  This engraver creates the following layout object(s): `VoiceFollower` (page 507).

`Note_spacing_engraver` (page 309)
: Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

  This engraver creates the following layout object(s): `NoteSpacing` (page 448).

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

  Music types accepted: `apply-output-event` (page 46),

`Part_combine_engraver` (page 310)
: Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

  Music types accepted: `note-event` (page 50), and `part-combine-event` (page 51),

  Properties (read)

  `aDueText` (markup)
  : Text to print at a unisono passage.

  `partCombineTextsOnNote` (boolean)
  : Print part-combine texts only on the next note rather than immediately on rests or skips.

  `printPartCombineTexts` (boolean)
  : Set 'Solo' and 'A due' texts in the part combiner?

  `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.

  This engraver creates the following layout object(s): `CombineTextScript` (page 377).

`Percent_repeat_engraver` (page 311)
: Make whole measure repeats.

  Music types accepted: `percent-event` (page 51),

  Properties (read)

  `countPercentRepeats` (boolean)
  : If set, produce counters for percent repeats.

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `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.

  This engraver creates the following layout object(s): `PercentRepeat` (page 451), and `PercentRepeatCounter` (page 452).

`Phrasing_slur_engraver` (page 311)
: Print phrasing slurs. Similar to Section 2.2.111 [`Slur_engraver`], page 317.

  Music types accepted: `note-event` (page 50), and `phrasing-slur-event` (page 51),

  This engraver creates the following layout object(s): `PhrasingSlur` (page 453).

`Repeat_tie_engraver` (page 314)
: Create repeat ties.

  Music types accepted: `repeat-tie-event` (page 51),

  This engraver creates the following layout object(s): `RepeatTie` (page 459), and `RepeatTieColumn` (page 460).

`Rest_engraver` (page 315)
: Engrave rests.

  Music types accepted: `rest-event` (page 51),

  Properties (read)

  `middleCPosition` (number)
  : The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

  This engraver creates the following layout object(s): `Rest` (page 460).

`Rhythmic_column_engraver` (page 315)
: Generate `NoteColumn`, an object that groups stems, note heads, and rests.

  This engraver creates the following layout object(s): `NoteColumn` (page 445).

`Script_column_engraver` (page 315)
: Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

  This engraver creates the following layout object(s): `ScriptColumn` (page 463).

`Script_engraver` (page 315)
: Handle note scripted articulations.

  Music types accepted: `articulation-event` (page 46),

  Properties (read)

  `scriptDefinitions` (list)
  : The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See `scm/script.scm` for more information.

  This engraver creates the following layout object(s): `Script` (page 461).

`Slash_repeat_engraver` (page 316)
: Make beat repeats.

  Music types accepted: `repeat-slash-event` (page 51),

  This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 390), and `RepeatSlash` (page 458).

`Slur_engraver` (page 317)
: Build slur grobs from slur events.

  Music types accepted: `note-event` (page 50), and `slur-event` (page 52),

  Properties (read)

  `doubleSlurs` (boolean)
  : If set, two slurs are created for every slurred note, one above and one below the chord.

`slurMelismaBusy` (boolean)
Signal if a slur is present.

This engraver creates the following layout object(s): `Slur` (page 463).

`Spanner_break_forbid_engraver` (page 318)
Forbid breaks in certain spanners.

`Stem_engraver` (page 319)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 54), and `tuplet-span-event` (page 54),

Properties (read)

`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`.

`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`.

This engraver creates the following layout object(s): `Flag` (page 401), `Stem` (page 472), `StemStub` (page 474), and `StemTremolo` (page 475).

`Tab_note_heads_engraver` (page 320)
Generate one or more tablature note heads from event of type `NoteEvent`.

Music types accepted: `fingering-event` (page 48), `note-event` (page 50), and `string-number-event` (page 53),

Properties (read)

`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.

`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.

`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.

`maximumFretStretch` (number)
Don't allocate frets further than this from specified frets.

`middleCPosition` (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

`minimumFret` (number)
: The tablature auto string-selecting mechanism selects the highest string with a fret at least `minimumFret`.

`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.

`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).

`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.

This engraver creates the following layout object(s): `TabNoteHead` (page 485).

`Tab_tie_follow_engraver` (page 321)
: Adjust TabNoteHead properties when a tie is followed by a slur or glissando.

`Text_engraver` (page 321)
: Create text scripts.

Music types accepted: `text-script-event` (page 54),

This engraver creates the following layout object(s): `TextScript` (page 487).

`Text_spanner_engraver` (page 322)
: Create text spanner from an event.

Music types accepted: `text-span-event` (page 54),

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TextSpanner` (page 489).

`Tie_engraver` (page 322)
: Generate ties between note heads of equal pitch.

  Music types accepted: `tie-event` (page 54),

  Properties (read)

  `skipTypesetting` (boolean)
  : If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

  `tieWaitForNote` (boolean)
  : If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

  Properties (write)

  `tieMelismaBusy` (boolean)
  : Signal whether a tie is present.

  This engraver creates the following layout object(s): `Tie` (page 490), and `TieColumn` (page 492).

`Trill_spanner_engraver` (page 324)
: Create trill spanner from an event.

  Music types accepted: `trill-span-event` (page 54),

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `currentMusicalColumn` (graphical (layout) object)
  : Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

  This engraver creates the following layout object(s): `TrillSpanner` (page 498).

`Tuplet_engraver` (page 325)
: Catch tuplet events and generate appropriate bracket.

  Music types accepted: `tuplet-span-event` (page 54),

  Properties (read)

  `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.

  This engraver creates the following layout object(s): `TupletBracket` (page 499), and `TupletNumber` (page 500).

2.1.31 `VaticanaStaff`

Same as `Staff` context, except that it is accommodated for typesetting Gregorian Chant in the notational style of Editio Vaticana.

This context also accepts commands for the following context(s): `Staff` (page 217).

This context creates the following layout object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), `AccidentalSuggestion` (page 345), `BarLine` (page 354), `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureAlignmentPositioning` (page 360), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), `BassFigureLine` (page 362), `Clef` (page 372), `ClefModifier` (page 374), `CueClef` (page 378), `CueEndClef` (page 381), `Custos` (page 384), `DotColumn` (page 386), `FingeringColumn` (page 401), `InstrumentName` (page 413), `KeyCancellation` (page 417), `KeySignature` (page 419), `LedgerLineSpanner` (page 424), `NoteCollision` (page 445), `OttavaBracket` (page 448), `PianoPedalBracket` (page 455), `RestCollision` (page 461), `ScriptRow` (page 463), `SostenutoPedal` (page 465), `SostenutoPedalLineSpanner` (page 466), `StaffSpacing` (page 470), `StaffSymbol` (page 471), `SustainPedal` (page 479), `SustainPedalLineSpanner` (page 480), `UnaCordaPedal` (page 501), `UnaCordaPedalLineSpanner` (page 503), and `VerticalAxisGroup` (page 505).

This context sets the following properties:

- Set grob property `glyph-name-alist` in `Accidental` (page 342), to:

```
'((-1/2 . "accidentals.vaticanaM1")
  (0 . "accidentals.vaticana0")
  (1/2 . "accidentals.mensural1"))
```

- Set grob property `glyph-name-alist` in `KeySignature` (page 419), to:

```
'((-1/2 . "accidentals.vaticanaM1")
  (0 . "accidentals.vaticana0")
  (1/2 . "accidentals.mensural1"))
```

- Set grob property `hair-thickness` in `BarLine` (page 354), to `0.6`.
- Set grob property `line-count` in `StaffSymbol` (page 471), to `4`.
- Set grob property `neutral-direction` in `Custos` (page 384), to `-1`.
- Set grob property `neutral-position` in `Custos` (page 384), to `3`.
- Set grob property `style` in `Custos` (page 384), to `'vaticana`.
- Set grob property `style` in `Dots` (page 386), to `'vaticana`.
- Set grob property `thick-thickness` in `BarLine` (page 354), to `0.6`.
- Set grob property `thickness` in `StaffSymbol` (page 471), to `0.6`.
- Set translator property `clefGlyph` to `"clefs.vaticana.do"`.
- Set translator property `clefPosition` to `1`.
- Set translator property `clefTransposition` to `0`.
- Set translator property `createSpacing` to `#t`.
- Set translator property `defaultBarType` to `""`.
- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localAlterations` to `'()`.
- Set translator property `middleCClefPosition` to `1`.
- Set translator property `middleCPosition` to `1`.
- Set translator property `ottavationMarkups` to:

```
'((4 . "29")
  (3 . "22")
  (2 . "15")
  (1 . "8")
```

```
(-1 . "8")
(-2 . "15")
(-3 . "22")
(-4 . "29"))
```

- Set translator property `shortInstrumentName` to `'()`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `VaticanaVoice` (page 258).

Context `VaticanaStaff` can contain `CueVoice` (page 64), `NullVoice` (page 167), and `VaticanaVoice` (page 258).

This context is built from the following engraver(s):

`Accidental_engraver` (page 279)

Make accidentals. Catch note heads, ties and notices key-change events. This engraver usually lives at Staff level, but reads the settings for Accidental at `Voice` level, so you can `\override` them at `Voice`.

Properties (read)

`accidentalGrouping` (symbol)

If set to `'voice`, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

`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.

`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.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`harmonicAccidentals` (boolean)
: If set, harmonic notes in chords get accidentals.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`localAlterations` (list)
: The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber`*` . `*`measureposition`*`))` pairs.

Properties (write)

`localAlterations` (list)
: The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber`*` . `*`measureposition`*`))` pairs.

This engraver creates the following layout object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), and `AccidentalSuggestion` (page 345).

`Axis_group_engraver` (page 282)
: Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Bar_engraver` (page 283)
: Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

`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`.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `BarLine` (page 354).

`Clef_engraver` (page 287)
: Determine and set reference point for pitches.

Properties (read)

`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.

`clefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`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.

This engraver creates the following layout object(s): `Clef` (page 372), and `ClefModifier` (page 374).

`Collision_engraver` (page 288)
Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s): `NoteCollision` (page 445).

`Cue_clef_engraver` (page 290)
Determine and set reference point for pitches in cued voices.

Properties (read)

`clefTransposition` (integer)
Add this much extra transposition. Values of 7 and -7 are common.

`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.

`cueClefTranspositionStyle` (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitCueClefVisibility` (vector)
'`break-visibility`' function for cue clef changes.

`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`.

This engraver creates the following layout object(s): `ClefModifier` (page 374), `CueClef` (page 378), and `CueEndClef` (page 381).

`Custos_engraver` (page 290)
Engrave custodes.

This engraver creates the following layout object(s): `Custos` (page 384).

`Dot_column_engraver` (page 291)
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s): `DotColumn` (page 386).

`Figured_bass_engraver` (page 294)
Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 46), and `rest-event` (page 51),

Properties (read)

`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.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s): `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), and `BassFigureLine` (page 362).

`Figured_bass_position_engraver` (page 295)
: Position figured bass alignments over notes.

This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 360).

`Fingering_column_engraver` (page 295)
: Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `FingeringColumn` (page 401).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
: The relative size of all grobs in a context.

`Grob_pq_engraver` (page 299)
: Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_name_engraver` (page 300)
Create a system start text for instrument or vocal names.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

`shortInstrumentName` (markup)
See `instrumentName`.

`shortVocalName` (markup)
Name of a vocal line, short version.

`vocalName` (markup)
Name of a vocal line.

This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Key_engraver` (page 301)
Engrave a key signature.

Music types accepted: `key-change-event` (page 48),

Properties (read)

`createKeyOnClefChange` (boolean)
Print a key signature whenever the clef is changed.

`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.

`extraNatural` (boolean)
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`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).

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
Last key signature before a key signature change.

`middleCClefPosition` (number)
: The position of the middle C, as determined only by the clef. This can be calculated by looking at `clefPosition` and `clefGlyph`.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

Properties (write)

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`tonic` (pitch)
: The tonic of the current scale.

This engraver creates the following layout object(s): `KeyCancellation` (page 417), and `KeySignature` (page 419).

`Ledger_line_engraver` (page 303)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 424).

`Merge_mmrest_numbers_engraver` (page 305)
: Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Ottava_spanner_engraver` (page 309)
: Create a text spanner when the ottavation property changes.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`middleCOffset` (number)
: The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

`ottavation` (markup)
: If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s): `OttavaBracket` (page 448).

`Output_property_engraver` (page 309)
: Apply a procedure to any grob acknowledged.

  Music types accepted: `apply-output-event` (page 46),

`Piano_pedal_align_engraver` (page 311)
: Align piano pedal symbols and brackets.

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 466), `SustainPedalLineSpanner` (page 480), and `UnaCordaPedalLineSpanner` (page 503).

`Piano_pedal_engraver` (page 312)
: Engrave piano pedal symbols and brackets.

  Music types accepted: `sostenuto-event` (page 52), `sustain-event` (page 54), and `una-corda-event` (page 54),

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `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`.

  This engraver creates the following layout object(s): `PianoPedalBracket` (page 455), `SostenutoPedal` (page 465), `SustainPedal` (page 479), and `UnaCordaPedal` (page 501).

`Pure_from_neighbor_engraver` (page 313)
: Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 315)
: Handle collisions of rests.

  Properties (read)

busyGrobs (list)
A queue of (*end-moment . grob*) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s): RestCollision (page 461).

Script_row_engraver (page 316)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 463).

Separating_line_group_engraver (page 316)
Generate objects for computing spacing parameters.

Properties (read)

createSpacing (boolean)
Create StaffSpacing objects? Should be set for staves.

Properties (write)

hasStaffSpacing (boolean)
True if the current CommandColumn contains items that will affect spacing.

This engraver creates the following layout object(s): StaffSpacing (page 470).

Staff_collecting_engraver (page 318)
Maintain the stavesFound variable.

Properties (read)

stavesFound (list of grobs)
A list of all staff-symbols found.

Properties (write)

stavesFound (list of grobs)
A list of all staff-symbols found.

Staff_symbol_engraver (page 319)
Create the constellation of five (default) staff lines.

Music types accepted: staff-span-event (page 53),

This engraver creates the following layout object(s): StaffSymbol (page 471).

2.1.32 VaticanaVoice

Same as Voice context, except that it is accommodated for typesetting Gregorian Chant in the notational style of Editio Vaticana.

This context also accepts commands for the following context(s): Voice (page 268).

This context creates the following layout object(s): Arpeggio (page 351), Beam (page 362), BendAfter (page 364), BreathingSign (page 369), ClusterSpanner (page 376), ClusterSpannerBeacon (page 376), CombineTextScript (page 377), DotColumn (page 386), Dots (page 386), DoublePercentRepeat (page 387), DoublePercentRepeatCounter (page 388), DoubleRepeatSlash (page 390), DynamicLineSpanner (page 392), DynamicText (page 394), DynamicTextSpanner (page 395), Episema (page 397), FingerGlideSpanner (page 398), Fingering (page 399), Glissando (page 406), Hairpin (page 409),

InstrumentSwitch (page 413), LaissezVibrerTie (page 423), LaissezVibrerTieColumn (page 424), MultiMeasureRest (page 438), MultiMeasureRestNumber (page 439), MultiMeasureRestScript (page 441), MultiMeasureRestText (page 442), NoteColumn (page 445), NoteHead (page 446), NoteSpacing (page 448), PercentRepeat (page 451), PercentRepeatCounter (page 452), PhrasingSlur (page 453), RepeatSlash (page 458), RepeatTie (page 459), RepeatTieColumn (page 460), Rest (page 460), Script (page 461), ScriptColumn (page 463), StringNumber (page 476), StrokeFinger (page 477), TextScript (page 487), Tie (page 490), TieColumn (page 492), TrillPitchAccidental (page 495), TrillPitchGroup (page 496), TrillPitchHead (page 497), TrillSpanner (page 498), TupletBracket (page 499), TupletNumber (page 500), VaticanaLigature (page 504), and VoiceFollower (page 507).

This context sets the following properties:

- Set grob property padding in Script (page 461), to 0.5.
- Set grob property style in NoteHead (page 446), to 'vaticana.punctum.
- Set translator property autoBeaming to #f.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

Arpeggio_engraver (page 281)

Generate an Arpeggio symbol.

Music types accepted: arpeggio-event (page 46),

This engraver creates the following layout object(s): Arpeggio (page 351).

Auto_beam_engraver (page 281)

Generate beams based on measure characteristics and observed Stems. Uses baseMoment, beatStructure, beamExceptions, measureLength, and measurePosition to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.124 [Stem_engraver], page 319, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 46),

Properties (read)

autoBeaming (boolean)

If set to true then beams are generated automatically.

baseMoment (moment)

Smallest unit of time that will stand on its own as a subdivided section.

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 baseMoments that are combined to make beats.

subdivideBeams (boolean)

If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Beam_engraver` (page 284)
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatStructure` (list)
List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `Beam` (page 362).

`Bend_engraver` (page 285)
Create fall spanners.

Music types accepted: `bend-after-event` (page 46),

This engraver creates the following layout object(s): `BendAfter` (page 364).

`Breathing_sign_engraver` (page 286)
Create a breathing sign.

Music types accepted: `breathing-event` (page 47),

This engraver creates the following layout object(s): `BreathingSign` (page 369).

`Chord_tremolo_engraver` (page 287)
Generate beams for tremolo repeats.

Music types accepted: `tremolo-span-event` (page 54),

This engraver creates the following layout object(s): `Beam` (page 362).

`Cluster_spanner_engraver` (page 288)
Engrave a cluster using `Spanner` notation.

Music types accepted: `cluster-note-event` (page 47),

This engraver creates the following layout object(s): `ClusterSpanner` (page 376), and `ClusterSpannerBeacon` (page 376).

`Dots_engraver` (page 291)
Create Section 3.1.36 [`Dots`], page 386, objects for Section 3.2.103 [`rhythmic-head-interface`], page 567s.

This engraver creates the following layout object(s): `Dots` (page 386).

`Double_percent_repeat_engraver` (page 291)
Make double measure repeats.

Music types accepted: `double-percent-event` (page 47),

Properties (read)

`countPercentRepeats` (boolean)
If set, produce counters for percent repeats.

`measureLength` (moment)
Length of one measure in the current time signature.

`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.

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 387), and `DoublePercentRepeatCounter` (page 388).

`Dynamic_align_engraver` (page 293)
Align hairpins and dynamic texts on a horizontal line.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `DynamicLineSpanner` (page 392).

`Dynamic_engraver` (page 293)
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 45), `break-span-event` (page 47), and `span-dynamic-event` (page 52),

Properties (read)

`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.`'.

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`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.`'.

This engraver creates the following layout object(s): `DynamicText` (page 394), `DynamicTextSpanner` (page 395), and `Hairpin` (page 409).

`Episema_engraver` (page 294)
: Create an *Editio Vaticana*-style episema line.

Music types accepted: `episema-event` (page 47),

This engraver creates the following layout object(s): `Episema` (page 397).

`Finger_glide_engraver` (page 295)
: Engraver to print a line between two `Fingering` grobs.

Music types accepted: `note-event` (page 50),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 398).

`Fingering_engraver` (page 295)
: Create fingering scripts.

Music types accepted: `fingering-event` (page 48),

This engraver creates the following layout object(s): `Fingering` (page 399).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
: The relative size of all grobs in a context.

`Forbid_line_break_engraver` (page 296)
: Forbid line breaks when note heads are still playing at some point.

Properties (read)

`busyGrobs` (list)
: A queue of (*`end-moment . grob`*) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

`Glissando_engraver` (page 297)
: Engrave glissandi.

Music types accepted: `glissando-event` (page 48),

Properties (read)

`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.

This engraver creates the following layout object(s): `Glissando` (page 406).

`Grace_auto_beam_engraver` (page 297)
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeaming, just like setting the context property '`autoBeaming`' to `##f`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_beam_engraver` (page 298)
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatStructure` (list)
List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_engraver` (page 298)
Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`Grob_pq_engraver` (page 299)
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_switch_engraver` (page 300)
Create a cue text for taking instrument.

Properties (read)

`instrumentCueName` (markup)
The name to print if another instrument is to be taken.

This engraver creates the following layout object(s): `InstrumentSwitch` (page 413).

`Laissez_vibrer_engraver` (page 302)
Create laissez vibrer items.

Music types accepted: `laissez-vibrer-event` (page 48),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 423), and `LaissezVibrerTieColumn` (page 424).

`Multi_measure_rest_engraver` (page 306)
Engrave multi-measure rests that are produced with '`R`'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the Section 3.1.80 [`MultiMeasureRest`], page 438.

Music types accepted: `multi-measure-articulation-event` (page 49), `multi-measure-rest-event` (page 49), and `multi-measure-text-event` (page 50),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`internalBarNumber` (integer)
Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`measureStartNow` (boolean)
True at the beginning of a measure.

`restNumberThreshold` (number)
If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), and `MultiMeasureRestText` (page 442).

`New_fingering_engraver` (page 307)
Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

`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.

`harmonicDots` (boolean)
If set, harmonic notes in dotted chords get dots.

`stringNumberOrientations` (list)
See `fingeringOrientations`.

`strokeFingerOrientations` (list)
See `fingeringOrientations`.

This engraver creates the following layout object(s): `Fingering` (page 399), `Script` (page 461), `StringNumber` (page 476), and `StrokeFinger` (page 477).

`Note_head_line_engraver` (page 307)
Engrave a line between two note heads in a staff switch if `followVoice` is set.

Properties (read)

`followVoice` (boolean)
If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s): `VoiceFollower` (page 507).

`Note_heads_engraver` (page 308)
Generate note heads.

Music types accepted: `note-event` (page 50),

Properties (read)

`middleCPosition` (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

`staffLineLayoutFunction` (procedure)
Layout of staff lines, `traditional`, or `semitone`.

This engraver creates the following layout object(s): `NoteHead` (page 446).

`Note_spacing_engraver` (page 309)
Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s): `NoteSpacing` (page 448).

`Output_property_engraver` (page 309)
Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Part_combine_engraver` (page 310)
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted: `note-event` (page 50), and `part-combine-event` (page 51),

Properties (read)

`aDueText` (markup)
Text to print at a unisono passage.

`partCombineTextsOnNote` (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.

`printPartCombineTexts` (boolean)
Set 'Solo' and 'A due' texts in the part combiner?

`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.

This engraver creates the following layout object(s): `CombineTextScript` (page 377).

`Percent_repeat_engraver` (page 311)
Make whole measure repeats.

Music types accepted: `percent-event` (page 51),

Properties (read)

`countPercentRepeats` (boolean)
If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

This engraver creates the following layout object(s): `PercentRepeat` (page 451), and `PercentRepeatCounter` (page 452).

`Phrasing_slur_engraver` (page 311)
Print phrasing slurs. Similar to Section 2.2.111 [`Slur_engraver`], page 317.

Music types accepted: `note-event` (page 50), and `phrasing-slur-event` (page 51),

This engraver creates the following layout object(s): `PhrasingSlur` (page 453).

`Pitched_trill_engraver` (page 313)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), and `TrillPitchHead` (page 497).

`Repeat_tie_engraver` (page 314)
Create repeat ties.

Music types accepted: `repeat-tie-event` (page 51),

This engraver creates the following layout object(s): `RepeatTie` (page 459), and `RepeatTieColumn` (page 460).

`Rest_engraver` (page 315)
Engrave rests.

Music types accepted: `rest-event` (page 51),

Properties (read)

`middleCPosition` (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

This engraver creates the following layout object(s): `Rest` (page 460).

`Rhythmic_column_engraver` (page 315)
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 445).

`Script_column_engraver` (page 315)
Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 463).

`Script_engraver` (page 315)
Handle note scripted articulations.

Music types accepted: `articulation-event` (page 46),

Properties (read)

`scriptDefinitions` (list)
The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See `scm/script.scm` for more information.

This engraver creates the following layout object(s): `Script` (page 461).

`Slash_repeat_engraver` (page 316)
Make beat repeats.

Music types accepted: `repeat-slash-event` (page 51),

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 390), and `RepeatSlash` (page 458).

`Spanner_break_forbid_engraver` (page 318)
Forbid breaks in certain spanners.

`Text_engraver` (page 321)
Create text scripts.

Music types accepted: `text-script-event` (page 54),

This engraver creates the following layout object(s): `TextScript` (page 487).

`Tie_engraver` (page 322)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 54),

Properties (read)

`skipTypesetting` (boolean)
If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

`tieWaitForNote` (boolean)
: If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

`tieMelismaBusy` (boolean)
: Signal whether a tie is present.

This engraver creates the following layout object(s): `Tie` (page 490), and `TieColumn` (page 492).

`Trill_spanner_engraver` (page 324)
: Create trill spanner from an event.

Music types accepted: `trill-span-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TrillSpanner` (page 498).

`Tuplet_engraver` (page 325)
: Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 54),

Properties (read)

`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.

This engraver creates the following layout object(s): `TupletBracket` (page 499), and `TupletNumber` (page 500).

`Vaticana_ligature_engraver` (page 325)
: Handle ligatures by glueing special ligature heads together.

Music types accepted: `ligature-event` (page 49), and `pes-or-flexa-event` (page 51),

This engraver creates the following layout object(s): `DotColumn` (page 386), and `VaticanaLigature` (page 504).

2.1.33 `Voice`

Corresponds to a voice on a staff. This context handles the conversion of dynamic signs, stems, beams, super- and subscripts, slurs, ties, and rests.

You have to instantiate this explicitly if you want to have multiple voices on the same staff.

This context creates the following layout object(s): `Arpeggio` (page 351), `Beam` (page 362), `BendAfter` (page 364), `BreathingSign` (page 369), `ClusterSpanner`

(page 376), ClusterSpannerBeacon (page 376), CombineTextScript (page 377), Dots (page 386), DoublePercentRepeat (page 387), DoublePercentRepeatCounter (page 388), DoubleRepeatSlash (page 390), DynamicLineSpanner (page 392), DynamicText (page 394), DynamicTextSpanner (page 395), FingerGlideSpanner (page 398), Fingering (page 399), Flag (page 401), Glissando (page 406), Hairpin (page 409), InstrumentSwitch (page 413), LaissezVibrerTie (page 423), LaissezVibrerTieColumn (page 424), LigatureBracket (page 427), MultiMeasureRest (page 438), MultiMeasureRestNumber (page 439), MultiMeasureRestScript (page 441), MultiMeasureRestText (page 442), NoteColumn (page 445), NoteHead (page 446), NoteSpacing (page 448), PercentRepeat (page 451), PercentRepeatCounter (page 452), PhrasingSlur (page 453), RepeatSlash (page 458), RepeatTie (page 459), RepeatTieColumn (page 460), Rest (page 460), Script (page 461), ScriptColumn (page 463), Slur (page 463), Stem (page 472), StemStub (page 474), StemTremolo (page 475), StringNumber (page 476), StrokeFinger (page 477), TextScript (page 487), TextSpanner (page 489), Tie (page 490), TieColumn (page 492), TrillPitchAccidental (page 495), TrillPitchGroup (page 496), TrillPitchHead (page 497), TrillSpanner (page 498), TupletBracket (page 499), TupletNumber (page 500), and VoiceFollower (page 507).

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

Arpeggio_engraver (page 281)

Generate an Arpeggio symbol.

Music types accepted: arpeggio-event (page 46),

This engraver creates the following layout object(s): Arpeggio (page 351).

Auto_beam_engraver (page 281)

Generate beams based on measure characteristics and observed Stems. Uses baseMoment, beatStructure, beamExceptions, measureLength, and measurePosition to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.124 [Stem_engraver], page 319, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 46),

Properties (read)

autoBeaming (boolean)

If set to true then beams are generated automatically.

baseMoment (moment)

Smallest unit of time that will stand on its own as a subdivided section.

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 baseMoments that are combined to make beats.

subdivideBeams (boolean)

If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Beam_engraver` (page 284)
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatStructure` (list)
List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `Beam` (page 362).

`Bend_engraver` (page 285)
Create fall spanners.

Music types accepted: `bend-after-event` (page 46),

This engraver creates the following layout object(s): `BendAfter` (page 364).

`Breathing_sign_engraver` (page 286)
Create a breathing sign.

Music types accepted: `breathing-event` (page 47),

This engraver creates the following layout object(s): `BreathingSign` (page 369).

`Chord_tremolo_engraver` (page 287)
Generate beams for tremolo repeats.

Music types accepted: `tremolo-span-event` (page 54),

This engraver creates the following layout object(s): `Beam` (page 362).

`Cluster_spanner_engraver` (page 288)
Engrave a cluster using `Spanner` notation.

Music types accepted: `cluster-note-event` (page 47),

This engraver creates the following layout object(s): `ClusterSpanner` (page 376), and `ClusterSpannerBeacon` (page 376).

`Dots_engraver` (page 291)
Create Section 3.1.36 [`Dots`], page 386, objects for Section 3.2.103 [`rhythmic-head-interface`], page 567s.

This engraver creates the following layout object(s): `Dots` (page 386).

`Double_percent_repeat_engraver` (page 291)
Make double measure repeats.

Music types accepted: `double-percent-event` (page 47),

Properties (read)

`countPercentRepeats` (boolean)
If set, produce counters for percent repeats.

`measureLength` (moment)
Length of one measure in the current time signature.

`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.

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 387), and `DoublePercentRepeatCounter` (page 388).

`Dynamic_align_engraver` (page 293)
Align hairpins and dynamic texts on a horizontal line.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `DynamicLineSpanner` (page 392).

`Dynamic_engraver` (page 293)
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 45), `break-span-event` (page 47), and `span-dynamic-event` (page 52),

Properties (read)

`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.`'.

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`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.`'.

This engraver creates the following layout object(s): `DynamicText` (page 394), `DynamicTextSpanner` (page 395), and `Hairpin` (page 409).

`Finger_glide_engraver` (page 295)
: Engraver to print a line between two `Fingering` grobs.

Music types accepted: `note-event` (page 50),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 398).

`Fingering_engraver` (page 295)
: Create fingering scripts.

Music types accepted: `fingering-event` (page 48),

This engraver creates the following layout object(s): `Fingering` (page 399).

`Font_size_engraver` (page 296)
: Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
: The relative size of all grobs in a context.

`Forbid_line_break_engraver` (page 296)
: Forbid line breaks when note heads are still playing at some point.

Properties (read)

`busyGrobs` (list)
: A queue of (*`end-moment . grob`*) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

`Glissando_engraver` (page 297)
: Engrave glissandi.

Music types accepted: `glissando-event` (page 48),

Properties (read)

`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.

This engraver creates the following layout object(s): `Glissando` (page 406).

`Grace_auto_beam_engraver` (page 297)
: Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeaming, just like setting the context property '`autoBeaming`' to `##f`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
: If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_beam_engraver` (page 298)
: Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_engraver` (page 298)
: Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
: Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`Grob_pq_engraver` (page 299)
: Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Instrument_switch_engraver` (page 300)
: Create a cue text for taking instrument.

Properties (read)

`instrumentCueName` (markup)
: The name to print if another instrument is to be taken.

This engraver creates the following layout object(s): `InstrumentSwitch` (page 413).

`Laissez_vibrer_engraver` (page 302)
Create laissez vibrer items.

Music types accepted: `laissez-vibrer-event` (page 48),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 423), and `LaissezVibrerTieColumn` (page 424).

`Ligature_bracket_engraver` (page 303)
Handle `Ligature_events` by engraving `Ligature` brackets.

Music types accepted: `ligature-event` (page 49),

This engraver creates the following layout object(s): `LigatureBracket` (page 427).

`Multi_measure_rest_engraver` (page 306)
Engrave multi-measure rests that are produced with '`R`'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the Section 3.1.80 [`MultiMeasureRest`], page 438.

Music types accepted: `multi-measure-articulation-event` (page 49), `multi-measure-rest-event` (page 49), and `multi-measure-text-event` (page 50),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`internalBarNumber` (integer)
Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`measureStartNow` (boolean)
True at the beginning of a measure.

`restNumberThreshold` (number)
If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), and `MultiMeasureRestText` (page 442).

`New_fingering_engraver` (page 307)
Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

`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.

`harmonicDots` (boolean)
If set, harmonic notes in dotted chords get dots.

`stringNumberOrientations` (list)
See `fingeringOrientations`.

`strokeFingerOrientations` (list)
See `fingeringOrientations`.

This engraver creates the following layout object(s): `Fingering` (page 399), `Script` (page 461), `StringNumber` (page 476), and `StrokeFinger` (page 477).

`Note_head_line_engraver` (page 307)
Engrave a line between two note heads in a staff switch if `followVoice` is set.

Properties (read)

`followVoice` (boolean)
If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s): `VoiceFollower` (page 507).

`Note_heads_engraver` (page 308)
Generate note heads.

Music types accepted: `note-event` (page 50),

Properties (read)

`middleCPosition` (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

`staffLineLayoutFunction` (procedure)
Layout of staff lines, `traditional`, or `semitone`.

This engraver creates the following layout object(s): `NoteHead` (page 446).

`Note_spacing_engraver` (page 309)
Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s): `NoteSpacing` (page 448).

`Output_property_engraver` (page 309)
Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 46),

`Part_combine_engraver` (page 310)
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted: `note-event` (page 50), and `part-combine-event` (page 51),

Properties (read)

`aDueText` (markup)
Text to print at a unisono passage.

`partCombineTextsOnNote` (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.

`printPartCombineTexts` (boolean)
Set 'Solo' and 'A due' texts in the part combiner?

`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.

This engraver creates the following layout object(s): `CombineTextScript` (page 377).

`Percent_repeat_engraver` (page 311)
Make whole measure repeats.

Music types accepted: `percent-event` (page 51),

Properties (read)

`countPercentRepeats` (boolean)
If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

This engraver creates the following layout object(s): `PercentRepeat` (page 451), and `PercentRepeatCounter` (page 452).

`Phrasing_slur_engraver` (page 311)
Print phrasing slurs. Similar to Section 2.2.111 [`Slur_engraver`], page 317.

Music types accepted: `note-event` (page 50), and `phrasing-slur-event` (page 51),

This engraver creates the following layout object(s): `PhrasingSlur` (page 453).

`Pitched_trill_engraver` (page 313)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), and `TrillPitchHead` (page 497).

`Repeat_tie_engraver` (page 314)
Create repeat ties.

Music types accepted: `repeat-tie-event` (page 51),

This engraver creates the following layout object(s): `RepeatTie` (page 459), and `RepeatTieColumn` (page 460).

`Rest_engraver` (page 315)
Engrave rests.

Music types accepted: `rest-event` (page 51),

Properties (read)

`middleCPosition` (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

This engraver creates the following layout object(s): `Rest` (page 460).

`Rhythmic_column_engraver` (page 315)
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 445).

`Script_column_engraver` (page 315)
Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 463).

`Script_engraver` (page 315)
Handle note scripted articulations.

Music types accepted: `articulation-event` (page 46),

Properties (read)

`scriptDefinitions` (list)
The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See `scm/script.scm` for more information.

This engraver creates the following layout object(s): `Script` (page 461).

`Slash_repeat_engraver` (page 316)
Make beat repeats.

Music types accepted: `repeat-slash-event` (page 51),

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 390), and `RepeatSlash` (page 458).

`Slur_engraver` (page 317)
Build slur grobs from slur events.

Music types accepted: `note-event` (page 50), and `slur-event` (page 52),

Properties (read)

`doubleSlurs` (boolean)
If set, two slurs are created for every slurred note, one above and one below the chord.

`slurMelismaBusy` (boolean)
Signal if a slur is present.

This engraver creates the following layout object(s): `Slur` (page 463).

`Spanner_break_forbid_engraver` (page 318)
Forbid breaks in certain spanners.

`Stem_engraver` (page 319)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 54), and `tuplet-span-event` (page 54),

Properties (read)

`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`.

`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`.

This engraver creates the following layout object(s): `Flag` (page 401), `Stem` (page 472), `StemStub` (page 474), and `StemTremolo` (page 475).

`Text_engraver` (page 321)
: Create text scripts.

  Music types accepted: `text-script-event` (page 54),

  This engraver creates the following layout object(s): `TextScript` (page 487).

`Text_spanner_engraver` (page 322)
: Create text spanner from an event.

  Music types accepted: `text-span-event` (page 54),

  Properties (read)

  `currentMusicalColumn` (graphical (layout) object)
  : Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

  This engraver creates the following layout object(s): `TextSpanner` (page 489).

`Tie_engraver` (page 322)
: Generate ties between note heads of equal pitch.

  Music types accepted: `tie-event` (page 54),

  Properties (read)

  `skipTypesetting` (boolean)
  : If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

  `tieWaitForNote` (boolean)
  : If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

  Properties (write)

  `tieMelismaBusy` (boolean)
  : Signal whether a tie is present.

This engraver creates the following layout object(s): `Tie` (page 490), and `TieColumn` (page 492).

`Trill_spanner_engraver` (page 324)
Create trill spanner from an event.

Music types accepted: `trill-span-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TrillSpanner` (page 498).

`Tuplet_engraver` (page 325)
Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 54),

Properties (read)

`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.

This engraver creates the following layout object(s): `TupletBracket` (page 499), and `TupletNumber` (page 500).

2.2 Engravers and Performers

See Section "Modifying context plug-ins" in *Notation Reference*.

2.2.1 `Accidental_engraver`

Make accidentals. Catch note heads, ties and notices key-change events. This engraver usually lives at Staff level, but reads the settings for Accidental at `Voice` level, so you can `\override` them at `Voice`.

Properties (read)

`accidentalGrouping` (symbol)
If set to `'voice`, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

`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.

`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.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`harmonicAccidentals` (boolean)
: If set, harmonic notes in chords get accidentals.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`localAlterations` (list)
: The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber`*` . `*`measureposition`*`))` pairs.

Properties (write)

`localAlterations` (list)
: The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber`*` . `*`measureposition`*`))` pairs.

This engraver creates the following layout object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), and `AccidentalSuggestion` (page 345).

`Accidental_engraver` is part of the following context(s) in `\layout`: `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `Staff` (page 217), and `VaticanaStaff` (page 248).

2.2.2 Ambitus_engraver

Create an ambitus.

Properties (read)

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`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`.

`staffLineLayoutFunction` (procedure)
: Layout of staff lines, `traditional`, or `semitone`.

This engraver creates the following layout object(s): `AccidentalPlacement` (page 344), `Ambitus` (page 347), `AmbitusAccidental` (page 348), `AmbitusLine` (page 349), and `AmbitusNoteHead` (page 350).

`Ambitus_engraver` is not part of any context

2.2.3 Arpeggio_engraver

Generate an Arpeggio symbol.

Music types accepted: `arpeggio-event` (page 46),

This engraver creates the following layout object(s): `Arpeggio` (page 351).

`Arpeggio_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.4 Auto_beam_engraver

Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.124 [`Stem_engraver`], page 319, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
: If set to true then beams are generated automatically.

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`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.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Auto_beam_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.5 `Axis_group_engraver`

Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAxisGroup` (page 505).

`Axis_group_engraver` is part of the following context(s) in `\layout`: `ChordNames` (page 62), `DrumStaff` (page 75), `Dynamics` (page 91), `FiguredBass` (page 94), `FretBoards` (page 96), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `Lyrics` (page 141), `MensuralStaff` (page 144), `NoteNames` (page 165), `OneStaff` (page 169), `PetrucciStaff` (page 170), `RhythmicStaff` (page 193), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.6 Balloon_engraver

Create balloon texts.

Music types accepted: `annotate-output-event` (page 46),

This engraver creates the following layout object(s): `BalloonTextItem` (page 352).

`Balloon_engraver` is not part of any context

2.2.7 Bar_engraver

Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

`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`.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `BarLine` (page 354).

`Bar_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `Dynamics` (page 91), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `RhythmicStaff` (page 193), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.8 Bar_number_engraver

A bar number may be created at any bar line, subject to the `barNumberVisibility` callback. By default, it is put on top of all staves and appears only at the left side of the staff. The staves are taken from `stavesFound`, which is maintained by Section 2.2.119 [`Staff_collecting_engraver`], page 318.

Properties (read)

`alternativeNumber` (integer)
: When set, the index of the current `\alternative` element, starting from one. Not set outside of alternatives. Note the distinction from volta number: an alternative may pertain to multiple volte.

`alternativeNumberingStyle` (symbol)
: The scheme and style for numbering bars in repeat alternatives. If not set (the default), bar numbers continue through alternatives. Can be set to `numbers` to reset the bar number at each alternative, or set to `numbers-with-letters` to reset and also include letter suffixes.

`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.

`currentBarNumber` (integer)
: Contains the current barnumber. This property is incremented at every bar line.

`measurePosition` (moment)
: How much of the current measure have we had. This can be set manually to create incomplete measures.

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

This engraver creates the following layout object(s): `BarNumber` (page 357).

`Bar_number_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.9 Beam_collision_engraver

Help beams avoid colliding with notes and clefs in other voices.

`Beam_collision_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.10 Beam_engraver

Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `Beam` (page 362).

`Beam_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `NullVoice` (page 167), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.11 Beam_performer

Music types accepted: `beam-event` (page 46),

`Beam_performer` is part of the following context(s) in `\midi`: `ChordNames` (page 62), `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `NullVoice` (page 167), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.12 Bend_engraver

Create fall spanners.

Music types accepted: `bend-after-event` (page 46),

This engraver creates the following layout object(s): `BendAfter` (page 364).

`Bend_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.13 Bend_spanner_engraver

Engraver to print a BendSpanner.

Music types accepted: `bend-span-event` (page 46), `note-event` (page 50), and `string-number-event` (page 53),

Properties (read)

`stringFretFingerList` (list)
: A list containg three entries. In `TabVoice` and `FretBoards` they determine the string, fret and finger to use

`supportNonIntegerFret` (boolean)
: If set in `Score` the `TabStaff` will print micro-tones as '$2\frac{1}{2}$'

Properties (write)

`stringFretFingerList` (list)
: A list containg three entries. In `TabVoice` and `FretBoards` they determine the string, fret and finger to use

`supportNonIntegerFret` (boolean)
: If set in `Score` the `TabStaff` will print micro-tones as '$2\frac{1}{2}$'

This engraver creates the following layout object(s): `BendSpanner` (page 365).

`Bend_spanner_engraver` is part of the following context(s) in `\layout: TabVoice` (page 237).

2.2.14 Break_align_engraver

Align grobs with corresponding `break-align-symbols` into groups, and order the groups according to `breakAlignOrder`. The left edge of the alignment gets a separate group, with a symbol `left-edge`.

This engraver creates the following layout object(s): `BreakAlignGroup` (page 367), `BreakAlignment` (page 368), and `LeftEdge` (page 425).

`Break_align_engraver` is part of the following context(s) in `\layout: Score` (page 196).

2.2.15 Breathing_sign_engraver

Create a breathing sign.

Music types accepted: `breathing-event` (page 47),

This engraver creates the following layout object(s): `BreathingSign` (page 369).

`Breathing_sign_engraver` is part of the following context(s) in `\layout: CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.16 Chord_name_engraver

Catch note and rest events and generate the appropriate chordname.

Music types accepted: `note-event` (page 50), and `rest-event` (page 51),

Properties (read)

`chordChanges` (boolean)
: Only show changes in chords scheme?

`chordNameExceptions` (list)
: An alist of chord exceptions. Contains `(`*`chord . markup`*`)` entries.

`chordNameExceptions` (list)
: An alist of chord exceptions. Contains `(`*`chord . markup`*`)` entries.

`chordNameFunction` (procedure)
: The function that converts lists of pitches to chord names.

`chordNoteNamer` (procedure)
: A function that converts from a pitch object to a text markup. Used for single pitches.

`chordRootNamer` (procedure)
: A function that converts from a pitch object to a text markup. Used for chords.

`lastChord` (markup)
: Last chord, used for detecting chord changes.

`majorSevenSymbol` (markup)
: How should the major 7th be formatted in a chord name?

`noChordSymbol` (markup)
: Markup to be displayed for rests in a ChordNames context.

Properties (write)

`lastChord` (markup)
: Last chord, used for detecting chord changes.

This engraver creates the following layout object(s): `ChordName` (page 371).

`Chord_name_engraver` is part of the following context(s) in `\layout`: `ChordNames` (page 62).

2.2.17 `Chord_tremolo_engraver`

Generate beams for tremolo repeats.

Music types accepted: `tremolo-span-event` (page 54),

This engraver creates the following layout object(s): `Beam` (page 362).

`Chord_tremolo_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.18 `Clef_engraver`

Determine and set reference point for pitches.

Properties (read)

`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.

`clefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`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.

This engraver creates the following layout object(s): `Clef` (page 372), and `ClefModifier` (page 374).

`Clef_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.19 Cluster_spanner_engraver

Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 47),

This engraver creates the following layout object(s): ClusterSpanner (page 376), and ClusterSpannerBeacon (page 376).

Cluster_spanner_engraver is part of the following context(s) in \layout: CueVoice (page 64), GregorianTranscriptionVoice (page 110), KievanVoice (page 130), MensuralVoice (page 154), PetrucciVoice (page 180), TabVoice (page 237), VaticanaVoice (page 258), and Voice (page 268).

2.2.20 Collision_engraver

Collect NoteColumns, and as soon as there are two or more, put them in a NoteCollision object.

This engraver creates the following layout object(s): NoteCollision (page 445).

Collision_engraver is part of the following context(s) in \layout: DrumStaff (page 75), GregorianTranscriptionStaff (page 100), KievanStaff (page 121), MensuralStaff (page 144), PetrucciStaff (page 170), Staff (page 217), TabStaff (page 229), and VaticanaStaff (page 248).

2.2.21 Completion_heads_engraver

This engraver replaces Note_heads_engraver. It plays some trickery to break long notes and automatically tie them into the next measure.

Music types accepted: note-event (page 50),

Properties (read)

completionFactor (an exact rational or procedure)
: When Completion_heads_engraver and Completion_rest_engraver need to split a note or rest with a scaled duration, such as c2*3, this specifies the scale factor to use for the newly-split notes and rests created by the engraver.

  If #f, the completion engraver uses the scale-factor of each duration being split.

  If set to a callback procedure, that procedure is called with the context of the completion engraver, and the duration to be split.

completionUnit (moment)
: Sub-bar unit of completion.

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.

middleCPosition (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

timing (boolean)
: Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

Properties (write)

`completionBusy` (boolean)
: Whether a completion-note head is playing.

This engraver creates the following layout object(s): `NoteHead` (page 446), `Tie` (page 490), and `TieColumn` (page 492).

`Completion_heads_engraver` is not part of any context

2.2.22 Completion_rest_engraver

This engraver replaces `Rest_engraver`. It plays some trickery to break long rests into the next measure.

Music types accepted: `rest-event` (page 51),

Properties (read)

`completionFactor` (an exact rational or procedure)
: When `Completion_heads_engraver` and `Completion_rest_engraver` need to split a note or rest with a scaled duration, such as `c2*3`, this specifies the scale factor to use for the newly-split notes and rests created by the engraver.

  If `#f`, the completion engraver uses the scale-factor of each duration being split.

  If set to a callback procedure, that procedure is called with the context of the completion engraver, and the duration to be split.

`completionUnit` (moment)
: Sub-bar unit of completion.

`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.

`middleCPosition` (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

Properties (write)

`restCompletionBusy` (boolean)
: Signal whether a completion-rest is active.

This engraver creates the following layout object(s): `Rest` (page 460).

`Completion_rest_engraver` is not part of any context

2.2.23 Concurrent_hairpin_engraver

Collect concurrent hairpins.

`Concurrent_hairpin_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.24 Control_track_performer

`Control_track_performer` is part of the following context(s) in `\midi`: `Score` (page 196).

2.2.25 Cue_clef_engraver

Determine and set reference point for pitches in cued voices.

Properties (read)

`clefTransposition` (integer)
: Add this much extra transposition. Values of 7 and -7 are common.

`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.

`cueClefTranspositionStyle` (symbol)
: Determines the way the ClefModifier grob is displayed. Possible values are '`default`', '`parenthesized`' and '`bracketed`'.

`explicitCueClefVisibility` (vector)
: '`break-visibility`' function for cue clef changes.

`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`.

This engraver creates the following layout object(s): `ClefModifier` (page 374), `CueClef` (page 378), and `CueEndClef` (page 381).

`Cue_clef_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.26 Custos_engraver

Engrave custodes.

This engraver creates the following layout object(s): `Custos` (page 384).

`Custos_engraver` is part of the following context(s) in `\layout`: `MensuralStaff` (page 144), `PetrucciStaff` (page 170), and `VaticanaStaff` (page 248).

2.2.27 Default_bar_line_engraver

This engraver determines what kind of automatic bar lines should be produced, and sets `whichBar` accordingly. It should be at the same level as Section 2.2.136 [`Timing_translator`], page 323.

Properties (read)

`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.

`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.

`measureStartNow` (boolean)
: True at the beginning of a measure.

Properties (write)

`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`.

`Default_bar_line_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.28 Dot_column_engraver

Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s): `DotColumn` (page 386).

`Dot_column_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `RhythmicStaff` (page 193), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.29 Dots_engraver

Create Section 3.1.36 [`Dots`], page 386, objects for Section 3.2.103 [`rhythmic-head-interface`], page 567s.

This engraver creates the following layout object(s): `Dots` (page 386).

`Dots_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.30 Double_percent_repeat_engraver

Make double measure repeats.

Music types accepted: `double-percent-event` (page 47),

Properties (read)

`countPercentRepeats` (boolean)
: If set, produce counters for percent repeats.

`measureLength` (moment)
: Length of one measure in the current time signature.

`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.

Properties (write)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 387), and `DoublePercentRepeatCounter` (page 388).

`Double_percent_repeat_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.31 Drum_note_performer

Play drum notes.

Music types accepted: `note-event` (page 50),

`Drum_note_performer` is part of the following context(s) in `\midi`: `DrumVoice` (page 81).

2.2.32 Drum_notes_engraver

Generate drum note heads.

Music types accepted: `note-event` (page 50),

Properties (read)

`drumStyleTable` (hash table)
: A hash table which maps drums to layout settings. Predefined values: '`drums-style`', '`agostini-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.

This engraver creates the following layout object(s): `NoteHead` (page 446), and `Script` (page 461).

`Drum_notes_engraver` is part of the following context(s) in `\layout`: `DrumVoice` (page 81).

2.2.33 Duration_line_engraver

Engraver to print a line representing the duration of a rhythmic event like `NoteHead`, `NoteColumn` or `Rest`.

Music types accepted: `duration-line-event` (page 47),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`endAtSkip` (boolean)
: End `DurationLine` grob on `skip-event`

`startAtNoteColumn` (boolean)
: Start `DurationLine` grob at entire `NoteColumn`.

`startAtSkip` (boolean)
: Start `DurationLine` grob at `skip-event`.

This engraver creates the following layout object(s): `DurationLine` (page 390).

`Duration_line_engraver` is not part of any context

2.2.34 Dynamic_align_engraver

Align hairpins and dynamic texts on a horizontal line.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `DynamicLineSpanner` (page 392).

`Dynamic_align_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `Dynamics` (page 91), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.35 Dynamic_engraver

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 45), `break-span-event` (page 47), and `span-dynamic-event` (page 52),

Properties (read)

`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.`'.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`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.`'.

This engraver creates the following layout object(s): `DynamicText` (page 394), `DynamicTextSpanner` (page 395), and `Hairpin` (page 409).

`Dynamic_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `Dynamics` (page 91), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.36 Dynamic_performer

Music types accepted: `absolute-dynamic-event` (page 45), `crescendo-event` (page 47), and `decrescendo-event` (page 47),

Properties (read)

`dynamicAbsoluteVolumeFunction` (procedure)
: A procedure that takes one argument, the text value of a dynamic event, and returns the absolute volume of that dynamic event.

`instrumentEqualizer` (procedure)
: A function taking a string (instrument name), and returning a `(min . max)` pair of numbers for the loudness range of the instrument.

`midiInstrument` (string)
: Name of the MIDI instrument to use.

`midiMaximumVolume` (number)
: Analogous to `midiMinimumVolume`.

`midiMinimumVolume` (number)
: Set the minimum loudness for MIDI. Ranges from 0 to 1.

`Dynamic_performer` is part of the following context(s) in `\midi`: `ChordNames` (page 62), `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.37 Episema_engraver

Create an *Editio Vaticana*-style episema line.

Music types accepted: `episema-event` (page 47),

This engraver creates the following layout object(s): `Episema` (page 397).

`Episema_engraver` is part of the following context(s) in `\layout`: `GregorianTranscriptionVoice` (page 110), and `VaticanaVoice` (page 258).

2.2.38 Extender_engraver

Create lyric extenders.

Music types accepted: `completize-extender-event` (page 47), and `extender-event` (page 48),

Properties (read)

`extendersOverRests` (boolean)
: Whether to continue extenders as they cross a rest.

This engraver creates the following layout object(s): `LyricExtender` (page 428).

`Extender_engraver` is part of the following context(s) in `\layout`: `Lyrics` (page 141).

2.2.39 Figured_bass_engraver

Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 46), and `rest-event` (page 51),

Properties (read)

`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.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s): `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), and `BassFigureLine` (page 362).

`Figured_bass_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `FiguredBass` (page 94), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.40 `Figured_bass_position_engraver`

Position figured bass alignments over notes.

This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 360).

`Figured_bass_position_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.41 `Finger_glide_engraver`

Engraver to print a line between two `Fingering` grobs.

Music types accepted: `note-event` (page 50),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 398).

`Finger_glide_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.42 `Fingering_column_engraver`

Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `FingeringColumn` (page 401).

`Fingering_column_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.43 `Fingering_engraver`

Create fingering scripts.

Music types accepted: `fingering-event` (page 48),

This engraver creates the following layout object(s): `Fingering` (page 399).

`Fingering_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.44 Font_size_engraver

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
The relative size of all grobs in a context.

`Font_size_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumStaff` (page 75), `DrumVoice` (page 81), `Dynamics` (page 91), `FretBoards` (page 96), `GregorianTranscriptionStaff` (page 100), `GregorianTranscriptionVoice` (page 110), `KievanStaff` (page 121), `KievanVoice` (page 130), `Lyrics` (page 141), `MensuralStaff` (page 144), `MensuralVoice` (page 154), `PetrucciStaff` (page 170), `PetrucciVoice` (page 180), `RhythmicStaff` (page 193), `Staff` (page 217), `TabStaff` (page 229), `TabVoice` (page 237), `VaticanaStaff` (page 248), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.45 Footnote_engraver

Create footnote texts.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `FootnoteItem` (page 402), and `FootnoteSpanner` (page 403).

`Footnote_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.46 Forbid_line_break_engraver

Forbid line breaks when note heads are still playing at some point.

Properties (read)

`busyGrobs` (list)
A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

`Forbid_line_break_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.47 Fretboard_engraver

Generate fret diagram from one or more events of type `NoteEvent`.

Music types accepted: `fingering-event` (page 48), `note-event` (page 50), and `string-number-event` (page 53),

Properties (read)

`chordChanges` (boolean)
Only show changes in chords scheme?

`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.

`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.

`maximumFretStretch` (number)
: Don't allocate frets further than this from specified frets.

`minimumFret` (number)
: The tablature auto string-selecting mechanism selects the highest string with a fret at least `minimumFret`.

`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.

`predefinedDiagramTable` (hash table)
: The hash table of predefined fret diagrams to use in FretBoards.

`stringTunings` (list)
: The tablature strings tuning. It is a list of the pitches of each string (starting with the lowest numbered one).

`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.

This engraver creates the following layout object(s): `FretBoard` (page 404).

`Fretboard_engraver` is part of the following context(s) in `\layout`: `FretBoards` (page 96).

2.2.48 `Glissando_engraver`

Engrave glissandi.

Music types accepted: `glissando-event` (page 48),

Properties (read)

`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.

This engraver creates the following layout object(s): `Glissando` (page 406).

`Glissando_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.49 `Grace_auto_beam_engraver`

Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeaming, just like setting the context property '`autoBeaming`' to `##f`.

Music types accepted: `beam-forbid-event` (page 46),

Properties (read)

`autoBeaming` (boolean)
: If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_auto_beam_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.50 Grace_beam_engraver

Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted: `beam-event` (page 46),

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s): `Beam` (page 362).

`Grace_beam_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.51 Grace_engraver

Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
: Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`Grace_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.52 Grace_spacing_engraver

Bookkeeping of shortest starting and playing notes in grace note runs.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `GraceSpacing` (page 408).

`Grace_spacing_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.53 Grid_line_span_engraver

This engraver makes cross-staff lines: It catches all normal lines and draws a single span line across them.

This engraver creates the following layout object(s): `GridLine` (page 408).

`Grid_line_span_engraver` is not part of any context

2.2.54 Grid_point_engraver

Generate grid points.

Properties (read)

`gridInterval` (moment)
: Interval for which to generate `GridPoint`s.

This engraver creates the following layout object(s): `GridPoint` (page 409).

`Grid_point_engraver` is not part of any context

2.2.55 Grob_pq_engraver

Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`Grob_pq_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumStaff` (page 75), `DrumVoice` (page 81), `GregorianTranscriptionStaff` (page 100), `GregorianTranscriptionVoice` (page 110), `KievanStaff` (page 121), `KievanVoice` (page 130), `MensuralStaff` (page 144), `MensuralVoice` (page 154), `NullVoice` (page 167), `PetrucciStaff` (page 170), `PetrucciVoice` (page 180), `Staff` (page 217), `TabStaff` (page 229), `TabVoice` (page 237), `VaticanaStaff` (page 248), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.56 Horizontal_bracket_engraver

Create horizontal brackets over notes for musical analysis purposes.

Music types accepted: `note-grouping-event` (page 50),

This engraver creates the following layout object(s): `HorizontalBracket` (page 411), and `HorizontalBracketText` (page 412).

`Horizontal_bracket_engraver` is not part of any context

2.2.57 Hyphen_engraver

Create lyric hyphens, vowel transitions and distance constraints between words.

Music types accepted: `hyphen-event` (page 48), and `vowel-transition-event` (page 55),

This engraver creates the following layout object(s): `LyricHyphen` (page 428), `LyricSpace` (page 430), and `VowelTransition` (page 510).

`Hyphen_engraver` is part of the following context(s) in `\layout`: `Lyrics` (page 141).

2.2.58 Instrument_name_engraver

Create a system start text for instrument or vocal names.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

`shortInstrumentName` (markup)
: See `instrumentName`.

`shortVocalName` (markup)
: Name of a vocal line, short version.

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s): `InstrumentName` (page 413).

`Instrument_name_engraver` is part of the following context(s) in `\layout`: `ChoirStaff` (page 61), `DrumStaff` (page 75), `FretBoards` (page 96), `GrandStaff` (page 98), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `Lyrics` (page 141), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `PianoStaff` (page 191), `RhythmicStaff` (page 193), `Staff` (page 217), `StaffGroup` (page 227), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.59 Instrument_switch_engraver

Create a cue text for taking instrument.

Properties (read)

`instrumentCueName` (markup)
: The name to print if another instrument is to be taken.

This engraver creates the following layout object(s): `InstrumentSwitch` (page 413).

`Instrument_switch_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.60 Jump_engraver

Create `JumpScript` objects. It puts them outside all staves (which is taken from the property `stavesFound`). If moving this engraver to a different context, Section 2.2.119 [`Staff_collecting_engraver`], page 318, must move along, otherwise all marks end up on the same Y location.

Music types accepted: `fine-event` (page 48),

Properties (read)

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

This engraver creates the following layout object(s): `JumpScript` (page 415).

`Jump_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.61 Keep_alive_together_engraver

This engraver collects all `Hara_kiri_group_spanner`s that are created in contexts at or below its own. These spanners are then tied together so that one will be removed only if all are removed. For example, if a `StaffGroup` uses this engraver, then the staves in the group will all be visible as long as there is a note in at least one of them.

`Keep_alive_together_engraver` is part of the following context(s) in `\layout`: `PianoStaff` (page 191).

2.2.62 Key_engraver

Engrave a key signature.

Music types accepted: `key-change-event` (page 48),

Properties (read)

`createKeyOnClefChange` (boolean)
: Print a key signature whenever the clef is changed.

`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.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`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).

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`middleCClefPosition` (number)
: The position of the middle C, as determined only by the clef. This can be calculated by looking at `clefPosition` and `clefGlyph`.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

Properties (write)

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`tonic` (pitch)
: The tonic of the current scale.

This engraver creates the following layout object(s): `KeyCancellation` (page 417), and `KeySignature` (page 419).

`Key_engraver` is part of the following context(s) in `\layout`: `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `Staff` (page 217), and `VaticanaStaff` (page 248).

2.2.63 Key_performer

Music types accepted: `key-change-event` (page 48),

Properties (read)

`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.

`Key_performer` is part of the following context(s) in `\midi`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `RhythmicStaff` (page 193), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.64 Kievan_ligature_engraver

Handle `Kievan_ligature_events` by glueing Kievan heads together.

Music types accepted: `ligature-event` (page 49),

This engraver creates the following layout object(s): `KievanLigature` (page 422).

`Kievan_ligature_engraver` is part of the following context(s) in `\layout`: `KievanVoice` (page 130).

2.2.65 Laissez_vibrer_engraver

Create laissez vibrer items.

Music types accepted: `laissez-vibrer-event` (page 48),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 423), and `LaissezVibrerTieColumn` (page 424).

`Laissez_vibrer_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.66 Ledger_line_engraver

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 424).

`Ledger_line_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `RhythmicStaff` (page 193), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.67 Ligature_bracket_engraver

Handle `Ligature_events` by engraving `Ligature` brackets.

Music types accepted: `ligature-event` (page 49),

This engraver creates the following layout object(s): `LigatureBracket` (page 427).

`Ligature_bracket_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `GregorianTranscriptionVoice` (page 110), `TabVoice` (page 237), and `Voice` (page 268).

2.2.68 Lyric_engraver

Engrave text for lyrics.

Music types accepted: `lyric-event` (page 49),

Properties (read)

`ignoreMelismata` (boolean)
: Ignore melismata for this Section "Lyrics" in *Internals Reference* line.

`lyricMelismaAlignment` (number)
: Alignment to use for a melisma syllable.

`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.

This engraver creates the following layout object(s): `LyricText` (page 430).

`Lyric_engraver` is part of the following context(s) in `\layout`: `Lyrics` (page 141).

2.2.69 Lyric_performer

Music types accepted: `lyric-event` (page 49),

`Lyric_performer` is part of the following context(s) in `\midi`: `Lyrics` (page 141).

2.2.70 Mark_engraver

Create `RehearsalMark` objects. It puts them on top of all staves (which is taken from the property `stavesFound`). If moving this engraver to a different context, Section 2.2.119 [`Staff_collecting_engraver`], page 318, must move along, otherwise all marks end up on the same Y location.

Music types accepted: `mark-event` (page 49),

Properties (read)

`markFormatter` (procedure)
: A procedure taking as arguments the context and the rehearsal mark. It should return the formatted mark as a markup object.

`rehearsalMark` (integer)
: The last rehearsal mark printed.

`stavesFound` (list of grobs)
A list of all staff-symbols found.

This engraver creates the following layout object(s): `RehearsalMark` (page 456).

`Mark_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.71 Measure_counter_engraver

This engraver numbers ranges of measures, which is useful in parts as an aid for counting repeated measures. There is no requirement that the affected measures be repeated, however. The user delimits the area to receive a count with `\startMeasureCount` and `\stopMeasureCount`.

Music types accepted: `measure-counter-event` (page 49),

Properties (read)

`currentBarNumber` (integer)
Contains the current barnumber. This property is incremented at every bar line.

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`measurePosition` (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

This engraver creates the following layout object(s): `MeasureCounter` (page 432).

`Measure_counter_engraver` is not part of any context

2.2.72 Measure_grouping_engraver

Create `MeasureGrouping` to indicate beat subdivision.

Properties (read)

`baseMoment` (moment)
Smallest unit of time that will stand on its own as a subdivided section.

`beatStructure` (list)
List of `baseMoment`s that are combined to make beats.

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`measurePosition` (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

This engraver creates the following layout object(s): `MeasureGrouping` (page 433).

`Measure_grouping_engraver` is not part of any context

2.2.73 Measure_spanner_engraver

This engraver creates spanners bounded by the columns that start and end measures in response to `\startMeasureSpanner` and `\stopMeasureSpanner`.

Music types accepted: `measure-spanner-event` (page 49),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`measurePosition` (moment)
: How much of the current measure have we had. This can be set manually to create incomplete measures.

This engraver creates the following layout object(s): `MeasureSpanner` (page 434).

`Measure_spanner_engraver` is not part of any context

2.2.74 Melody_engraver

Create information for context dependent typesetting decisions.

This engraver creates the following layout object(s): `MelodyItem` (page 435).

`Melody_engraver` is not part of any context

2.2.75 Mensural_ligature_engraver

Handle `Mensural_ligature_events` by glueing special ligature heads together.

Music types accepted: `ligature-event` (page 49),

This engraver creates the following layout object(s): `MensuralLigature` (page 436).

`Mensural_ligature_engraver` is part of the following context(s) in `\layout`: `MensuralVoice` (page 154), and `PetrucciVoice` (page 180).

2.2.76 Merge_mmrest_numbers_engraver

Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Merge_mmrest_numbers_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.77 Merge_rests_engraver

Engraver to merge rests in multiple voices on the same staff. This works by gathering all rests at a time step. If they are all of the same length and there are at least two they are moved to the correct location as if there were one voice.

Properties (read)

`suspendRestMerging` (boolean)
: When using the Merge_rest_engraver do not merge rests when this is set to true.

`Merge_rests_engraver` is not part of any context

2.2.78 Metronome_mark_engraver

Engrave metronome marking. This delegates the formatting work to the function in the `metronomeMarkFormatter` property. The mark is put over all staves. The staves are taken from the `stavesFound` property, which is maintained by Section 2.2.119 [`Staff_collecting_engraver`], page 318.

Music types accepted: `tempo-change-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`metronomeMarkFormatter` (procedure)
: How to produce a metronome markup. Called with two arguments: a `TempoChangeEvent` and context.

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

`tempoHideNote` (boolean)
: Hide the note = count in tempo marks.

This engraver creates the following layout object(s): `MetronomeMark` (page 436).

`Metronome_mark_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.79 `Midi_control_change_performer`

This performer listens to SetProperty events on context properties for generating MIDI control changes and prepares them for MIDI output.

Properties (read)

`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.

`midiChorusLevel` (number)
: Chorus effect level for the MIDI channel associated with the current context. Ranges from 0 to 1 (0=off, 1=full effect).

`midiExpression` (number)
: Expression control for the MIDI channel associated with the current context. Ranges from 0 to 1 (0=off, 1=full effect).

`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).

`Midi_control_change_performer` is part of the following context(s) in `\midi`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `RhythmicStaff` (page 193), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.80 `Multi_measure_rest_engraver`

Engrave multi-measure rests that are produced with '`R`'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the Section 3.1.80 [`MultiMeasureRest`], page 438.

Music types accepted: `multi-measure-articulation-event` (page 49), `multi-measure-rest-event` (page 49), and `multi-measure-text-event` (page 50),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`measureStartNow` (boolean)
: True at the beginning of a measure.

`restNumberThreshold` (number)
: If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), and `MultiMeasureRestText` (page 442).

`Multi_measure_rest_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.81 New_fingering_engraver

Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

`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.

`harmonicDots` (boolean)
: If set, harmonic notes in dotted chords get dots.

`stringNumberOrientations` (list)
: See `fingeringOrientations`.

`strokeFingerOrientations` (list)
: See `fingeringOrientations`.

This engraver creates the following layout object(s): `Fingering` (page 399), `Script` (page 461), `StringNumber` (page 476), and `StrokeFinger` (page 477).

`New_fingering_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.82 Note_head_line_engraver

Engrave a line between two note heads in a staff switch if `followVoice` is set.

Properties (read)

`followVoice` (boolean)
: If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s): `VoiceFollower` (page 507).

`Note_head_line_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.83 Note_heads_engraver

Generate note heads.

Music types accepted: `note-event` (page 50),

Properties (read)

`middleCPosition` (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

`staffLineLayoutFunction` (procedure)
: Layout of staff lines, `traditional`, or `semitone`.

This engraver creates the following layout object(s): `NoteHead` (page 446).

`Note_heads_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `NullVoice` (page 167), `PetrucciVoice` (page 180), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.84 Note_name_engraver

Print pitches as words.

Music types accepted: `note-event` (page 50),

Properties (read)

`noteNameFunction` (procedure)
: Function used to convert pitches into strings and markups.

`noteNameSeparator` (string)
: String used to separate simultaneous NoteName objects.

`printAccidentalNames` (boolean or symbol)
: Print accidentals in the `NoteNames` context.

`printNotesLanguage` (string)
: Use a specific language in the `NoteNames` context.

`printOctaveNames` (boolean or symbol)
: Print octave marks in the `NoteNames` context.

This engraver creates the following layout object(s): `NoteName` (page 447).

`Note_name_engraver` is part of the following context(s) in `\layout`: `NoteNames` (page 165).

2.2.85 Note_performer

Music types accepted: `articulation-event` (page 46), `breathing-event` (page 47), `note-event` (page 50), and `tie-event` (page 54),

`Note_performer` is part of the following context(s) in `\midi`: `ChordNames` (page 62), `CueVoice` (page 64), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.86 Note_spacing_engraver

Generate NoteSpacing, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s): NoteSpacing (page 448).

Note_spacing_engraver is part of the following context(s) in \layout: CueVoice (page 64), DrumVoice (page 81), GregorianTranscriptionVoice (page 110), KievanVoice (page 130), MensuralVoice (page 154), PetrucciVoice (page 180), TabVoice (page 237), VaticanaVoice (page 258), and Voice (page 268).

2.2.87 Ottava_spanner_engraver

Create a text spanner when the ottavation property changes.

Properties (read)

currentMusicalColumn (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

middleCOffset (number)
: The offset of middle C from the position given by middleCClefPosition This is used for ottava brackets.

ottavation (markup)
: If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s): OttavaBracket (page 448).

Ottava_spanner_engraver is part of the following context(s) in \layout: GregorianTranscriptionStaff (page 100), KievanStaff (page 121), MensuralStaff (page 144), PetrucciStaff (page 170), Staff (page 217), and VaticanaStaff (page 248).

2.2.88 Output_property_engraver

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 46),

Output_property_engraver is part of the following context(s) in \layout: ChordNames (page 62), CueVoice (page 64), DrumStaff (page 75), DrumVoice (page 81), Dynamics (page 91), FretBoards (page 96), GregorianTranscriptionStaff (page 100), GregorianTranscriptionVoice (page 110), KievanStaff (page 121), KievanVoice (page 130), MensuralStaff (page 144), MensuralVoice (page 154), PetrucciStaff (page 170), PetrucciVoice (page 180), RhythmicStaff (page 193), Score (page 196), Staff (page 217), StaffGroup (page 227), TabStaff (page 229), TabVoice (page 237), VaticanaStaff (page 248), VaticanaVoice (page 258), and Voice (page 268).

2.2.89 Page_turn_engraver

Decide where page turns are allowed to go.

Music types accepted: break-event (page 47),

Properties (read)

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.

Page_turn_engraver is not part of any context

2.2.90 Paper_column_engraver

Take care of generating columns.

This engraver decides whether a column is breakable. The default is that a column is always breakable. However, every `Bar_engraver` that does not have a barline at a certain point will set `forbidBreaks` in the score context to stop line breaks. In practice, this means that you can make a break point by creating a bar line (assuming that there are no beams or notes that prevent a break point).

Music types accepted: `break-event` (page 47), and `label-event` (page 48),

Properties (read)

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

Properties (write)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`forbidBreak` (boolean)
: If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s): `NonMusicalPaperColumn` (page 443), and `PaperColumn` (page 450).

`Paper_column_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.91 Parenthesis_engraver

Parenthesize objects whose music cause has the `parenthesize` property.

This engraver creates the following layout object(s): `ParenthesesItem` (page 451).

`Parenthesis_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.92 Part_combine_engraver

Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted: `note-event` (page 50), and `part-combine-event` (page 51),

Properties (read)

`aDueText` (markup)
: Text to print at a unisono passage.

`partCombineTextsOnNote` (boolean)
: Print part-combine texts only on the next note rather than immediately on rests or skips.

`printPartCombineTexts` (boolean)
: Set ‘Solo’ and ‘A due’ texts in the part combiner?

`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.

This engraver creates the following layout object(s): `CombineTextScript` (page 377).

`Part_combine_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.93 `Percent_repeat_engraver`

Make whole measure repeats.

Music types accepted: `percent-event` (page 51),

Properties (read)

`countPercentRepeats` (boolean)
: If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

This engraver creates the following layout object(s): `PercentRepeat` (page 451), and `PercentRepeatCounter` (page 452).

`Percent_repeat_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.94 `Phrasing_slur_engraver`

Print phrasing slurs. Similar to Section 2.2.111 [`Slur_engraver`], page 317.

Music types accepted: `note-event` (page 50), and `phrasing-slur-event` (page 51),

This engraver creates the following layout object(s): `PhrasingSlur` (page 453).

`Phrasing_slur_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.95 `Piano_pedal_align_engraver`

Align piano pedal symbols and brackets.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 466), `SustainPedalLineSpanner` (page 480), and `UnaCordaPedalLineSpanner` (page 503).

`Piano_pedal_align_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.96 Piano_pedal_engraver

Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 52), `sustain-event` (page 54), and `una-corda-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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`.

This engraver creates the following layout object(s): `PianoPedalBracket` (page 455), `SostenutoPedal` (page 465), `SustainPedal` (page 479), and `UnaCordaPedal` (page 501).

`Piano_pedal_engraver` is part of the following context(s) in `\layout`: `Dynamics` (page 91), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.97 Piano_pedal_performer

Music types accepted: `sostenuto-event` (page 52), `sustain-event` (page 54), and `una-corda-event` (page 54),

`Piano_pedal_performer` is part of the following context(s) in `\midi`: `ChordNames` (page 62), `CueVoice` (page 64), `DrumVoice` (page 81), `Dynamics` (page 91), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.98 Pitch_squash_engraver

Set the vertical position of note heads to `squashedPosition`, if that property is set. This can be used to make a single-line staff demonstrating the rhythm of a melody.

Properties (read)

`squashedPosition` (integer)
: Vertical position of squashing for Section "Pitch_squash_engraver" in *Internals Reference*.

`Pitch_squash_engraver` is part of the following context(s) in `\layout`: `NullVoice` (page 167), and `RhythmicStaff` (page 193).

2.2.99 `Pitched_trill_engraver`

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), and `TrillPitchHead` (page 497).

`Pitched_trill_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.100 `Pure_from_neighbor_engraver`

Coordinates items that get their pure heights from their neighbors.

`Pure_from_neighbor_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `Lyrics` (page 141), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.101 `Repeat_acknowledge_engraver`

Acknowledge repeated music, and convert the contents of `repeatCommands` into an appropriate setting for `whichBar`.

Music types accepted: `fine-event` (page 48), `section-event` (page 52), `segno-event` (page 52), and `volta-span-event` (page 55),

Properties (read)

`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.

`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.

`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.

`fineBarType` (string)
: The bar line for `\fine`. See `whichBar` for information on available bar types.

`fineSegnoType` (string)
: Set the default bar line for a requested segno with fine. Default is '`|.S`'.

`fineStartRepeatSegnoType` (string)
: Set the default bar line for the combinations beginning of repeat with segno and fine. Default is '`|.S.|:`'.

`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.

`sectionBarType` (string)
: The bar line for `\section`. See `whichBar` for information on available bar types.

`segnoType` (string)
: Set the default bar line for a requested segno. Default is '`S`'.

`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.

`underlyingRepeatType` (string)
: Set the bar line to use at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno.

`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`.

Properties (write)

`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`.

`Repeat_acknowledge_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.102 Repeat_tie_engraver

Create repeat ties.

Music types accepted: `repeat-tie-event` (page 51),

This engraver creates the following layout object(s): `RepeatTie` (page 459), and `RepeatTieColumn` (page 460).

`Repeat_tie_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.103 Rest_collision_engraver

Handle collisions of rests.

Properties (read)

`busyGrobs` (list)
: A queue of (*end-moment* . *grob*) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s): `RestCollision` (page 461).

`Rest_collision_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.104 Rest_engraver

Engrave rests.

Music types accepted: `rest-event` (page 51),

Properties (read)

`middleCPosition` (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

This engraver creates the following layout object(s): `Rest` (page 460).

`Rest_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.105 Rhythmic_column_engraver

Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 445).

`Rhythmic_column_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.106 Script_column_engraver

Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 463).

`Script_column_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.107 Script_engraver

Handle note scripted articulations.

Music types accepted: `articulation-event` (page 46),

Properties (read)

`scriptDefinitions` (list)
: The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See `scm/script.scm` for more information.

This engraver creates the following layout object(s): `Script` (page 461).

`Script_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `Dynamics` (page 91), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.108 Script_row_engraver

Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 463).

`Script_row_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.109 Separating_line_group_engraver

Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)
: Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)
: True if the current `CommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 470).

`Separating_line_group_engraver` is part of the following context(s) in `\layout`: `ChordNames` (page 62), `DrumStaff` (page 75), `FiguredBass` (page 94), `FretBoards` (page 96), `GregorianTranscriptionStaff` (page 100), `KievanStaff` (page 121), `MensuralStaff` (page 144), `NoteNames` (page 165), `PetrucciStaff` (page 170), `RhythmicStaff` (page 193), `Staff` (page 217), `TabStaff` (page 229), and `VaticanaStaff` (page 248).

2.2.110 Slash_repeat_engraver

Make beat repeats.

Music types accepted: `repeat-slash-event` (page 51),

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 390), and `RepeatSlash` (page 458).

`Slash_repeat_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.111 Slur_engraver

Build slur grobs from slur events.

Music types accepted: `note-event` (page 50), and `slur-event` (page 52),

Properties (read)

`doubleSlurs` (boolean)
: If set, two slurs are created for every slurred note, one above and one below the chord.

`slurMelismaBusy` (boolean)
: Signal if a slur is present.

This engraver creates the following layout object(s): `Slur` (page 463).

`Slur_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `NullVoice` (page 167), `PetrucciVoice` (page 180), `TabVoice` (page 237), and `Voice` (page 268).

2.2.112 Slur_performer

Music types accepted: `slur-event` (page 52),

`Slur_performer` is part of the following context(s) in `\midi`: `ChordNames` (page 62), `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `NullVoice` (page 167), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.113 Spacing_engraver

Make a `SpacingSpanner` and do bookkeeping of shortest starting and playing notes.

Music types accepted: `spacing-section-event` (page 52),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`proportionalNotationDuration` (moment)
: Global override for shortest-playing duration. This is used for switching on proportional notation.

This engraver creates the following layout object(s): `SpacingSpanner` (page 467).

`Spacing_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.114 Span_arpeggio_engraver

Make arpeggios that span multiple staves.

Properties (read)

`connectArpeggios` (boolean)
: If set, connect arpeggios across piano staff.

This engraver creates the following layout object(s): `Arpeggio` (page 351).

`Span_arpeggio_engraver` is part of the following context(s) in `\layout`: `GrandStaff` (page 98), `PianoStaff` (page 191), and `StaffGroup` (page 227).

2.2.115 Span_bar_engraver

Make cross-staff bar lines: It catches all normal bar lines and draws a single span bar across them.

This engraver creates the following layout object(s): SpanBar (page 468).

Span_bar_engraver is part of the following context(s) in \layout: GrandStaff (page 98), PianoStaff (page 191), and StaffGroup (page 227).

2.2.116 Span_bar_stub_engraver

Make stubs for span bars in all contexts that the span bars cross.

This engraver creates the following layout object(s): SpanBarStub (page 469).

Span_bar_stub_engraver is part of the following context(s) in \layout: GrandStaff (page 98), PianoStaff (page 191), and StaffGroup (page 227).

2.2.117 Span_stem_engraver

Connect cross-staff stems to the stems above in the system

This engraver creates the following layout object(s): Stem (page 472).

Span_stem_engraver is not part of any context

2.2.118 Spanner_break_forbid_engraver

Forbid breaks in certain spanners.

Spanner_break_forbid_engraver is part of the following context(s) in \layout: CueVoice (page 64), DrumVoice (page 81), GregorianTranscriptionVoice (page 110), KievanVoice (page 130), MensuralVoice (page 154), PetrucciVoice (page 180), TabVoice (page 237), VaticanaVoice (page 258), and Voice (page 268).

2.2.119 Staff_collecting_engraver

Maintain the stavesFound variable.

Properties (read)

stavesFound (list of grobs)
: A list of all staff-symbols found.

Properties (write)

stavesFound (list of grobs)
: A list of all staff-symbols found.

Staff_collecting_engraver is part of the following context(s) in \layout: DrumStaff (page 75), GregorianTranscriptionStaff (page 100), KievanStaff (page 121), MensuralStaff (page 144), PetrucciStaff (page 170), Score (page 196), Staff (page 217), TabStaff (page 229), and VaticanaStaff (page 248).

2.2.120 Staff_performer

Staff_performer is part of the following context(s) in \midi: ChordNames (page 62), DrumStaff (page 75), GregorianTranscriptionStaff (page 100), KievanStaff (page 121), Lyrics (page 141), MensuralStaff (page 144), NoteNames (page 165), PetrucciStaff (page 170), RhythmicStaff (page 193), Staff (page 217), TabStaff (page 229), and VaticanaStaff (page 248).

2.2.121 Staff_symbol_engraver

Create the constellation of five (default) staff lines.

Music types accepted: staff-span-event (page 53),

This engraver creates the following layout object(s): StaffSymbol (page 471).

Staff_symbol_engraver is part of the following context(s) in \layout: DrumStaff (page 75), GregorianTranscriptionStaff (page 100), KievanStaff (page 121), MensuralStaff (page 144), PetrucciStaff (page 170), RhythmicStaff (page 193), Staff (page 217), TabStaff (page 229), and VaticanaStaff (page 248).

2.2.122 Stanza_number_align_engraver

This engraver ensures that stanza numbers are neatly aligned.

Stanza_number_align_engraver is part of the following context(s) in \layout: Score (page 196).

2.2.123 Stanza_number_engraver

Engrave stanza numbers.

Properties (read)

stanza (markup)
: Stanza 'number' to print before the start of a verse. Use in Lyrics context.

This engraver creates the following layout object(s): StanzaNumber (page 472).

Stanza_number_engraver is part of the following context(s) in \layout: Lyrics (page 141).

2.2.124 Stem_engraver

Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: tremolo-event (page 54), and tuplet-span-event (page 54),

Properties (read)

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.

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.

This engraver creates the following layout object(s): Flag (page 401), Stem (page 472), StemStub (page 474), and StemTremolo (page 475).

Stem_engraver is part of the following context(s) in \layout: CueVoice (page 64), DrumVoice (page 81), GregorianTranscriptionVoice (page 110), KievanVoice (page 130), MensuralVoice (page 154), PetrucciVoice (page 180), TabVoice (page 237), and Voice (page 268).

2.2.125 System_start_delimiter_engraver

Create a system start delimiter (i.e., a `SystemStartBar`, `SystemStartBrace`, `SystemStartBracket` or `SystemStartSquare` spanner).

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`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.

This engraver creates the following layout object(s): `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), and `SystemStartSquare` (page 484).

`System_start_delimiter_engraver` is part of the following context(s) in `\layout`: `ChoirStaff` (page 61), `GrandStaff` (page 98), `PianoStaff` (page 191), `Score` (page 196), and `StaffGroup` (page 227).

2.2.126 Tab_note_heads_engraver

Generate one or more tablature note heads from event of type `NoteEvent`.

Music types accepted: `fingering-event` (page 48), `note-event` (page 50), and `string-number-event` (page 53),

Properties (read)

`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.

`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.

`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.

`maximumFretStretch` (number)
: Don't allocate frets further than this from specified frets.

`middleCPosition` (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

`minimumFret` (number)
: The tablature auto string-selecting mechanism selects the highest string with a fret at least `minimumFret`.

`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.

`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).

`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.

This engraver creates the following layout object(s): `TabNoteHead` (page 485).

`Tab_note_heads_engraver` is part of the following context(s) in `\layout`: `TabVoice` (page 237).

2.2.127 `Tab_staff_symbol_engraver`

Create a tablature staff symbol, but look at `stringTunings` for the number of lines.

Properties (read)

`stringTunings` (list)
: The tablature strings tuning. It is a list of the pitches of each string (starting with the lowest numbered one).

This engraver creates the following layout object(s): `StaffSymbol` (page 471).

`Tab_staff_symbol_engraver` is part of the following context(s) in `\layout`: `TabStaff` (page 229).

2.2.128 `Tab_tie_follow_engraver`

Adjust TabNoteHead properties when a tie is followed by a slur or glissando.

`Tab_tie_follow_engraver` is part of the following context(s) in `\layout`: `TabVoice` (page 237).

2.2.129 `Tempo_performer`

Properties (read)

`tempoWholesPerMinute` (moment)
: The tempo in whole notes per minute.

`Tempo_performer` is part of the following context(s) in `\midi`: `Score` (page 196).

2.2.130 `Text_engraver`

Create text scripts.

Music types accepted: `text-script-event` (page 54),

This engraver creates the following layout object(s): `TextScript` (page 487).

`Text_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `Dynamics` (page 91), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.131 Text_spanner_engraver

Create text spanner from an event.

Music types accepted: `text-span-event` (page 54),

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TextSpanner` (page 489).

`Text_spanner_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `Dynamics` (page 91), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), and `Voice` (page 268).

2.2.132 Tie_engraver

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 54),

Properties (read)

`skipTypesetting` (boolean)
: If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

`tieWaitForNote` (boolean)
: If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

`tieMelismaBusy` (boolean)
: Signal whether a tie is present.

This engraver creates the following layout object(s): `Tie` (page 490), and `TieColumn` (page 492).

`Tie_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `NoteNames` (page 165), `NullVoice` (page 167), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.133 Tie_performer

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 54),

Properties (read)

`tieWaitForNote` (boolean)
: If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

`tieMelismaBusy` (boolean)
: Signal whether a tie is present.

`Tie_performer` is part of the following context(s) in `\midi`: `ChordNames` (page 62), `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `NullVoice` (page 167), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.134 Time_signature_engraver

Create a Section 3.1.133 [TimeSignature], page 492, whenever `timeSignatureFraction` changes.

Music types accepted: `time-signature-event` (page 54),

Properties (read)

`initialTimeSignatureVisibility` (vector)
: break visibility for the initial time signature.

`partialBusy` (boolean)
: Signal that \partial acts at the current timestep.

`timeSignatureFraction` (fraction, as pair)
: A pair of numbers, signifying the time signature. For example, `'(4 . 4)` is a 4/4 time signature.

This engraver creates the following layout object(s): `TimeSignature` (page 492).

`Time_signature_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 75), `GregorianTranscriptionStaff` (page 100), `MensuralStaff` (page 144), `PetrucciStaff` (page 170), `RhythmicStaff` (page 193), `Staff` (page 217), and `TabStaff` (page 229).

2.2.135 Time_signature_performer

`Time_signature_performer` is part of the following context(s) in `\midi`: `Score` (page 196).

2.2.136 Timing_translator

This engraver adds the alias `Timing` to its containing context. Responsible for synchronizing timing information from staves. Normally in `Score`. In order to create polyrhythmic music, this engraver should be removed from `Score` and placed in `Staff`.

Music types accepted: `alternative-event` (page 45),

Properties (read)

`alternativeNumberingStyle` (symbol)
: The scheme and style for numbering bars in repeat alternatives. If not set (the default), bar numbers continue through alternatives. Can be set to `numbers` to reset the bar number at each alternative, or set to `numbers-with-letters` to reset and also include letter suffixes.

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`currentBarNumber` (integer)
: Contains the current barnumber. This property is incremented at every bar line.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`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.

`timeSignatureFraction` (fraction, as pair)
: A pair of numbers, signifying the time signature. For example, `'(4 . 4)` is a 4/4 time signature.

Properties (write)

`alternativeNumber` (integer)
: When set, the index of the current `\alternative` element, starting from one. Not set outside of alternatives. Note the distinction from volta number: an alternative may pertain to multiple volte.

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`currentBarNumber` (integer)
: Contains the current barnumber. This property is incremented at every bar line.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`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.

`measureStartNow` (boolean)
: True at the beginning of a measure.

`timeSignatureFraction` (fraction, as pair)
: A pair of numbers, signifying the time signature. For example, `'(4 . 4)` is a 4/4 time signature.

`Timing_translator` is part of the following context(s) in `\layout`: `Score` (page 196); in `\midi`: `Score` (page 196).

2.2.137 `Trill_spanner_engraver`

Create trill spanner from an event.

Music types accepted: `trill-span-event` (page 54),

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s): `TrillSpanner` (page 498).

`Trill_spanner_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.138 Tuplet_engraver

Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 54),

Properties (read)

`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.

This engraver creates the following layout object(s): `TupletBracket` (page 499), and `TupletNumber` (page 500).

`Tuplet_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 64), `DrumVoice` (page 81), `GregorianTranscriptionVoice` (page 110), `KievanVoice` (page 130), `MensuralVoice` (page 154), `PetrucciVoice` (page 180), `TabVoice` (page 237), `VaticanaVoice` (page 258), and `Voice` (page 268).

2.2.139 Tweak_engraver

Read the `tweaks` property from the originating event, and set properties.

`Tweak_engraver` is part of the following context(s) in `\layout`: `Score` (page 196).

2.2.140 Vaticana_ligature_engraver

Handle ligatures by glueing special ligature heads together.

Music types accepted: `ligature-event` (page 49), and `pes-or-flexa-event` (page 51),

This engraver creates the following layout object(s): `DotColumn` (page 386), and `VaticanaLigature` (page 504).

`Vaticana_ligature_engraver` is part of the following context(s) in `\layout`: `VaticanaVoice` (page 258).

2.2.141 Vertical_align_engraver

Catch groups (staves, lyrics lines, etc.) and stack them vertically.

Properties (read)

`alignAboveContext` (string)
: Where to insert newly created context in vertical alignment.

`alignBelowContext` (string)
: Where to insert newly created context in vertical alignment.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

This engraver creates the following layout object(s): `VerticalAlignment` (page 504).

`Vertical_align_engraver` is part of the following context(s) in `\layout`: `ChoirStaff` (page 61), `GrandStaff` (page 98), `PianoStaff` (page 191), `Score` (page 196), and `StaffGroup` (page 227).

2.2.142 Volta_engraver

Make volta brackets.

Music types accepted: volta-span-event (page 55),

Properties (read)

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.

stavesFound (list of grobs)
: A list of all staff-symbols found.

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.

This engraver creates the following layout object(s): VoltaBracket (page 507), and VoltaBracketSpanner (page 509).

Volta_engraver is part of the following context(s) in \layout: Score (page 196).

2.3 Tunable context properties

accidentalGrouping (symbol)
: If set to 'voice, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

additionalBassStrings (list)
: The additional tablature bass-strings, which will not get a seprate line in TabStaff. It is a list of the pitches of each string (starting with the lowest numbered one).

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.

alignBelowContext (string)
: Where to insert newly created context in vertical alignment.

alternativeNumber (integer)
: When set, the index of the current \alternative element, starting from one. Not set outside of alternatives. Note the distinction from volta number: an alternative may pertain to multiple volte.

alternativeNumberingStyle (symbol)
: The scheme and style for numbering bars in repeat alternatives. If not set (the default), bar numbers continue through alternatives. Can be set to numbers to reset the bar number at each alternative, or set to numbers-with-letters to reset and also include letter suffixes.

alternativeRestores (symbol list)
: Timing variables that are restored to their value at the start of the first alternative in subsequent alternatives.

`associatedVoice` (string)
: Name of the context (see `associatedVoiceType` for its type, usually `Voice`) that has the melody for this `Lyrics` line.

`associatedVoiceType` (symbol)
: Type of the context 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.

`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.

`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.

`completionFactor` (an exact rational or procedure)
: When `Completion_heads_engraver` and `Completion_rest_engraver` need to split a note or rest with a scaled duration, such as `c2*3`, this specifies the scale factor to use for the newly-split notes and rests created by the engraver.

  If `#f`, the completion engraver uses the scale-factor of each duration being split.

  If set to a callback procedure, that procedure is called with the context of the completion engraver, and the duration to be split.

`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`', '`agostini-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.

`endAtSkip` (boolean)
: End `DurationLine` grob on `skip-event`

`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.

`fineBarType` (string)
: The bar line for `\fine`. See `whichBar` for information on available bar types.

`fineSegnoType` (string)
: Set the default bar line for a requested segno with fine. Default is '`|.S`'.

`fineStartRepeatSegnoType` (string)
: Set the default bar line for the combinations beginning of repeat with segno and fine. Default is '`|.S.|:`'.

`fineText` (markup)
: The text to print at `\fine`.

`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.

`ignoreBarNumberChecks` (boolean)
: Ignore bar number 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.

`includeGraceNotes` (boolean)
: Do not ignore grace notes for Section "Lyrics" in *Internals Reference*.

`initialTimeSignatureVisibility` (vector)
: break visibility for the initial time signature.

`instrumentCueName` (markup)
: The name to print if another instrument is to be taken.

`instrumentEqualizer` (procedure)
: A function taking a string (instrument name), and returning a `(`*`min . max`*`)` pair of numbers for the loudness range of the instrument.

`instrumentName` (markup)
: The name to print left of a staff. The `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).

`keyAlterations` (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. `keyAlterations = #`((6 . ,FLAT))`.

`lyricMelismaAlignment` (number)
: Alignment to use for a melisma syllable.

`magnifyStaffValue` (positive number)
: The most recent value set with `\magnifyStaff`.

`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.

`measureStartNow` (boolean)
: True at the beginning of a measure.

`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).

`midiExpression` (number)
: Expression control 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.

`noteNameFunction` (procedure)
: Function used to convert pitches into strings and markups.

`noteNameSeparator` (string)
: String used to separate simultaneous NoteName objects.

`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.

`nullAccidentals` (boolean)
: The `Accidental_engraver` generates no accidentals for notes in contexts were this is set. In addition to supressing the printed accidental, this option removes any effect the note would have had on accidentals in other voices.

`ottavation` (markup)
: If set, the text for an ottava spanner. Changing this creates a new text spanner.

`ottavationMarkups` (list)
: An alist defining the markups used for ottava brackets. It contains entries of the form `(`*`number of octaves . markup`*`)`.

`output` (music output)
: The output produced by a score-level translator during music interpretation.

`partCombineForced` (symbol)
: Override for the partCombine decision. Can be `apart`, `chords`, `unisono`, `solo1`, or `solo2`.

`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.

`printAccidentalNames` (boolean or symbol)
: Print accidentals in the `NoteNames` context.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

`printNotesLanguage` (string)
: Use a specific language in the `NoteNames` context.

`printOctaveNames` (boolean or symbol)
: Print octave marks in 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.

`sectionBarType` (string)
: The bar line for `\section`. See `whichBar` for information on available bar types.

`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.

`startAtNoteColumn` (boolean)
: Start `DurationLine` grob at entire `NoteColumn`.

`startAtSkip` (boolean)
: Start `DurationLine` grob at `skip-event`.

`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 or symbol)
: If set to `#t`, accidentals are typeset as suggestions above the note. Setting it to `'cautionary` only applies that to cautionary accidentals.

`supportNonIntegerFret` (boolean)
: If set in `Score` the `TabStaff` will print micro-tones as '$2\frac{1}{2}$'

`suspendMelodyDecisions` (boolean)
: When using the `Melody_engraver`, stop changing orientation of stems based on the melody when this is set to true.

`suspendRestMerging` (boolean)
: When using the Merge_rest_engraver do not merge rests when this is set to true.

`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*

`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 }
}
```

`underlyingRepeatType` (string)
: Set the bar line to use at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno.

`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`.

2.4 Internal context properties

`associatedVoiceContext` (context)
: The context object of the `Voice` that has the melody for this `Lyrics`.

`barCheckLastFail` (moment)
: Where in the measure did the last barcheck fail?

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`busyGrobs` (list)
: A queue of `(`*`end-moment . grob`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`dynamicAbsoluteVolumeFunction` (procedure)
: A procedure that takes one argument, the text value of a dynamic event, and returns the absolute volume of that dynamic event.

`finalizations` (list)
: A list of expressions to evaluate before proceeding to next time step. This is an internal variable.

`graceSettings` (list)
: Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`hasAxisGroup` (boolean)
: True if the current context is contained in an axis group.

`hasStaffSpacing` (boolean)
: True if the current `CommandColumn` contains items that will affect spacing.

`lastChord` (markup)
: Last chord, used for detecting chord changes.

`lastKeyAlterations` (list)
: Last key signature before a key signature change.

`localAlterations` (list)
: The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((`*`octave . name`*`) . (`*`alter barnumber . measureposition`*`))` pairs.

`melismaBusy` (boolean)
: Signifies whether a melisma is active. This can be used to signal melismas on top of those automatically detected.

`partialBusy` (boolean)
: Signal that \partial acts at the current timestep.

`quotedCueEventTypes` (list)
: A list of symbols, representing the event types that should be duplicated for `\cueDuring` commands.

`quotedEventTypes` (list)
: A list of symbols, representing the event types that should be duplicated for `\quoteDuring` commands. This is also a fallback for `\cueDuring` if `quotedCueEventTypes` is not set

`rootSystem` (graphical (layout) object)
: The System object.

`scriptDefinitions` (list)
: The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See `scm/script.scm` for more information.

`slurMelismaBusy` (boolean)
: Signal if a slur is present.

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

`stringFretFingerList` (list)
: A list containg three entries. In `TabVoice` and `FretBoards` they determine the string, fret and finger to use

`tieMelismaBusy` (boolean)
: Signal whether a tie is present.

3 Backend

3.1 All layout objects

3.1.1 Accidental

`Accidental` objects are created by: `Accidental_engraver` (page 279).

Standard settings:

`after-line-breaking` (boolean):

`ly:accidental-interface::remove-tied`

Dummy property, used to trigger callback for `after-line-breaking`.

`alteration` (number):

`accidental-interface::calc-alteration`

Alteration numbers for accidental.

`avoid-slur` (symbol):

`'inside`

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`.

`extra-spacing-width` (pair of numbers):

`'(-0.2 . 0.0)`

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)`.

`glyph-name` (string):

`accidental-interface::glyph-name`

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):

```
'((0 . "accidentals.natural")
  (-1/2 . "accidentals.flat")
  (1/2 . "accidentals.sharp")
  (1 . "accidentals.doublesharp")
  (-1 . "accidentals.flatflat")
  (3/4
   .
   "accidentals.sharp.slashslash.stemstemstem")
  (1/4 . "accidentals.sharp.slashslash.stem")
  (-1/4 . "accidentals.mirroredflat")
  (-3/4 . "accidentals.mirroredflat.flat"))
```

An alist of key-string pairs.

`horizontal-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:accidental-interface::horizontal-skylines> >`
Two skylines, one to the left and one to the right of this grob.

`stencil` (stencil):
`ly:accidental-interface::print`
The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`
Two skylines, one above and one below this grob.

`X-offset` (number):
`ly:grob::x-parent-positioning`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:accidental-interface::height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `accidental-interface` (page 511), `font-interface` (page 532), `grob-interface` (page 538), `inline-accidental-interface` (page 544), and `item-interface` (page 546).

3.1.2 AccidentalCautionary

`AccidentalCautionary` objects are created by: `Accidental_engraver` (page 279).

Standard settings:

`after-line-breaking` (boolean):
`ly:accidental-interface::remove-tied`
Dummy property, used to trigger callback for `after-line-breaking`.

`alteration` (number):
`accidental-interface::calc-alteration`
Alteration numbers for accidental.

`avoid-slur` (symbol):
`'inside`
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`.

`glyph-name-alist` (list):
```
'((0 . "accidentals.natural")
  (-1/2 . "accidentals.flat")
  (1/2 . "accidentals.sharp")
```

```
(1 . "accidentals.doublesharp")
(-1 . "accidentals.flatflat")
(3/4
 .
 "accidentals.sharp.slashslash.stemstemstem")
(1/4 . "accidentals.sharp.slashslash.stem")
(-1/4 . "accidentals.mirroredflat")
(-3/4 . "accidentals.mirroredflat.flat"))
```

An alist of key-string pairs.

`parenthesized` (boolean):

`#t`

Parenthesize this grob.

`stencil` (stencil):

`ly:accidental-interface::print`

The symbol to print.

`X-offset` (number):

`ly:grob::x-parent-positioning`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):

`#<unpure-pure-container #<primitive-procedure ly:accidental-interface::height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `accidental-interface` (page 511), `font-interface` (page 532), `grob-interface` (page 538), `inline-accidental-interface` (page 544), and `item-interface` (page 546).

3.1.3 AccidentalPlacement

`AccidentalPlacement` objects are created by: `Accidental_engraver` (page 279), and `Ambitus_engraver` (page 281).

Standard settings:

`direction` (direction):

`-1`

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`.

`right-padding` (dimension, in staff space):

`0.15`

Space to insert on the right side of an object (e.g., between note and its accidentals).

`script-priority` (number):

`-100`

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.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `accidental-placement-interface` (page 512), `grob-interface` (page 538), and `item-interface` (page 546).

3.1.4 AccidentalSuggestion

`AccidentalSuggestion` objects are created by: `Accidental_engraver` (page 279).

Standard settings:

`after-line-breaking` (boolean):
`ly:accidental-interface::remove-tied`

Dummy property, used to trigger callback for `after-line-breaking`.

`alteration` (number):
`accidental-interface::calc-alteration`

Alteration numbers for accidental.

`direction` (direction):
`1`

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`.

`font-size` (number):
`-2`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`glyph-name-alist` (list):

```
'((0 . "accidentals.natural")
  (-1/2 . "accidentals.flat")
  (1/2 . "accidentals.sharp")
  (1 . "accidentals.doublesharp")
  (-1 . "accidentals.flatflat")
  (3/4
   .
   "accidentals.sharp.slashslash.stemstemstem")
  (1/4 . "accidentals.sharp.slashslash.stem")
  (-1/4 . "accidentals.mirroredflat")
  (-3/4 . "accidentals.mirroredflat.flat"))
```

An alist of key-string pairs.

`outside-staff-priority` (number):
`0`

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.

`parent-alignment-X` (number):
`0`

Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`script-priority` (number):
`0`

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):
`0`

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 - the unit is half the object width.

`side-axis` (number):
`1`

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.

`staff-padding` (dimension, in staff space):
`0.25`

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.

`stencil` (stencil):
`ly:accidental-interface::print`

The symbol to print.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:accidental-interface::height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `accidental-interface` (page 511), `accidental-suggestion-interface` (page 513), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `outside-staff-interface` (page 561), `script-interface` (page 567), `self-alignment-interface` (page 568), and `side-position-interface` (page 571).

3.1.5 Ambitus

`Ambitus` objects are created by: `Ambitus_engraver` (page 281).

Standard settings:

`axes` (list):
`'(0 1)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`break-align-symbol` (symbol):
`'ambitus`

This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
`#(#f #f #t)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):
```
'((cue-end-clef extra-space . 0.5)
  (clef extra-space . 1.15)
  (cue-clef extra-space . 0.5)
  (key-signature extra-space . 1.15)
  (staff-bar extra-space . 1.15)
  (time-signature extra-space . 1.15)
  (right-edge extra-space . 0.5)
  (first-note extra-space . 1.15))
```

An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for *`break-align-symbol`* are listed in Section "break-alignment-interface" in *Internals Reference*. Additionally, three special break-align symbols available to `space-alist` are:

`first-note`
: used when the grob is just left of the first note on a line

`next-note`
: used when the grob is just left of any other note; if not set, the value of `first-note` gets used

`right-edge`
: used when the grob is the last item on the line (only compatible with the `extra-space` spacing style)

Choices for *spacing-style* are:

`extra-space`
: Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

`minimum-space`
: Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

`fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

`minimum-fixed-space`
: Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

`semi-fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `ambitus-interface` (page 513), `axis-group-interface` (page 515), `break-aligned-interface` (page 523), `grob-interface` (page 538), and `item-interface` (page 546).

3.1.6 AmbitusAccidental

`AmbitusAccidental` objects are created by: `Ambitus_engraver` (page 281).

Standard settings:

`direction` (direction):
`-1`

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.

glyph-name-alist (list):

```
'((0 . "accidentals.natural")
  (-1/2 . "accidentals.flat")
  (1/2 . "accidentals.sharp")
  (1 . "accidentals.doublesharp")
  (-1 . "accidentals.flatflat")
  (3/4
   .
   "accidentals.sharp.slashslash.stemstemstem")
  (1/4 . "accidentals.sharp.slashslash.stem")
  (-1/4 . "accidentals.mirroredflat")
  (-3/4 . "accidentals.mirroredflat.flat"))
```

An alist of key-string pairs.

padding (dimension, in staff space):

```
0.5
```

Add this much extra space between objects that are next to each other.

side-axis (number):

```
0
```

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.

stencil (stencil):

```
ly:accidental-interface::print
```

The symbol to print.

X-offset (number):

```
ly:grob::x-parent-positioning
```

The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):

```
#<unpure-pure-container #<primitive-procedure ly:accidental-
interface::height> >
```

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): accidental-interface (page 511), break-aligned-interface (page 523), font-interface (page 532), grob-interface (page 538), item-interface (page 546), and side-position-interface (page 571).

3.1.7 AmbitusLine

AmbitusLine objects are created by: Ambitus_engraver (page 281).

Standard settings:

gap (dimension, in staff space):

```
ambitus-line::calc-gap
```

Size of a gap in a variable symbol.

`length-fraction` (number):
`0.7`

Multiplier for lengths. Used for determining ledger lines and stem lengths.

`maximum-gap` (number):
`0.45`

Maximum value allowed for `gap` property.

`stencil` (stencil):
`ambitus::print`

The symbol to print.

`thickness` (number):
`2`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`X-offset` (number):
`ly:self-alignment-interface::centered-on-x-parent`

The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): `ambitus-interface` (page 513), `font-interface` (page 532), `grob-interface` (page 538), and `item-interface` (page 546).

3.1.8 AmbitusNoteHead

`AmbitusNoteHead` objects are created by: `Ambitus_engraver` (page 281).

Standard settings:

`duration-log` (integer):
`2`

The 2-log of the note head duration, i.e., `0` = whole note, `1` = half note, etc.

`glyph-name` (string):
`note-head::calc-glyph-name`

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.

`ignore-ambitus` (boolean):
`#t`

If set, don't consider this notehead for ambitus calculation.

`stencil` (stencil):
`ly:note-head::print`

The symbol to print.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `ambitus-interface` (page 513), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `ledgered-interface` (page 549), `note-head-interface` (page 559), `rhythmic-head-interface` (page 567), and `staff-symbol-referencer-interface` (page 580).

3.1.9 Arpeggio

`Arpeggio` objects are created by: `Arpeggio_engraver` (page 281), and `Span_arpeggio_engraver` (page 317).

Standard settings:

`direction` (direction):
`-1`

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`.

`line-thickness` (number):
`1`

For slurs and ties, this is the diameter of the virtual "pen" that draws the two arcs of the curve's outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`padding` (dimension, in staff space):
`0.5`

Add this much extra space between objects that are next to each other.

`positions` (pair of numbers):
`ly:arpeggio::calc-positions`

Pair of staff coordinates (*`start . end`*), where *start* and *end* are vertical positions 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.

`protrusion` (number):
`0.4`

In an arpeggio bracket, the length of the horizontal edges.

`script-priority` (number):
`0`

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.

`side-axis` (number):
`0`

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.

`staff-position` (number):
`0.0`

Vertical position, measured in half staff spaces, counted from the middle line.

`stencil` (stencil):
`ly:arpeggio::print`

The symbol to print.

`thickness` (number):
`1`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`X-extent` (pair of numbers):
`ly:arpeggio::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> #<primitive-procedure ly:arpeggio::pure-height>>`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `arpeggio-interface` (page 514), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `side-position-interface` (page 571), and `staff-symbol-referencer-interface` (page 580).

3.1.10 BalloonTextItem

`BalloonTextItem` objects are created by: `Balloon_engraver` (page 283).

Standard settings:

`annotation-balloon` (boolean):
`#t`

Print the balloon around an annotation.

`annotation-line` (boolean):
`#t`

Print the line from an annotation to the grob that it annotates.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`

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)`.

`stencil` (stencil):
`ly:balloon-interface::print`

The symbol to print.

`text` (markup):
`#<procedure #f (grob)>`

Text markup. See Section "Formatting text" in *Notation Reference*.

`X-offset` (number):
`#<procedure #f (grob)>`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<procedure #f (grob)>`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `balloon-interface` (page 517), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), and `text-interface` (page 586).

3.1.11 BalloonTextSpanner

`BalloonTextSpanner` objects are not created by any engraver.

Standard settings:

`annotation-balloon` (boolean):
`#t`

Print the balloon around an annotation.

`annotation-line` (boolean):
`#t`

Print the line from an annotation to the grob that it annotates.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`

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)`.

`stencil` (stencil):
`ly:balloon-interface::print-spanner`

The symbol to print.

`text` (markup):
`#<procedure #f (grob)>`

Text markup. See Section "Formatting text" in *Notation Reference*.

`X-offset` (number):
`#<procedure #f (grob)>`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> #<primitive-procedure ly:balloon-interface::pure-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<procedure #f (grob)>`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `balloon-interface` (page 517), `font-interface` (page 532), `grob-interface` (page 538), `spanner-interface` (page 577), and `text-interface` (page 586).

3.1.12 BarLine

`BarLine` objects are created by: `Bar_engraver` (page 283).

Standard settings:

`allow-span-bar` (boolean):
`#t`

If false, no inter-staff bar line will be created below this bar line.

`bar-extent` (pair of numbers):
`ly:bar-line::calc-bar-extent`

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.

`break-align-anchor` (number):
`ly:bar-line::calc-anchor`

Grobs aligned to this breakable item 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-symbol` (symbol):
`'staff-bar`

This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
`bar-line::calc-break-visibility`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`extra-spacing-height` (pair of numbers):
`pure-from-neighbor-interface::account-for-span-bar`

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)`.

`gap` (dimension, in staff space):
`0.4`

Size of a gap in a variable symbol.

`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):
`bar-line::calc-glyph-name`

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.

`hair-thickness` (number):
`1.9`

Thickness of the thin line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`kern` (dimension, in staff space):
`3.0`

The space between individual elements in any compound bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`layer` (integer):
`0`

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.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`rounded` (boolean)
Decide whether lines should be drawn rounded or not.

`segno-kern` (number):
`3.0`

The space between the two thin lines of the segno bar line symbol, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`space-alist` (list):

```
'((ambitus extra-space . 1.0)
  (time-signature extra-space . 0.75)
  (custos minimum-space . 2.0)
  (clef extra-space . 1.0)
  (key-signature extra-space . 1.0)
  (key-cancellation extra-space . 1.0)
  (first-note fixed-space . 1.3)
  (next-note semi-fixed-space . 0.9)
  (right-edge extra-space . 0.0))
```

An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for *`break-align-symbol`* are listed in Section "break-alignment-interface" in *Internals Reference*. Additionally, three special break-align symbols available to `space-alist` are:

`first-note`
: used when the grob is just left of the first note on a line

`next-note`
: used when the grob is just left of any other note; if not set, the value of `first-note` gets used

`right-edge`
: used when the grob is the last item on the line (only compatible with the `extra-space` spacing style)

Choices for *`spacing-style`* are:

`extra-space`
: Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

`minimum-space`
: Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

`fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

`minimum-fixed-space`
: Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

`semi-fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

`stencil` (stencil):
: `ly:bar-line::print`

The symbol to print.

`thick-thickness` (number):
: `6.0`

Thickness of the thick line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`Y-extent` (pair of numbers):
: `#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `bar-line-interface` (page 517), `break-aligned-interface` (page 523), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), and `pure-from-neighbor-interface` (page 565).

3.1.13 BarNumber

`BarNumber` objects are created by: `Bar_number_engraver` (page 283).

Standard settings:

`after-line-breaking` (boolean):
: `ly:side-position-interface::move-to-extremal-staff`

Dummy property, used to trigger callback for `after-line-breaking`.

`break-align-symbols` (list):
: `'(left-edge staff-bar)`

A list of *break-align symbols* that determines which breakable items 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 listed in Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
: `#(#f #f #t)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`direction` (direction):
: `1`

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`.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`

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)`.

`font-family` (symbol):
`'roman`

The font family is the broadest category for selecting text fonts. Options include: `sans`, `roman`.

`font-size` (number):
`-2`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`horizon-padding` (number):
`0.05`

The amount to pad the axis along which a `Skyline` is built for the `side-position-interface`.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`outside-staff-priority` (number):
`100`

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.

`padding` (dimension, in staff space):
`1.0`

Add this much extra space between objects that are next to each other.

`self-alignment-X` (number):
`#<procedure #f (grob)>`

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 - the unit is half the object width.

`side-axis` (number):
`1`

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.

`stencil` (stencil):
`ly:text-interface::print`

The symbol to print.

`X-offset` (number):
`self-alignment-interface::self-aligned-on-breakable`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-alignable-interface` (page 523), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), and `text-interface` (page 586).

3.1.14 BassFigure

`BassFigure` objects are created by: `Figured_bass_engraver` (page 294).

Standard settings:

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `bass-figure-interface` (page 518), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `rhythmic-grob-interface` (page 567), and `text-interface` (page 586).

3.1.15 BassFigureAlignment

`BassFigureAlignment` objects are created by: `Figured_bass_engraver` (page 294).

Standard settings:

`axes` (list):
`'(1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`padding` (dimension, in staff space):
`0.2`
Add this much extra space between objects that are next to each other.

`stacking-dir` (direction):
`-1`
Stack objects in which direction?

`vertical-skylines` (pair of skylines):
`ly:axis-group-interface::calc-skylines`
Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `align-interface` (page 513), `axis-group-interface` (page 515), `bass-figure-alignment-interface` (page 518), `grob-interface` (page 538), and `spanner-interface` (page 577).

3.1.16 BassFigureAlignmentPositioning

`BassFigureAlignmentPositioning` objects are created by: `Figured_bass_position_engraver` (page 295).

Standard settings:

`add-stem-support` (boolean):
`#t`
If set, the `Stem` object is included in this script's support.

`axes` (list):
`'(1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`direction` (direction):
`1`
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`.

`padding` (dimension, in staff space):
`0.5`
Add this much extra space between objects that are next to each other.

`side-axis` (number):
`1`
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.

`staff-padding` (dimension, in staff space):
`1.0`
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.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `axis-group-interface` (page 515), `grob-interface` (page 538), `outside-staff-interface` (page 561), `side-position-interface` (page 571), and `spanner-interface` (page 577).

3.1.17 BassFigureBracket

`BassFigureBracket` objects are created by: `Figured_bass_engraver` (page 294).

Standard settings:

`edge-height` (pair):
`'(0.2 . 0.2)`

A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`stencil` (stencil):
`ly:enclosing-bracket::print`

The symbol to print.

`X-extent` (pair of numbers):
`ly:enclosing-bracket::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `enclosing-bracket-interface` (page 529), `grob-interface` (page 538), and `item-interface` (page 546).

3.1.18 BassFigureContinuation

`BassFigureContinuation` objects are created by: `Figured_bass_engraver` (page 294).

Standard settings:

`stencil` (stencil):
`ly:figured-bass-continuation::print`

The symbol to print.

`Y-offset` (number):
`ly:figured-bass-continuation::center-on-figures`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `figured-bass-continuation-interface` (page 530), `grob-interface` (page 538), and `spanner-interface` (page 577).

3.1.19 BassFigureLine

`BassFigureLine` objects are created by: `Figured_bass_engraver` (page 294).

Standard settings:

`axes` (list):
`'(1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`vertical-skylines` (pair of skylines):
`ly:axis-group-interface::calc-skylines`
Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 515), `grob-interface` (page 538), `outside-staff-axis-group-interface` (page 561), and `spanner-interface` (page 577).

3.1.20 Beam

`Beam` objects are created by: `Auto_beam_engraver` (page 281), `Beam_engraver` (page 284), `Chord_tremolo_engraver` (page 287), `Grace_auto_beam_engraver` (page 297), and `Grace_beam_engraver` (page 298).

Standard settings:

`auto-knee-gap` (dimension, in staff space):
`5.5`
If a gap is found between note heads where a horizontal beam fits and it is larger than this number, make a kneed beam.

`beam-thickness` (dimension, in staff space):
`0.48`
Beam thickness, measured in `staff-space` units.

`beamed-stem-shorten` (list):
`'(1.0 0.5 0.25)`
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):
`ly:beam::calc-beaming`
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.

`clip-edges` (boolean):
`#t`

Allow outward pointing beamlets at the edges of beams?

`collision-interfaces` (list):
```
'(beam-interface
   clef-interface
   clef-modifier-interface
   flag-interface
   inline-accidental-interface
   key-signature-interface
   note-head-interface
   stem-interface
   time-signature-interface)
```

A list of interfaces for which automatic beam-collision resolution is run.

`damping` (number):
`1`

Amount of beam slope damping.

`details` (list):
```
'((secondary-beam-demerit . 10)
  (stem-length-demerit-factor . 5)
  (region-size . 2)
  (beam-eps . 0.001)
  (stem-length-limit-penalty . 5000)
  (damping-direction-penalty . 800)
  (hint-direction-penalty . 20)
  (musical-direction-factor . 400)
  (ideal-slope-factor . 10)
  (collision-penalty . 500)
  (collision-padding . 0.35)
  (round-to-zero-slope . 0.02))
```

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.

`direction` (direction):
`ly:beam::calc-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`.

`font-family` (symbol):
`'roman`

The font family is the broadest category for selecting text fonts. Options include: `sans`, `roman`.

`gap` (dimension, in staff space):
`0.8`

Size of a gap in a variable symbol.

`neutral-direction` (direction):
`-1`

Which direction to take in the center of the staff.

`normalized-endpoints` (pair):
`ly:spanner::calc-normalized-endpoints`
Represents left and right placement over the total spanner, where the width of the spanner is normalized between 0 and 1.

`positions` (pair of numbers):
`beam::place-broken-parts-individually`
Pair of staff coordinates `(start . end)`, where *start* and *end* are vertical positions 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.

`stencil` (stencil):
`ly:beam::print`
The symbol to print.

`transparent` (boolean):
`#<procedure #f (grob)>`
This makes the grob invisible.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`
Two skylines, one above and one below this grob.

`X-positions` (pair of numbers):
`ly:beam::calc-x-positions`
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.

This object supports the following interface(s): `beam-interface` (page 519), `grob-interface` (page 538), `spanner-interface` (page 577), `staff-symbol-referencer-interface` (page 580), and `unbreakable-spanner-interface` (page 593).

3.1.21 BendAfter

`BendAfter` objects are created by: `Bend_engraver` (page 285).

Standard settings:

`minimum-length` (dimension, in staff space):
`0.5`
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.

`stencil` (stencil):
`bend::print`
The symbol to print.

`thickness` (number):
`2.0`
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest

point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *Staff*.StaffSymbol.thickness).

This object supports the following interface(s): bend-after-interface (page 521), grob-interface (page 538), and spanner-interface (page 577).

3.1.22 BendSpanner

BendSpanner objects are created by: Bend_spanner_engraver (page 285).

Standard settings:

avoid-slur (symbol):
'ignore

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.

baseline-skip (dimension, in staff space):
3

Distance between base lines of multiple lines of text.

before-line-breaking (boolean):
bend::target-cautionary

Dummy property, used to trigger a callback function.

details (list):

```
'((arrow-stencil
    .
    #<procedure bend::arrow-head-stencil (thickness x-y-coords height width c
  (curvature-factor . 0.35)
  (bend-arrowhead-height . 1.25)
  (bend-arrowhead-width . 0.8)
  (bend-amount-strings
    (quarter . "1/4")
    (half . "1/2")
    (three-quarter . "3/4")
    (full . #f))
  (curve-x-padding-line-end . 0.5)
  (curve-y-padding-line-end . 1)
  (dashed-line-settings 0.4 0.4 0)
  (head-text-break-visibility . #(#f #t #t))
  (horizontal-left-padding . 0.1)
  (successive-level . 1)
  (target-visibility . #f)
  (vertical-padding . 0.2)
  (y-distance-from-tabstaff-to-arrow-tip . 2.75))
```

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.

`direction` (direction):
`1`
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`.

`font-encoding` (symbol):
`'latin1`
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-shape` (symbol):
`'italic`
Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`font-size` (number):
`-2`
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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`padding` (dimension, in staff space):
`0.15`
Add this much extra space between objects that are next to each other.

`side-axis` (number):
`1`
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.

`spanner-id` (index or symbol):
`""`
An identifier to distinguish concurrent spanners.

`stencil` (stencil):
`bend-spanner::print`
The symbol to print.

`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*.

`thickness` (number):
`1`
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`vertical-skylines` (pair of skylines):
: `#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

  Two skylines, one above and one below this grob.

`word-space` (dimension, in staff space):
: `0.6`

  Space to insert between words in texts.

`Y-offset` (number):
: `0`

  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `bend-interface` (page 521), `font-interface` (page 532), `grob-interface` (page 538), `line-spanner-interface` (page 550), `outside-staff-interface` (page 561), `spanner-interface` (page 577), `text-interface` (page 586), and `text-script-interface` (page 586).

3.1.23 BreakAlignGroup

`BreakAlignGroup` objects are created by: `Break_align_engraver` (page 286).

Standard settings:

`axes` (list):
: `'(0)`

  List of axis numbers. In the case of alignment grobs, this should contain only one number.

`break-align-anchor` (number):
: `ly:break-aligned-interface::calc-average-anchor`

  Grobs aligned to this breakable item 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):
: `ly:break-aligned-interface::calc-joint-anchor-alignment`

  Read by `ly:break-aligned-interface::calc-extent-aligned-anchor` for aligning an anchor to a grob's extent.

`break-visibility` (vector):
: `ly:break-aligned-interface::calc-break-visibility`

  A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`X-extent` (pair of numbers):
: `ly:axis-group-interface::width`

  Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 515), `break-aligned-interface` (page 523), `grob-interface` (page 538), and `item-interface` (page 546).

3.1.24 BreakAlignment

`BreakAlignment` objects are created by: `Break_align_engraver` (page 286).

Standard settings:

`axes` (list):

```
'(0)
```

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`break-align-orders` (vector):

```
#((left-edge
    cue-end-clef
    ambitus
    breathing-sign
    clef
    cue-clef
    staff-bar
    key-cancellation
    key-signature
    time-signature
    custos)
  (left-edge
    cue-end-clef
    ambitus
    breathing-sign
    clef
    cue-clef
    staff-bar
    key-cancellation
    key-signature
    time-signature
    custos)
  (left-edge
    ambitus
    breathing-sign
    clef
    key-cancellation
    key-signature
    time-signature
    staff-bar
    cue-clef
    custos))
```

This is a vector of 3 lists: `#(`*`end-of-line unbroken start-of-line`*`)`. Each list contains *break-align symbols* that specify an order of breakable items (see Section "break-alignment-interface" in *Internals Reference*).

For example, this places time signatures before clefs:

```
\override Score.BreakAlignment.break-align-orders =
  #(make-vector 3 '(left-edge
                    cue-end-clef
                    ambitus
                    breathing-sign
                    time-signature
```

```
                                        clef
                                        cue-clef
                                        staff-bar
                                        key-cancellation
                                        key-signature
                                        custos))
```

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`stacking-dir` (direction):
`1`

Stack objects in which direction?

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 515), `break-alignment-interface` (page 524), `grob-interface` (page 538), and `item-interface` (page 546).

3.1.25 BreathingSign

`BreathingSign` objects are created by: `Breathing_sign_engraver` (page 286).

Standard settings:

`break-align-symbol` (symbol):
`'breathing-sign`

This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
`#(#t #t #f)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):

```
'((ambitus extra-space . 2.0)
  (custos minimum-space . 1.0)
  (key-signature minimum-space . 1.5)
  (time-signature minimum-space . 1.5)
  (staff-bar minimum-space . 1.5)
  (clef minimum-space . 2.0)
  (cue-clef minimum-space . 2.0)
  (cue-end-clef minimum-space . 2.0)
  (first-note fixed-space . 1.0)
  (right-edge extra-space . 0.1))
```

An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for *break-align-symbol* are listed in Section "break-alignment-interface" in *Internals Reference*. Additionally, three special break-align symbols available to `space-alist` are:

`first-note`
: used when the grob is just left of the first note on a line

`next-note`
: used when the grob is just left of any other note; if not set, the value of `first-note` gets used

`right-edge`
: used when the grob is the last item on the line (only compatible with the `extra-space` spacing style)

Choices for *spacing-style* are:

`extra-space`
: Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

`minimum-space`
: Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

`fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

`minimum-fixed-space`
: Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

`semi-fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

`stencil` (stencil):
: `ly:text-interface::print`

  The symbol to print.

`text` (markup):
`'(#<procedure musicglyph-markup (layout props glyph-name)>
"scripts.rcomma")`
Text markup. See Section "Formatting text" in *Notation Reference*.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`ly:breathing-sign::offset-callback`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-aligned-interface` (page 523), `breathing-sign-interface` (page 525), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `outside-staff-interface` (page 561), and `text-interface` (page 586).

3.1.26 ChordName

`ChordName` objects are created by: `Chord_name_engraver` (page 286).

Standard settings:

`after-line-breaking` (boolean):
`ly:chord-name::after-line-breaking`
Dummy property, used to trigger callback for `after-line-breaking`.

`extra-spacing-height` (pair of numbers):
`'(0.2 . -0.2)`
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):
`'(-0.5 . 0.5)`
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)`.

`font-family` (symbol):
`'sans`
The font family is the broadest category for selecting text fonts. Options include: `sans`, `roman`.

`font-size` (number):
`1.5`
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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`stencil` (stencil):
`ly:text-interface::print`

The symbol to print.

`word-space` (dimension, in staff space):
`0.0`

Space to insert between words in texts.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `chord-name-interface` (page 526), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `outside-staff-interface` (page 561), `rhythmic-grob-interface` (page 567), and `text-interface` (page 586).

3.1.27 `Clef`

`Clef` objects are created by: `Clef_engraver` (page 287).

Standard settings:

`avoid-slur` (symbol):
`'inside`

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`.

`break-align-anchor` (number):
`ly:break-aligned-interface::calc-extent-aligned-anchor`

Grobs aligned to this breakable item 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):
`1`

Read by `ly:break-aligned-interface::calc-extent-aligned-anchor` for aligning an anchor to a grob's extent.

`break-align-symbol` (symbol):
`'clef`

This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
`#(#f #f #t)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`extra-spacing-height` (pair of numbers):

`pure-from-neighbor-interface::extra-spacing-height-at-beginning-of-line`

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)`.

`glyph-name` (string):

`ly:clef::calc-glyph-name`

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.

`non-musical` (boolean):

`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):

```
'((cue-clef extra-space . 2.0)
  (staff-bar extra-space . 0.7)
  (ambitus extra-space . 1.15)
  (key-cancellation minimum-space . 3.5)
  (key-signature minimum-space . 3.5)
  (time-signature minimum-space . 4.2)
  (first-note minimum-fixed-space . 5.0)
  (next-note extra-space . 1.0)
  (right-edge extra-space . 0.5))
```

An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for *`break-align-symbol`* are listed in Section "break-alignment-interface" in *Internals Reference*. Additionally, three special break-align symbols available to `space-alist` are:

`first-note`
: used when the grob is just left of the first note on a line

`next-note`
: used when the grob is just left of any other note; if not set, the value of `first-note` gets used

`right-edge`
: used when the grob is the last item on the line (only compatible with the `extra-space` spacing style)

Choices for *`spacing-style`* are:

`extra-space`
: Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

`minimum-space`
: Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

`fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

`minimum-fixed-space`
: Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

`semi-fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

`stencil` (stencil):
: `ly:clef::print`

  The symbol to print.

`vertical-skylines` (pair of skylines):
: `#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`

  Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
: `#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

  Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
: `#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`

  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-aligned-interface` (page 523), `clef-interface` (page 526), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `pure-from-neighbor-interface` (page 565), and `staff-symbol-referencer-interface` (page 580).

3.1.28 `ClefModifier`

`ClefModifier` objects are created by: `Clef_engraver` (page 287), and `Cue_clef_engraver` (page 290).

Standard settings:

`break-visibility` (vector):
`#<procedure #f (grob)>`
A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`clef-alignments` (list):
`'((G -0.2 . 0.1) (F -0.3 . -0.2) (C 0 . 0))`
An alist of parent-alignments that should be used for clef modifiers with various clefs

`color` (color):
`#<procedure #f (grob)>`
The color of this grob.

`font-shape` (symbol):
`'italic`
Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`font-size` (number):
`-4`
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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`parent-alignment-X` (number):
`ly:clef-modifier::calc-parent-alignment`
Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`self-alignment-X` (number):
`0`
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 - the unit is half the object width.

`staff-padding` (dimension, in staff space):
`0.7`
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.

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

`transparent` (boolean):
`#<procedure #f (grob)>`
This makes the grob invisible.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`
Two skylines, one above and one below this grob.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `clef-modifier-interface` (page 526), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), and `text-interface` (page 586).

3.1.29 ClusterSpanner

`ClusterSpanner` objects are created by: `Cluster_spanner_engraver` (page 288).

Standard settings:

`minimum-length` (dimension, in staff space):
`0.0`

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.

`padding` (dimension, in staff space):
`0.25`

Add this much extra space between objects that are next to each other.

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:cluster::print`

The symbol to print.

`style` (symbol):
`'ramp`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

This object supports the following interface(s): `cluster-interface` (page 527), `grob-interface` (page 538), and `spanner-interface` (page 577).

3.1.30 ClusterSpannerBeacon

`ClusterSpannerBeacon` objects are created by: `Cluster_spanner_engraver` (page 288).

Standard settings:

`Y-extent` (pair of numbers):

`ly:cluster-beacon::height`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `cluster-beacon-interface` (page 526), `grob-interface` (page 538), `item-interface` (page 546), and `rhythmic-grob-interface` (page 567).

3.1.31 CombineTextScript

`CombineTextScript` objects are created by: `Part_combine_engraver` (page 310).

Standard settings:

`avoid-slur` (symbol):

`'outside`

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`.

`baseline-skip` (dimension, in staff space):

`2`

Distance between base lines of multiple lines of text.

`direction` (direction):

`1`

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`.

`extra-spacing-width` (pair of numbers):

`'(+inf.0 . -inf.0)`

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)`.

`font-series` (symbol):

`'bold`

Select the series of a font. Choices include `medium`, `bold`, `bold-narrow`, etc.

`outside-staff-priority` (number):

`450`

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.

`padding` (dimension, in staff space):

`0.5`

Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number)
: Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`script-priority` (number):
: `200`

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 - the unit is half the object width.

`side-axis` (number):
: `1`

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.

`staff-padding` (dimension, in staff space):
: `0.5`

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.

`stencil` (stencil):
: `ly:text-interface::print`

The symbol to print.

`X-offset` (number):
: `ly:self-alignment-interface::aligned-on-x-parent`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
: `#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
: `#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), `text-interface` (page 586), and `text-script-interface` (page 586).

3.1.32 CueClef

`CueClef` objects are created by: `Cue_clef_engraver` (page 290).

Standard settings:

`avoid-slur` (symbol):
`'inside`

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`.

`break-align-anchor` (number):
`ly:break-aligned-interface::calc-extent-aligned-anchor`

Grobs aligned to this breakable item 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-symbol` (symbol):
`'cue-clef`

This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
`#(#f #f #t)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`extra-spacing-height` (pair of numbers):
`pure-from-neighbor-interface::extra-spacing-height-at-beginning-of-line`

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)`.

`font-size` (number):
`-4`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`full-size-change` (boolean):
`#t`

Don't make a change clef smaller.

`glyph-name` (string):
`ly:clef::calc-glyph-name`

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.

`non-musical` (boolean):

`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):

```
'((staff-bar minimum-space . 2.7)
  (key-cancellation minimum-space . 3.5)
  (key-signature minimum-space . 3.5)
  (time-signature minimum-space . 4.2)
  (custos minimum-space . 0.0)
  (first-note minimum-fixed-space . 3.0)
  (next-note extra-space . 1.0)
  (right-edge extra-space . 0.5))
```

An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for *`break-align-symbol`* are listed in Section "break-alignment-interface" in *Internals Reference*. Additionally, three special break-align symbols available to `space-alist` are:

`first-note`
: used when the grob is just left of the first note on a line

`next-note`
: used when the grob is just left of any other note; if not set, the value of `first-note` gets used

`right-edge`
: used when the grob is the last item on the line (only compatible with the `extra-space` spacing style)

Choices for *`spacing-style`* are:

`extra-space`
: Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

`minimum-space`
: Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

`fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

`minimum-fixed-space`
: Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left

side of the grob and the left side of the note, without allowing them to collide.

`semi-fixed-space`
Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

`stencil` (stencil):
`ly:clef::print`
The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`
Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-aligned-interface` (page 523), `clef-interface` (page 526), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `pure-from-neighbor-interface` (page 565), and `staff-symbol-referencer-interface` (page 580).

3.1.33 CueEndClef

`CueEndClef` objects are created by: `Cue_clef_engraver` (page 290).

Standard settings:

`avoid-slur` (symbol):
`'inside`
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`.

`break-align-anchor` (number):
`ly:break-aligned-interface::calc-extent-aligned-anchor`
Grobs aligned to this breakable item 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-symbol` (symbol):
`'cue-end-clef`

This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
`#(#t #t #f)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`extra-spacing-height` (pair of numbers):
`pure-from-neighbor-interface::extra-spacing-height-at-beginning-of-line`

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)`.

`font-size` (number):
`-4`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`full-size-change` (boolean):
`#t`

Don't make a change clef smaller.

`glyph-name` (string):
`ly:clef::calc-glyph-name`

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.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):

```
'((clef extra-space . 0.7)
  (cue-clef extra-space . 0.7)
  (staff-bar extra-space . 0.7)
  (key-cancellation minimum-space . 3.5)
  (key-signature minimum-space . 3.5)
  (time-signature minimum-space . 4.2)
  (first-note minimum-fixed-space . 5.0)
  (next-note extra-space . 1.0)
  (right-edge extra-space . 0.5))
```

An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
```

...)

Standard choices for *break-align-symbol* are listed in Section "break-alignment-interface" in *Internals Reference*. Additionally, three special break-align symbols available to `space-alist` are:

`first-note`
: used when the grob is just left of the first note on a line

`next-note`
: used when the grob is just left of any other note; if not set, the value of `first-note` gets used

`right-edge`
: used when the grob is the last item on the line (only compatible with the `extra-space` spacing style)

Choices for *spacing-style* are:

`extra-space`
: Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

`minimum-space`
: Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

`fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

`minimum-fixed-space`
: Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

`semi-fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

`stencil` (stencil):
`ly:clef::print`

The symbol to print.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-aligned-interface` (page 523), `clef-interface` (page 526), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `pure-from-neighbor-interface` (page 565), and `staff-symbol-referencer-interface` (page 580).

3.1.34 Custos

`Custos` objects are created by: `Custos_engraver` (page 290).

Standard settings:

`break-align-symbol` (symbol):
`'custos`

This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
`#(#t #f #f)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`neutral-direction` (direction):
`-1`

Which direction to take in the center of the staff.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):
```
'((first-note minimum-fixed-space . 0.0)
  (right-edge extra-space . 0.1))
```

An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for *`break-align-symbol`* are listed in Section "break-alignment-interface" in *Internals Reference*. Additionally, three special break-align symbols available to `space-alist` are:

`first-note`
: used when the grob is just left of the first note on a line

`next-note`
: used when the grob is just left of any other note; if not set, the value of `first-note` gets used

`right-edge`
: used when the grob is the last item on the line (only compatible with the `extra-space` spacing style)

Choices for *`spacing-style`* are:

`extra-space`
: Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

`minimum-space`
: Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

`fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

`minimum-fixed-space`
: Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

`semi-fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

`stencil` (stencil):
: `ly:custos::print`

  The symbol to print.

`style` (symbol):
: `'vaticana`

  This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`Y-offset` (number):
: `#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`

  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-aligned-interface` (page 523), `custos-interface` (page 527), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), and `staff-symbol-referencer-interface` (page 580).

3.1.35 DotColumn

DotColumn objects are created by: Dot_column_engraver (page 291), and Vaticana_ligature_engraver (page 325).

Standard settings:

axes (list):
'(0)

List of axis numbers. In the case of alignment grobs, this should contain only one number.

chord-dots-limit (integer):
3

Limits the column of dots on each chord to the height of the chord plus chord-dots-limit staff-positions.

direction (direction):
1

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.

X-extent (pair of numbers):
ly:axis-group-interface::width

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): axis-group-interface (page 515), dot-column-interface (page 527), grob-interface (page 538), and item-interface (page 546).

3.1.36 Dots

Dots objects are created by: Dots_engraver (page 291).

Standard settings:

avoid-slur (symbol):
'inside

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.

dot-count (integer):
dots::calc-dot-count

The number of dots.

extra-spacing-height (pair of numbers):
'(-0.5 . 0.5)

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):
`'(0.0 . 0.2)`

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)`.

`staff-position` (number):
`dots::calc-staff-position`

Vertical position, measured in half staff spaces, counted from the middle line.

`stencil` (stencil):
`ly:dots::print`

The symbol to print.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `dots-interface` (page 528), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), and `staff-symbol-referencer-interface` (page 580).

3.1.37 DoublePercentRepeat

`DoublePercentRepeat` objects are created by: `Double_percent_repeat_engraver` (page 291).

Standard settings:

`break-align-symbol` (symbol):
`'staff-bar`

This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
`#(#t #t #f)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`dot-negative-kern` (number):
`0.75`

The space to remove between a dot and a slash in percent repeat glyphs. Larger values bring the two elements closer together.

`font-encoding` (symbol):
`'fetaMusic`

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).

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`slash-negative-kern` (number):
`1.6`

The space to remove between slashes in percent repeat glyphs. Larger values bring the two elements closer together.

`slope` (number):
`1.0`

The slope of this object.

`stencil` (stencil):
`ly:percent-repeat-item-interface::double-percent`

The symbol to print.

`thickness` (number):
`0.48`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `break-aligned-interface` (page 523), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `percent-repeat-interface` (page 564), and `percent-repeat-item-interface` (page 564).

3.1.38 DoublePercentRepeatCounter

`DoublePercentRepeatCounter` objects are created by: `Double_percent_repeat_engraver` (page 291).

Standard settings:

`direction` (direction):
`1`

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`.

`font-encoding` (symbol):
`'fetaText`

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-size` (number):
`-2`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`padding` (dimension, in staff space):

`0.2`

Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number):

`0`

Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`self-alignment-X` (number):

`0`

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 - the unit is half the object width.

`side-axis` (number):

`1`

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.

`staff-padding` (dimension, in staff space):

`0.25`

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.

`stencil` (stencil):

`ly:text-interface::print`

The symbol to print.

`X-offset` (number):

`ly:self-alignment-interface::aligned-on-x-parent`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):

`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):

`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `outside-staff-interface` (page 561), `percent-repeat-interface` (page 564), `percent-repeat-item-interface` (page 564), `self-alignment-interface` (page 568), `side-position-interface` (page 571), and `text-interface` (page 586).

3.1.39 DoubleRepeatSlash

DoubleRepeatSlash objects are created by: Slash_repeat_engraver (page 316).

Standard settings:

dot-negative-kern (number):
0.75

The space to remove between a dot and a slash in percent repeat glyphs. Larger values bring the two elements closer together.

font-encoding (symbol):
'fetaMusic

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).

slash-negative-kern (number):
1.6

The space to remove between slashes in percent repeat glyphs. Larger values bring the two elements closer together.

slope (number):
1.0

The slope of this object.

stencil (stencil):
ly:percent-repeat-item-interface::beat-slash

The symbol to print.

thickness (number):
0.48

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *Staff*.StaffSymbol.thickness).

Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): font-interface (page 532), grob-interface (page 538), item-interface (page 546), outside-staff-interface (page 561), percent-repeat-interface (page 564), percent-repeat-item-interface (page 564), and rhythmic-grob-interface (page 567).

3.1.40 DurationLine

DurationLine objects are created by: Duration_line_engraver (page 292).

Standard settings:

after-line-breaking (boolean):
ly:spanner::kill-zero-spanned-time

Dummy property, used to trigger callback for after-line-breaking.

`arrow-length` (number):
`2`

Arrow length.

`arrow-width` (number):
`1.5`

Arrow width.

`bound-details` (list):

```
'((right (end-on-accidental . #t)
         (end-on-arpeggio . #t)
         (padding . 0.4)
         (end-style . #f))
  (right-broken (padding . 0.4) (end-style . #f))
  (left-broken (padding . 0.4))
  (left (padding . -0.3) (start-at-dot . #f)))
```

An alist of properties for determining attachments of spanners to edges.

`breakable` (boolean):
`#t`

Allow breaks here.

`details` (list):

```
'((hook-height . 0.34)
  (hook-thickness . #f)
  (hook-direction . 1))
```

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.

`minimum-length` (dimension, in staff space):
`2`

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-after-break` (dimension, in staff space):
`6`

If set, try to make a broken spanner starting a line this long. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance to the notehead.

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):
`duration-line::print`

The symbol to print.

`style` (symbol):
`'beam`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`thickness` (number):
`4`
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`to-barline` (boolean)
If true, the spanner will stop at the bar line just before it would otherwise stop.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`
Two skylines, one above and one below this grob.

`Y-offset` (number):
`0`
The vertical amount that this object is moved relative to its Y-parent.

`zigzag-length` (dimension, in staff space):
`1`
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):
`1`
The width of one zigzag squiggle. This number is adjusted slightly so that the spanner line can be constructed from a whole number of squiggles.

This object supports the following interface(s): `duration-line-interface` (page 528), `font-interface` (page 532), `grob-interface` (page 538), `line-interface` (page 550), `line-spanner-interface` (page 550), `spanner-interface` (page 577), and `unbreakable-spanner-interface` (page 593).

3.1.41 DynamicLineSpanner

`DynamicLineSpanner` objects are created by: `Dynamic_align_engraver` (page 293).

Standard settings:

`axes` (list):
`'(1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`direction` (direction):
`-1`
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`.

`minimum-space` (dimension, in staff space):
`1.2`
Minimum distance that the victim should move (after padding).

`outside-staff-priority` (number):
`250`

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.

`padding` (dimension, in staff space):
`0.6`

Add this much extra space between objects that are next to each other.

`side-axis` (number):
`1`

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.

`slur-padding` (number):
`0.3`

Extra distance between slur and script.

`staff-padding` (dimension, in staff space):
`0.1`

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.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-element-stencils> #<primitive-procedure ly:grob::pure-vertical-skylines-from-element-stencils> >`

Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `axis-group-interface` (page 515), `dynamic-interface` (page 529), `dynamic-line-spanner-interface` (page 529), `grob-interface` (page 538), `outside-staff-interface` (page 561), `side-position-interface` (page 571), and `spanner-interface` (page 577).

3.1.42 DynamicText

DynamicText objects are created by: Dynamic_engraver (page 293).

Standard settings:

direction (direction):
ly:script-interface::calc-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.

extra-spacing-width (pair of numbers):
'(+inf.0 . -inf.0)

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).

font-encoding (symbol):
'fetaText

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-series (symbol):
'bold

Select the series of a font. Choices include medium, bold, bold-narrow, etc.

font-shape (symbol):
'italic

Select the shape of a font. Choices include upright, italic, caps.

parent-alignment-X (number):
0

Specify on which point of the parent the object is aligned. The value -1 means aligned on parent's left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from self-alignment-X property will be used.

right-padding (dimension, in staff space):
0.5

Space to insert on the right side of an object (e.g., between note and its accidentals).

self-alignment-X (number):
0

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 - the unit is half the object width.

stencil (stencil):
ly:text-interface::print

The symbol to print.

`vertical-skylines` (pair of skylines):
: `#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`

  Two skylines, one above and one below this grob.

`X-align-on-main-noteheads` (boolean):
: `#t`

  If true, this grob will ignore suspended noteheads when aligning itself on NoteColumn.

`X-offset` (number):
: `ly:self-alignment-interface::aligned-on-x-parent`

  The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
: `#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

  Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
: `#<unpure-pure-container #<procedure #f (grob)> >`

  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `dynamic-interface` (page 529), `dynamic-text-interface` (page 529), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `outside-staff-interface` (page 561), `script-interface` (page 567), `self-alignment-interface` (page 568), and `text-interface` (page 586).

3.1.43 DynamicTextSpanner

`DynamicTextSpanner` objects are created by: `Dynamic_engraver` (page 293).

Standard settings:

`before-line-breaking` (boolean):
: `dynamic-text-spanner::before-line-breaking`

  Dummy property, used to trigger a callback function.

`bound-details` (list):
: ```
  '((right (attach-dir . -1)
           (Y . 0)
           (padding . 0.75))
    (right-broken (attach-dir . 1) (padding . 0.0))
    (left (attach-dir . -1)
          (Y . 0)
          (stencil-offset -0.75 . -0.5)
          (padding . 0.75))
    (left-broken (attach-dir . 1)))
  ```

  An alist of properties for determining attachments of spanners to edges.

`dash-fraction` (number):
: `0.2`

  Size of the dashes, relative to `dash-period`. Should be between `0.1` and `1.0` (continuous line). If set to `0.0`, a dotted line is produced
  ```

`dash-period` (number):
`3.0`

The length of one dash together with whitespace. If negative, no line is drawn at all.

`font-shape` (symbol):
`'italic`

Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`font-size` (number):
`1`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`left-bound-info` (list):
`ly:line-spanner::calc-left-bound-info-and-text`

An alist of properties for determining attachments of spanners to edges.

`minimum-length` (dimension, in staff space):
`2.0`

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-Y-extent` (pair of numbers):
`'(-1 . 1)`

Minimum size of an object in Y dimension, measured in `staff-space` units.

`right-bound-info` (list):
`ly:line-spanner::calc-right-bound-info`

An alist of properties for determining attachments of spanners to edges.

`skyline-horizontal-padding` (number):
`0.2`

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.

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:line-spanner::print`

The symbol to print.

`style` (symbol):
`'dashed-line`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`vertical-skylines` (pair of skylines):
: `#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

  Two skylines, one above and one below this grob.

This object supports the following interface(s): `dynamic-interface` (page 529), `dynamic-text-spanner-interface` (page 529), `font-interface` (page 532), `grob-interface` (page 538), `line-interface` (page 550), `line-spanner-interface` (page 550), `spanner-interface` (page 577), and `text-interface` (page 586).

3.1.44 Episema

`Episema` objects are created by: `Episema_engraver` (page 294).

Standard settings:

`bound-details` (list):
: `'((left (Y . 0) (padding . 0) (attach-dir . -1))`
  `(right (Y . 0) (padding . 0) (attach-dir . 1)))`

  An alist of properties for determining attachments of spanners to edges.

`direction` (direction):
: `1`

  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`.

`left-bound-info` (list):
: `ly:line-spanner::calc-left-bound-info`

  An alist of properties for determining attachments of spanners to edges.

`right-bound-info` (list):
: `ly:line-spanner::calc-right-bound-info`

  An alist of properties for determining attachments of spanners to edges.

`side-axis` (number):
: `1`

  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.

`stencil` (stencil):
: `ly:line-spanner::print`

  The symbol to print.

`style` (symbol):
: `'line`

  This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`Y-offset` (number):
: `#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `episema-interface` (page 530), `font-interface` (page 532), `grob-interface` (page 538), `line-interface` (page 550), `line-spanner-interface` (page 550), `side-position-interface` (page 571), and `spanner-interface` (page 577).

3.1.45 FingerGlideSpanner

`FingerGlideSpanner` objects are created by: `Finger_glide_engraver` (page 295).

Standard settings:

`bound-details` (list):

```
'((right (attach-dir . -1)
         (right-stub-length . 1)
         (padding . 0.2))
  (left (attach-dir . 1)
        (left-stub-length . 1)
        (padding . 0.2)))
```

An alist of properties for determining attachments of spanners to edges.

`dash-fraction` (number):

`0.4`

Size of the dashes, relative to `dash-period`. Should be between `0.1` and `1.0` (continuous line). If set to `0.0`, a dotted line is produced

`dash-period` (number):

`1`

The length of one dash together with whitespace. If negative, no line is drawn at all.

`details` (list):

`'((bow-direction . #f))`

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.

`left-bound-info` (list):

`ly:line-spanner::calc-left-bound-info`

An alist of properties for determining attachments of spanners to edges.

`minimum-length` (dimension, in staff space):

`2.5`

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-after-break` (dimension, in staff space):

`2.5`

If set, try to make a broken spanner starting a line this long. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance to the notehead.

`normalized-endpoints` (pair):

`ly:spanner::calc-normalized-endpoints`

Represents left and right placement over the total spanner, where the width of the spanner is normalized between 0 and 1.

`right-bound-info` (list):
`ly:line-spanner::calc-right-bound-info`

An alist of properties for determining attachments of spanners to edges.

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):
`finger-glide::print`

The symbol to print.

`style` (symbol):
`'line`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`thickness` (number):
`1.4`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

Two skylines, one above and one below this grob.

`zigzag-length` (dimension, in staff space):
`1`

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):
`1`

The width of one zigzag squiggle. This number is adjusted slightly so that the spanner line can be constructed from a whole number of squiggles.

This object supports the following interface(s): `finger-glide-interface` (page 531), `grob-interface` (page 538), `line-spanner-interface` (page 550), and `spanner-interface` (page 577).

3.1.46 Fingering

`Fingering` objects are created by: `Fingering_engraver` (page 295), and `New_fingering_engraver` (page 307).

Standard settings:

`add-stem-support` (boolean):
`only-if-beamed`

If set, the `Stem` object is included in this script's support.

`avoid-slur` (symbol):
`'around`

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`.

`direction` (direction):
`ly:script-interface::calc-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`.

`font-encoding` (symbol):
`'fetaText`

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-size` (number):
`-5`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`padding` (dimension, in staff space):
`0.5`

Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number):
`0`

Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`parent-alignment-Y` (number):
`0`

Like `parent-alignment-X` but for the Y axis.

`script-priority` (number):
`100`

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):
`0`

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 - the unit is half the object width.

`self-alignment-Y` (number):
`0`
Like `self-alignment-X` but for the Y axis.

`slur-padding` (number):
`0.2`
Extra distance between slur and script.

`staff-padding` (dimension, in staff space):
`0.5`
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.

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

`text` (markup):
`fingering::calc-text`
Text markup. See Section "Formatting text" in *Notation Reference*.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `finger-interface` (page 532), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), `text-interface` (page 586), and `text-script-interface` (page 586).

3.1.47 FingeringColumn

`FingeringColumn` objects are created by: `Fingering_column_engraver` (page 295).

Standard settings:

`padding` (dimension, in staff space):
`0.2`
Add this much extra space between objects that are next to each other.

`snap-radius` (number):
`0.3`
The maximum distance between two objects that will cause them to snap to alignment along an axis.

This object supports the following interface(s): `fingering-column-interface` (page 532), `grob-interface` (page 538), and `item-interface` (page 546).

3.1.48 Flag

`Flag` objects are created by: `Stem_engraver` (page 319).

Standard settings:

`color` (color):
`#<procedure #f (grob)>`
The color of this grob.

`glyph-name` (string):
`ly:flag::glyph-name`

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.

`stencil` (stencil):
`ly:flag::print`

The symbol to print.

`transparent` (boolean):
`#<procedure #f (grob)>`

This makes the grob invisible.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`

Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:flag::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`X-offset` (number):
`ly:flag::calc-x-offset`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:flag::calc-y-offset> #<primitive-procedure ly:flag::pure-calc-y-offset> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `flag-interface` (page 532), `font-interface` (page 532), `grob-interface` (page 538), and `item-interface` (page 546).

3.1.49 FootnoteItem

`FootnoteItem` objects are created by: `Footnote_engraver` (page 296).

Standard settings:

`annotation-balloon` (boolean)
Print the balloon around an annotation.

`annotation-line` (boolean):
`#t`

Print the line from an annotation to the grob that it annotates.

`automatically-numbered` (boolean):
`#<procedure #f (grob)>`

If set, footnotes are automatically numbered.

`break-visibility` (vector):
`#<procedure #f (grob)>`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`footnote` (boolean):
`#t`

Should this be a footnote or in-note?

`footnote-text` (markup):
`#<procedure #f (grob)>`

A footnote for the grob.

`stencil` (stencil):
`ly:balloon-interface::print`

The symbol to print.

`text` (markup):
`#<procedure #f (grob)>`

Text markup. See Section "Formatting text" in *Notation Reference*.

`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):
`#<procedure #f (grob)>`

The horizontal amount that this object is moved relative to its X-parent.

`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):
`#<procedure #f (grob)>`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `balloon-interface` (page 517), `font-interface` (page 532), `footnote-interface` (page 534), `grob-interface` (page 538), `item-interface` (page 546), and `text-interface` (page 586).

3.1.50 FootnoteSpanner

`FootnoteSpanner` objects are created by: `Footnote_engraver` (page 296).

Standard settings:

`annotation-balloon` (boolean)
Print the balloon around an annotation.

`annotation-line` (boolean):
`#t`

Print the line from an annotation to the grob that it annotates.

`automatically-numbered` (boolean):
`#<procedure #f (grob)>`
If set, footnotes are automatically numbered.

`footnote` (boolean):
`#t`
Should this be a footnote or in-note?

`footnote-text` (markup):
`#<procedure #f (grob)>`
A footnote for the grob.

`stencil` (stencil):
`ly:balloon-interface::print-spanner`
The symbol to print.

`text` (markup):
`#<procedure #f (grob)>`
Text markup. See Section "Formatting text" in *Notation Reference*.

`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):
`#<procedure #f (grob)>`
The horizontal amount that this object is moved relative to its X-parent.

`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):
`#<procedure #f (grob)>`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `balloon-interface` (page 517), `font-interface` (page 532), `footnote-interface` (page 534), `footnote-spanner-interface` (page 534), `grob-interface` (page 538), `spanner-interface` (page 577), and `text-interface` (page 586).

3.1.51 FretBoard

`FretBoard` objects are created by: `Fretboard_engraver` (page 296).

Standard settings:

`after-line-breaking` (boolean):
`ly:chord-name::after-line-breaking`
Dummy property, used to trigger callback for `after-line-breaking`.

`extra-spacing-height` (pair of numbers):
`'(0.2 . -0.2)`
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):
`'(-0.5 . 0.5)`

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)`.

`fret-diagram-details` (list):
`'((finger-code . below-string))`

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-distance` – Multiplier to adjust the distance between frets. Default 1.0.
- `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.
- `fret-label-horizontal-offset` – The offset of the fret label from the center of the fret in direction orthogonal to strings. Default 0.
- `handedness` – Print the fret-diagram left- or right-handed. `-1`, `LEFT` for left ; `1`, `RIGHT` for right. Default `RIGHT`.
- `paren-padding` – The padding for the parenthesis. Default 0.05.
- `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-distance` – Multiplier to adjust the distance between strings. Default 1.0.
- `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.

`stencil` (stencil):
`fret-board::calc-stencil`

The symbol to print.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `chord-name-interface` (page 526), `font-interface` (page 532), `fret-diagram-interface` (page 534), `grob-interface` (page 538), `item-interface` (page 546), `outside-staff-interface` (page 561), and `rhythmic-grob-interface` (page 567).

3.1.52 Glissando

`Glissando` objects are created by: `Glissando_engraver` (page 297).

Standard settings:

`after-line-breaking` (boolean):
`ly:spanner::kill-zero-spanned-time`

Dummy property, used to trigger callback for `after-line-breaking`.

`bound-details` (list):
```
'((right (attach-dir . -1)
         (end-on-accidental . #t)
         (padding . 0.5))
  (left (attach-dir . 1)
        (padding . 0.5)
        (start-at-dot . #t)))
```

An alist of properties for determining attachments of spanners to edges.

`gap` (dimension, in staff space):
`0.5`

Size of a gap in a variable symbol.

`left-bound-info` (list):
`ly:line-spanner::calc-left-bound-info`

An alist of properties for determining attachments of spanners to edges.

`normalized-endpoints` (pair):
`ly:spanner::calc-normalized-endpoints`

Represents left and right placement over the total spanner, where the width of the spanner is normalized between 0 and 1.

`right-bound-info` (list):
`ly:line-spanner::calc-right-bound-info`

An alist of properties for determining attachments of spanners to edges.

`simple-Y` (boolean):
`#t`

Should the Y placement of a spanner disregard changes in system heights?

`stencil` (stencil):
`ly:line-spanner::print`

The symbol to print.

`style` (symbol):
`'line`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

Two skylines, one above and one below this grob.

`X-extent` (pair of numbers)
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers)
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`zigzag-width` (dimension, in staff space):
`0.75`

The width of one zigzag squiggle. This number is adjusted slightly so that the spanner line can be constructed from a whole number of squiggles.

This object supports the following interface(s): `glissando-interface` (page 536), `grob-interface` (page 538), `line-interface` (page 550), `line-spanner-interface` (page 550), `spanner-interface` (page 577), and `unbreakable-spanner-interface` (page 593).

3.1.53 GraceSpacing

`GraceSpacing` objects are created by: `Grace_spacing_engraver` (page 298).

Standard settings:

`common-shortest-duration` (moment):
`grace-spacing::calc-shortest-duration`
The most common shortest note length. This is used in spacing. Enlarging this sets the score tighter.

`shortest-duration-space` (number):
`1.6`
Start with this multiple of `spacing-increment` space for the shortest duration. See also Section "spacing-spanner-interface" in *Internals Reference*.

`spacing-increment` (dimension, in staff space):
`0.8`
The unit of length for note-spacing. Typically, the width of a note head. See also Section "spacing-spanner-interface" in *Internals Reference*.

This object supports the following interface(s): `grace-spacing-interface` (page 536), `grob-interface` (page 538), `spacing-options-interface` (page 576), and `spanner-interface` (page 577).

3.1.54 GridLine

`GridLine` objects are created by: `Grid_line_span_engraver` (page 299).

Standard settings:

`layer` (integer):
`0`
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.

`parent-alignment-X` (number):
`0`
Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`self-alignment-X` (number):
`0`
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 - the unit is half the object width.

`stencil` (stencil):
`ly:grid-line-interface::print`
The symbol to print.

`X-extent` (pair of numbers):
`ly:grid-line-interface::width`
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`
The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): `grid-line-interface` (page 537), `grob-interface` (page 538), `item-interface` (page 546), and `self-alignment-interface` (page 568).

3.1.55 GridPoint

`GridPoint` objects are created by: `Grid_point_engraver` (page 299).

Standard settings:

`X-extent` (pair of numbers):
`'(0 . 0)`
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`'(0 . 0)`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grid-point-interface` (page 538), `grob-interface` (page 538), and `item-interface` (page 546).

3.1.56 Hairpin

`Hairpin` objects are created by: `Dynamic_engraver` (page 293).

Standard settings:

`after-line-breaking` (boolean):
`ly:spanner::kill-zero-spanned-time`
Dummy property, used to trigger callback for `after-line-breaking`.

`bound-padding` (number):
`1.0`
The amount of padding to insert around spanner bounds.

`broken-bound-padding` (number):
`ly:hairpin::broken-bound-padding`
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).

`endpoint-alignments` (pair of numbers):
`'(-1 . 1)`
A pair of numbers representing the alignments of an object's endpoints. E.g., the ends of a hairpin relative to `NoteColumn` grobs.

`grow-direction` (direction):
`hairpin::calc-grow-direction`
Crescendo or decrescendo?

`height` (dimension, in staff space):
`0.6666`
Height of an object in `staff-space` units.

`minimum-length` (dimension, in staff space):
`2.0`

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.

`self-alignment-Y` (number):
`0`

Like `self-alignment-X` but for the Y axis.

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:hairpin::print`

The symbol to print.

`thickness` (number):
`1.0`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`to-barline` (boolean):
`#t`

If true, the spanner will stop at the bar line just before it would otherwise stop.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> #<primitive-procedure ly:hairpin::pure-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:self-alignment-interface::y-aligned-on-self> #<primitive-procedure ly:self-alignment-interface::pure-y-aligned-on-self> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `dynamic-interface` (page 529), `grob-interface` (page 538), `hairpin-interface` (page 542), `line-interface` (page 550), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), and `spanner-interface` (page 577).

3.1.57 HorizontalBracket

`HorizontalBracket` objects are created by: `Horizontal_bracket_engraver` (page 299).

Standard settings:

`bracket-flare` (pair of numbers):
`'(0.5 . 0.5)`
A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

`connect-to-neighbor` (pair):
`ly:tuplet-bracket::calc-connect-to-neighbors`
Pair of booleans, indicating whether this grob looks as a continued break.

`direction` (direction):
`-1`
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`.

`padding` (dimension, in staff space):
`0.2`
Add this much extra space between objects that are next to each other.

`side-axis` (number):
`1`
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.

`staff-padding` (dimension, in staff space):
`0.2`
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.

`stencil` (stencil):
`ly:horizontal-bracket::print`
The symbol to print.

`thickness` (number):
`1.0`
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `grob-interface` (page 538), `horizontal-bracket-interface` (page 543), `line-interface` (page 550), `outside-staff-interface` (page 561), `side-position-interface` (page 571), and `spanner-interface` (page 577).

3.1.58 HorizontalBracketText

HorizontalBracketText objects are created by: Horizontal_bracket_engraver (page 299).

Standard settings:

direction (direction):
: ly:horizontal-bracket-text::calc-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.

font-size (number):
: -1

  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. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

padding (dimension, in staff space):
: 0.5

  Add this much extra space between objects that are next to each other.

parent-alignment-X (number):
: 0

  Specify on which point of the parent the object is aligned. The value -1 means aligned on parent's left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from self-alignment-X property will be used.

self-alignment-X (number):
: 0

  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 - the unit is half the object width.

side-axis (number):
: 1

  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.

stencil (stencil):
: ly:horizontal-bracket-text::print

  The symbol to print.

X-offset (number):
: ly:self-alignment-interface::aligned-on-x-parent

  The horizontal amount that this object is moved relative to its X-parent.

Y-offset (number):
: #<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >

  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `horizontal-bracket-text-interface` (page 544), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), `spanner-interface` (page 577), and `text-interface` (page 586).

3.1.59 InstrumentName

`InstrumentName` objects are created by: `Instrument_name_engraver` (page 300).

Standard settings:

`direction` (direction):
`-1`

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`.

`padding` (dimension, in staff space):
`0.3`

Add this much extra space between objects that are next to each other.

`self-alignment-X` (number):
`0`

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 - the unit is half the object width.

`self-alignment-Y` (number):
`0`

Like `self-alignment-X` but for the Y axis.

`stencil` (stencil):
`system-start-text::print`

The symbol to print.

`X-offset` (number):
`system-start-text::calc-x-offset`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`system-start-text::calc-y-offset`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `self-alignment-interface` (page 568), `side-position-interface` (page 571), `spanner-interface` (page 577), `system-start-text-interface` (page 585), and `text-interface` (page 586).

3.1.60 InstrumentSwitch

`InstrumentSwitch` objects are created by: `Instrument_switch_engraver` (page 300).

Standard settings:

`direction` (direction):
`1`

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`.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`

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)`.

`outside-staff-priority` (number):
`500`

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.

`padding` (dimension, in staff space):
`0.5`

Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number)
Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`self-alignment-X` (number):
`-1`

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 - the unit is half the object width.

`side-axis` (number):
`1`

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.

`staff-padding` (dimension, in staff space):
`0.5`

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.

`stencil` (stencil):
`ly:text-interface::print`

The symbol to print.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
: `#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), and `text-interface` (page 586).

3.1.61 JumpScript

`JumpScript` objects are created by: `Jump_engraver` (page 300).

Standard settings:

`after-line-breaking` (boolean):
: `ly:side-position-interface::move-to-extremal-staff`

  Dummy property, used to trigger callback for `after-line-breaking`.

`baseline-skip` (dimension, in staff space):
: `2`

  Distance between base lines of multiple lines of text.

`break-align-symbols` (list):
: `'(staff-bar key-signature clef)`

  A list of *break-align symbols* that determines which breakable items 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 listed in Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
: `#(#t #t #f)`

  A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`direction` (direction):
: `-1`

  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`.

`extra-spacing-width` (pair of numbers):
: `'(+inf.0 . -inf.0)`

  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)`.

`font-shape` (symbol):
: `'italic`

  Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`non-musical` (boolean):
: `#t`

  True if the grob belongs to a `NonMusicalPaperColumn`.

`outside-staff-horizontal-padding` (number):
`0.2`

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-priority` (number):
`1500`

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.

`padding` (dimension, in staff space):
`0.8`

Add this much extra space between objects that are next to each other.

`self-alignment-X` (number):
`1`

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 - the unit is half the object width.

`stencil` (stencil):
`ly:text-interface::print`

The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`

Two skylines, one above and one below this grob.

`X-offset` (number):
`self-alignment-interface::self-aligned-on-breakable`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-alignable-interface` (page 523), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `jump-script-interface` (page 547), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), and `text-interface` (page 586).

3.1.62 KeyCancellation

KeyCancellation objects are created by: Key_engraver (page 301).

Standard settings:

break-align-symbol (symbol):
'key-cancellation

This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

break-visibility (vector):
#(#t #t #f)

A vector of 3 booleans, #(*end-of-line unbroken begin-of-line*). #t means visible, #f means killed.

extra-spacing-height (pair of numbers):
pure-from-neighbor-interface::extra-spacing-height-including-staff

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):
'(0.0 . 1.0)

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).

flat-positions (list):
'(2 3 4 2 1 2 1)

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.

glyph-name-alist (list):
'((0 . "accidentals.natural"))

An alist of key-string pairs.

non-musical (boolean):
#t

True if the grob belongs to a NonMusicalPaperColumn.

sharp-positions (list):
'(4 5 4 2 3 2 3)

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.

`space-alist` (list):

```
'((time-signature extra-space . 1.25)
  (staff-bar extra-space . 0.6)
  (key-signature extra-space . 0.5)
  (cue-clef extra-space . 0.5)
  (right-edge extra-space . 0.5)
  (first-note fixed-space . 2.5)
  (custos extra-space . 1.0))
```

An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for *`break-align-symbol`* are listed in Section "break-alignment-interface" in *Internals Reference*. Additionally, three special break-align symbols available to `space-alist` are:

`first-note`
: used when the grob is just left of the first note on a line

`next-note`
: used when the grob is just left of any other note; if not set, the value of `first-note` gets used

`right-edge`
: used when the grob is the last item on the line (only compatible with the `extra-space` spacing style)

Choices for *`spacing-style`* are:

`extra-space`
: Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

`minimum-space`
: Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

`fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

`minimum-fixed-space`
: Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

`semi-fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note,

such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

`stencil` (stencil):
`ly:key-signature-interface::print`
The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`
Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-aligned-interface` (page 523), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `key-cancellation-interface` (page 547), `key-signature-interface` (page 547), `pure-from-neighbor-interface` (page 565), and `staff-symbol-referencer-interface` (page 580).

3.1.63 KeySignature

`KeySignature` objects are created by: `Key_engraver` (page 301).

Standard settings:

`avoid-slur` (symbol):
`'inside`
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`.

`break-align-anchor` (number):
`ly:break-aligned-interface::calc-extent-aligned-anchor`
Grobs aligned to this breakable item 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):
`1`
Read by `ly:break-aligned-interface::calc-extent-aligned-anchor` for aligning an anchor to a grob's extent.

`break-align-symbol` (symbol):
`'key-signature`

This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
`#(#f #f #t)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`extra-spacing-height` (pair of numbers):
`pure-from-neighbor-interface::extra-spacing-height-including-staff`

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):
`'(0.0 . 1.0)`

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)`.

`flat-positions` (list):
`'(2 3 4 2 1 2 1)`

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.

`glyph-name-alist` (list):

```
'((0 . "accidentals.natural")
  (-1/2 . "accidentals.flat")
  (1/2 . "accidentals.sharp")
  (1 . "accidentals.doublesharp")
  (-1 . "accidentals.flatflat")
  (3/4
   .
   "accidentals.sharp.slashslash.stemstemstem")
  (1/4 . "accidentals.sharp.slashslash.stem")
  (-1/4 . "accidentals.mirroredflat")
  (-3/4 . "accidentals.mirroredflat.flat"))
```

An alist of key-string pairs.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`sharp-positions` (list):
`'(4 5 4 2 3 2 3)`

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.

`space-alist` (list):

```
'((ambitus extra-space . 1.15)
  (time-signature extra-space . 1.15)
  (staff-bar extra-space . 1.1)
  (cue-clef extra-space . 0.5)
  (right-edge extra-space . 0.5)
  (first-note fixed-space . 2.5))
```

An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for *`break-align-symbol`* are listed in Section "break-alignment-interface" in *Internals Reference*. Additionally, three special break-align symbols available to `space-alist` are:

`first-note`
: used when the grob is just left of the first note on a line

`next-note`
: used when the grob is just left of any other note; if not set, the value of `first-note` gets used

`right-edge`
: used when the grob is the last item on the line (only compatible with the `extra-space` spacing style)

Choices for *`spacing-style`* are:

`extra-space`
: Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

`minimum-space`
: Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

`fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

`minimum-fixed-space`
: Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left

side of the grob and the left side of the note, without allowing them to collide.

`semi-fixed-space`
Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

`stencil` (stencil):
`ly:key-signature-interface::print`
The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`
Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-aligned-interface` (page 523), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `key-signature-interface` (page 547), `pure-from-neighbor-interface` (page 565), and `staff-symbol-referencer-interface` (page 580).

3.1.64 KievanLigature

`KievanLigature` objects are created by: `Kievan_ligature_engraver` (page 302).

Standard settings:

`padding` (dimension, in staff space):
`0.5`
Add this much extra space between objects that are next to each other.

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`
Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:kievan-ligature::print`
The symbol to print.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `kievan-ligature-interface` (page 548), and `spanner-interface` (page 577).

3.1.65 LaissezVibrerTie

LaissezVibrerTie objects are created by: Laissez_vibrer_engraver (page 302).

Standard settings:

control-points (list of number pairs):
ly:semi-tie::calc-control-points

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.

details (list):
'((ratio . 0.333) (height-limit . 1.0))

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.

direction (direction):
ly:tie::calc-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.

extra-spacing-height (pair of numbers):
'(-0.5 . 0.5)

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).

head-direction (direction):
-1

Are the note heads left or right in a semitie?

stencil (stencil):
laissez-vibrer::print

The symbol to print.

thickness (number):
1.0

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *Staff*.StaffSymbol.thickness).

vertical-skylines (pair of skylines):
#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >

Two skylines, one above and one below this grob.

Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), `item-interface` (page 546), `semi-tie-interface` (page 570), and `tie-interface` (page 587).

3.1.66 LaissezVibrerTieColumn

`LaissezVibrerTieColumn` objects are created by: `Laissez_vibrer_engraver` (page 302).

Standard settings:

`head-direction` (direction):
`ly:semi-tie-column::calc-head-direction`
Are the note heads left or right in a semitie?

`X-extent` (pair of numbers)
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers)
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), `item-interface` (page 546), and `semi-tie-column-interface` (page 569).

3.1.67 LedgerLineSpanner

`LedgerLineSpanner` objects are created by: `Ledger_line_engraver` (page 303).

Standard settings:

`layer` (integer):
`0`
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.

`length-fraction` (number):
`0.25`
Multiplier for lengths. Used for determining ledger lines and stem lengths.

`minimum-length-fraction` (number):
`0.25`
Minimum length of ledger line as fraction of note head size.

`springs-and-rods` (boolean):
`ly:ledger-line-spanner::set-spacing-rods`
Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:ledger-line-spanner::print`
The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

Two skylines, one above and one below this grob.

`X-extent` (pair of numbers)
: Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers)
: Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), `ledger-line-spanner-interface` (page 549), and `spanner-interface` (page 577).

3.1.68 LeftEdge

`LeftEdge` objects are created by: `Break_align_engraver` (page 286).

Standard settings:

`break-align-anchor` (number):
: `ly:break-aligned-interface::calc-extent-aligned-anchor`

Grobs aligned to this breakable item 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-symbol` (symbol):
: `'left-edge`

This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
: `#(#f #f #t)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`non-musical` (boolean):
: `#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):
: ```
'((ambitus extra-space . 1.15)
  (breathing-sign minimum-space . 0.0)
  (cue-end-clef extra-space . 0.8)
  (clef extra-space . 0.8)
  (cue-clef extra-space . 0.8)
  (staff-bar extra-space . 0.0)
  (key-cancellation extra-space . 0.0)
  (key-signature extra-space . 0.8)
  (time-signature extra-space . 1.0)
  (custos extra-space . 0.0)
  (first-note fixed-space . 2.0)
  (right-edge extra-space . 0.0))
```

An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```
```

Standard choices for *`break-align-symbol`* are listed in Section "break-alignment-interface" in *Internals Reference*. Additionally, three special break-align symbols available to `space-alist` are:

`first-note`
: used when the grob is just left of the first note on a line

`next-note`
: used when the grob is just left of any other note; if not set, the value of `first-note` gets used

`right-edge`
: used when the grob is the last item on the line (only compatible with the `extra-space` spacing style)

Choices for *`spacing-style`* are:

`extra-space`
: Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

`minimum-space`
: Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

`fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

`minimum-fixed-space`
: Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

`semi-fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

`X-extent` (pair of numbers):
`'(0 . 0)`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`'(0 . 0)`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `break-aligned-interface` (page 523), `grob-interface` (page 538), and `item-interface` (page 546).

3.1.69 LigatureBracket

`LigatureBracket` objects are created by: `Ligature_bracket_engraver` (page 303).

Standard settings:

`bracket-visibility` (boolean or symbol):
`#t`

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.

`connect-to-neighbor` (pair):
`ly:tuplet-bracket::calc-connect-to-neighbors`

Pair of booleans, indicating whether this grob looks as a continued break.

`direction` (direction):
`1`

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`.

`edge-height` (pair):
`'(0.7 . 0.7)`

A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`padding` (dimension, in staff space):
`2.0`

Add this much extra space between objects that are next to each other.

`positions` (pair of numbers):
`ly:tuplet-bracket::calc-positions`

Pair of staff coordinates `(`*`start . end`*`)`, where *start* and *end* are vertical positions 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.

`shorten-pair` (pair of numbers):
`'(-0.2 . -0.2)`

The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

`staff-padding` (dimension, in staff space):
`0.25`

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.

`stencil` (stencil):
`ly:tuplet-bracket::print`

The symbol to print.

`thickness` (number):
`1.6`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *Staff*.`StaffSymbol.thickness`).

`tuplet-slur` (boolean)
Draw a slur instead of a bracket for tuplets.

`X-positions` (pair of numbers):
`ly:tuplet-bracket::calc-x-positions`

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.

This object supports the following interface(s): `grob-interface` (page 538), `line-interface` (page 550), `spanner-interface` (page 577), and `tuplet-bracket-interface` (page 591).

3.1.70 LyricExtender

`LyricExtender` objects are created by: `Extender_engraver` (page 294).

Standard settings:

`minimum-length` (dimension, in staff space):
`1.5`

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.

`stencil` (stencil):
`ly:lyric-extender::print`

The symbol to print.

`thickness` (number):
`0.8`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *Staff*.`StaffSymbol.thickness`).

`Y-extent` (pair of numbers):
`'(0 . 0)`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), `lyric-extender-interface` (page 552), `lyric-interface` (page 553), and `spanner-interface` (page 577).

3.1.71 LyricHyphen

`LyricHyphen` objects are created by: `Hyphen_engraver` (page 300).

Standard settings:

`after-line-breaking` (boolean):
`ly:spanner::kill-zero-spanned-time`

Dummy property, used to trigger callback for `after-line-breaking`.

`dash-period` (number):
`10.0`

The length of one dash together with whitespace. If negative, no line is drawn at all.

`height` (dimension, in staff space):
`0.42`

Height of an object in `staff-space` units.

`length` (dimension, in staff space):
`0.66`

User override for the stem length of unbeamed stems (each unit represents half a `staff-space`).

`minimum-distance` (dimension, in staff space):
`0.1`

Minimum distance between rest and notes or beam.

`minimum-length` (dimension, in staff space):
`0.3`

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.

`padding` (dimension, in staff space):
`0.07`

Add this much extra space between objects that are next to each other.

`springs-and-rods` (boolean):
`ly:lyric-hyphen::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:lyric-hyphen::print`

The symbol to print.

`thickness` (number):
`1.3`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`'(0 . 0)`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `lyric-hyphen-interface` (page 552), `lyric-interface` (page 553), and `spanner-interface` (page 577).

3.1.72 LyricSpace

`LyricSpace` objects are created by: `Hyphen_engraver` (page 300).

Standard settings:

`minimum-distance` (dimension, in staff space):
`0.45`

Minimum distance between rest and notes or beam.

`padding` (dimension, in staff space):
`0.0`

Add this much extra space between objects that are next to each other.

`springs-and-rods` (boolean):
`ly:lyric-hyphen::set-spacing-rods`

Dummy variable for triggering spacing routines.

`X-extent` (pair of numbers)
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers)
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), `lyric-hyphen-interface` (page 552), and `spanner-interface` (page 577).

3.1.73 LyricText

`LyricText` objects are created by: `Lyric_engraver` (page 303).

Standard settings:

`extra-spacing-height` (pair of numbers):
`'(0.2 . -0.2)`

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):
`'(0.0 . 0.0)`

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)`.

`font-series` (symbol):
`'medium`
Select the series of a font. Choices include `medium`, `bold`, `bold-narrow`, etc.

`font-size` (number):
`1.0`
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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`parent-alignment-X` (number):
`'()`
Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`self-alignment-X` (number):
`0`
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 - the unit is half the object width.

`skyline-horizontal-padding` (number):
`0.1`
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.

`stencil` (stencil):
`lyric-text::print`
The symbol to print.

`text` (markup):
`#<procedure #f (grob)>`
Text markup. See Section "Formatting text" in *Notation Reference*.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`
Two skylines, one above and one below this grob.

`word-space` (dimension, in staff space):
`0.6`
Space to insert between words in texts.

`X-align-on-main-noteheads` (boolean):
`#t`
If true, this grob will ignore suspended noteheads when aligning itself on NoteColumn.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `lyric-syllable-interface` (page 553), `rhythmic-grob-interface` (page 567), `self-alignment-interface` (page 568), and `text-interface` (page 586).

3.1.74 MeasureCounter

`MeasureCounter` objects are created by: `Measure_counter_engraver` (page 304).

Standard settings:

`count-from` (integer):
`1`

The first measure in a measure count receives this number. The following measures are numbered in increments from this initial value.

`direction` (direction):
`1`

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`.

`font-encoding` (symbol):
`'fetaText`

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-size` (number):
`-2`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`outside-staff-horizontal-padding` (number):
`0.5`

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-priority` (number):
`750`

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.

`self-alignment-X` (number):
`0`

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 - the unit is half the object width.

`side-axis` (number):
`1`
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.

`spacing-pair` (pair):
`'(break-alignment . break-alignment)`
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)
```

`staff-padding` (dimension, in staff space):
`0.5`
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.

`stencil` (stencil):
`measure-counter-stencil`
The symbol to print.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `measure-counter-interface` (page 553), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), `spanner-interface` (page 577), and `text-interface` (page 586).

3.1.75 MeasureGrouping

`MeasureGrouping` objects are created by: `Measure_grouping_engraver` (page 304).

Standard settings:

`direction` (direction):
`1`
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`.

`height` (dimension, in staff space):
`2.0`
Height of an object in `staff-space` units.

`padding` (dimension, in staff space):
`2`
Add this much extra space between objects that are next to each other.

`side-axis` (number):
`1`

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.

`staff-padding` (dimension, in staff space):
`3`

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.

`stencil` (stencil):
`ly:measure-grouping::print`

The symbol to print.

`thickness` (number):
`1`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `grob-interface` (page 538), `measure-grouping-interface` (page 554), `outside-staff-interface` (page 561), `side-position-interface` (page 571), and `spanner-interface` (page 577).

3.1.76 MeasureSpanner

`MeasureSpanner` objects are created by: `Measure_spanner_engraver` (page 304).

Standard settings:

`connect-to-neighbor` (pair):
`ly:measure-spanner::calc-connect-to-neighbors`

Pair of booleans, indicating whether this grob looks as a continued break.

`direction` (direction):
`1`

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`.

`edge-height` (pair):
`'(0.7 . 0.7)`

A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`outside-staff-priority` (number):
`750`

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.

`self-alignment-X` (number):
`0`

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 - the unit is half the object width.

`side-axis` (number):
`1`

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.

`spacing-pair` (pair):
`'(staff-bar . staff-bar)`

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)
```

`staff-padding` (dimension, in staff space):
`0.5`

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.

`stencil` (stencil):
`ly:measure-spanner::print`

The symbol to print.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `line-interface` (page 550), `measure-spanner-interface` (page 554), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), `spanner-interface` (page 577), and `text-interface` (page 586).

3.1.77 MelodyItem

`MelodyItem` objects are created by: `Melody_engraver` (page 305).

Standard settings:

`neutral-direction` (direction):
`-1`

Which direction to take in the center of the staff.

This object supports the following interface(s): `grob-interface` (page 538), `item-interface` (page 546), and `melody-spanner-interface` (page 555).

3.1.78 MensuralLigature

`MensuralLigature` objects are created by: `Mensural_ligature_engraver` (page 305).

Standard settings:

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`
Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:mensural-ligature::print`
The symbol to print.

`thickness` (number):
`1.3`
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `mensural-ligature-interface` (page 555), and `spanner-interface` (page 577).

3.1.79 MetronomeMark

`MetronomeMark` objects are created by: `Metronome_mark_engraver` (page 305).

Standard settings:

`after-line-breaking` (boolean):
`ly:side-position-interface::move-to-extremal-staff`
Dummy property, used to trigger callback for `after-line-breaking`.

`break-align-symbols` (list):
`'(time-signature)`
A list of *break-align symbols* that determines which breakable items 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 listed in Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
`#(#f #t #t)`
A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`direction` (direction):
`1`
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`.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`
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-style` (symbol):
`'default`
The style of the flag to be used with `MetronomeMark`. Available are `'modern-straight-flag`, `'old-straight-flag`, `flat-flag`, `mensural` and `'default`

`non-break-align-symbols` (list):
`'(paper-column-interface)`
A list of symbols that determine which NON-break-aligned interfaces to align this to.

`outside-staff-horizontal-padding` (number):
`0.2`
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-priority` (number):
`1000`
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.

`padding` (dimension, in staff space):
`0.8`
Add this much extra space between objects that are next to each other.

`self-alignment-X` (number):
`-1`
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 - the unit is half the object width.

`side-axis` (number):
`1`
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.

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`
Two skylines, one above and one below this grob.

`X-offset` (number):
`self-alignment-interface::self-aligned-on-breakable`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):

`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-alignable-interface` (page 523), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `metronome-mark-interface` (page 556), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), and `text-interface` (page 586).

3.1.80 MultiMeasureRest

`MultiMeasureRest` objects are created by: `Multi_measure_rest_engraver` (page 306).

Standard settings:

`bound-padding` (number):

`0.5`

The amount of padding to insert around spanner bounds.

`expand-limit` (integer):

`10`

Maximum number of measures expanded in church rests.

`hair-thickness` (number):

`2.0`

Thickness of the thin line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to *Staff*`.StaffSymbol.thickness`).

`max-symbol-separation` (number):

`8.0`

The maximum distance between symbols making up a church rest.

`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*.

`spacing-pair` (pair):

`'(break-alignment . break-alignment)`

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)
```

`springs-and-rods` (boolean):

`ly:multi-measure-rest::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:multi-measure-rest::print`
The symbol to print.

`thick-thickness` (number):
`6.6`
Thickness of the thick line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to *Staff*`.StaffSymbol.thickness`).

`usable-duration-logs` (list):
`'(-3 -2 -1 0)`
List of `duration-log`s that can be used in typesetting the grob.

`voiced-position` (number):
`4`
The staff-position of a voiced `Rest`, negative if the rest has `direction DOWN`.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:multi-measure-rest::height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `multi-measure-interface` (page 556), `multi-measure-rest-interface` (page 556), `outside-staff-interface` (page 561), `rest-interface` (page 566), `spanner-interface` (page 577), and `staff-symbol-referencer-interface` (page 580).

3.1.81 MultiMeasureRestNumber

`MultiMeasureRestNumber` objects are created by: `Multi_measure_rest_engraver` (page 306).

Standard settings:

`bound-padding` (number):
`1.0`
The amount of padding to insert around spanner bounds.

`direction` (direction):
`1`
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`.

`font-encoding` (symbol):
`'fetaText`
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).

`padding` (dimension, in staff space):
`0.4`
Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number):
`0`
Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`self-alignment-X` (number):
`0`
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 - the unit is half the object width.

`side-axis` (number):
`1`
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.

`springs-and-rods` (boolean):
`ly:multi-measure-rest::set-text-rods`
Dummy variable for triggering spacing routines.

`staff-padding` (dimension, in staff space):
`0.4`
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.

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`
Two skylines, one above and one below this grob.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): font-interface (page 532), grob-interface (page 538), multi-measure-interface (page 556), multi-measure-rest-number-interface (page 557), outside-staff-interface (page 561), self-alignment-interface (page 568), side-position-interface (page 571), spanner-interface (page 577), and text-interface (page 586).

3.1.82 MultiMeasureRestScript

MultiMeasureRestScript objects are created by: Multi_measure_rest_engraver (page 306).

Standard settings:

direction (direction):
: 1

  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.

outside-staff-padding (number):
: 0

  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-priority (number):
: 40

  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.

parent-alignment-X (number):
: 0

  Specify on which point of the parent the object is aligned. The value -1 means aligned on parent's left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from self-alignment-X property will be used.

self-alignment-X (number):
: 0

  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 - the unit is half the object width.

staff-padding (dimension, in staff space):
: 0.25

  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.

stencil (stencil):
: ly:script-interface::print

  The symbol to print.

vertical-skylines (pair of skylines):
: #<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >

Two skylines, one above and one below this grob.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `multi-measure-interface` (page 556), `outside-staff-interface` (page 561), `script-interface` (page 567), `self-alignment-interface` (page 568), `side-position-interface` (page 571), and `spanner-interface` (page 577).

3.1.83 MultiMeasureRestText

`MultiMeasureRestText` objects are created by: `Multi_measure_rest_engraver` (page 306).

Standard settings:

`direction` (direction):
`1`
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`.

`outside-staff-priority` (number):
`450`
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.

`padding` (dimension, in staff space):
`0.2`
Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number):
`0`
Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`self-alignment-X` (number):
`0`
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 - the unit is half the object width.

`skyline-horizontal-padding` (number):
`0.2`

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.

`staff-padding` (dimension, in staff space):
`0.25`

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.

`stencil` (stencil):
`ly:text-interface::print`

The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

Two skylines, one above and one below this grob.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `multi-measure-interface` (page 556), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), `spanner-interface` (page 577), and `text-interface` (page 586).

3.1.84 NonMusicalPaperColumn

`NonMusicalPaperColumn` objects are created by: `Paper_column_engraver` (page 310).

Standard settings:

`allow-loose-spacing` (boolean):
`#t`

If set, column can be detached from main spacing.

`axes` (list):
`'(0)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`before-line-breaking` (boolean):
`ly:paper-column::before-line-breaking`

Dummy property, used to trigger a callback function.

`font-size` (number):
`-7.5`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`full-measure-extra-space` (number):
`1.0`

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.

`horizontal-skylines` (pair of skylines):
`ly:separation-item::calc-skylines`

Two skylines, one to the left and one to the right of this grob.

`keep-inside-line` (boolean):
`#t`

If set, this column cannot have objects sticking into the margin.

`layer` (integer):
`1000`

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.

`line-break-permission` (symbol):
`'allow`

Instructs the line breaker on whether to put a line break at this column. Can be `force` or `allow`.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`page-break-permission` (symbol):
`'allow`

Instructs the page breaker on whether to put a page break at this column. Can be `force` or `allow`.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 515), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `paper-column-interface` (page 562), `separation-item-interface` (page 571), and `spaceable-grob-interface` (page 575).

3.1.85 NoteCollision

`NoteCollision` objects are created by: `Collision_engraver` (page 288).

Standard settings:

`axes` (list):
`'(0 1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`note-collision-threshold` (dimension, in staff space):
`1`
Simultaneous notes that are this close or closer in units of `staff-space` will be identified as vertically colliding. Used by `Stem` grobs for notes in the same voice, and `NoteCollision` grobs for notes in different voices. Default value 1.

`prefer-dotted-right` (boolean):
`#t`
For note collisions, prefer to shift dotted up-note to the right, rather than shifting just the dot.

`vertical-skylines` (pair of skylines):
`ly:axis-group-interface::calc-skylines`
Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 515), `grob-interface` (page 538), `item-interface` (page 546), and `note-collision-interface` (page 557).

3.1.86 NoteColumn

`NoteColumn` objects are created by: `Rhythmic_column_engraver` (page 315).

Standard settings:

`axes` (list):
`'(0 1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`bend-me` (boolean):
`'()`
Decide whether this grob is bent.

`horizontal-skylines` (pair of skylines):
`ly:separation-item::calc-skylines`
Two skylines, one to the left and one to the right of this grob.

`skyline-vertical-padding` (number):
`0.15`

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.

`vertical-skylines` (pair of skylines):
`ly:axis-group-interface::calc-skylines`

Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 515), `bend-interface` (page 521), `grob-interface` (page 538), `item-interface` (page 546), `note-column-interface` (page 558), and `separation-item-interface` (page 571).

3.1.87 NoteHead

`NoteHead` objects are created by: `Completion_heads_engraver` (page 288), `Drum_notes_engraver` (page 292), and `Note_heads_engraver` (page 308).

Standard settings:

`bend-me` (boolean):
`'()`

Decide whether this grob is bent.

`duration-log` (integer):
`note-head::calc-duration-log`

The 2-log of the note head duration, i.e., `0` = whole note, `1` = half note, etc.

`extra-spacing-height` (pair of numbers):
`ly:note-head::include-ledger-line-height`

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)`.

`glyph-name` (string):
`note-head::calc-glyph-name`

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.

`parenthesis-friends` (list):
`'(accidental-grob dot)`

A list of Grob types, as symbols. When parentheses enclose a Grob that has 'parenthesis-friends, the parentheses widen to include any child Grobs with type among 'parenthesis-friends.

`stem-attachment` (pair of numbers):
`ly:note-head::calc-stem-attachment`

An `(x . y)` pair where the stem attaches to the notehead.

`stencil` (stencil):
`ly:note-head::print`

The symbol to print.

`X-offset` (number):
`ly:note-head::stem-x-shift`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `bend-interface` (page 521), `font-interface` (page 532), `gregorian-ligature-interface` (page 536), `grob-interface` (page 538), `item-interface` (page 546), `ledgered-interface` (page 549), `ligature-head-interface` (page 549), `mensural-ligature-interface` (page 555), `note-head-interface` (page 559), `rhythmic-grob-interface` (page 567), `rhythmic-head-interface` (page 567), `staff-symbol-referencer-interface` (page 580), and `vaticana-ligature-interface` (page 593).

3.1.88 NoteName

`NoteName` objects are created by: `Note_name_engraver` (page 308).

Standard settings:

`stencil` (stencil):
`ly:text-interface::print`

The symbol to print.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `note-name-interface` (page 559), and `text-interface` (page 586).

3.1.89 NoteSpacing

NoteSpacing objects are created by: Note_spacing_engraver (page 309).

Standard settings:

knee-spacing-correction (number):
1.0

Factor for the optical correction amount for kneed beams. Set between 0 for no correction and 1 for full correction.

same-direction-correction (number):
0.25

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.

space-to-barline (boolean):
#t

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.

stem-spacing-correction (number):
0.5

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.

This object supports the following interface(s): grob-interface (page 538), item-interface (page 546), note-spacing-interface (page 559), and spacing-interface (page 575).

3.1.90 OttavaBracket

OttavaBracket objects are created by: Ottava_spanner_engraver (page 309).

Standard settings:

dash-fraction (number):
0.3

Size of the dashes, relative to dash-period. Should be between 0.1 and 1.0 (continuous line). If set to 0.0, a dotted line is produced

direction (direction):
1

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.

edge-height (pair):
'(0 . 0.8)

A pair of numbers specifying the heights of the vertical edges: (*left-height* . *right-height*).

`font-series` (symbol):
`'bold`

Select the series of a font. Choices include `medium`, `bold`, `bold-narrow`, etc.

`font-shape` (symbol):
`'italic`

Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`minimum-length` (dimension, in staff space):
`0.3`

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.

`outside-staff-priority` (number):
`400`

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.

`padding` (dimension, in staff space):
`0.5`

Add this much extra space between objects that are next to each other.

`shorten-pair` (pair of numbers):
`'(-0.8 . -0.6)`

The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

`staff-padding` (dimension, in staff space):
`2.0`

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.

`stencil` (stencil):
`ly:ottava-bracket::print`

The symbol to print.

`style` (symbol):
`'dashed-line`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

Two skylines, one above and one below this grob.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `horizontal-bracket-interface` (page 543), `line-interface` (page 550), `ottava-bracket-interface` (page 560), `outside-staff-interface` (page 561), `side-position-interface` (page 571), `spanner-interface` (page 577), and `text-interface` (page 586).

3.1.91 PaperColumn

`PaperColumn` objects are created by: `Paper_column_engraver` (page 310).

Standard settings:

`allow-loose-spacing` (boolean):
`#t`
If set, column can be detached from main spacing.

`axes` (list):
`'(0)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`before-line-breaking` (boolean):
`ly:paper-column::before-line-breaking`
Dummy property, used to trigger a callback function.

`font-size` (number):
`-7.5`
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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`horizontal-skylines` (pair of skylines):
`ly:separation-item::calc-skylines`
Two skylines, one to the left and one to the right of this grob.

`keep-inside-line` (boolean):
`#t`
If set, this column cannot have objects sticking into the margin.

`layer` (integer):
`1000`
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.

`skyline-vertical-padding` (number):
`0.08`
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.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 515), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `paper-column-interface` (page 562), `separation-item-interface` (page 571), and `spaceable-grob-interface` (page 575).

3.1.92 ParenthesesItem

`ParenthesesItem` objects are created by: `Parenthesis_engraver` (page 310).

Standard settings:

`font-size` (number):
`-6`
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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`padding` (dimension, in staff space):
`0.2`
Add this much extra space between objects that are next to each other.

`stencil` (stencil):
`parentheses-item::print`
The symbol to print.

`stencils` (list):
`parentheses-item::calc-parenthesis-stencils`
Multiple stencils, used as intermediate value.

`X-extent` (pair of numbers):
`'(0 . 0)`
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`parentheses-item::y-extent`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), and `parentheses-interface` (page 563).

3.1.93 PercentRepeat

`PercentRepeat` objects are created by: `Percent_repeat_engraver` (page 311).

Standard settings:

`dot-negative-kern` (number):
`0.75`
The space to remove between a dot and a slash in percent repeat glyphs. Larger values bring the two elements closer together.

`font-encoding` (symbol):
`'fetaMusic`
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).

`slope` (number):
`1.0`

The slope of this object.

`spacing-pair` (pair):
`'(break-alignment . staff-bar)`

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)
```

`springs-and-rods` (boolean):
`ly:multi-measure-rest::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:multi-measure-rest::percent`

The symbol to print.

`thickness` (number):
`0.48`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `multi-measure-rest-interface` (page 556), `percent-repeat-interface` (page 564), and `spanner-interface` (page 577).

3.1.94 PercentRepeatCounter

`PercentRepeatCounter` objects are created by: `Percent_repeat_engraver` (page 311).

Standard settings:

`direction` (direction):
`1`

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`.

`font-encoding` (symbol):
`'fetaText`

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-size` (number):
`-2`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`padding` (dimension, in staff space):
`0.2`
Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number):
`0`
Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`self-alignment-X` (number):
`0`
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 - the unit is half the object width.

`staff-padding` (dimension, in staff space):
`0.25`
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.

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `outside-staff-interface` (page 561), `percent-repeat-interface` (page 564), `self-alignment-interface` (page 568), `side-position-interface` (page 571), `spanner-interface` (page 577), and `text-interface` (page 586).

3.1.95 PhrasingSlur

`PhrasingSlur` objects are created by: `Phrasing_slur_engraver` (page 311).

Standard settings:

`control-points` (list of number pairs):
`ly:slur::calc-control-points`

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.

`details` (list):

```
'((region-size . 4)
  (head-encompass-penalty . 1000.0)
  (stem-encompass-penalty . 30.0)
  (edge-attraction-factor . 4)
  (same-slope-penalty . 20)
  (steeper-slope-factor . 50)
  (non-horizontal-penalty . 15)
  (max-slope . 1.1)
  (max-slope-factor . 10)
  (free-head-distance . 0.3)
  (free-slur-distance . 0.8)
  (gap-to-staffline-inside . 0.2)
  (gap-to-staffline-outside . 0.1)
  (extra-object-collision-penalty . 50)
  (accidental-collision . 3)
  (extra-encompass-free-distance . 0.3)
  (extra-encompass-collision-distance . 0.8)
  (head-slur-distance-max-ratio . 3)
  (head-slur-distance-factor . 10)
  (absolute-closeness-measure . 0.3)
  (edge-slope-exponent . 1.7)
  (close-to-edge-length . 2.5)
  (encompass-object-range-overshoot . 0.5)
  (slur-tie-extrema-min-distance . 0.2)
  (slur-tie-extrema-min-distance-penalty . 2))
```

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.

`direction` (direction):

```
ly:slur::calc-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`.

`height-limit` (dimension, in staff space):

```
2.0
```

Maximum slur height: The longer the slur, the closer it is to this height.

`minimum-length` (dimension, in staff space):

```
1.5
```

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.

`ratio` (number):

```
0.333
```

Parameter for slur shape. The higher this number, the quicker the slur attains its `height-limit`.

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:slur::print`

The symbol to print.

`thickness` (number):
`1.1`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:slur::vertical-skylines> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:slur::height> #<primitive-procedure ly:slur::pure-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), `outside-staff-interface` (page 561), `slur-interface` (page 572), and `spanner-interface` (page 577).

3.1.96 PianoPedalBracket

`PianoPedalBracket` objects are created by: `Piano_pedal_engraver` (page 312).

Standard settings:

`bound-padding` (number):
`1.0`

The amount of padding to insert around spanner bounds.

`bracket-flare` (pair of numbers):
`'(0.5 . 0.5)`

A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

`direction` (direction):
`-1`

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`.

`edge-height` (pair):
`'(1.0 . 1.0)`
A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`shorten-pair` (pair of numbers):
`'(0.0 . 0.0)`
The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

`stencil` (stencil):
`ly:piano-pedal-bracket::print`
The symbol to print.

`style` (symbol):
`'line`
This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`thickness` (number):
`1.0`
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`
Two skylines, one above and one below this grob.

This object supports the following interface(s): `grob-interface` (page 538), `line-interface` (page 550), `piano-pedal-bracket-interface` (page 564), `piano-pedal-interface` (page 565), and `spanner-interface` (page 577).

3.1.97 RehearsalMark

`RehearsalMark` objects are created by: `Mark_engraver` (page 303).

Standard settings:

`after-line-breaking` (boolean):
`ly:side-position-interface::move-to-extremal-staff`
Dummy property, used to trigger callback for `after-line-breaking`.

`baseline-skip` (dimension, in staff space):
`2`
Distance between base lines of multiple lines of text.

`break-align-symbols` (list):
`'(staff-bar key-signature clef)`
A list of *break-align symbols* that determines which breakable items 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 listed in Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
`#(#f #t #t)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`direction` (direction):
`1`

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`.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`

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)`.

`font-size` (number):
`2`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`outside-staff-horizontal-padding` (number):
`0.2`

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-priority` (number):
`1500`

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.

`padding` (dimension, in staff space):
`0.8`

Add this much extra space between objects that are next to each other.

`self-alignment-X` (number):
`break-alignable-interface::self-alignment-opposite-of-anchor`

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 - the unit is half the object width.

`stencil` (stencil):
`ly:text-interface::print`

The symbol to print.

`vertical-skylines` (pair of skylines):
: `#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`

  Two skylines, one above and one below this grob.

`X-offset` (number):
: `self-alignment-interface::self-aligned-on-breakable`

  The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
: `#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

  Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
: `#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-alignable-interface` (page 523), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `mark-interface` (page 553), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), and `text-interface` (page 586).

3.1.98 RepeatSlash

`RepeatSlash` objects are created by: `Slash_repeat_engraver` (page 316).

Standard settings:

`slash-negative-kern` (number):
: `0.85`

  The space to remove between slashes in percent repeat glyphs. Larger values bring the two elements closer together.

`slope` (number):
: `1.7`

  The slope of this object.

`stencil` (stencil):
: `ly:percent-repeat-item-interface::beat-slash`

  The symbol to print.

`thickness` (number):
: `0.48`

  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`Y-extent` (pair of numbers):
: `#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), `item-interface` (page 546), `percent-repeat-interface` (page 564), `percent-repeat-item-interface` (page 564), and `rhythmic-grob-interface` (page 567).

3.1.99 RepeatTie

`RepeatTie` objects are created by: `Repeat_tie_engraver` (page 314).

Standard settings:

`control-points` (list of number pairs):
`ly:semi-tie::calc-control-points`

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.

`details` (list):
`'((ratio . 0.333) (height-limit . 1.0))`

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.

`direction` (direction):
`ly:tie::calc-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`.

`extra-spacing-height` (pair of numbers):
`'(-0.5 . 0.5)`

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)`.

`head-direction` (direction):
`1`

Are the note heads left or right in a semitie?

`stencil` (stencil):
`ly:tie::print`

The symbol to print.

`thickness` (number):
`1.0`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`
Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), `item-interface` (page 546), `semi-tie-interface` (page 570), and `tie-interface` (page 587).

3.1.100 RepeatTieColumn

`RepeatTieColumn` objects are created by: `Repeat_tie_engraver` (page 314).

Standard settings:

`head-direction` (direction):
`ly:semi-tie-column::calc-head-direction`
Are the note heads left or right in a semitie?

`X-extent` (pair of numbers)
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers)
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), `item-interface` (page 546), and `semi-tie-column-interface` (page 569).

3.1.101 Rest

`Rest` objects are created by: `Completion_rest_engraver` (page 289), and `Rest_engraver` (page 315).

Standard settings:

`duration-log` (integer):
`stem::calc-duration-log`
The 2-log of the note head duration, i.e., `0` = whole note, `1` = half note, etc.

`minimum-distance` (dimension, in staff space):
`0.25`
Minimum distance between rest and notes or beam.

`parenthesis-friends` (list):
`'(dot)`
A list of Grob types, as symbols. When parentheses enclose a Grob that has 'parenthesis-friends, the parentheses widen to include any child Grobs with type among 'parenthesis-friends.

`stencil` (stencil):
`ly:rest::print`
The symbol to print.

`vertical-skylines` (pair of skylines):
: `#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

  Two skylines, one above and one below this grob.

`voiced-position` (number):
: `4`

  The staff-position of a voiced `Rest`, negative if the rest has `direction DOWN`.

`X-extent` (pair of numbers):
: `ly:rest::width`

  Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
: `#<unpure-pure-container #<primitive-procedure ly:rest::height> #<primitive-procedure ly:rest::pure-height> >`

  Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
: `#<unpure-pure-container #<primitive-procedure ly:rest::y-offset-callback> >`

  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `rest-interface` (page 566), `rhythmic-grob-interface` (page 567), `rhythmic-head-interface` (page 567), and `staff-symbol-referencer-interface` (page 580).

3.1.102 RestCollision

`RestCollision` objects are created by: `Rest_collision_engraver` (page 315).

Standard settings:

`minimum-distance` (dimension, in staff space):
: `0.75`

  Minimum distance between rest and notes or beam.

This object supports the following interface(s): `grob-interface` (page 538), `item-interface` (page 546), and `rest-collision-interface` (page 566).

3.1.103 Script

`Script` objects are created by: `Drum_notes_engraver` (page 292), `New_fingering_engraver` (page 307), and `Script_engraver` (page 315).

Standard settings:

`add-stem-support` (boolean):
: `#t`

  If set, the `Stem` object is included in this script's support.

`direction` (direction):
: `ly:script-interface::calc-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`.

`font-encoding` (symbol):
`'fetaMusic`
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).

`horizon-padding` (number):
`0.1`
The amount to pad the axis along which a `Skyline` is built for the `side-position-interface`.

`self-alignment-X` (number):
`0`
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 - the unit is half the object width.

`side-axis` (number):
`1`
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.

`slur-padding` (number):
`0.2`
Extra distance between slur and script.

`staff-padding` (dimension, in staff space):
`0.25`
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.

`stencil` (stencil):
`ly:script-interface::print`
The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`
Two skylines, one above and one below this grob.

`X-offset` (number):
`script-interface::calc-x-offset`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `outside-staff-interface` (page 561), `script-interface` (page 567), `self-alignment-interface` (page 568), and `side-position-interface` (page 571).

3.1.104 ScriptColumn

`ScriptColumn` objects are created by: `Script_column_engraver` (page 315).

Standard settings:

`before-line-breaking` (boolean):
`ly:script-column::before-line-breaking`

Dummy property, used to trigger a callback function.

This object supports the following interface(s): `grob-interface` (page 538), `item-interface` (page 546), and `script-column-interface` (page 567).

3.1.105 ScriptRow

`ScriptRow` objects are created by: `Script_row_engraver` (page 316).

Standard settings:

`before-line-breaking` (boolean):
`ly:script-column::row-before-line-breaking`

Dummy property, used to trigger a callback function.

This object supports the following interface(s): `grob-interface` (page 538), `item-interface` (page 546), and `script-column-interface` (page 567).

3.1.106 Slur

`Slur` objects are created by: `Slur_engraver` (page 317).

Standard settings:

`avoid-slur` (symbol):
`'inside`

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`.

`control-points` (list of number pairs):
`ly:slur::calc-control-points`

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.

`details` (list):

```
'((region-size . 4)
  (head-encompass-penalty . 1000.0)
  (stem-encompass-penalty . 30.0)
  (edge-attraction-factor . 4)
```

```
(same-slope-penalty . 20)
(steeper-slope-factor . 50)
(non-horizontal-penalty . 15)
(max-slope . 1.1)
(max-slope-factor . 10)
(free-head-distance . 0.3)
(free-slur-distance . 0.8)
(gap-to-staffline-inside . 0.2)
(gap-to-staffline-outside . 0.1)
(extra-object-collision-penalty . 50)
(accidental-collision . 3)
(extra-encompass-free-distance . 0.3)
(extra-encompass-collision-distance . 0.8)
(head-slur-distance-max-ratio . 3)
(head-slur-distance-factor . 10)
(absolute-closeness-measure . 0.3)
(edge-slope-exponent . 1.7)
(close-to-edge-length . 2.5)
(encompass-object-range-overshoot . 0.5)
(slur-tie-extrema-min-distance . 0.2)
(slur-tie-extrema-min-distance-penalty . 2))
```

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.

`direction` (direction):
`ly:slur::calc-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`.

`height-limit` (dimension, in staff space):
`2.0`

Maximum slur height: The longer the slur, the closer it is to this height.

`line-thickness` (number):
`0.8`

For slurs and ties, this is the diameter of the virtual "pen" that draws the two arcs of the curve's outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`minimum-length` (dimension, in staff space):
`1.5`

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.

`ratio` (number):
`0.25`

Parameter for slur shape. The higher this number, the quicker the slur attains its `height-limit`.

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:slur::print`

The symbol to print.

`thickness` (number):
`1.2`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:slur::vertical-skylines> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:slur::height> #<primitive-procedure ly:slur::pure-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), `outside-staff-interface` (page 561), `slur-interface` (page 572), and `spanner-interface` (page 577).

3.1.107 SostenutoPedal

`SostenutoPedal` objects are created by: `Piano_pedal_engraver` (page 312).

Standard settings:

`direction` (direction):
`1`

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`.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`

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)`.

`font-shape` (symbol):
`'italic`

Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`padding` (dimension, in staff space):
`0.0`
Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number)
Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`self-alignment-X` (number):
`0`
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 - the unit is half the object width.

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`
Two skylines, one above and one below this grob.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `piano-pedal-script-interface` (page 565), `self-alignment-interface` (page 568), and `text-interface` (page 586).

3.1.108 SostenutoPedalLineSpanner

`SostenutoPedalLineSpanner` objects are created by: `Piano_pedal_align_engraver` (page 311).

Standard settings:

`axes` (list):
`'(1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`direction` (direction):
`-1`
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`.

`minimum-space` (dimension, in staff space):
`1.0`

Minimum distance that the victim should move (after padding).

`outside-staff-priority` (number):
`1000`

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.

`padding` (dimension, in staff space):
`1.2`

Add this much extra space between objects that are next to each other.

`side-axis` (number):
`1`

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.

`staff-padding` (dimension, in staff space):
`1.0`

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.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-element-stencils> #<primitive-procedure ly:grob::pure-vertical-skylines-from-element-stencils> >`

Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `axis-group-interface` (page 515), `grob-interface` (page 538), `outside-staff-interface` (page 561), `piano-pedal-interface` (page 565), `side-position-interface` (page 571), and `spanner-interface` (page 577).

3.1.109 SpacingSpanner

`SpacingSpanner` objects are created by: `Spacing_engraver` (page 317).

Standard settings:

`average-spacing-wishes` (boolean):
`#t`
If set, the spacing wishes are averaged over staves.

`base-shortest-duration` (moment):
`#<Mom 3/16>`
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.

`common-shortest-duration` (moment):
`ly:spacing-spanner::calc-common-shortest-duration`
The most common shortest note length. This is used in spacing. Enlarging this sets the score tighter.

`shortest-duration-space` (number):
`2.0`
Start with this multiple of `spacing-increment` space for the shortest duration. See also Section "spacing-spanner-interface" in *Internals Reference*.

`spacing-increment` (dimension, in staff space):
`1.2`
The unit of length for note-spacing. Typically, the width of a note head. See also Section "spacing-spanner-interface" in *Internals Reference*.

`springs-and-rods` (boolean):
`ly:spacing-spanner::set-springs`
Dummy variable for triggering spacing routines.

This object supports the following interface(s): `grob-interface` (page 538), `spacing-options-interface` (page 576), `spacing-spanner-interface` (page 576), and `spanner-interface` (page 577).

3.1.110 SpanBar

`SpanBar` objects are created by: `Span_bar_engraver` (page 318).

Standard settings:

`allow-span-bar` (boolean):
`#t`
If false, no inter-staff bar line will be created below this bar line.

`bar-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`
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.

`before-line-breaking` (boolean):
`ly:span-bar::before-line-breaking`
Dummy property, used to trigger a callback function.

`break-align-symbol` (symbol):
`'staff-bar`
This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`glyph-name` (string):
`ly:span-bar::calc-glyph-name`
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.

`layer` (integer):
`0`
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.

`non-musical` (boolean):
`#t`
True if the grob belongs to a `NonMusicalPaperColumn`.

`stencil` (stencil):
`ly:span-bar::print`
The symbol to print.

`X-extent` (pair of numbers):
`ly:span-bar::width`
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`'(+inf.0 . -inf.0)`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `bar-line-interface` (page 517), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), and `span-bar-interface` (page 577).

3.1.111 SpanBarStub

`SpanBarStub` objects are created by: `Span_bar_stub_engraver` (page 318).

Standard settings:

`extra-spacing-height` (pair of numbers):
`pure-from-neighbor-interface::extra-spacing-height`
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)`.

`X-extent` (pair of numbers):
`#<procedure #f (grob)>`
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #f #<procedure pure-from-neighbor-interface::pure-height (grob beg end)> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), `item-interface` (page 546), and `pure-from-neighbor-interface` (page 565).

3.1.112 StaffGrouper

`StaffGrouper` objects are not created by any engraver.

Standard settings:

`staff-staff-spacing` (list):

```
'((basic-distance . 9)
  (minimum-distance . 7)
  (padding . 1)
  (stretchability . 5))
```

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):

```
'((basic-distance . 10.5)
  (minimum-distance . 8)
  (padding . 1)
  (stretchability . 9))
```

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.

This object supports the following interface(s): `grob-interface` (page 538), `spanner-interface` (page 577), and `staff-grouper-interface` (page 578).

3.1.113 StaffSpacing

`StaffSpacing` objects are created by: `Separating_line_group_engraver` (page 316).

Standard settings:

`non-musical` (boolean):
`#t`
True if the grob belongs to a `NonMusicalPaperColumn`.

`stem-spacing-correction` (number):
`0.4`
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.

This object supports the following interface(s): `grob-interface` (page 538), `item-interface` (page 546), `spacing-interface` (page 575), and `staff-spacing-interface` (page 579).

3.1.114 StaffSymbol

`StaffSymbol` objects are created by: `Staff_symbol_engraver` (page 319), and `Tab_staff_symbol_engraver` (page 321).

Standard settings:

`break-align-symbols` (list):
`'(staff-bar break-alignment)`
A list of *break-align symbols* that determines which breakable items 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 listed in Section "break-alignment-interface" in *Internals Reference*.

`layer` (integer):
`0`
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-line-thickness` (pair of numbers):
`'(1.0 . 0.1)`
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.

`line-count` (integer):
`5`
The number of staff lines.

`stencil` (stencil):
`ly:staff-symbol::print`
The symbol to print.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:staff-symbol::height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), `spanner-interface` (page 577), and `staff-symbol-interface` (page 579).

3.1.115 StanzaNumber

StanzaNumber objects are created by: Stanza_number_engraver (page 319).

Standard settings:

direction (direction):
-1

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.

font-series (symbol):
'bold

Select the series of a font. Choices include medium, bold, bold-narrow, etc.

padding (dimension, in staff space):
1.0

Add this much extra space between objects that are next to each other.

side-axis (number):
0

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.

stencil (stencil):
ly:text-interface::print

The symbol to print.

X-offset (number):
ly:side-position-interface::x-aligned-side

The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): font-interface (page 532), grob-interface (page 538), item-interface (page 546), side-position-interface (page 571), stanza-number-interface (page 580), and text-interface (page 586).

3.1.116 Stem

Stem objects are created by: Span_stem_engraver (page 318), and Stem_engraver (page 319).

Standard settings:

beamlet-default-length (pair):
'(1.1 . 1.1)

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):
`'(0.75 . 0.75)`

The maximum length of a beamlet, as a proportion of the distance between two adjacent stems.

`default-direction` (direction):
`ly:stem::calc-default-direction`

Direction determined by note head positions.

`details` (list):
```
'((lengths 3.5 3.5 3.5 4.25 5.0 6.0 7.0 8.0 9.0)
  (beamed-lengths 3.26 3.5 3.6)
  (beamed-minimum-free-lengths 1.83 1.5 1.25)
  (beamed-extreme-minimum-free-lengths 2.0 1.25)
  (stem-shorten 1.0 0.5 0.25))
```

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.

`direction` (direction):
`ly:stem::calc-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`.

`double-stem-separation` (number):
`0.5`

The distance between the two stems of a half note in tablature when using `\tabFullNotation`, not counting the width of the stems themselves, expressed as a multiple of the default height of a staff-space in the traditional five-line staff.

`duration-log` (integer):
`stem::calc-duration-log`

The 2-log of the note head duration, i.e., `0` = whole note, `1` = half note, etc.

`length` (dimension, in staff space):
`#<unpure-pure-container #<primitive-procedure ly:stem::calc-length> #<primitive-procedure ly:stem::pure-calc-length>>`

User override for the stem length of unbeamed stems (each unit represents half a `staff-space`).

`neutral-direction` (direction):
`-1`

Which direction to take in the center of the staff.

`note-collision-threshold` (dimension, in staff space):
`1`

Simultaneous notes that are this close or closer in units of `staff-space` will be identified as vertically colliding. Used by `Stem` grobs for notes in the same voice, and `NoteCollision` grobs for notes in different voices. Default value 1.

`stem-begin-position` (number):
`#<unpure-pure-container #<primitive-procedure ly:stem::calc-stem-begin-position> #<primitive-procedure ly:stem::pure-calc-stem-begin-position> >`

User override for the begin position of a stem.

`stencil` (stencil):
`ly:stem::print`

The symbol to print.

`thickness` (number):
`1.3`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *Staff*`.StaffSymbol.thickness`).

`X-extent` (pair of numbers):
`ly:stem::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`X-offset` (number):
`ly:stem::offset-callback`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:stem::height> #<primitive-procedure ly:stem::pure-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `grob-interface` (page 538), `item-interface` (page 546), and `stem-interface` (page 580).

3.1.117 StemStub

`StemStub` objects are created by: `Stem_engraver` (page 319).

Standard settings:

`extra-spacing-height` (pair of numbers):
`stem-stub::extra-spacing-height`

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)`.

`X-extent` (pair of numbers):
`stem-stub::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #f #<procedure stem-stub::pure-height (grob beg end)> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), and `item-interface` (page 546).

3.1.118 StemTremolo

`StemTremolo` objects are created by: `Stem_engraver` (page 319).

Standard settings:

`beam-thickness` (dimension, in staff space):
`0.48`

Beam thickness, measured in `staff-space` units.

`beam-width` (dimension, in staff space):
`ly:stem-tremolo::calc-width`

Width of the tremolo sign.

`direction` (direction):
`ly:stem-tremolo::calc-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`.

`parent-alignment-X` (number):
`0`

Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`shape` (symbol):
`ly:stem-tremolo::calc-shape`

This setting determines what shape a grob has. Valid choices depend on the `stencil` callback reading this property.

`slope` (number):
`ly:stem-tremolo::calc-slope`

The slope of this object.

`stencil` (stencil):
`ly:stem-tremolo::print`

The symbol to print.

`X-extent` (pair of numbers):
`ly:stem-tremolo::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> #<primitive-procedure ly:stem-tremolo::pure-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:stem-tremolo::calc-y-offset> #<primitive-procedure ly:stem-tremolo::pure-calc-y-offset> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `grob-interface` (page 538), `item-interface` (page 546), `self-alignment-interface` (page 568), and `stem-tremolo-interface` (page 583).

3.1.119 StringNumber

`StringNumber` objects are created by: `New_fingering_engraver` (page 307).

Standard settings:

`add-stem-support` (boolean):
`only-if-beamed`
If set, the `Stem` object is included in this script's support.

`avoid-slur` (symbol):
`'around`
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`.

`font-encoding` (symbol):
`'fetaText`
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-size` (number):
`-5`
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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`number-type` (symbol):
`'arabic`
Numbering style. Choices include `roman-lower`, `roman-upper` and `arabic`.

`padding` (dimension, in staff space):
`0.5`

Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number):
`0`

Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`script-priority` (number):
`100`

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):
`0`

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 - the unit is half the object width.

`self-alignment-Y` (number):
`0`

Like `self-alignment-X` but for the Y axis.

`staff-padding` (dimension, in staff space):
`0.5`

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.

`stencil` (stencil):
`print-circled-text-callback`

The symbol to print.

`text` (markup):
`string-number::calc-text`

Text markup. See Section "Formatting text" in *Notation Reference*.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `number-interface` (page 560), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), `string-number-interface` (page 583), `text-interface` (page 586), and `text-script-interface` (page 586).

3.1.120 StrokeFinger

`StrokeFinger` objects are created by: `New_fingering_engraver` (page 307).

Standard settings:

`add-stem-support` (boolean):
`only-if-beamed`
If set, the `Stem` object is included in this script's support.

`digit-names` (vector):
`#("p" "i" "m" "a" "x")`
Names for string finger digits.

`font-shape` (symbol):
`'italic`
Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`font-size` (number):
`-4`
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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`padding` (dimension, in staff space):
`0.5`
Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number):
`0`
Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`script-priority` (number):
`100`
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):
`0`
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 - the unit is half the object width.

`self-alignment-Y` (number):
`0`
Like `self-alignment-X` but for the Y axis.

`staff-padding` (dimension, in staff space):
`0.5`
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.

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

`text` (markup):
`stroke-finger::calc-text`
Text markup. See Section "Formatting text" in *Notation Reference*.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), `stroke-finger-interface` (page 583), `text-interface` (page 586), and `text-script-interface` (page 586).

3.1.121 SustainPedal

`SustainPedal` objects are created by: `Piano_pedal_engraver` (page 312).

Standard settings:

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`
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)`.

`padding` (dimension, in staff space):
`0.0`
Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number)
Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`self-alignment-X` (number):
`0`
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 - the unit is half the object width.

`stencil` (stencil):
`ly:sustain-pedal::print`
The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`
Two skylines, one above and one below this grob.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `piano-pedal-interface` (page 565), `piano-pedal-script-interface` (page 565), `self-alignment-interface` (page 568), and `text-interface` (page 586).

3.1.122 SustainPedalLineSpanner

`SustainPedalLineSpanner` objects are created by: `Piano_pedal_align_engraver` (page 311).

Standard settings:

`axes` (list):
`'(1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`direction` (direction):
`-1`
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`.

`minimum-space` (dimension, in staff space):
`1.0`
Minimum distance that the victim should move (after padding).

`outside-staff-priority` (number):
`1000`
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.

`padding` (dimension, in staff space):
`1.2`
Add this much extra space between objects that are next to each other.

`side-axis` (number):
`1`
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.

`staff-padding` (dimension, in staff space):
`1.2`
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.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-element-stencils> #<primitive-procedure ly:grob::pure-vertical-skylines-from-element-stencils> >`

Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `axis-group-interface` (page 515), `grob-interface` (page 538), `outside-staff-interface` (page 561), `piano-pedal-interface` (page 565), `side-position-interface` (page 571), and `spanner-interface` (page 577).

3.1.123 System

`System` objects are not created by any engraver.

Standard settings:

`axes` (list):
`'(0 1)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`outside-staff-placement-directive` (symbol):
`'left-to-right-polite`

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.

`skyline-horizontal-padding` (number):
`1.0`

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.

`vertical-skylines` (pair of skylines):
`ly:axis-group-interface::calc-skylines`
Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:system::height> #<primitive-procedure ly:system::calc-pure-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 515), `grob-interface` (page 538), `outside-staff-axis-group-interface` (page 561), `spanner-interface` (page 577), and `system-interface` (page 584).

3.1.124 SystemStartBar

`SystemStartBar` objects are created by: `System_start_delimiter_engraver` (page 320).

Standard settings:

`collapse-height` (dimension, in staff space):
`5.0`
Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.

`direction` (direction):
`-1`
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`.

`padding` (dimension, in staff space):
`-0.1`
Add this much extra space between objects that are next to each other.

`stencil` (stencil):
`ly:system-start-delimiter::print`
The symbol to print.

`style` (symbol):
`'bar-line`
This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`thickness` (number):
`1.6`
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`
The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): `grob-interface` (page 538), `side-position-interface` (page 571), `spanner-interface` (page 577), and `system-start-delimiter-interface` (page 584).

3.1.125 SystemStartBrace

`SystemStartBrace` objects are created by: `System_start_delimiter_engraver` (page 320).

Standard settings:

`collapse-height` (dimension, in staff space):
`5.0`
Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.

`direction` (direction):
`-1`
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`.

`font-encoding` (symbol):
`'fetaBraces`
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).

`padding` (dimension, in staff space):
`0.3`
Add this much extra space between objects that are next to each other.

`stencil` (stencil):
`ly:system-start-delimiter::print`
The symbol to print.

`style` (symbol):
`'brace`
This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`
The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `side-position-interface` (page 571), `spanner-interface` (page 577), and `system-start-delimiter-interface` (page 584).

3.1.126 SystemStartBracket

`SystemStartBracket` objects are created by: `System_start_delimiter_engraver` (page 320).

Standard settings:

`collapse-height` (dimension, in staff space):
`5.0`

Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.

`direction` (direction):
`-1`

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`.

`padding` (dimension, in staff space):
`0.8`

Add this much extra space between objects that are next to each other.

`stencil` (stencil):
`ly:system-start-delimiter::print`

The symbol to print.

`style` (symbol):
`'bracket`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`thickness` (number):
`0.45`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`

The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `side-position-interface` (page 571), `spanner-interface` (page 577), and `system-start-delimiter-interface` (page 584).

3.1.127 SystemStartSquare

`SystemStartSquare` objects are created by: `System_start_delimiter_engraver` (page 320).

Standard settings:

`collapse-height` (dimension, in staff space):
`5.0`

Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.

`direction` (direction):
`-1`

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`.

`stencil` (stencil):
`ly:system-start-delimiter::print`

The symbol to print.

`style` (symbol):
`'line-bracket`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`thickness` (number):
`1.0`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`

The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `side-position-interface` (page 571), `spanner-interface` (page 577), and `system-start-delimiter-interface` (page 584).

3.1.128 TabNoteHead

`TabNoteHead` objects are created by: `Tab_note_heads_engraver` (page 320).

Standard settings:

`bend-me` (boolean):
`'()`

Decide whether this grob is bent.

`details` (list):

```
'((cautionary-properties
    (angularity . 0.4)
    (half-thickness . 0.075)
    (padding . 0)
    (procedure
      .
      #<procedure parenthesize-stencil (stencil half-thickness width angular
    (width . 0.25))
  (head-offset . 3/5)
  (harmonic-properties
    (angularity . 2)
    (half-thickness . 0.075)
    (padding . 0)
    (procedure
      .
```

```
    #<procedure parenthesize-stencil (stencil half-thickness width angular
  (width . 0.25))
 (repeat-tied-properties
  (note-head-visible . #t)
  (parenthesize . #t))
 (tied-properties (parenthesize . #t)))
```

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.

`direction` (direction):
`0`

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`.

`duration-log` (integer):
`note-head::calc-duration-log`

The 2-log of the note head duration, i.e., `0` = whole note, `1` = half note, etc.

`font-series` (symbol):
`'bold`

Select the series of a font. Choices include `medium`, `bold`, `bold-narrow`, etc.

`font-size` (number):
`-2`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`parenthesis-friends` (list):
`'(dot)`

A list of Grob types, as symbols. When parentheses enclose a Grob that has 'parenthesis-friends, the parentheses widen to include any child Grobs with type among 'parenthesis-friends.

`stem-attachment` (pair of numbers):
`ly:note-head::calc-tab-stem-attachment`

An `(`*x* `.` *y*`)` pair where the stem attaches to the notehead.

`stencil` (stencil):
`tab-note-head::print`

The symbol to print.

`whiteout` (boolean-or-number):
`#t`

If a number or true, the grob is printed over a white background to white-out underlying material, if the grob is visible. A number indicates how far the white background extends beyond the bounding box of the grob as a multiple of the staff-line thickness. The `LyricHyphen` grob uses a special implementation of whiteout: A positive number indicates how far the white background extends beyond the bounding box in multiples of `line-thickness`. The shape of the background is determined by `whiteout-style`. Usually `#f` by default.

`X-offset` (number):
`ly:self-alignment-interface::x-aligned-on-self`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `bend-interface` (page 521), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `note-head-interface` (page 559), `rhythmic-grob-interface` (page 567), `rhythmic-head-interface` (page 567), `staff-symbol-referencer-interface` (page 580), `tab-note-head-interface` (page 585), and `text-interface` (page 586).

3.1.129 TextScript

`TextScript` objects are created by: `Text_engraver` (page 321).

Standard settings:

`avoid-slur` (symbol):
`'around`

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`.

`direction` (direction):
`-1`

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`.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`

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)`.

`outside-staff-horizontal-padding` (number):
`0.2`

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-priority` (number):
`450`

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.

`padding` (dimension, in staff space):
`0.3`

Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number)
Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`script-priority` (number):
`200`

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 - the unit is half the object width.

`side-axis` (number):
`1`

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.

`slur-padding` (number):
`0.5`

Extra distance between slur and script.

`staff-padding` (dimension, in staff space):
`0.5`

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.

`stencil` (stencil):
`ly:text-interface::print`

The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`

Two skylines, one above and one below this grob.

`X-align-on-main-noteheads` (boolean):
`#t`

If true, this grob will ignore suspended noteheads when aligning itself on NoteColumn.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `instrument-specific-markup-interface` (page 544), `item-interface` (page 546), `outside-staff-interface` (page 561), `self-alignment-interface` (page 568), `side-position-interface` (page 571), `text-interface` (page 586), and `text-script-interface` (page 586).

3.1.130 TextSpanner

`TextSpanner` objects are created by: `Text_spanner_engraver` (page 322).

Standard settings:

`bound-details` (list):
```
'((left (Y . 0) (padding . 0.25) (attach-dir . -1))
  (left-broken (attach-dir . 1))
  (right (Y . 0) (padding . 0.25)))
```
An alist of properties for determining attachments of spanners to edges.

`dash-fraction` (number):
`0.2`
Size of the dashes, relative to `dash-period`. Should be between `0.1` and `1.0` (continuous line). If set to `0.0`, a dotted line is produced

`dash-period` (number):
`3.0`
The length of one dash together with whitespace. If negative, no line is drawn at all.

`direction` (direction):
`1`
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`.

`font-shape` (symbol):
`'italic`
Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`left-bound-info` (list):
`ly:line-spanner::calc-left-bound-info`
An alist of properties for determining attachments of spanners to edges.

`outside-staff-priority` (number):
`350`

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.

`right-bound-info` (list):
`ly:line-spanner::calc-right-bound-info`

An alist of properties for determining attachments of spanners to edges.

`side-axis` (number):
`1`

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.

`staff-padding` (dimension, in staff space):
`0.8`

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.

`stencil` (stencil):
`ly:line-spanner::print`

The symbol to print.

`style` (symbol):
`'dashed-line`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `line-interface` (page 550), `line-spanner-interface` (page 550), `outside-staff-interface` (page 561), `side-position-interface` (page 571), and `spanner-interface` (page 577).

3.1.131 Tie

`Tie` objects are created by: `Completion_heads_engraver` (page 288), and `Tie_engraver` (page 322).

Standard settings:

`avoid-slur` (symbol):
`'inside`

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`.

`control-points` (list of number pairs):

`ly:tie::calc-control-points`

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.

`details` (list):

```
'((ratio . 0.333)
  (center-staff-line-clearance . 0.6)
  (tip-staff-line-clearance . 0.45)
  (note-head-gap . 0.2)
  (stem-gap . 0.35)
  (height-limit . 1.0)
  (horizontal-distance-penalty-factor . 10)
  (same-dir-as-stem-penalty . 8)
  (min-length-penalty-factor . 26)
  (tie-tie-collision-distance . 0.45)
  (tie-tie-collision-penalty . 25.0)
  (intra-space-threshold . 1.25)
  (outer-tie-vertical-distance-symmetry-penalty-factor
    .
    10)
  (outer-tie-length-symmetry-penalty-factor . 10)
  (vertical-distance-penalty-factor . 7)
  (outer-tie-vertical-gap . 0.25)
  (multi-tie-region-size . 3)
  (single-tie-region-size . 4)
  (between-length-limit . 1.0))
```

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.

`direction` (direction):

`ly:tie::calc-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`.

`line-thickness` (number):

`0.8`

For slurs and ties, this is the diameter of the virtual "pen" that draws the two arcs of the curve's outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`neutral-direction` (direction):

`1`

Which direction to take in the center of the staff.

`springs-and-rods` (boolean):

`ly:spanner::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:tie::print`

The symbol to print.

`thickness` (number):
`1.2`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

Two skylines, one above and one below this grob.

This object supports the following interface(s): `grob-interface` (page 538), `spanner-interface` (page 577), and `tie-interface` (page 587).

3.1.132 TieColumn

`TieColumn` objects are created by: `Completion_heads_engraver` (page 288), and `Tie_engraver` (page 322).

Standard settings:

`before-line-breaking` (boolean):
`ly:tie-column::before-line-breaking`

Dummy property, used to trigger a callback function.

`X-extent` (pair of numbers)
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers)
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 538), `spanner-interface` (page 577), and `tie-column-interface` (page 587).

3.1.133 TimeSignature

`TimeSignature` objects are created by: `Time_signature_engraver` (page 323).

Standard settings:

`avoid-slur` (symbol):
`'inside`

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`.

`break-align-anchor` (number):
`ly:break-aligned-interface::calc-extent-aligned-anchor`

Grobs aligned to this breakable item 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):
`-1`

Read by `ly:break-aligned-interface::calc-extent-aligned-anchor` for aligning an anchor to a grob's extent.

`break-align-symbol` (symbol):
`'time-signature`

This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`break-visibility` (vector):
`#(#t #t #t)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`extra-spacing-height` (pair of numbers):
`pure-from-neighbor-interface::extra-spacing-height-including-staff`

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):
`'(0.0 . 0.8)`

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)`.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):

```
'((ambitus extra-space . 1.0)
  (cue-clef extra-space . 1.5)
  (first-note fixed-space . 2.0)
  (right-edge extra-space . 0.5)
  (staff-bar extra-space . 1.0))
```

An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for *break-align-symbol* are listed in Section "break-alignment-interface" in *Internals Reference*. Additionally, three special break-align symbols available to `space-alist` are:

`first-note`
: used when the grob is just left of the first note on a line

`next-note`
: used when the grob is just left of any other note; if not set, the value of `first-note` gets used

`right-edge`
: used when the grob is the last item on the line (only compatible with the `extra-space` spacing style)

Choices for *spacing-style* are:

`extra-space`
: Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

`minimum-space`
: Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

`fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

`minimum-fixed-space`
: Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

`semi-fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

`stencil` (stencil):
: `ly:time-signature::print`

The symbol to print.

`style` (symbol):
: `'C`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `break-aligned-interface` (page 523), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `pure-from-neighbor-interface` (page 565), and `time-signature-interface` (page 590).

3.1.134 TrillPitchAccidental

`TrillPitchAccidental` objects are created by: `Pitched_trill_engraver` (page 313).

Standard settings:

`direction` (direction):
`-1`
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`.

`font-size` (number):
`-4`
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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`glyph-name-alist` (list):
```
'((0 . "accidentals.natural")
  (-1/2 . "accidentals.flat")
  (1/2 . "accidentals.sharp")
  (1 . "accidentals.doublesharp")
  (-1 . "accidentals.flatflat")
  (3/4
   .
   "accidentals.sharp.slashslash.stemstemstem")
  (1/4 . "accidentals.sharp.slashslash.stem")
  (-1/4 . "accidentals.mirroredflat")
  (-3/4 . "accidentals.mirroredflat.flat"))
```
An alist of key-string pairs.

`padding` (dimension, in staff space):
`0.2`
Add this much extra space between objects that are next to each other.

`side-axis` (number):
`0`
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.

`stencil` (stencil):
`ly:accidental-interface::print`
The symbol to print.

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:accidental-interface::height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `accidental-interface` (page 511), `font-interface` (page 532), `grob-interface` (page 538), `inline-accidental-interface` (page 544), `item-interface` (page 546), `side-position-interface` (page 571), and `trill-pitch-accidental-interface` (page 591).

3.1.135 TrillPitchGroup

`TrillPitchGroup` objects are created by: `Pitched_trill_engraver` (page 313).

Standard settings:

`axes` (list):
`'(0)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`direction` (direction):
`1`
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`.

`font-size` (number):
`-4`
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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`horizon-padding` (number):
`0.1`
The amount to pad the axis along which a `Skyline` is built for the `side-position-interface`.

`minimum-space` (dimension, in staff space):
`2.5`
Minimum distance that the victim should move (after padding).

`padding` (dimension, in staff space):
`0.3`
Add this much extra space between objects that are next to each other.

`side-axis` (number):
`0`
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.

`stencil` (stencil):
`parenthesize-elements`
The symbol to print.

`stencils` (list):
`parentheses-item::calc-parenthesis-stencils`
Multiple stencils, used as intermediate value.

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 515), `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `note-head-interface` (page 559), `parentheses-interface` (page 563), and `side-position-interface` (page 571).

3.1.136 TrillPitchHead

`TrillPitchHead` objects are created by: `Pitched_trill_engraver` (page 313).

Standard settings:

`duration-log` (integer):
`2`
The 2-log of the note head duration, i.e., `0` = whole note, `1` = half note, etc.

`font-size` (number):
`-4`
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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`stencil` (stencil):
`ly:note-head::print`
The symbol to print.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `ledgered-interface` (page 549), `pitched-trill-interface` (page 565), `rhythmic-head-interface` (page 567), and `staff-symbol-referencer-interface` (page 580).

3.1.137 TrillSpanner

TrillSpanner objects are created by: Trill_spanner_engraver (page 324).

Standard settings:

after-line-breaking (boolean):
ly:spanner::kill-zero-spanned-time

Dummy property, used to trigger callback for after-line-breaking.

bound-details (list):

```
'((left (text #<procedure musicglyph-markup (layout props glyph-name)>
                "scripts.trill")
        (Y . 0)
        (stencil-offset -0.5 . -1)
        (padding . 0.5)
        (attach-dir . 0))
  (left-broken (end-on-note . #t))
  (right (Y . 0)))
```

An alist of properties for determining attachments of spanners to edges.

direction (direction):
1

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.

left-bound-info (list):
ly:line-spanner::calc-left-bound-info

An alist of properties for determining attachments of spanners to edges.

outside-staff-priority (number):
50

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.

padding (dimension, in staff space):
0.5

Add this much extra space between objects that are next to each other.

right-bound-info (list):
ly:line-spanner::calc-right-bound-info

An alist of properties for determining attachments of spanners to edges.

side-axis (number):
1

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.

staff-padding (dimension, in staff space):
1.0

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.

`stencil` (stencil):
`ly:line-spanner::print`
The symbol to print.

`style` (symbol):
`'trill`
This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`Y-offset` (number):
`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `line-interface` (page 550), `line-spanner-interface` (page 550), `outside-staff-interface` (page 561), `side-position-interface` (page 571), `spanner-interface` (page 577), and `trill-spanner-interface` (page 591).

3.1.138 TupletBracket

`TupletBracket` objects are created by: `Tuplet_engraver` (page 325).

Standard settings:

`avoid-scripts` (boolean):
`#t`
If set, a tuplet bracket avoids the scripts associated with the note heads it encompasses.

`connect-to-neighbor` (pair):
`ly:tuplet-bracket::calc-connect-to-neighbors`
Pair of booleans, indicating whether this grob looks as a continued break.

`direction` (direction):
`ly:tuplet-bracket::calc-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`.

`edge-height` (pair):
`'(0.7 . 0.7)`
A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`full-length-to-extent` (boolean):
`#t`
Run to the extent of the column for a full-length tuplet bracket.

`padding` (dimension, in staff space):
`1.1`
Add this much extra space between objects that are next to each other.

`positions` (pair of numbers):
`ly:tuplet-bracket::calc-positions`

Pair of staff coordinates (*start . end*), where *start* and *end* are vertical positions 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.

`shorten-pair` (pair of numbers):
`'(-0.2 . -0.2)`

The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

`staff-padding` (dimension, in staff space):
`0.25`

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.

`stencil` (stencil):
`ly:tuplet-bracket::print`

The symbol to print.

`thickness` (number):
`1.6`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *Staff*.`StaffSymbol.thickness`).

`tuplet-slur` (boolean)
Draw a slur instead of a bracket for tuplets.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

Two skylines, one above and one below this grob.

`X-positions` (pair of numbers):
`ly:tuplet-bracket::calc-x-positions`

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.

This object supports the following interface(s): `grob-interface` (page 538), `line-interface` (page 550), `outside-staff-interface` (page 561), `spanner-interface` (page 577), and `tuplet-bracket-interface` (page 591).

3.1.139 TupletNumber

`TupletNumber` objects are created by: `Tuplet_engraver` (page 325).

Standard settings:

`avoid-slur` (symbol):
`'inside`

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`.

`direction` (direction):
`tuplet-number::calc-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`.

`font-shape` (symbol):
`'italic`

Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`font-size` (number):
`-2`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`knee-to-beam` (boolean):
`#t`

Determines whether a tuplet number will be positioned next to a kneed beam.

`stencil` (stencil):
`ly:tuplet-number::print`

The symbol to print.

`text` (markup):
`tuplet-number::calc-denominator-text`

Text markup. See Section "Formatting text" in *Notation Reference*.

`X-offset` (number):
`ly:tuplet-number::calc-x-offset`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:tuplet-number::calc-y-offset`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `outside-staff-interface` (page 561), `spanner-interface` (page 577), `text-interface` (page 586), and `tuplet-number-interface` (page 592).

3.1.140 UnaCordaPedal

`UnaCordaPedal` objects are created by: `Piano_pedal_engraver` (page 312).

Standard settings:

`direction` (direction):
`1`

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`.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`

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)`.

`font-shape` (symbol):
`'italic`

Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`padding` (dimension, in staff space):
`0.0`

Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number)
Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`self-alignment-X` (number):
`0`

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 - the unit is half the object width.

`stencil` (stencil):
`ly:text-interface::print`

The symbol to print.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`

Two skylines, one above and one below this grob.

`X-offset` (number):
`ly:self-alignment-interface::aligned-on-x-parent`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `item-interface` (page 546), `piano-pedal-script-interface` (page 565), `self-alignment-interface` (page 568), and `text-interface` (page 586).

3.1.141 UnaCordaPedalLineSpanner

`UnaCordaPedalLineSpanner` objects are created by: `Piano_pedal_align_engraver` (page 311).

Standard settings:

`axes` (list):
`'(1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`direction` (direction):
`-1`
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`.

`minimum-space` (dimension, in staff space):
`1.0`
Minimum distance that the victim should move (after padding).

`outside-staff-priority` (number):
`1000`
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.

`padding` (dimension, in staff space):
`1.2`
Add this much extra space between objects that are next to each other.

`side-axis` (number):
`1`
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.

`staff-padding` (dimension, in staff space):
`1.2`
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.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-element-stencils> #<primitive-procedure ly:grob::pure-vertical-skylines-from-element-stencils> >`
Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):

`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `axis-group-interface` (page 515), `grob-interface` (page 538), `outside-staff-interface` (page 561), `piano-pedal-interface` (page 565), `side-position-interface` (page 571), and `spanner-interface` (page 577).

3.1.142 VaticanaLigature

`VaticanaLigature` objects are created by: `Vaticana_ligature_engraver` (page 325).

Standard settings:

`stencil` (stencil):

`ly:vaticana-ligature::print`

The symbol to print.

`thickness` (number):

`0.6`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `spanner-interface` (page 577), and `vaticana-ligature-interface` (page 593).

3.1.143 VerticalAlignment

`VerticalAlignment` objects are created by: `Vertical_align_engraver` (page 325).

Standard settings:

`axes` (list):

`'(1)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`stacking-dir` (direction):

`-1`

Stack objects in which direction?

`vertical-skylines` (pair of skylines):

`ly:axis-group-interface::combine-skylines`

Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):

`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):

`#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `align-interface` (page 513), `axis-group-interface` (page 515), `grob-interface` (page 538), and `spanner-interface` (page 577).

3.1.144 VerticalAxisGroup

`VerticalAxisGroup` objects are created by: `Axis_group_engraver` (page 282).

Standard settings:

`axes` (list):

```
'(1)
```

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`default-staff-staff-spacing` (list):

```
'((basic-distance . 9)
  (minimum-distance . 8)
  (padding . 1))
```

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`).

`nonstaff-unrelatedstaff-spacing` (list):

```
'((padding . 0.5))
```

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.

`outside-staff-placement-directive` (symbol):

```
'left-to-right-polite
```

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.

`skyline-horizontal-padding` (number):

```
0.1
```

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.

`staff-staff-spacing` (list):
: `#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::calc-staff-staff-spacing> #<primitive-procedure ly:axis-group-interface::calc-pure-staff-staff-spacing> >`

  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).

`stencil` (stencil):
: `ly:axis-group-interface::print`

  The symbol to print.

`vertical-skylines` (pair of skylines):
: `ly:hara-kiri-group-spanner::calc-skylines`

  Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
: `ly:axis-group-interface::width`

  Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
: `#<unpure-pure-container #<primitive-procedure ly:hara-kiri-group-spanner::y-extent> #<primitive-procedure ly:hara-kiri-group-spanner::pure-height> >`

  Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
: `ly:hara-kiri-group-spanner::force-hara-kiri-callback`

  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `axis-group-interface` (page 515), `grob-interface` (page 538), `hara-kiri-group-spanner-interface` (page 542), `outside-staff-axis-group-interface` (page 561), and `spanner-interface` (page 577).

3.1.145 VoiceFollower

VoiceFollower objects are created by: Note_head_line_engraver (page 307).

Standard settings:

after-line-breaking (boolean):
ly:spanner::kill-zero-spanned-time
Dummy property, used to trigger callback for after-line-breaking.

bound-details (list):
'((right (attach-dir . 0) (padding . 1.5))
(left (attach-dir . 0) (padding . 1.5)))
An alist of properties for determining attachments of spanners to edges.

gap (dimension, in staff space):
0.5
Size of a gap in a variable symbol.

left-bound-info (list):
ly:line-spanner::calc-left-bound-info
An alist of properties for determining attachments of spanners to edges.

non-musical (boolean):
#t
True if the grob belongs to a NonMusicalPaperColumn.

right-bound-info (list):
ly:line-spanner::calc-right-bound-info
An alist of properties for determining attachments of spanners to edges.

stencil (stencil):
ly:line-spanner::print
The symbol to print.

style (symbol):
'line
This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

X-extent (pair of numbers)
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

Y-extent (pair of numbers)
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): grob-interface (page 538), line-interface (page 550), line-spanner-interface (page 550), and spanner-interface (page 577).

3.1.146 VoltaBracket

VoltaBracket objects are created by: Volta_engraver (page 326).

Standard settings:

baseline-skip (dimension, in staff space):
1.7
Distance between base lines of multiple lines of text.

`direction` (direction):
`1`

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`.

`edge-height` (pair):
`'(2.0 . 2.0)`

A pair of numbers specifying the heights of the vertical edges: (*`left-height . right-height`*).

`font-encoding` (symbol):
`'fetaText`

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-size` (number):
`-4`

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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`shorten-pair` (pair of numbers):
`ly:volta-bracket::calc-shorten-pair`

The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

`stencil` (stencil):
`ly:volta-bracket-interface::print`

The symbol to print.

`thickness` (number):
`1.6`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`

Two skylines, one above and one below this grob.

`word-space` (dimension, in staff space):
`0.6`

Space to insert between words in texts.

`Y-extent` (pair of numbers):

`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> #<procedure volta-bracket-interface::pure-height (grob start end)> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `font-interface` (page 532), `grob-interface` (page 538), `horizontal-bracket-interface` (page 543), `line-interface` (page 550), `side-position-interface` (page 571), `spanner-interface` (page 577), `text-interface` (page 586), `volta-bracket-interface` (page 594), and `volta-interface` (page 594).

3.1.147 VoltaBracketSpanner

`VoltaBracketSpanner` objects are created by: `Volta_engraver` (page 326).

Standard settings:

`after-line-breaking` (boolean):

`ly:side-position-interface::move-to-extremal-staff`

Dummy property, used to trigger callback for `after-line-breaking`.

`axes` (list):

`'(1)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`direction` (direction):

`1`

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`.

`no-alignment` (boolean):

`#t`

If set, don't place this grob in a `VerticalAlignment`; rather, place it using its own `Y-offset` callback.

`outside-staff-priority` (number):

`600`

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.

`padding` (dimension, in staff space):

`1`

Add this much extra space between objects that are next to each other.

`side-axis` (number):

`1`

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.

`vertical-skylines` (pair of skylines):
: `#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-element-stencils> #<primitive-procedure ly:grob::pure-vertical-skylines-from-element-stencils> >`

  Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
: `ly:axis-group-interface::width`

  Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
: `#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`

  Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
: `#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `axis-group-interface` (page 515), `grob-interface` (page 538), `outside-staff-interface` (page 561), `side-position-interface` (page 571), `spanner-interface` (page 577), and `volta-interface` (page 594).

3.1.148 VowelTransition

`VowelTransition` objects are created by: `Hyphen_engraver` (page 300).

Standard settings:

`after-line-breaking` (boolean):
: `ly:spanner::kill-zero-spanned-time`

  Dummy property, used to trigger callback for `after-line-breaking`.

`arrow-length` (number):
: `0.5`

  Arrow length.

`arrow-width` (number):
: `0.5`

  Arrow width.

`bound-details` (list):
: ```
  '((left (Y . 0) (padding . 0.14) (attach-dir . 1))
    (right-broken (padding . 0))
    (left-broken (padding . 0))
    (right (Y . 0)
           (padding . 0.14)
           (attach-dir . -1)
           (arrow . #t)))
  ```

  An alist of properties for determining attachments of spanners to edges.
  ```

`left-bound-info` (list):
`ly:line-spanner::calc-left-bound-info`
An alist of properties for determining attachments of spanners to edges.

`minimum-length` (dimension, in staff space):
`1.0`
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.

`right-bound-info` (list):
`ly:line-spanner::calc-right-bound-info`
An alist of properties for determining attachments of spanners to edges.

`springs-and-rods` (boolean):
`ly:vowel-transition::set-spacing-rods`
Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:line-spanner::print`
The symbol to print.

`style` (symbol):
`'line`
This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents> >`
Two skylines, one above and one below this grob.

`Y-offset` (number):
`0.5`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `grob-interface` (page 538), `line-interface` (page 550), `line-spanner-interface` (page 550), `lyric-interface` (page 553), and `spanner-interface` (page 577).

3.2 Graphical Object Interfaces

3.2.1 `accidental-interface`

A single accidental.

User settable properties:

`alteration` (number)
Alteration numbers for accidental.

`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`.

`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.

`hide-tied-accidental-after-break` (boolean)
: If set, an accidental that appears on a tied note after a line break will not be displayed.

`parenthesized` (boolean)
: Parenthesize this grob.

`restore-first` (boolean)
: Print a natural before the accidental.

Internal properties:

`forced` (boolean)
: Manually forced accidental.

`tie` (graphical (layout) object)
: A pointer to a `Tie` object.

This grob interface is used in the following graphical object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalSuggestion` (page 345), `AmbitusAccidental` (page 348), and `TrillPitchAccidental` (page 495).

3.2.2 accidental-placement-interface

Resolve accidental collisions.

User settable properties:

`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`.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`right-padding` (dimension, in staff space)
: Space to insert on the right side of an object (e.g., between note and its accidentals).

`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.

Internal properties:

`accidental-grobs` (list)
: An alist with (*notename* . *groblist*) entries.

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): `AccidentalPlacement` (page 344).

3.2.3 accidental-suggestion-interface

An accidental, printed as a suggestion (typically: vertically over a note).

This grob interface is used in the following graphical object(s): `AccidentalSuggestion` (page 345).

3.2.4 align-interface

Order grobs from top to bottom, left to right, right to left or bottom to top. For vertical alignments of staves, the `line-break-system-details` of the left Section "NonMusicalPaperColumn" in *Internals Reference* may be set to tune vertical spacing.

User settable properties:

`align-dir` (direction)
: Which side to align? `-1`: left side, `0`: around center of width, `1`: right side.

`axes` (list)
: List of axis numbers. In the case of alignment grobs, this should contain only one number.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`stacking-dir` (direction)
: Stack objects in which direction?

Internal properties:

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

`minimum-translations-alist` (list)
: An list of translations for a given start and end point.

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): `BassFigureAlignment` (page 359), and `VerticalAlignment` (page 504).

3.2.5 ambitus-interface

The line between note heads for a pitch range.

User settable properties:

`gap` (dimension, in staff space)
: Size of a gap in a variable symbol.

`length-fraction` (number)
: Multiplier for lengths. Used for determining ledger lines and stem lengths.

`maximum-gap` (number)
: Maximum value allowed for `gap` property.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`note-heads` (array of grobs)
: An array of note head grobs.

This grob interface is used in the following graphical object(s): `Ambitus` (page 347), `AmbitusLine` (page 349), and `AmbitusNoteHead` (page 350).

3.2.6 arpeggio-interface

Functions and settings for drawing an arpeggio symbol.

User settable properties:

`arpeggio-direction` (direction)
: If set, put an arrow on the arpeggio squiggly line.

`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`.

`line-thickness` (number)
: For slurs and ties, this is the diameter of the virtual "pen" that draws the two arcs of the curve's outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`positions` (pair of numbers)
: Pair of staff coordinates `(`*`start . end`*`)`, where *start* and *end* are vertical positions 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.

`protrusion` (number)
: In an arpeggio bracket, the length of the horizontal edges.

`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.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`stems` (array of grobs)
: An array of stem objects.

This grob interface is used in the following graphical object(s): `Arpeggio` (page 351).

3.2.7 axis-group-interface

An object that groups other layout objects.

User settable properties:

`axes` (list) List of axis numbers. In the case of alignment grobs, this should contain only one number.

`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`).

`no-alignment` (boolean)
: If set, don't place this grob in a `VerticalAlignment`; rather, place it using its own `Y-offset` callback.

`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.

`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-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).

Internal properties:

`adjacent-pure-heights` (pair)
: A pair of vectors. Used by a `VerticalAxisGroup` to cache the `Y-extent`s of different column ranges.

`bound-alignment-interfaces` (list)
: Interfaces to be used for positioning elements that align with a column.

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

`pure-relevant-grobs` (array of grobs)
: All the grobs (items and spanners) that are relevant for finding the `pure-Y-extent`

`pure-relevant-items` (array of grobs)
: A subset of elements that are relevant for finding the `pure-Y-extent`.

`pure-relevant-spanners` (array of grobs)
: A subset of elements that are relevant for finding the `pure-Y-extent`.

`pure-Y-common` (graphical (layout) object)
: A cache of the `common_refpoint_of_array` of the `elements` grob set.

`staff-grouper` (graphical (layout) object)
: The staff grouper we belong to.

`system-Y-offset` (number)
: The Y-offset (relative to the bottom of the top-margin of the page) of the system to which this staff belongs.

`X-common` (graphical (layout) object)
: Common reference point for axis group.

`Y-common` (graphical (layout) object)
: See `X-common`.

This grob interface is used in the following graphical object(s): `Ambitus` (page 347), `BassFigureAlignment` (page 359), `BassFigureAlignmentPositioning` (page 360), `BassFigureLine` (page 362), `BreakAlignGroup` (page 367), `BreakAlignment` (page 368),

DotColumn (page 386), DynamicLineSpanner (page 392), NonMusicalPaperColumn (page 443), NoteCollision (page 445), NoteColumn (page 445), PaperColumn (page 450), SostenutoPedalLineSpanner (page 466), SustainPedalLineSpanner (page 480), System (page 481), TrillPitchGroup (page 496), UnaCordaPedalLineSpanner (page 503), VerticalAlignment (page 504), VerticalAxisGroup (page 505), and VoltaBracketSpanner (page 509).

3.2.8 balloon-interface

A collection of routines to put text balloons around an object.

User settable properties:

annotation-balloon (boolean)
: Print the balloon around an annotation.

annotation-line (boolean)
: Print the line from an annotation to the grob that it annotates.

padding (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

text (markup)
: Text markup. See Section "Formatting text" in *Notation Reference*.

Internal properties:

spanner-placement (direction)
: The place of an annotation on a spanner. LEFT is for the first spanner, and RIGHT is for the last. CENTER will place it on the broken spanner that falls closest to the center of the length of the entire spanner, although this behavior is unpredictable in situations with lots of rhythmic diversity. For predictable results, use LEFT and RIGHT.

This grob interface is used in the following graphical object(s): BalloonTextItem (page 352), BalloonTextSpanner (page 353), FootnoteItem (page 402), and FootnoteSpanner (page 403).

3.2.9 bar-line-interface

Print a special bar symbol. It replaces the regular bar symbol with a special symbol. The argument *bartype* is a string which specifies the kind of bar line to print.

The list of allowed glyphs and predefined bar lines can be found in scm/bar-line.scm.

gap is used for the gaps in dashed bar lines.

User settable properties:

allow-span-bar (boolean)
: If false, no inter-staff bar line will be created below this bar line.

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.

gap (dimension, in staff space)
: Size of a gap in a variable symbol.

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.

`hair-thickness` (number)
: Thickness of the thin line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to `Staff.StaffSymbol.thickness`).

`kern` (dimension, in staff space)
: The space between individual elements in any compound bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to `Staff.StaffSymbol.thickness`).

`rounded` (boolean)
: Decide whether lines should be drawn rounded or not.

`segno-kern` (number)
: The space between the two thin lines of the segno bar line symbol, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to `Staff.StaffSymbol.thickness`).

`thick-thickness` (number)
: Thickness of the thick line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to `Staff.StaffSymbol.thickness`).

Internal properties:

`has-span-bar` (pair)
: A pair of grobs containing the span bars to be drawn below and above the staff. If no span bar is in a position, the respective element is set to `#f`.

This grob interface is used in the following graphical object(s): `BarLine` (page 354), and `SpanBar` (page 468).

3.2.10 bass-figure-alignment-interface

Align a bass figure.

This grob interface is used in the following graphical object(s): `BassFigureAlignment` (page 359).

3.2.11 bass-figure-interface

A bass figure text.

User settable properties:

`implicit` (boolean)
: Is this an implicit bass figure?

This grob interface is used in the following graphical object(s): `BassFigure` (page 359).

3.2.12 beam-interface

A beam.

The `beam-thickness` property is the weight of beams, measured in staffspace. The `direction` property is not user-serviceable. Use the `direction` property of `Stem` instead. The following properties may be set in the `details` list.

`stem-length-demerit-factor`
: Demerit factor used for inappropriate stem lengths.

`secondary-beam-demerit`
: Demerit used in quanting calculations for multiple beams.

`region-size`
: Size of region for checking quant scores.

`beam-eps` Epsilon for beam quant code to check for presence in gap.

`stem-length-limit-penalty`
: Penalty for differences in stem lengths on a beam.

`damping-direction-penalty`
: Demerit penalty applied when beam direction is different from damping direction.

`hint-direction-penalty`
: Demerit penalty applied when beam direction is different from damping direction, but damping slope is <= `round-to-zero-slope`.

`musical-direction-factor`
: Demerit scaling factor for difference between beam slope and music slope.

`ideal-slope-factor`
: Demerit scaling factor for difference between beam slope and damping slope.

`round-to-zero-slope`
: Damping slope which is considered zero for purposes of calculating direction penalties.

User settable properties:

`auto-knee-gap` (dimension, in staff space)
: If a gap is found between note heads where a horizontal beam fits and it is larger than this number, make a kneed beam.

`beam-thickness` (dimension, in staff space)
: Beam thickness, measured in `staff-space` units.

`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.

`break-overshoot` (pair of numbers)
: How much does a broken spanner stick out of its bounds?

`clip-edges` (boolean)
: Allow outward pointing beamlets at the edges of beams?

`collision-interfaces` (list)
: A list of interfaces for which automatic beam-collision resolution is run.

`collision-voice-only` (boolean)
: Does automatic beam collsion apply only to the voice in which the beam was created?

`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.

`damping` (number)
: Amount of beam slope damping.

`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.

`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`.

`gap` (dimension, in staff space)
: Size of a gap in a variable symbol.

`gap-count` (integer)
: Number of gapped beams for tremolo.

`grow-direction` (direction)
: Crescendo or decrescendo?

`inspect-quants` (pair of numbers)
: If debugging is set, set beam and slur position to a (quantized) position that is as close as possible to this value, and print the demerits for the inspected position in the output.

`knee` (boolean)
: Is this beam kneed?

`length-fraction` (number)
: Multiplier for lengths. Used for determining ledger lines and stem lengths.

`neutral-direction` (direction)
: Which direction to take in the center of the staff.

`positions` (pair of numbers)
: Pair of staff coordinates `(`*`start . end`*`)`, where *start* and *end* are vertical positions 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.

`skip-quanting` (boolean)
: Should beam quanting be skipped?

`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.

Internal properties:

`annotation` (string)
: Annotate a grob for debug purposes.

`beam-segments` (list)
: Internal representation of beam segments.

`covered-grobs` (array of grobs)
: Grobs that could potentially collide with a beam.

`least-squares-dy` (number)
: The ideal beam slope, without damping.

`normal-stems` (array of grobs)
: An array of visible stems.

`quantized-positions` (pair of numbers)
: The beam positions after quanting.

`shorten` (dimension, in staff space)
: The amount of space that a stem is shortened. Internally used to distribute beam shortening over stems.

`stems` (array of grobs)
: An array of stem objects.

This grob interface is used in the following graphical object(s): `Beam` (page 362).

3.2.13 bend-after-interface

A doit or drop.

User settable properties:

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`delta-position` (number)
: The vertical position difference.

This grob interface is used in the following graphical object(s): `BendAfter` (page 364).

3.2.14 bend-interface

The (curved) line representing a bent string.

Available for the `'style` property are `'hold`, `'pre-bend` and `'pre-bend-hold`.

The following properties may be set in the details list.

`arrow-stencil`
: The stencil procedure for the `BendSpanner` arrow head.

`curvature-factor`
: Determines the horizontal part of a bend arrow as percentage of the total horizontal extent, usually between 0 and 1.

`bend-arrowhead-height`
: The height of the arrow head.

`bend-arrowhead-width`
: The width of the arrow head.

`bend-amount-strings`
: An alist with entries for `'quarter`, `'half`, `'three-quarter` and `'full`, which are used to print how much a string is bent.

`curve-x-padding-line-end`
: For a broken `BendSpanner`, set the padding at the line end to subsequent objects like changed `Clef`, etc.

`curve-y-padding-line-end`
: For a broken `BendSpanner` started from a chord the curves don't match; there is a certain vertical gap specified by this value.

`dashed-line-settings`
: List of three numeric values representing on, off and phase of a dashed line.

`head-text-break-visibility`
: A vector of three booleans to set visibility of the arrow head and the text at a line break. This is important for `'style` set to `'hold`, `'pre-bend` or `'pre-bend-hold`.

`horizontal-left-padding`
: The amount of horizontal free space between a `TabNoteHead` and the starting `BendSpanner`.

`successive-level`
: An integer used as a factor determining the vertical coordinate of the starting `BendSpanner`. If `successive-level` is 1, the `BendSpanner` starts at the `TabNoteHead`. If consecutive `BendSpanner`s are set this value should be set to an appropriate value for the first one; later on, this value is maintained by the engraver.

`target-visibility`
: A boolean to decide whether the target `TabNoteHead` should be visible. For up-pointing bends this is usually true.

`y-distance-from-tabstaff-to-arrow-tip`
: This numeric value determines the distance between the `TabStaff` and the arrow head of the `BendSpanner`.

User settable properties:

`bend-me` (boolean)
: Decide whether this grob is bent.

`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.

`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`.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

This grob interface is used in the following graphical object(s): `BendSpanner` (page 365), `NoteColumn` (page 445), `NoteHead` (page 446), and `TabNoteHead` (page 485).

3.2.15 break-alignable-interface

Object that is aligned on a break alignment.

User settable properties:

`break-align-symbols` (list)
: A list of *break-align symbols* that determines which breakable items 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 listed in Section "break-alignment-interface" in *Internals Reference*.

`non-break-align-symbols` (list)
: A list of symbols that determine which NON-break-aligned interfaces to align this to.

This grob interface is used in the following graphical object(s): `BarNumber` (page 357), `JumpScript` (page 415), `MetronomeMark` (page 436), and `RehearsalMark` (page 456).

3.2.16 break-aligned-interface

Breakable items.

User settable properties:

`break-align-anchor` (number)
: Grobs aligned to this breakable item 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-symbol` (symbol)
: This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`space-alist` (list)
: An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for *`break-align-symbol`* are listed in Section "break-alignment-interface" in *Internals Reference*. Additionally, three special break-align symbols available to `space-alist` are:

`first-note`
: used when the grob is just left of the first note on a line

`next-note`
: used when the grob is just left of any other note; if not set, the value of `first-note` gets used

`right-edge`
: used when the grob is the last item on the line (only compatible with the `extra-space` spacing style)

Choices for *`spacing-style`* are:

`extra-space`
: Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

`minimum-space`
: Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

`fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

`minimum-fixed-space`
: Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

`semi-fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

This grob interface is used in the following graphical object(s): `Ambitus` (page 347), `AmbitusAccidental` (page 348), `BarLine` (page 354), `BreakAlignGroup` (page 367), `BreathingSign` (page 369), `Clef` (page 372), `CueClef` (page 378), `CueEndClef` (page 381), `Custos` (page 384), `DoublePercentRepeat` (page 387), `KeyCancellation` (page 417), `KeySignature` (page 419), `LeftEdge` (page 425), and `TimeSignature` (page 492).

3.2.17 `break-alignment-interface`

The object that performs break alignment.

Three interfaces deal specifically with break alignment:

1. break-alignment-interface (this one),
2. Section 3.2.15 [`break-alignable-interface`], page 523, and
3. Section 3.2.16 [`break-aligned-interface`], page 523.

Each of these interfaces supports grob properties that use *break-align symbols*, which are Scheme symbols that are used to specify the alignment, ordering, and spacing of certain notational elements ('breakable' items).

Available break-align symbols:

```
ambitus
breathing-sign
clef
cue-clef
cue-end-clef
custos
key-cancellation
key-signature
left-edge
staff-bar
time-signature
```

User settable properties:

`break-align-orders` (vector)

This is a vector of 3 lists: `#(`*`end-of-line unbroken start-of-line`*`)`. Each list contains *break-align symbols* that specify an order of breakable items (see Section "break-alignment-interface" in *Internals Reference*).

For example, this places time signatures before clefs:

```
\override Score.BreakAlignment.break-align-orders =
  #(make-vector 3 '(left-edge
                    cue-end-clef
                    ambitus
                    breathing-sign
                    time-signature
                    clef
                    cue-clef
                    staff-bar
                    key-cancellation
                    key-signature
                    custos))
```

Internal properties:

`positioning-done` (boolean)

Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): `BreakAlignment` (page 368).

3.2.18 breathing-sign-interface

A breathing sign.

User settable properties:

`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`.

This grob interface is used in the following graphical object(s): `BreathingSign` (page 369).

3.2.19 `chord-name-interface`

A chord label (name or fretboard).

Internal properties:

`begin-of-line-visible` (boolean)
: Set to make `ChordName` or `FretBoard` be visible only at beginning of line or at chord changes.

This grob interface is used in the following graphical object(s): `ChordName` (page 371), and `FretBoard` (page 404).

3.2.20 `clef-interface`

A clef sign.

User settable properties:

`full-size-change` (boolean)
: Don't make a change clef smaller.

`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.

`non-default` (boolean)
: Set for manually specified clefs and keys.

This grob interface is used in the following graphical object(s): `Clef` (page 372), `CueClef` (page 378), and `CueEndClef` (page 381).

3.2.21 `clef-modifier-interface`

The number describing transposition of the clef, placed below or above clef sign. Usually this is 8 (octave transposition) or 15 (two octaves), but LilyPond allows any integer here.

User settable properties:

`clef-alignments` (list)
: An alist of parent-alignments that should be used for clef modifiers with various clefs

This grob interface is used in the following graphical object(s): `ClefModifier` (page 374).

3.2.22 `cluster-beacon-interface`

A place holder for the cluster spanner to determine the vertical extents of a cluster spanner at this X position.

User settable properties:

`positions` (pair of numbers)
: Pair of staff coordinates `(start . end)`, where *start* and *end* are vertical positions 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.

This grob interface is used in the following graphical object(s): `ClusterSpannerBeacon` (page 376).

3.2.23 `cluster-interface`

A graphically drawn musical cluster.

`padding` adds to the vertical extent of the shape (top and bottom).

The property `style` controls the shape of cluster segments. Valid values include `leftsided-stairs`, `rightsided-stairs`, `centered-stairs`, and `ramp`.

User settable properties:

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

Internal properties:

`columns` (array of grobs)
: An array of grobs, typically containing `PaperColumn` or `NoteColumn` objects.

This grob interface is used in the following graphical object(s): `ClusterSpanner` (page 376).

3.2.24 `custos-interface`

A custos object. `style` can have four valid values: `mensural`, `vaticana`, `medicaea`, and `hufnagel`. `mensural` is the default style.

User settable properties:

`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.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

This grob interface is used in the following graphical object(s): `Custos` (page 384).

3.2.25 `dot-column-interface`

Group dot objects so they form a column, and position dots so they do not clash with staff lines.

User settable properties:

`chord-dots-limit` (integer)
: Limits the column of dots on each chord to the height of the chord plus `chord-dots-limit` staff-positions.

`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`.

Internal properties:

`dots` (array of grobs)
: Multiple `Dots` objects.

`note-collision` (graphical (layout) object)
: The `NoteCollision` object of a dot column.

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): `DotColumn` (page 386).

3.2.26 dots-interface

The dots to go with a notehead or rest. `direction` sets the preferred direction to move in case of staff line collisions. `style` defaults to undefined, which is normal 19th/20th century traditional style. Set `style` to `vaticana` for ancient type dots.

User settable properties:

`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.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

This grob interface is used in the following graphical object(s): `Dots` (page 386).

3.2.27 duration-line-interface

A line lasting for the duration of a rhythmic event.

User settable properties:

`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.

This grob interface is used in the following graphical object(s): `DurationLine` (page 390).

3.2.28 dynamic-interface

Any kind of loudness sign.

This grob interface is used in the following graphical object(s): `DynamicLineSpanner` (page 392), `DynamicText` (page 394), `DynamicTextSpanner` (page 395), and `Hairpin` (page 409).

3.2.29 dynamic-line-spanner-interface

Dynamic line spanner.

User settable properties:

`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`.

This grob interface is used in the following graphical object(s): `DynamicLineSpanner` (page 392).

3.2.30 dynamic-text-interface

An absolute text dynamic.

User settable properties:

`right-padding` (dimension, in staff space)
: Space to insert on the right side of an object (e.g., between note and its accidentals).

This grob interface is used in the following graphical object(s): `DynamicText` (page 394).

3.2.31 dynamic-text-spanner-interface

Dynamic text spanner.

User settable properties:

`text` (markup)
: Text markup. See Section “Formatting text” in *Notation Reference*.

This grob interface is used in the following graphical object(s): `DynamicTextSpanner` (page 395).

3.2.32 enclosing-bracket-interface

Brackets alongside bass figures.

User settable properties:

`bracket-flare` (pair of numbers)
: A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

`dashed-edge` (boolean)
: If set, the bracket edges are dashed like the rest of the bracket.

`edge-height` (pair)
: A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`shorten-pair` (pair of numbers)
: The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

This grob interface is used in the following graphical object(s): `BassFigureBracket` (page 361).

3.2.33 `episema-interface`

An episema line.

This grob interface is used in the following graphical object(s): `Episema` (page 397).

3.2.34 `figured-bass-continuation-interface`

Simple extender line between bounds.

User settable properties:

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`figures` (array of grobs)
: Figured bass objects for continuation line.

This grob interface is used in the following graphical object(s): `BassFigureContinuation` (page 361).

3.2.35 finger-glide-interface

The line between Fingering grobs indicating a glide with that finger.

The property style may take the following symbols.

line A simple connecting line.

dashed-line
: Print a dashed line. Customizable with settings for dash-fraction and dash-period.

dotted-line
: Print a dotted line.

stub-right
: The printed line is limited to a certain amount right before its right bound. This amount is configurable by a suitable setting for bound-details.right.right-stub-length.

stub-left
: The printed line is limited to a certain amount right after its left bound. The amount is configurable by a suitable setting for bound-details.right.left-stub-length.

stub-both
: The printed line combines the settings of stub-left and stub-right.

zigzag A zigzag line, configurable with suitable settings for zigzag-width and zigzag-length.

trill A trill style line.

bow A bow style line. The orientation of the bow may be tweaked with a suitable setting of details.bow-direction.

User settable properties:

dash-fraction (number)
: Size of the dashes, relative to dash-period. Should be between 0.1 and 1.0 (continuous line). If set to 0.0, a dotted line is produced

dash-period (number)
: The length of one dash together with whitespace. If negative, no line is drawn at all.

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.

style (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

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 spanner line can be constructed from a whole number of squiggles.

This grob interface is used in the following graphical object(s): FingerGlideSpanner (page 398).

3.2.36 finger-interface

A fingering instruction.

This grob interface is used in the following graphical object(s): Fingering (page 399).

3.2.37 fingering-column-interface

Makes sure that fingerings placed laterally do not collide and that they are flush if necessary.

User settable properties:

padding (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

snap-radius (number)
: The maximum distance between two objects that will cause them to snap to alignment along an axis.

Internal properties:

positioning-done (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): FingeringColumn (page 401).

3.2.38 flag-interface

A flag that gets attached to a stem.The style property is symbol determining what style of flag glyph is typeset on a Stem. Valid options include '() for standard flags, 'mensural and 'no-flag, which switches off the flag.

User settable properties:

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.

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.

This grob interface is used in the following graphical object(s): Flag (page 401).

3.2.39 font-interface

Any symbol that is typeset through fixed sets of glyphs, (i.e., fonts).

User settable properties:

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-features` (list)
: Opentype features.

`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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

Internal properties:

`font` (font metric)
: A cached font metric object.

This grob interface is used in the following graphical object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalSuggestion` (page 345), `AmbitusAccidental` (page 348), `AmbitusLine` (page 349), `AmbitusNoteHead` (page 350), `Arpeggio` (page 351), `BalloonTextItem` (page 352), `BalloonTextSpanner` (page 353), `BarLine` (page 354), `BarNumber` (page 357), `BassFigure` (page 359), `BendSpanner` (page 365), `BreathingSign` (page 369), `ChordName` (page 371), `Clef` (page 372), `ClefModifier` (page 374), `CombineTextScript` (page 377), `CueClef` (page 378), `CueEndClef` (page 381), `Custos` (page 384), `Dots` (page 386), `DoublePercentRepeat` (page 387), `DoublePercentRepeatCounter` (page 388), `DoubleRepeatSlash` (page 390), `DurationLine` (page 390), `DynamicText` (page 394), `DynamicTextSpanner` (page 395), `Episema` (page 397), `Fingering` (page 399), `Flag` (page 401), `FootnoteItem` (page 402), `FootnoteSpanner` (page 403), `FretBoard` (page 404), `HorizontalBracketText` (page 412), `InstrumentName` (page 413), `InstrumentSwitch` (page 413), `JumpScript` (page 415), `KeyCancellation` (page 417), `KeySignature` (page 419), `KievanLigature` (page 422), `LyricHyphen` (page 428), `LyricText` (page 430), `MeasureCounter` (page 432), `MeasureSpanner` (page 434), `MensuralLigature` (page 436), `MetronomeMark` (page 436), `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), `MultiMeasureRestText` (page 442), `NonMusicalPaperColumn` (page 443), `NoteHead` (page 446), `NoteName` (page 447), `OttavaBracket` (page 448), `PaperColumn` (page 450), `ParenthesesItem` (page 451), `PercentRepeat` (page 451), `PercentRepeatCounter` (page 452), `RehearsalMark` (page 456), `Rest` (page 460), `Script` (page 461), `SostenutoPedal` (page 465), `SpanBar` (page 468), `StanzaNumber` (page 472), `StringNumber` (page 476), `StrokeFinger` (page 477), `SustainPedal` (page 479), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), `SystemStartSquare` (page 484), `TabNoteHead` (page 485), `TextScript` (page 487), `TextSpanner` (page 489), `TimeSignature` (page 492), `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), `TrillPitchHead` (page 497), `TrillSpanner` (page 498), `TupletNumber` (page 500), `UnaCordaPedal` (page 501), `VaticanaLigature` (page 504), and `VoltaBracket` (page 507).

3.2.40 footnote-interface

Make a footnote.

User settable properties:

`automatically-numbered` (boolean)
: If set, footnotes are automatically numbered.

`footnote` (boolean)
: Should this be a footnote or in-note?

`footnote-text` (markup)
: A footnote for the grob.

Internal properties:

`numbering-assertion-function` (any type)
: The function used to assert that footnotes are receiving correct automatic numbers.

This grob interface is used in the following graphical object(s): `FootnoteItem` (page 402), and `FootnoteSpanner` (page 403).

3.2.41 footnote-spanner-interface

Make a footnote spanner.

User settable properties:

`footnote-text` (markup)
: A footnote for the grob.

Internal properties:

`spanner-placement` (direction)
: The place of an annotation on a spanner. `LEFT` is for the first spanner, and `RIGHT` is for the last. `CENTER` will place it on the broken spanner that falls closest to the center of the length of the entire spanner, although this behavior is unpredictable in situations with lots of rhythmic diversity. For predictable results, use `LEFT` and `RIGHT`.

This grob interface is used in the following graphical object(s): `FootnoteSpanner` (page 403).

3.2.42 fret-diagram-interface

A fret diagram

User settable properties:

`align-dir` (direction)
: Which side to align? `-1`: left side, `0`: around center of width, `1`: right side.

`dot-placement-list` (list)
: List consisting of `(`*`description string-number fret-number finger-number`*`)` entries used to define fret diagrams.

`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-distance` – Multiplier to adjust the distance between frets. Default 1.0.
- `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.
- `fret-label-horizontal-offset` – The offset of the fret label from the center of the fret in direction orthogonal to strings. Default 0.
- `handedness` – Print the fret-diagram left- or right-handed. `-1`, `LEFT` for left ; `1`, `RIGHT` for right. Default `RIGHT`.
- `paren-padding` – The padding for the parenthesis. Default 0.05.
- `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-distance` – Multiplier to adjust the distance between strings. Default 1.0.
- `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.

`size` (number)
: The ratio of the size of the object to its default size.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

This grob interface is used in the following graphical object(s): `FretBoard` (page 404).

3.2.43 glissando-interface

A glissando.

Internal properties:

`glissando-index` (integer)
: The index of a glissando in its note column.

This grob interface is used in the following graphical object(s): `Glissando` (page 406).

3.2.44 grace-spacing-interface

Keep track of durations in a run of grace notes.

User settable properties:

`common-shortest-duration` (moment)
: The most common shortest note length. This is used in spacing. Enlarging this sets the score tighter.

Internal properties:

`columns` (array of grobs)
: An array of grobs, typically containing `PaperColumn` or `NoteColumn` objects.

This grob interface is used in the following graphical object(s): `GraceSpacing` (page 408).

3.2.45 gregorian-ligature-interface

A gregorian ligature.

Internal properties:

`ascendens` (boolean)
: Is this neume of ascending type?

`auctum` (boolean)
: Is this neume liquescentically augmented?

`cavum` (boolean)
: Is this neume outlined?

`context-info` (integer)
: Within a ligature, the final glyph or shape of a head may be affected by the left and/or right neighbour head. `context-info` holds for each head such information about the left and right neighbour, encoded as a bit mask.

`deminutum` (boolean)
: Is this neume deminished?

`descendens` (boolean)
: Is this neume of descendent type?

`inclinatum` (boolean)
: Is this neume an inclinatum?

`linea` (boolean)
: Attach vertical lines to this neume?

`oriscus` (boolean)
: Is this neume an oriscus?

`pes-or-flexa` (boolean)
: Shall this neume be joined with the previous head?

`prefix-set` (number)
: A bit mask that holds all Gregorian head prefixes, such as `\virga` or `\quilisma`.

`quilisma` (boolean)
: Is this neume a quilisma?

`stropha` (boolean)
: Is this neume a stropha?

`virga` (boolean)
: Is this neume a virga?

This grob interface is used in the following graphical object(s): `NoteHead` (page 446).

3.2.46 grid-line-interface

A line that is spanned between grid-points.

User settable properties:

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

This grob interface is used in the following graphical object(s): `GridLine` (page 408).

3.2.47 grid-point-interface

A spanning point for grid lines.

This grob interface is used in the following graphical object(s): `GridPoint` (page 409).

3.2.48 grob-interface

A grob represents a piece of music notation.

All grobs have an X and Y position on the page. These X and Y positions are stored in a relative format, thus they can easily be combined by stacking them, hanging one grob to the side of another, or coupling them into grouping objects.

Each grob has a reference point (a.k.a. parent): The position of a grob is stored relative to that reference point. For example, the X reference point of a staccato dot usually is the note head that it applies to. When the note head is moved, the staccato dot moves along automatically.

A grob is often associated with a symbol, but some grobs do not print any symbols. They take care of grouping objects. For example, there is a separate grob that stacks staves vertically. The Section 3.1.85 [`NoteCollision`], page 445, object is also an abstract grob: It only moves around chords, but doesn't print anything.

Grobs have properties (Scheme variables) that can be read and set. Two types of them exist: immutable and mutable. Immutable variables define the default style and behavior. They are shared between many objects. They can be changed using `\override` and `\revert`. Mutable properties are variables that are specific to one grob. Typically, lists of other objects, or results from computations are stored in mutable properties. In particular, every call to `ly:grob-set-property!` (or its C++ equivalent) sets a mutable property.

The properties `after-line-breaking` and `before-line-breaking` are dummies that are not user-serviceable.

User settable properties:

`after-line-breaking` (boolean)
: Dummy property, used to trigger callback for `after-line-breaking`.

`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`.

`before-line-breaking` (boolean)
: Dummy property, used to trigger a callback function.

`color` (color)
: The color of this grob.

`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`.

`footnote-music` (music)
: Music creating a footnote.

`forced-spacing` (number)
: Spacing forced between grobs, used in various ligature engravers.

`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.

`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.

`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.

`output-attributes` (list)
: An alist of attributes for the grob, to be included in output files. When the SVG typesetting backend is used, the attributes are assigned to a group (`<g>`) containing all of the stencils that comprise a given grob. For example,

```
'((id . 123) (class . foo) (data-whatever . "bar"))
```

produces

```
<g id="123" class="foo" data-whatever="bar"> ... </g>
```

In the Postscript backend, where there is no way to group items, the setting of the `output-attributes` property has no effect.

`parenthesis-friends` (list)
: A list of Grob types, as symbols. When parentheses enclose a Grob that has 'parenthesis-friends, the parentheses widen to include any child Grobs with type among 'parenthesis-friends.

`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.

`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.

`springs-and-rods` (boolean)
: Dummy variable for triggering spacing routines.

`stencil` (stencil)
: The symbol to print.

`transparent` (boolean)
: This makes the grob invisible.

`vertical-skylines` (pair of skylines)
: Two skylines, one above and one below this grob.

`whiteout` (boolean-or-number)
: If a number or true, the grob is printed over a white background to white-out underlying material, if the grob is visible. A number indicates how far the

white background extends beyond the bounding box of the grob as a multiple of the staff-line thickness. The `LyricHyphen` grob uses a special implementation of whiteout: A positive number indicates how far the white background extends beyond the bounding box in multiples of `line-thickness`. The shape of the background is determined by `whiteout-style`. Usually `#f` by default.

`whiteout-style` (symbol)
: Determines the shape of the `whiteout` background. Available are `'outline`, `'rounded-box`, and the default `'box`. There is one exception: Use `'special` for `LyricHyphen`.

`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.

`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.

Internal properties:

`axis-group-parent-X` (graphical (layout) object)
: Containing X axis group.

`axis-group-parent-Y` (graphical (layout) object)
: Containing Y axis group.

`cause` (any type)
: Any kind of causation objects (i.e., music, or perhaps translator) that was the cause for this grob.

`cross-staff` (boolean)
: True for grobs whose `Y-extent` depends on inter-staff spacing. The extent is measured relative to the grobs's parent staff (more generally, its `VerticalAxisGroup`) so this boolean flags grobs that are not rigidly fixed to their parent staff. Beams that join notes from two staves are `cross-staff`. Grobs that are positioned around such beams are also `cross-staff`. Grobs that are grouping objects, however, like `VerticalAxisGroups` will not in general be marked `cross-staff` when some of the members of the group are `cross-staff`.

`interfaces` (list)
: A list of symbols indicating the interfaces supported by this object. It is initialized from the `meta` field.

`meta` (list) Provide meta information. It is an alist with the entries `name` and `interfaces`.

`pure-Y-offset-in-progress` (boolean)
: A debugging aid for catching cyclic dependencies.

`staff-symbol` (graphical (layout) object)
: The staff symbol grob that we are in.

This grob interface is used in the following graphical object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), `AccidentalSuggestion` (page 345), `Ambitus` (page 347), `AmbitusAccidental` (page 348), `AmbitusLine` (page 349), `AmbitusNoteHead` (page 350), `Arpeggio` (page 351), `BalloonTextItem` (page 352), `BalloonTextSpanner` (page 353), `BarLine` (page 354), `BarNumber` (page 357), `BassFigure` (page 359), `BassFigureAlignment` (page 359), `BassFigureAlignmentPositioning` (page 360), `BassFigureBracket` (page 361), `BassFigureContinuation` (page 361), `BassFigureLine` (page 362), `Beam` (page 362), `BendAfter` (page 364), `BendSpanner` (page 365), `BreakAlignGroup` (page 367), `BreakAlignment` (page 368), `BreathingSign` (page 369), `ChordName` (page 371), `Clef` (page 372), `ClefModifier` (page 374), `ClusterSpanner` (page 376), `ClusterSpannerBeacon` (page 376), `CombineTextScript` (page 377), `CueClef` (page 378), `CueEndClef` (page 381), `Custos` (page 384), `DotColumn` (page 386), `Dots` (page 386), `DoublePercentRepeat` (page 387), `DoublePercentRepeatCounter` (page 388), `DoubleRepeatSlash` (page 390), `DurationLine` (page 390), `DynamicLineSpanner` (page 392), `DynamicText` (page 394), `DynamicTextSpanner` (page 395), `Episema` (page 397), `FingerGlideSpanner` (page 398), `Fingering` (page 399), `FingeringColumn` (page 401), `Flag` (page 401), `FootnoteItem` (page 402), `FootnoteSpanner` (page 403), `FretBoard` (page 404), `Glissando` (page 406), `GraceSpacing` (page 408), `GridLine` (page 408), `GridPoint` (page 409), `Hairpin` (page 409), `HorizontalBracket` (page 411), `HorizontalBracketText` (page 412), `InstrumentName` (page 413), `InstrumentSwitch` (page 413), `JumpScript` (page 415), `KeyCancellation` (page 417), `KeySignature` (page 419), `KievanLigature` (page 422), `LaissezVibrerTie` (page 423), `LaissezVibrerTieColumn` (page 424), `LedgerLineSpanner` (page 424), `LeftEdge` (page 425), `LigatureBracket` (page 427), `LyricExtender` (page 428), `LyricHyphen` (page 428), `LyricSpace` (page 430), `LyricText` (page 430), `MeasureCounter` (page 432), `MeasureGrouping` (page 433), `MeasureSpanner` (page 434), `MelodyItem` (page 435), `MensuralLigature` (page 436), `MetronomeMark` (page 436), `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), `MultiMeasureRestText` (page 442), `NonMusicalPaperColumn` (page 443), `NoteCollision` (page 445), `NoteColumn` (page 445), `NoteHead` (page 446), `NoteName` (page 447), `NoteSpacing` (page 448), `OttavaBracket` (page 448), `PaperColumn` (page 450), `ParenthesesItem` (page 451), `PercentRepeat` (page 451), `PercentRepeatCounter` (page 452), `PhrasingSlur` (page 453), `PianoPedalBracket` (page 455), `RehearsalMark` (page 456), `RepeatSlash` (page 458), `RepeatTie` (page 459), `RepeatTieColumn` (page 460), `Rest` (page 460), `RestCollision` (page 461), `Script` (page 461), `ScriptColumn` (page 463), `ScriptRow` (page 463), `Slur` (page 463), `SostenutoPedal` (page 465), `SostenutoPedalLineSpanner` (page 466), `SpacingSpanner` (page 467), `SpanBar` (page 468), `SpanBarStub` (page 469), `StaffGrouper` (page 470), `StaffSpacing` (page 470), `StaffSymbol` (page 471), `StanzaNumber` (page 472), `Stem` (page 472), `StemStub` (page 474), `StemTremolo` (page 475), `StringNumber` (page 476), `StrokeFinger` (page 477), `SustainPedal` (page 479), `SustainPedalLineSpanner` (page 480), `System` (page 481), `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), `SystemStartSquare` (page 484), `TabNoteHead` (page 485), `TextScript` (page 487), `TextSpanner` (page 489), `Tie` (page 490), `TieColumn` (page 492), `TimeSignature` (page 492), `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), `TrillPitchHead` (page 497), `TrillSpanner` (page 498), `TupletBracket` (page 499), `TupletNumber` (page 500), `UnaCordaPedal` (page 501), `UnaCordaPedalLineSpanner` (page 503), `VaticanaLigature` (page 504), `VerticalAlignment` (page 504), `VerticalAxisGroup` (page 505), `VoiceFollower` (page 507), `VoltaBracket` (page 507), `VoltaBracketSpanner` (page 509), and `VowelTransition` (page 510).

3.2.49 hairpin-interface

A hairpin crescendo or decrescendo.

User settable properties:

`bound-padding` (number)
: The amount of padding to insert around spanner bounds.

`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).

`endpoint-alignments` (pair of numbers)
: A pair of numbers representing the alignments of an object's endpoints. E.g., the ends of a hairpin relative to `NoteColumn` grobs.

`grow-direction` (direction)
: Crescendo or decrescendo?

`height` (dimension, in staff space)
: Height of an object in `staff-space` units.

`shorten-pair` (pair of numbers)
: The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

Internal properties:

`adjacent-spanners` (array of grobs)
: An array of directly neighboring dynamic spanners.

`concurrent-hairpins` (array of grobs)
: All concurrent hairpins.

This grob interface is used in the following graphical object(s): `Hairpin` (page 409).

3.2.50 hara-kiri-group-spanner-interface

A group spanner that keeps track of interesting items. If it doesn't contain any after line breaking, it removes itself and all its children. Greater control can be exercised via `remove-layer` which can prioritize layers so only the lowest-numbered non-empty layer is retained; make the layer independent of the group; or make it dependent on any other member of the group

User settable properties:

`remove-empty` (boolean)
: If set, remove group if it contains no interesting items.

`remove-first` (boolean)
: Remove the first staff of an orchestral score?

`remove-layer` (index or symbol)
: When set as a positive integer, the `Keep_alive_together_engraver` removes all `VerticalAxisGroup` grobs with a `remove-layer` larger than the smallest retained `remove-layer`. Set to `#f` to make a layer independent of the `Keep_alive_together_engraver`. Set to `'()`, the layer does not participate in the layering decisions. The property can also be set as a symbol for common

behaviors: `#'any` to keep the layer alive with any other layer in the group; `#'above` or `#'below` to keep the layer alive with the context immediately before or after it, respectively.

Internal properties:

`important-column-ranks` (vector)
: A cache of columns that contain `items-worth-living` data.

`items-worth-living` (array of grobs)
: An array of interesting items. If empty in a particular staff, then that staff is erased.

`keep-alive-with` (array of grobs)
: An array of other `VerticalAxisGroup`s. If any of them are alive, then we will stay alive.

`make-dead-when` (array of grobs)
: An array of other `VerticalAxisGroup`s. If any of them are alive, then we will turn dead.

This grob interface is used in the following graphical object(s): `VerticalAxisGroup` (page 505).

3.2.51 horizontal-bracket-interface

A horizontal bracket encompassing notes.

User settable properties:

`bracket-flare` (pair of numbers)
: A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

`connect-to-neighbor` (pair)
: Pair of booleans, indicating whether this grob looks as a continued break.

`dashed-edge` (boolean)
: If set, the bracket edges are dashed like the rest of the bracket.

`edge-height` (pair)
: A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`shorten-pair` (pair of numbers)
: The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

Internal properties:

`bracket-text` (graphical (layout) object)
: The text for an analysis bracket.

`columns` (array of grobs)
: An array of grobs, typically containing `PaperColumn` or `NoteColumn` objects.

This grob interface is used in the following graphical object(s): `HorizontalBracket` (page 411), `OttavaBracket` (page 448), and `VoltaBracket` (page 507).

3.2.52 horizontal-bracket-text-interface

Label for an analysis bracket.

Internal properties:

`bracket` (graphical (layout) object)
: The bracket for a number.

`columns` (array of grobs)
: An array of grobs, typically containing `PaperColumn` or `NoteColumn` objects.

This grob interface is used in the following graphical object(s): `HorizontalBracketText` (page 412).

3.2.53 inline-accidental-interface

An inlined accidental (i.e. normal accidentals, cautionary accidentals).

This grob interface is used in the following graphical object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), and `TrillPitchAccidental` (page 495).

3.2.54 instrument-specific-markup-interface

Instrument-specific markup (like fret boards or harp pedal diagrams).

User settable properties:

`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-distance` – Multiplier to adjust the distance between frets. Default 1.0.
  - `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.
- `fret-label-horizontal-offset` – The offset of the fret label from the center of the fret in direction orthogonal to strings. Default 0.
- `handedness` – Print the fret-diagram left- or right-handed. `-1`, `LEFT` for left ; `1`, `RIGHT` for right. Default `RIGHT`.
- `paren-padding` – The padding for the parenthesis. Default 0.05.
- `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-distance` – Multiplier to adjust the distance between strings. Default 1.0.
- `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.

`graphical` (boolean)
: Display in graphical (vs. text) form.

`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.

`size` (number)
: The ratio of the size of the object to its default size.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

This grob interface is used in the following graphical object(s): `TextScript` (page 487).

3.2.55 `item-interface`

Grobs can be distinguished in their role in the horizontal spacing. Many grobs define constraints on the spacing by their sizes, for example, note heads, clefs, stems, and all other symbols with a fixed shape. These grobs form a subtype called `Item`.

Some items need special treatment for line breaking. For example, a clef is normally only printed at the start of a line (i.e., after a line break). To model this, 'breakable' items (clef, key signature, bar lines, etc.) are copied twice. Then we have three versions of each breakable item: one version if there is no line break, one version that is printed before the line break (at the end of a system), and one version that is printed after the line break.

Whether these versions are visible and take up space is determined by the outcome of the `break-visibility` grob property, which is a function taking a direction (`-1`, `0` or `1`) as an argument. It returns a cons of booleans, signifying whether this grob should be transparent and have no extent.

The following variables for `break-visibility` are predefined:

grob will show:	before break	no break	after break
all-invisible	no	no	no
begin-of-line-visible	no	no	yes
end-of-line-visible	yes	no	no
all-visible	yes	yes	yes
begin-of-line-invisible	yes	yes	no
end-of-line-invisible	no	yes	yes
center-invisible	yes	no	yes

User settable properties:

`break-visibility` (vector)
: A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`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)`.

`non-musical` (boolean)
: True if the grob belongs to a `NonMusicalPaperColumn`.

This grob interface is used in the following graphical object(s): `Accidental` (page 342), `AccidentalCautionary` (page 343), `AccidentalPlacement` (page 344), `AccidentalSuggestion` (page 345), `Ambitus` (page 347), `AmbitusAccidental` (page 348), `AmbitusLine` (page 349), `AmbitusNoteHead` (page 350), `Arpeggio` (page 351), `BalloonTextItem` (page 352), `BarLine` (page 354), `BarNumber` (page 357), `BassFigure` (page 359), `BassFigureBracket` (page 361), `BreakAlignGroup` (page 367), `BreakAlignment` (page 368), `BreathingSign` (page 369), `ChordName` (page 371), `Clef` (page 372), `ClefModifier` (page 374), `ClusterSpannerBeacon` (page 376), `CombineTextScript` (page 377), `CueClef` (page 378), `CueEndClef` (page 381), `Custos` (page 384), `DotColumn` (page 386), `Dots` (page 386), `DoublePercentRepeat` (page 387), `DoublePercentRepeatCounter` (page 388), `DoubleRepeatSlash` (page 390), `DynamicText` (page 394), `Fingering` (page 399), `FingeringColumn` (page 401), `Flag` (page 401), `FootnoteItem` (page 402), `FretBoard` (page 404), `GridLine` (page 408), `GridPoint` (page 409), `InstrumentSwitch` (page 413), `JumpScript` (page 415), `KeyCancellation` (page 417), `KeySignature` (page 419), `LaissezVibrerTie` (page 423), `LaissezVibrerTieColumn` (page 424), `LeftEdge` (page 425), `LyricText` (page 430), `MelodyItem` (page 435), `MetronomeMark` (page 436), `NonMusicalPaperColumn` (page 443), `NoteCollision` (page 445), `NoteColumn` (page 445), `NoteHead` (page 446), `NoteName` (page 447), `NoteSpacing` (page 448), `PaperColumn` (page 450), `ParenthesesItem` (page 451), `RehearsalMark` (page 456), `RepeatSlash` (page 458), `RepeatTie` (page 459), `RepeatTieColumn` (page 460), `Rest` (page 460), `RestCollision` (page 461), `Script` (page 461), `ScriptColumn` (page 463), `ScriptRow` (page 463), `SostenutoPedal` (page 465), `SpanBar` (page 468), `SpanBarStub` (page 469), `StaffSpacing` (page 470), `StanzaNumber` (page 472), `Stem` (page 472), `StemStub` (page 474), `StemTremolo` (page 475), `StringNumber` (page 476), `StrokeFinger` (page 477), `SustainPedal` (page 479), `TabNoteHead` (page 485), `TextScript` (page 487), `TimeSignature` (page 492), `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), `TrillPitchHead` (page 497), and `UnaCordaPedal` (page 501).

3.2.56 jump-script-interface

A jump instruction, e.g. D.S.

This grob interface is used in the following graphical object(s): `JumpScript` (page 415).

3.2.57 key-cancellation-interface

A key cancellation.

This grob interface is used in the following graphical object(s): `KeyCancellation` (page 417).

3.2.58 key-signature-interface

A group of accidentals, to be printed as signature sign.

User settable properties:

`alteration-alist` (list)
: List of (*pitch* . *accidental*) pairs for key signature.

`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.

`glyph-name-alist` (list)
: An alist of key-string pairs.

`non-default` (boolean)
: Set for manually specified clefs and keys.

`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.

`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.

Internal properties:

`c0-position` (integer)
: An integer indicating the position of middle C.

This grob interface is used in the following graphical object(s): `KeyCancellation` (page 417), and `KeySignature` (page 419).

3.2.59 kievan-ligature-interface

A kievan ligature.

User settable properties:

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

Internal properties:

`primitive` (integer)
: A pointer to a ligature primitive, i.e., an item similar to a note head that is part of a ligature.

This grob interface is used in the following graphical object(s): `KievanLigature` (page 422).

3.2.60 ledger-line-spanner-interface

This spanner draws the ledger lines of a staff. This is a separate grob because it has to process all potential collisions between all note heads. The thickness of ledger lines is controlled by the `ledger-line-thickness` property of the Section 3.1.114 [StaffSymbol], page 471, grob.

User settable properties:

`gap` (dimension, in staff space)
: Size of a gap in a variable symbol.

`length-fraction` (number)
: Multiplier for lengths. Used for determining ledger lines and stem lengths.

`minimum-length-fraction` (number)
: Minimum length of ledger line as fraction of note head size.

Internal properties:

`note-heads` (array of grobs)
: An array of note head grobs.

This grob interface is used in the following graphical object(s): `LedgerLineSpanner` (page 424).

3.2.61 ledgered-interface

Objects that need ledger lines, typically note heads. See also Section 3.2.60 [ledger-line-spanner-interface], page 549.

User settable properties:

`no-ledgers` (boolean)
: If set, don't draw ledger lines on this object.

This grob interface is used in the following graphical object(s): `AmbitusNoteHead` (page 350), `NoteHead` (page 446), and `TrillPitchHead` (page 497).

3.2.62 ligature-bracket-interface

A bracket indicating a ligature in the original edition.

User settable properties:

`height` (dimension, in staff space)
: Height of an object in `staff-space` units.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`width` (dimension, in staff space)
: The width of a grob measured in staff space.

This grob interface is not used in any graphical object.

3.2.63 ligature-head-interface

A note head that can become part of a ligature.

This grob interface is used in the following graphical object(s): `NoteHead` (page 446).

3.2.64 ligature-interface

A ligature.

This grob interface is not used in any graphical object.

3.2.65 line-interface

Generic line objects. Any object using lines supports this. The property `style` can be `line`, `dashed-line`, `trill`, `dotted-line`, `zigzag` or `none` (a transparent line).

For `dashed-line`, the length of the dashes is tuned with `dash-fraction`. If the latter is set to 0, a dotted line is produced.

User settable properties:

`arrow-length` (number)
: Arrow length.

`arrow-width` (number)
: Arrow width.

`dash-fraction` (number)
: Size of the dashes, relative to `dash-period`. Should be between `0.1` and `1.0` (continuous line). If set to `0.0`, a dotted line is produced

`dash-period` (number)
: The length of one dash together with whitespace. If negative, no line is drawn at all.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`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 spanner line can be constructed from a whole number of squiggles.

This grob interface is used in the following graphical object(s): `DurationLine` (page 390), `DynamicTextSpanner` (page 395), `Episema` (page 397), `Glissando` (page 406), `Hairpin` (page 409), `HorizontalBracket` (page 411), `LigatureBracket` (page 427), `MeasureSpanner` (page 434), `OttavaBracket` (page 448), `PianoPedalBracket` (page 455), `TextSpanner` (page 489), `TrillSpanner` (page 498), `TupletBracket` (page 499), `VoiceFollower` (page 507), `VoltaBracket` (page 507), and `VowelTransition` (page 510).

3.2.66 line-spanner-interface

Generic line drawn between two objects, e.g., for use with glissandi.

`bound-details` is a nested alist. It's possible to specify settings for the sub-properties: `left`, `left-broken`, `right` and `right-broken`.

Values for the following keys may be set:

`Y` Sets the Y coordinate of the end point, in staff-spaces 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`
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. Usually computed on the fly.

`stencil` Line spanners may have symbols at the beginning or end, which is contained in this sub-property. For internal use.

`text` This is a markup that is evaluated to yield the stencil.

`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 `stencil-align-dir-y` moves the symbol at the edge vertically relative to the end point of the line. With `stencil-offset`, expecting a number pair, the stencil is moved along the X axis according to the first value, the second value moves the stencil along the Y axis.

`arrow` Produces an arrowhead at the end-points of the line.

`padding` 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.

User settable properties:

`bound-details` (list)
An alist of properties for determining attachments of spanners to edges.

`extra-dy` (number)
Slope glissandi this much extra.

`gap` (dimension, in staff space)
Size of a gap in a variable symbol.

`left-bound-info` (list)
An alist of properties for determining attachments of spanners to edges.

`right-bound-info` (list)
An alist of properties for determining attachments of spanners to edges.

`simple-Y` (boolean)
Should the Y placement of a spanner disregard changes in system heights?

`thickness` (number)
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`to-barline` (boolean)
If true, the spanner will stop at the bar line just before it would otherwise stop.

Internal properties:

`note-columns` (array of grobs)
: An array of `NoteColumn` grobs.

This grob interface is used in the following graphical object(s): `BendSpanner` (page 365), `DurationLine` (page 390), `DynamicTextSpanner` (page 395), `Episema` (page 397), `FingerGlideSpanner` (page 398), `Glissando` (page 406), `TextSpanner` (page 489), `TrillSpanner` (page 498), `VoiceFollower` (page 507), and `VowelTransition` (page 510).

3.2.67 `lyric-extender-interface`

The extender is a simple line at the baseline of the lyric that helps show the length of a melisma (a tied or slurred note).

User settable properties:

`left-padding` (dimension, in staff space)
: The amount of space that is put left to an object (e.g., a lyric extender).

`next` (graphical (layout) object)
: Object that is next relation (e.g., the lyric syllable following an extender).

`right-padding` (dimension, in staff space)
: Space to insert on the right side of an object (e.g., between note and its accidentals).

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`heads` (array of grobs)
: An array of note heads.

This grob interface is used in the following graphical object(s): `LyricExtender` (page 428).

3.2.68 `lyric-hyphen-interface`

A centered hyphen is simply a line between lyrics used to divide syllables.

User settable properties:

`dash-period` (number)
: The length of one dash together with whitespace. If negative, no line is drawn at all.

`height` (dimension, in staff space)
: Height of an object in `staff-space` units.

`length` (dimension, in staff space)
: User override for the stem length of unbeamed stems (each unit represents half a `staff-space`).

`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.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

This grob interface is used in the following graphical object(s): `LyricHyphen` (page 428), and `LyricSpace` (page 430).

3.2.69 `lyric-interface`

Any object that is related to lyrics.

This grob interface is used in the following graphical object(s): `LyricExtender` (page 428), `LyricHyphen` (page 428), and `VowelTransition` (page 510).

3.2.70 `lyric-syllable-interface`

A single piece of lyrics.

This grob interface is used in the following graphical object(s): `LyricText` (page 430).

3.2.71 `mark-interface`

A rehearsal mark.

This grob interface is used in the following graphical object(s): `RehearsalMark` (page 456).

3.2.72 `measure-counter-interface`

A counter for numbering measures.

User settable properties:

`count-from` (integer)
: The first measure in a measure count receives this number. The following measures are numbered in increments from this initial value.

`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)
```

Internal properties:

`columns` (array of grobs)
: An array of grobs, typically containing `PaperColumn` or `NoteColumn` objects.

This grob interface is used in the following graphical object(s): `MeasureCounter` (page 432).

3.2.73 measure-grouping-interface

This object indicates groups of beats. Valid choices for `style` are `bracket` and `triangle`.

User settable properties:

`height` (dimension, in staff space)
: Height of an object in `staff-space` units.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

This grob interface is used in the following graphical object(s): `MeasureGrouping` (page 433).

3.2.74 measure-spanner-interface

A bracket aligned to a measure or measures.

User settable properties:

`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.

`connect-to-neighbor` (pair)
: Pair of booleans, indicating whether this grob looks as a continued break.

`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`.

`edge-height` (pair)
: A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`shorten-pair` (pair of numbers)
: The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

`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)
```

`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.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

This grob interface is used in the following graphical object(s): `MeasureSpanner` (page 434).

3.2.75 `melody-spanner-interface`

Context dependent typesetting decisions.

User settable properties:

`neutral-direction` (direction)
: Which direction to take in the center of the staff.

Internal properties:

`stems` (array of grobs)
: An array of stem objects.

This grob interface is used in the following graphical object(s): `MelodyItem` (page 435).

3.2.76 `mensural-ligature-interface`

A mensural ligature.

User settable properties:

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`add-join` (boolean)
: Is this ligature head-joined with the next one by a vertical line?

`delta-position` (number)
: The vertical position difference.

`flexa-interval` (integer)
: The interval spanned by the two notes of a flexa shape (1 is a second, 7 is an octave).

`head-width` (dimension, in staff space)
: The width of this ligature head.

`ligature-flexa` (boolean)
: request joining note to the previous one in a flexa.

`primitive` (integer)
: A pointer to a ligature primitive, i.e., an item similar to a note head that is part of a ligature.

This grob interface is used in the following graphical object(s): `MensuralLigature` (page 436), and `NoteHead` (page 446).

3.2.77 `metronome-mark-interface`

A metronome mark.

This grob interface is used in the following graphical object(s): `MetronomeMark` (page 436).

3.2.78 `multi-measure-interface`

Multi measure rest, and the text or number that is printed over it.

User settable properties:

`bound-padding` (number)
: The amount of padding to insert around spanner bounds.

This grob interface is used in the following graphical object(s): `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), and `MultiMeasureRestText` (page 442).

3.2.79 `multi-measure-rest-interface`

A rest that spans a whole number of measures.

User settable properties:

`bound-padding` (number)
: The amount of padding to insert around spanner bounds.

`expand-limit` (integer)
: Maximum number of measures expanded in church rests.

`hair-thickness` (number)
: Thickness of the thin line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to *Staff*`.StaffSymbol.thickness`).

`max-symbol-separation` (number)
: The maximum distance between symbols making up a church rest.

`measure-count` (integer)
: The number of measures for a multi-measure rest.

`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.

`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.

`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)
```

`thick-thickness` (number)
: Thickness of the thick line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to *Staff*`.StaffSymbol.thickness`).

`usable-duration-logs` (list)
: List of `duration-log`s that can be used in typesetting the grob.

Internal properties:

`space-increment` (dimension, in staff space)
: The amount by which the total duration of a multimeasure rest affects horizontal spacing. Each doubling of the duration adds `space-increment` to the length of the bar.

This grob interface is used in the following graphical object(s): `MultiMeasureRest` (page 438), and `PercentRepeat` (page 451).

3.2.80 `multi-measure-rest-number-interface`

Multi measure rest number that is printed over a rest.

This grob interface is used in the following graphical object(s): `MultiMeasureRestNumber` (page 439).

3.2.81 `note-collision-interface`

An object that handles collisions between notes with different stem directions and horizontal shifts. Most of the interesting properties are to be set in Section 3.2.82 [`note-column-interface`], page 558: these are `force-hshift` and `horizontal-shift`.

User settable properties:

`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).

`note-collision-threshold` (dimension, in staff space)
: Simultaneous notes that are this close or closer in units of `staff-space` will be identified as vertically colliding. Used by `Stem` grobs for notes in the same voice, and `NoteCollision` grobs for notes in different voices. Default value 1.

`prefer-dotted-right` (boolean)
: For note collisions, prefer to shift dotted up-note to the right, rather than shifting just the dot.

Internal properties:

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): `NoteCollision` (page 445).

3.2.82 `note-column-interface`

Stem and noteheads combined.

User settable properties:

`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*.

`glissando-skip` (boolean)
: Should this `NoteHead` be skipped by glissandi?

`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*.

`ignore-collision` (boolean)
: If set, don't do note collision resolution on this `NoteColumn`.

Internal properties:

`note-heads` (array of grobs)
: An array of note head grobs.

`rest` (graphical (layout) object)
: A pointer to a `Rest` object.

`rest-collision` (graphical (layout) object)
: A rest collision that a rest is in.

`stem` (graphical (layout) object)
: A pointer to a `Stem` object.

This grob interface is used in the following graphical object(s): `NoteColumn` (page 445).

3.2.83 note-head-interface

A note head. There are many possible values for `style`. For a complete list, see Section "Note head styles" in *Notation Reference*.

User settable properties:

`duration-log` (integer)
: The 2-log of the note head duration, i.e., `0` = whole note, `1` = half note, etc.

`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.

`ignore-ambitus` (boolean)
: If set, don't consider this notehead for ambitus calculation.

`ledger-positions` (list)
: Vertical positions of ledger lines. When set on a `StaffSymbol` grob it defines a repeating pattern of ledger lines and any parenthesized groups will always be shown together.

`note-names` (vector)
: Vector of strings containing names for easy-notation note heads.

`stem-attachment` (pair of numbers)
: An `(x . y)` pair where the stem attaches to the notehead.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

Internal properties:

`accidental-grob` (graphical (layout) object)
: The accidental for this note.

This grob interface is used in the following graphical object(s): `AmbitusNoteHead` (page 350), `NoteHead` (page 446), `TabNoteHead` (page 485), and `TrillPitchGroup` (page 496).

3.2.84 note-name-interface

Note names.

This grob interface is used in the following graphical object(s): `NoteName` (page 447).

3.2.85 note-spacing-interface

This object calculates spacing wishes for individual voices.

User settable properties:

`knee-spacing-correction` (number)
: Factor for the optical correction amount for kneed beams. Set between `0` for no correction and `1` for full correction.

`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.

`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.

`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.

Internal properties:

`left-items` (array of grobs)
: Grobs organized on the left by a spacing object.

`right-items` (array of grobs)
: Grobs organized on the right by a spacing object.

This grob interface is used in the following graphical object(s): `NoteSpacing` (page 448).

3.2.86 `number-interface`

Numbers.

User settable properties:

`number-type` (symbol)
: Numbering style. Choices include `roman-lower`, `roman-upper` and `arabic`.

This grob interface is used in the following graphical object(s): `StringNumber` (page 476).

3.2.87 `only-prebreak-interface`

Kill this grob after the line breaking process.

This grob interface is not used in any graphical object.

3.2.88 `ottava-bracket-interface`

An ottava bracket.

User settable properties:

`bracket-flare` (pair of numbers)
: A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

`dashed-edge` (boolean)
: If set, the bracket edges are dashed like the rest of the bracket.

`edge-height` (pair)
: A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`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.

`shorten-pair` (pair of numbers)
: The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

This grob interface is used in the following graphical object(s): `OttavaBracket` (page 448).

3.2.89 `outside-staff-axis-group-interface`

A vertical axis group on which outside-staff skyline calculations are done.

User settable properties:

`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.

Internal properties:

`vertical-skyline-elements` (array of grobs)
: An array of grobs used to create vertical skylines.

This grob interface is used in the following graphical object(s): `BassFigureLine` (page 362), `System` (page 481), and `VerticalAxisGroup` (page 505).

3.2.90 `outside-staff-interface`

A grob that could be placed outside staff.

User settable properties:

`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-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.

This grob interface is used in the following graphical object(s): `AccidentalSuggestion` (page 345), `BarNumber` (page 357), `BassFigureAlignmentPositioning` (page 360),

BendSpanner (page 365), BreathingSign (page 369), ChordName (page 371), ClefModifier (page 374), CombineTextScript (page 377), DoublePercentRepeatCounter (page 388), DoubleRepeatSlash (page 390), DynamicLineSpanner (page 392), DynamicText (page 394), Fingering (page 399), FretBoard (page 404), Hairpin (page 409), HorizontalBracket (page 411), HorizontalBracketText (page 412), InstrumentSwitch (page 413), JumpScript (page 415), MeasureCounter (page 432), MeasureGrouping (page 433), MeasureSpanner (page 434), MetronomeMark (page 436), MultiMeasureRest (page 438), MultiMeasureRestNumber (page 439), MultiMeasureRestScript (page 441), MultiMeasureRestText (page 442), OttavaBracket (page 448), PercentRepeatCounter (page 452), PhrasingSlur (page 453), RehearsalMark (page 456), Script (page 461), Slur (page 463), SostenutoPedalLineSpanner (page 466), StringNumber (page 476), StrokeFinger (page 477), SustainPedalLineSpanner (page 480), TextScript (page 487), TextSpanner (page 489), TrillSpanner (page 498), TupletBracket (page 499), TupletNumber (page 500), UnaCordaPedalLineSpanner (page 503), and VoltaBracketSpanner (page 509).

3.2.91 paper-column-interface

Paper_column objects form the top-most X parents for items. There are two types of columns: musical and non-musical, to which musical and non-musical objects are attached respectively. The spacing engine determines the X positions of these objects.

They are numbered, the first (leftmost) is column 0. Numbering happens before line breaking, and columns are not renumbered after line breaking. Since many columns go unused, you should only use the rank field to get ordering information. Two adjacent columns may have non-adjacent numbers.

User settable properties:

`between-cols` (pair)
: Where to attach a loose column to.

`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.

`labels` (list)
: List of labels (symbols) placed on a column.

`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.

`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`.

`rhythmic-location` (rhythmic location)
: Where (bar number, measure position) in the score.

`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.

`used` (boolean)
: If set, this spacing column is kept in the spacing problem.

`when` (moment)
: Global time step associated with this column.

Internal properties:

`bounded-by-me` (array of grobs)
: An array of spanners that have this column as start/begin point. Only columns that have grobs or act as bounds are spaced.

`grace-spacing` (graphical (layout) object)
: A run of grace notes.

`maybe-loose` (boolean)
: Used to mark a breakable column that is loose if and only if it is in the middle of a line.

`spacing` (graphical (layout) object)
: The spacing spanner governing this section.

This grob interface is used in the following graphical object(s): `NonMusicalPaperColumn` (page 443), and `PaperColumn` (page 450).

3.2.92 parentheses-interface

Parentheses for other objects.

User settable properties:

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`stencils` (list)
: Multiple stencils, used as intermediate value.

This grob interface is used in the following graphical object(s): `ParenthesesItem` (page 451), and `TrillPitchGroup` (page 496).

3.2.93 percent-repeat-interface

Beat, Double and single measure repeats.

User settable properties:

`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.

`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.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

This grob interface is used in the following graphical object(s): `DoublePercentRepeat` (page 387), `DoublePercentRepeatCounter` (page 388), `DoubleRepeatSlash` (page 390), `PercentRepeat` (page 451), `PercentRepeatCounter` (page 452), and `RepeatSlash` (page 458).

3.2.94 percent-repeat-item-interface

Repeats that look like percent signs.

User settable properties:

`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.

`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.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

This grob interface is used in the following graphical object(s): `DoublePercentRepeat` (page 387), `DoublePercentRepeatCounter` (page 388), `DoubleRepeatSlash` (page 390), and `RepeatSlash` (page 458).

3.2.95 piano-pedal-bracket-interface

The bracket of the piano pedal. It can be tuned through the regular bracket properties.

User settable properties:

`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.

`dashed-edge` (boolean)
: If set, the bracket edges are dashed like the rest of the bracket.

`edge-height` (pair)
: A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`shorten-pair` (pair of numbers)
: The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

Internal properties:

`pedal-text` (graphical (layout) object)
: A pointer to the text of a mixed-style piano pedal.

This grob interface is used in the following graphical object(s): `PianoPedalBracket` (page 455).

3.2.96 piano-pedal-interface

A piano pedal sign.

This grob interface is used in the following graphical object(s): `PianoPedalBracket` (page 455), `SostenutoPedalLineSpanner` (page 466), `SustainPedal` (page 479), `SustainPedalLineSpanner` (page 480), and `UnaCordaPedalLineSpanner` (page 503).

3.2.97 piano-pedal-script-interface

A piano pedal sign, fixed size.

This grob interface is used in the following graphical object(s): `SostenutoPedal` (page 465), `SustainPedal` (page 479), and `UnaCordaPedal` (page 501).

3.2.98 pitched-trill-interface

A note head to indicate trill pitches.

Internal properties:

`accidental-grob` (graphical (layout) object)
: The accidental for this note.

This grob interface is used in the following graphical object(s): `TrillPitchHead` (page 497).

3.2.99 pure-from-neighbor-interface

A collection of routines to allow for objects' pure heights and heights to be calculated based on the heights of the objects' neighbors.

Internal properties:

`neighbors` (array of grobs)
: The X-axis neighbors of a grob. Used by the pure-from-neighbor-interface to determine various grob heights.

`pure-relevant-grobs` (array of grobs)
: All the grobs (items and spanners) that are relevant for finding the `pure-Y-extent`

`pure-Y-common` (graphical (layout) object)
: A cache of the `common_refpoint_of_array` of the `elements` grob set.

This grob interface is used in the following graphical object(s): `BarLine` (page 354), `Clef` (page 372), `CueClef` (page 378), `CueEndClef` (page 381), `KeyCancellation` (page 417), `KeySignature` (page 419), `SpanBarStub` (page 469), and `TimeSignature` (page 492).

3.2.100 `rest-collision-interface`

Move ordinary rests (not multi-measure nor pitched rests) to avoid conflicts.

User settable properties:

`minimum-distance` (dimension, in staff space)
: Minimum distance between rest and notes or beam.

Internal properties:

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): `RestCollision` (page 461).

3.2.101 `rest-interface`

A rest symbol. The property `style` can be `default`, `mensural`, `neomensural` or `classical`.

User settable properties:

`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`.

`minimum-distance` (dimension, in staff space)
: Minimum distance between rest and notes or beam.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`voiced-position` (number)
: The staff-position of a voiced `Rest`, negative if the rest has `direction` `DOWN`.

This grob interface is used in the following graphical object(s): `MultiMeasureRest` (page 438), and `Rest` (page 460).

3.2.102 rhythmic-grob-interface

Any object with a duration. Used to determine which grobs are interesting enough to maintain a hara-kiri staff.

This grob interface is used in the following graphical object(s): BassFigure (page 359), ChordName (page 371), ClusterSpannerBeacon (page 376), DoubleRepeatSlash (page 390), FretBoard (page 404), LyricText (page 430), NoteHead (page 446), RepeatSlash (page 458), Rest (page 460), and TabNoteHead (page 485).

3.2.103 rhythmic-head-interface

Note head or rest.

User settable properties:

duration-log (integer)
: The 2-log of the note head duration, i.e., 0 = whole note, 1 = half note, etc.

glissando-skip (boolean)
: Should this NoteHead be skipped by glissandi?

Internal properties:

dot (graphical (layout) object)
: A reference to a Dots object.

stem (graphical (layout) object)
: A pointer to a Stem object.

This grob interface is used in the following graphical object(s): AmbitusNoteHead (page 350), NoteHead (page 446), Rest (page 460), TabNoteHead (page 485), and TrillPitchHead (page 497).

3.2.104 script-column-interface

An interface that sorts scripts according to their script-priority and outside-staff-priority.

Internal properties:

scripts (array of grobs)
: An array of Script objects.

This grob interface is used in the following graphical object(s): ScriptColumn (page 463), and ScriptRow (page 463).

3.2.105 script-interface

An object that is put above or below a note.

User settable properties:

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.

`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.

`side-relative-direction` (direction)
: Multiply direction of `direction-source` with this to get the direction of this object.

`slur-padding` (number)
: Extra distance between slur and script.

`toward-stem-shift` (number)
: Amount by which scripts are shifted toward the stem if their direction coincides with the stem direction. `0.0` means centered on the note head (the default position of most scripts); `1.0` means centered on the stem. Interpolated values are possible.

`toward-stem-shift-in-column` (number)
: Amount by which a script is shifted toward the stem if its direction coincides with the stem direction and it is associated with a `ScriptColumn` object. `0.0` means centered on the note head (the default position of most scripts); `1.0` means centered on the stem. Interpolated values are possible.

Internal properties:

`direction-source` (graphical (layout) object)
: In case `side-relative-direction` is set, which grob to get the direction from.

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

`script-column` (graphical (layout) object)
: A `ScriptColumn` associated with a `Script` object.

`script-stencil` (pair)
: A pair `(`*`type . arg`*`)` which acts as an index for looking up a `Stencil` object.

`slur` (graphical (layout) object)
: A pointer to a `Slur` object.

This grob interface is used in the following graphical object(s): `AccidentalSuggestion` (page 345), `DynamicText` (page 394), `MultiMeasureRestScript` (page 441), and `Script` (page 461).

3.2.106 `self-alignment-interface`

Position this object on itself and/or on its parent. To this end, the following functions are provided:

`Self_alignment_interface::[xy]_aligned_on_self`
: Align self on reference point, using `self-alignment-X` and `self-alignment-Y`.

`Self_alignment_interface::aligned_on_[xy]_parent`
`Self_alignment_interface::centered_on_[xy]_parent`
: Shift the object so its own reference point is centered on the extent of the parent

User settable properties:

`parent-alignment-X` (number)
: Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`parent-alignment-Y` (number)
: Like `parent-alignment-X` but for the Y axis.

`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 - the unit is half the object width.

`self-alignment-Y` (number)
: Like `self-alignment-X` but for the Y axis.

`X-align-on-main-noteheads` (boolean)
: If true, this grob will ignore suspended noteheads when aligning itself on NoteColumn.

This grob interface is used in the following graphical object(s): `AccidentalSuggestion` (page 345), `BarNumber` (page 357), `ClefModifier` (page 374), `CombineTextScript` (page 377), `DoublePercentRepeatCounter` (page 388), `DynamicText` (page 394), `Fingering` (page 399), `GridLine` (page 408), `Hairpin` (page 409), `HorizontalBracketText` (page 412), `InstrumentName` (page 413), `InstrumentSwitch` (page 413), `JumpScript` (page 415), `LyricText` (page 430), `MeasureCounter` (page 432), `MeasureSpanner` (page 434), `MetronomeMark` (page 436), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), `MultiMeasureRestText` (page 442), `PercentRepeatCounter` (page 452), `RehearsalMark` (page 456), `Script` (page 461), `SostenutoPedal` (page 465), `StemTremolo` (page 475), `StringNumber` (page 476), `StrokeFinger` (page 477), `SustainPedal` (page 479), `TextScript` (page 487), and `UnaCordaPedal` (page 501).

3.2.107 `semi-tie-column-interface`

The interface for a column of l.v. (laissez vibrer) ties.

User settable properties:

`head-direction` (direction)
: Are the note heads left or right in a semitie?

`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.

Internal properties:

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

`ties` (array of grobs)
: A grob array of `Tie` objects.

This grob interface is used in the following graphical object(s): `LaissezVibrerTieColumn` (page 424), and `RepeatTieColumn` (page 460).

3.2.108 `semi-tie-interface`

A tie which is only connected to a note head on one side. The following properties may be set in the `details` list:

`height-limit`
: Maximum tie height: The longer the tie, the closer it is to this height.

`ratio`
: Parameter for tie shape. The higher this number, the quicker the tie attains its `height-limit`.

User settable properties:

`control-points` (list of number pairs)
: 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.

`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.

`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`.

`head-direction` (direction)
: Are the note heads left or right in a semitie?

`line-thickness` (number)
: For slurs and ties, this is the diameter of the virtual "pen" that draws the two arcs of the curve's outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`annotation` (string)
: Annotate a grob for debug purposes.

`note-head` (graphical (layout) object)
: A single note head.

This grob interface is used in the following graphical object(s): `LaissezVibrerTie` (page 423), and `RepeatTie` (page 459).

3.2.109 separation-item-interface

Item that computes widths to generate spacing rods.

User settable properties:

`horizontal-skylines` (pair of skylines)
: Two skylines, one to the left and one to the right of this grob.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`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.

`X-extent` (pair of numbers)
: Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

Internal properties:

`conditional-elements` (array of grobs)
: Internal use only.

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

This grob interface is used in the following graphical object(s): `NonMusicalPaperColumn` (page 443), `NoteColumn` (page 445), and `PaperColumn` (page 450).

3.2.110 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?)

The routine also takes the size of the staff into account if `staff-padding` is set. If undefined, the staff symbol is ignored.

User settable properties:

`add-stem-support` (boolean)
: If set, the `Stem` object is included in this script's support.

`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`.

`horizon-padding` (number)
: The amount to pad the axis along which a `Skyline` is built for the `side-position-interface`.

`minimum-space` (dimension, in staff space)
: Minimum distance that the victim should move (after padding).

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`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.

`slur-padding` (number)
: Extra distance between slur and script.

`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.

`use-skylines` (boolean)
: Should skylines be used for side positioning?

Internal properties:

`quantize-position` (boolean)
: If set, a vertical alignment is aligned to be within staff spaces.

`side-support-elements` (array of grobs)
: The side support, an array of grobs.

This grob interface is used in the following graphical object(s): `AccidentalSuggestion` (page 345), `AmbitusAccidental` (page 348), `Arpeggio` (page 351), `BarNumber` (page 357), `BassFigureAlignmentPositioning` (page 360), `ClefModifier` (page 374), `CombineTextScript` (page 377), `DoublePercentRepeatCounter` (page 388), `DynamicLineSpanner` (page 392), `Episema` (page 397), `Fingering` (page 399), `HorizontalBracket` (page 411), `HorizontalBracketText` (page 412), `InstrumentName` (page 413), `InstrumentSwitch` (page 413), `JumpScript` (page 415), `MeasureCounter` (page 432), `MeasureGrouping` (page 433), `MeasureSpanner` (page 434), `MetronomeMark` (page 436), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), `MultiMeasureRestText` (page 442), `OttavaBracket` (page 448), `PercentRepeatCounter` (page 452), `RehearsalMark` (page 456), `Script` (page 461), `SostenutoPedalLineSpanner` (page 466), `StanzaNumber` (page 472), `StringNumber` (page 476), `StrokeFinger` (page 477), `SustainPedalLineSpanner` (page 480), `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), `SystemStartSquare` (page 484), `TextScript` (page 487), `TextSpanner` (page 489), `TrillPitchAccidental` (page 495), `TrillPitchGroup` (page 496), `TrillSpanner` (page 498), `UnaCordaPedalLineSpanner` (page 503), `VoltaBracket` (page 507), and `VoltaBracketSpanner` (page 509).

3.2.111 `slur-interface`

A slur. Slurs are formatted by trying a number of combinations of left/right end point, and then picking the slur with the lowest demerit score. The combinations are generated by going from the base attachments (i.e., note heads) in the direction in half space increments until we have covered `region-size` staff spaces. The following properties may be set in the `details` list.

`region-size`
: Size of region (in staff spaces) for determining potential endpoints in the Y direction.

`head-encompass-penalty`
: Demerit to apply when note heads collide with a slur.

`stem-encompass-penalty`
: Demerit to apply when stems collide with a slur.

`edge-attraction-factor`
: Factor used to calculate the demerit for distances between slur endpoints and their corresponding base attachments.

`same-slope-penalty`
: Demerit for slurs with attachment points that are horizontally aligned.

`steeper-slope-factor`
: Factor used to calculate demerit only if this slur is not broken.

`non-horizontal-penalty`
: Demerit for slurs with attachment points that are not horizontally aligned.

`max-slope`
: The maximum slope allowed for this slur.

`max-slope-factor`
: Factor that calculates demerit based on the max slope.

`free-head-distance`
: The amount of vertical free space that must exist between a slur and note heads.

`absolute-closeness-measure`
: Factor to calculate demerit for variance between a note head and slur.

`extra-object-collision-penalty`
: Factor to calculate demerit for extra objects that the slur encompasses, including accidentals, fingerings, and tuplet numbers.

`accidental-collision`
: Factor to calculate demerit for `Accidental` objects that the slur encompasses. This property value replaces the value of `extra-object-collision-penalty`.

`extra-encompass-free-distance`
: The amount of vertical free space that must exist between a slur and various objects it encompasses, including accidentals, fingerings, and tuplet numbers.

`extra-encompass-collision-distance`
: This detail is currently unused.

`head-slur-distance-factor`
: Factor to calculate demerit for variance between a note head and slur.

`head-slur-distance-max-ratio`
: The maximum value for the ratio of distance between a note head and slur.

`gap-to-staffline-inside`
: Minimum gap inside the curve of the slur where the slur is parallel to a staffline.

`gap-to-staffline-outside`
: Minimum gap outside the curve of the slur where the slur is parallel to a staffline.

`free-slur-distance`
: The amount of vertical free space that must exist between adjacent slurs. This subproperty only works for `PhrasingSlur`.

`edge-slope-exponent`
: Factor used to calculate the demerit for the slope of a slur near its endpoints; a larger value yields a larger demerit.

User settable properties:

`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`.

`control-points` (list of number pairs)
: 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.

`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`.

`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.

`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`.

`eccentricity` (number)
: How asymmetrical to make a slur. Positive means move the center to the right.

`height-limit` (dimension, in staff space)
: Maximum slur height: The longer the slur, the closer it is to this height.

`inspect-quants` (pair of numbers)
: If debugging is set, set beam and slur position to a (quantized) position that is as close as possible to this value, and print the demerits for the inspected position in the output.

`line-thickness` (number)
: For slurs and ties, this is the diameter of the virtual "pen" that draws the two arcs of the curve's outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`positions` (pair of numbers)
: Pair of staff coordinates (*`start . end`*), where *start* and *end* are vertical positions 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.

`ratio` (number)
: Parameter for slur shape. The higher this number, the quicker the slur attains its `height-limit`.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This

property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *Staff*.StaffSymbol.thickness).

Internal properties:

annotation (string)
: Annotate a grob for debug purposes.

encompass-objects (array of grobs)
: Objects that a slur should avoid in addition to notes and stems.

note-columns (array of grobs)
: An array of NoteColumn grobs.

This grob interface is used in the following graphical object(s): PhrasingSlur (page 453), and Slur (page 463).

3.2.112 spaceable-grob-interface

A layout object that takes part in the spacing problem.

User settable properties:

allow-loose-spacing (boolean)
: If set, column can be detached from main spacing.

keep-inside-line (boolean)
: If set, this column cannot have objects sticking into the margin.

measure-length (moment)
: Length of a measure. Used in some spacing situations.

Internal properties:

ideal-distances (list)
: (*obj* . (*dist* . *strength*)) pairs.

left-neighbor (graphical (layout) object)
: The right-most column that has a spacing-wish for this column.

minimum-distances (list)
: A list of rods that have the format (*obj* . *dist*).

right-neighbor (graphical (layout) object)
: See left-neighbor.

spacing-wishes (array of grobs)
: An array of note spacing or staff spacing objects.

This grob interface is used in the following graphical object(s): NonMusicalPaperColumn (page 443), and PaperColumn (page 450).

3.2.113 spacing-interface

This object calculates the desired and minimum distances between two columns.

Internal properties:

left-items (array of grobs)
: Grobs organized on the left by a spacing object.

right-items (array of grobs)
: Grobs organized on the right by a spacing object.

This grob interface is used in the following graphical object(s): `NoteSpacing` (page 448), and `StaffSpacing` (page 470).

3.2.114 spacing-options-interface

Supports setting of spacing variables.

User settable properties:

`shortest-duration-space` (number)
: Start with this multiple of `spacing-increment` space for the shortest duration. See also Section "spacing-spanner-interface" in *Internals Reference*.

`spacing-increment` (dimension, in staff space)
: The unit of length for note-spacing. Typically, the width of a note head. See also Section "spacing-spanner-interface" in *Internals Reference*.

This grob interface is used in the following graphical object(s): `GraceSpacing` (page 408), and `SpacingSpanner` (page 467).

3.2.115 spacing-spanner-interface

The space taken by a note is dependent on its duration. Doubling a duration adds `spacing-increment` to the space. The most common shortest note gets `shortest-duration-space`. Notes that are even shorter are spaced proportonial to their duration.

Typically, the increment is the width of a black note head. In a piece with lots of 8th notes, and some 16th notes, the eighth note gets a 2 note heads width (i.e., the space following a note is a 1 note head width). A 16th note is followed by 0.5 note head width. The quarter note is followed by 3 NHW, the half by 4 NHW, etc.

User settable properties:

`average-spacing-wishes` (boolean)
: If set, the spacing wishes are averaged over staves.

`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.

`common-shortest-duration` (moment)
: The most common shortest note length. This is used in spacing. Enlarging this sets the score tighter.

`packed-spacing` (boolean)
: If set, the notes are spaced as tightly as possible.

`shortest-duration-space` (number)
: Start with this multiple of `spacing-increment` space for the shortest duration. See also Section "spacing-spanner-interface" in *Internals Reference*.

`spacing-increment` (dimension, in staff space)
: The unit of length for note-spacing. Typically, the width of a note head. See also Section "spacing-spanner-interface" in *Internals Reference*.

`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.

`uniform-stretching` (boolean)
: If set, items stretch proportionally to their natural separation based on durations. This looks better in complex polyphonic patterns.

This grob interface is used in the following graphical object(s): `SpacingSpanner` (page 467).

3.2.116 span-bar-interface

A bar line that is spanned between other barlines. This interface is used for bar lines that connect different staves.

User settable properties:

`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.

Internal properties:

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

`pure-relevant-grobs` (array of grobs)
: All the grobs (items and spanners) that are relevant for finding the `pure-Y-extent`

`pure-relevant-items` (array of grobs)
: A subset of elements that are relevant for finding the `pure-Y-extent`.

`pure-relevant-spanners` (array of grobs)
: A subset of elements that are relevant for finding the `pure-Y-extent`.

`pure-Y-common` (graphical (layout) object)
: A cache of the `common_refpoint_of_array` of the `elements` grob set.

This grob interface is used in the following graphical object(s): `SpanBar` (page 468).

3.2.117 spanner-interface

Some objects are horizontally spanned between objects. For example, slurs, beams, ties, etc. These grobs form a subtype called `Spanner`. All spanners have two span points (these must be `Item` objects), one on the left and one on the right. The left bound is also the X reference point of the spanner.

User settable properties:

`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-after-break` (dimension, in staff space)
: If set, try to make a broken spanner starting a line this long. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance to the notehead.

`normalized-endpoints` (pair)
: Represents left and right placement over the total spanner, where the width of the spanner is normalized between 0 and 1.

`spanner-id` (index or symbol)
: An identifier to distinguish concurrent spanners.

`to-barline` (boolean)
: If true, the spanner will stop at the bar line just before it would otherwise stop.

Internal properties:

`spanner-broken` (boolean)
: Indicates whether spanner alignment should be broken after the current spanner.

This grob interface is used in the following graphical object(s): `BalloonTextSpanner` (page 353), `BassFigureAlignment` (page 359), `BassFigureAlignmentPositioning` (page 360), `BassFigureContinuation` (page 361), `BassFigureLine` (page 362), `Beam` (page 362), `BendAfter` (page 364), `BendSpanner` (page 365), `ClusterSpanner` (page 376), `DurationLine` (page 390), `DynamicLineSpanner` (page 392), `DynamicTextSpanner` (page 395), `Episema` (page 397), `FingerGlideSpanner` (page 398), `FootnoteSpanner` (page 403), `Glissando` (page 406), `GraceSpacing` (page 408), `Hairpin` (page 409), `HorizontalBracket` (page 411), `HorizontalBracketText` (page 412), `InstrumentName` (page 413), `KievanLigature` (page 422), `LedgerLineSpanner` (page 424), `LigatureBracket` (page 427), `LyricExtender` (page 428), `LyricHyphen` (page 428), `LyricSpace` (page 430), `MeasureCounter` (page 432), `MeasureGrouping` (page 433), `MeasureSpanner` (page 434), `MensuralLigature` (page 436), `MultiMeasureRest` (page 438), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestScript` (page 441), `MultiMeasureRestText` (page 442), `OttavaBracket` (page 448), `PercentRepeat` (page 451), `PercentRepeatCounter` (page 452), `PhrasingSlur` (page 453), `PianoPedalBracket` (page 455), `Slur` (page 463), `SostenutoPedalLineSpanner` (page 466), `SpacingSpanner` (page 467), `StaffGrouper` (page 470), `StaffSymbol` (page 471), `SustainPedalLineSpanner` (page 480), `System` (page 481), `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), `SystemStartSquare` (page 484), `TextSpanner` (page 489), `Tie` (page 490), `TieColumn` (page 492), `TrillSpanner` (page 498), `TupletBracket` (page 499), `TupletNumber` (page 500), `UnaCordaPedalLineSpanner` (page 503), `VaticanaLigature` (page 504), `VerticalAlignment` (page 504), `VerticalAxisGroup` (page 505), `VoiceFollower` (page 507), `VoltaBracket` (page 507), `VoltaBracketSpanner` (page 509), and `VowelTransition` (page 510).

3.2.118 `staff-grouper-interface`

A grob that collects staves together.

User settable properties:

`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.

This grob interface is used in the following graphical object(s): `StaffGrouper` (page 470).

3.2.119 `staff-spacing-interface`

This object calculates spacing details from a breakable symbol (left) to another object. For example, it takes care of optical spacing from a bar line to a note.

User settable properties:

`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.

This grob interface is used in the following graphical object(s): `StaffSpacing` (page 470).

3.2.120 `staff-symbol-interface`

This spanner draws the lines of a staff. A staff symbol defines a vertical unit, the *staff space*. Quantities that go by a half staff space are called *positions*. The center (i.e., middle line or space) is position 0. The length of the symbol may be set by hand through the `width` property.

User settable properties:

`break-align-symbols` (list)
: A list of *break-align symbols* that determines which breakable items 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 listed in Section "break-alignment-interface" in *Internals Reference*.

`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)
: Vertical positions of ledger lines. When set on a `StaffSymbol` grob it defines a repeating pattern of ledger lines and any parenthesized groups will always be shown together.

`ledger-positions-function` (any type)
: A quoted Scheme procedure that takes a `StaffSymbol` grob and the vertical position of a note head as arguments and returns a list of ledger line positions.

`line-count` (integer)
: The number of staff lines.

`line-positions` (list)
: Vertical positions of staff lines.

`staff-space` (dimension, in staff space)
: Amount of space between staff lines, expressed in global `staff-space`.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`width` (dimension, in staff space)
: The width of a grob measured in staff space.

This grob interface is used in the following graphical object(s): `StaffSymbol` (page 471).

3.2.121 staff-symbol-referencer-interface

An object whose Y position is meant relative to a staff symbol. These usually have `Staff_symbol_referencer::callback` in their `Y-offset-callbacks`.

User settable properties:

`staff-position` (number)
: Vertical position, measured in half staff spaces, counted from the middle line.

This grob interface is used in the following graphical object(s): `AmbitusNoteHead` (page 350), `Arpeggio` (page 351), `Beam` (page 362), `Clef` (page 372), `CueClef` (page 378), `CueEndClef` (page 381), `Custos` (page 384), `Dots` (page 386), `KeyCancellation` (page 417), `KeySignature` (page 419), `MultiMeasureRest` (page 438), `NoteHead` (page 446), `Rest` (page 460), `TabNoteHead` (page 485), and `TrillPitchHead` (page 497).

3.2.122 stanza-number-interface

A stanza number, to be put in from of a lyrics line.

This grob interface is used in the following graphical object(s): `StanzaNumber` (page 472).

3.2.123 stem-interface

The stem represents the graphical stem. In addition, it internally connects note heads, beams, and tremolos. Rests and whole notes have invisible stems.

The following properties may be set in the `details` list.

`beamed-lengths`
: List of stem lengths given beam multiplicity.

`beamed-minimum-free-lengths`
: List of normal minimum free stem lengths (chord to beams) given beam multiplicity.

`beamed-extreme-minimum-free-lengths`
: List of extreme minimum free stem lengths (chord to beams) given beam multiplicity.

`lengths` Default stem lengths. The list gives a length for each flag count.

`stem-shorten`
How much a stem in a forced direction should be shortened. The list gives an amount depending on the number of flags and beams.

User settable properties:

`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.

`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.

`default-direction` (direction)
Direction determined by note head positions.

`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.

`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`.

`double-stem-separation` (number)
The distance between the two stems of a half note in tablature when using `\tabFullNotation`, not counting the width of the stems themselves, expressed as a multiple of the default height of a staff-space in the traditional five-line staff.

`duration-log` (integer)
The 2-log of the note head duration, i.e., `0` = whole note, `1` = half note, etc.

`french-beaming` (boolean)
Use French beaming style for this stem. The stem stops at the innermost beams.

`length` (dimension, in staff space)
User override for the stem length of unbeamed stems (each unit represents half a `staff-space`).

`length-fraction` (number)
: Multiplier for lengths. Used for determining ledger lines and stem lengths.

`max-beam-connect` (integer)
: Maximum number of beams to connect to beams from this stem. Further beams are typeset as beamlets.

`neutral-direction` (direction)
: Which direction to take in the center of the staff.

`no-stem-extend` (boolean)
: If set, notes with ledger lines do not get stems extending to the middle staff line.

`note-collision-threshold` (dimension, in staff space)
: Simultaneous notes that are this close or closer in units of `staff-space` will be identified as vertically colliding. Used by `Stem` grobs for notes in the same voice, and `NoteCollision` grobs for notes in different voices. Default value 1.

`stem-begin-position` (number)
: User override for the begin position of a stem.

`stemlet-length` (number)
: How long should be a stem over a rest?

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`beam` (graphical (layout) object)
: A pointer to the beam, if applicable.

`flag` (graphical (layout) object)
: A pointer to a `Flag` object.

`french-beaming-stem-adjustment` (dimension, in staff space)
: Stem will be shortened by this amount of space in case of French beaming style.

`melody-spanner` (graphical (layout) object)
: The `MelodyItem` object for a stem.

`note-heads` (array of grobs)
: An array of note head grobs.

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

`rests` (array of grobs)
: An array of rest objects.

`stem-info` (pair)
: A cache of stem parameters.

`tremolo-flag` (graphical (layout) object)
: The tremolo object on a stem.

`tuplet-start` (boolean)
: Is stem at the start of a tuplet?

This grob interface is used in the following graphical object(s): `Stem` (page 472).

3.2.124 `stem-tremolo-interface`

A beam slashing a stem to indicate a tremolo. The property `shape` can be `beam-like` or `rectangle`.

User settable properties:

`beam-thickness` (dimension, in staff space)
: Beam thickness, measured in `staff-space` units.

`beam-width` (dimension, in staff space)
: Width of the tremolo sign.

`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`.

`flag-count` (number)
: The number of tremolo beams.

`length-fraction` (number)
: Multiplier for lengths. Used for determining ledger lines and stem lengths.

`shape` (symbol)
: This setting determines what shape a grob has. Valid choices depend on the `stencil` callback reading this property.

`slope` (number)
: The slope of this object.

Internal properties:

`stem` (graphical (layout) object)
: A pointer to a `Stem` object.

This grob interface is used in the following graphical object(s): `StemTremolo` (page 475).

3.2.125 `string-number-interface`

A string number instruction.

This grob interface is used in the following graphical object(s): `StringNumber` (page 476).

3.2.126 `stroke-finger-interface`

A right hand finger instruction.

User settable properties:

`digit-names` (vector)
: Names for string finger digits.

This grob interface is used in the following graphical object(s): `StrokeFinger` (page 477).

3.2.127 system-interface

This is the top-level object: Each object in a score ultimately has a System object as its X and Y parent.

User settable properties:

`labels` (list)
: List of labels (symbols) placed on a column.

`page-number` (number)
: Page number on which this system ends up.

`rank-on-page` (number)
: 0-based index of the system on a page.

Internal properties:

`all-elements` (array of grobs)
: An array of all grobs in this line. Its function is to protect objects from being garbage collected.

`columns` (array of grobs)
: An array of grobs, typically containing PaperColumn or NoteColumn objects.

`footnote-stencil` (stencil)
: The stencil of a system's footnotes.

`footnotes-after-line-breaking` (array of grobs)
: Footnote grobs of a broken system.

`footnotes-before-line-breaking` (array of grobs)
: Footnote grobs of a whole system.

`in-note-direction` (direction)
: Direction to place in-notes above a system.

`in-note-padding` (number)
: Padding between in-notes.

`in-note-stencil` (stencil)
: The stencil of a system's in-notes.

`pure-Y-extent` (pair of numbers)
: The estimated height of a system.

`vertical-alignment` (graphical (layout) object)
: The VerticalAlignment in a System.

This grob interface is used in the following graphical object(s): System (page 481).

3.2.128 system-start-delimiter-interface

The brace, bracket or bar in front of the system. The following values for `style` are recognized:

`bracket` A thick bracket, normally used to group similar instruments in a score. Default for StaffGroup. SystemStartBracket uses this style.

`brace` A 'piano style' brace normally used for an instrument that uses two staves. The default style for GrandStaff. SystemStartBrace uses this style.

`bar-line` A simple line between the staves in a score. Default for staves enclosed in << and >>. SystemStartBar uses this style.

`line-bracket`
: A simple square, normally used for subgrouping instruments in a score. `SystemStartSquare` uses this style.

See also `input/regression/system-start-nesting.ly`.

User settable properties:

`collapse-height` (dimension, in staff space)
: Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

This grob interface is used in the following graphical object(s): `SystemStartBar` (page 482), `SystemStartBrace` (page 483), `SystemStartBracket` (page 483), and `SystemStartSquare` (page 484).

3.2.129 `system-start-text-interface`

Text in front of the system.

User settable properties:

`long-text` (markup)
: Text markup. See Section "Formatting text" in *Notation Reference*.

`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 - the unit is half the object width.

`self-alignment-Y` (number)
: Like `self-alignment-X` but for the Y axis.

`text` (markup)
: Text markup. See Section "Formatting text" in *Notation Reference*.

This grob interface is used in the following graphical object(s): `InstrumentName` (page 413).

3.2.130 `tab-note-head-interface`

A note head in tablature.

User settable properties:

`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.

Internal properties:

`display-cautionary` (boolean)
: Should the grob be displayed as a cautionary grob?

`span-start` (boolean)
: Is the note head at the start of a spanner?

This grob interface is used in the following graphical object(s): `TabNoteHead` (page 485).

3.2.131 `text-interface`

A Scheme markup text, see Section "Formatting text" in *Notation Reference* and Section "New markup command definition" in *Extending*.

There are two important commands: `ly:text-interface::print`, which is a grob callback, and `ly:text-interface::interpret-markup`.

User settable properties:

`baseline-skip` (dimension, in staff space)
: Distance between base lines of multiple lines of text.

`flag-style` (symbol)
: The style of the flag to be used with `MetronomeMark`. Available are `'modern-straight-flag`, `'old-straight-flag`, `flat-flag`, `mensural` and `'default`

`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.

`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`.

`word-space` (dimension, in staff space)
: Space to insert between words in texts.

This grob interface is used in the following graphical object(s): `BalloonTextItem` (page 352), `BalloonTextSpanner` (page 353), `BarNumber` (page 357), `BassFigure` (page 359), `BendSpanner` (page 365), `BreathingSign` (page 369), `ChordName` (page 371), `ClefModifier` (page 374), `CombineTextScript` (page 377), `DoublePercentRepeatCounter` (page 388), `DynamicText` (page 394), `DynamicTextSpanner` (page 395), `Fingering` (page 399), `FootnoteItem` (page 402), `FootnoteSpanner` (page 403), `HorizontalBracketText` (page 412), `InstrumentName` (page 413), `InstrumentSwitch` (page 413), `JumpScript` (page 415), `LyricText` (page 430), `MeasureCounter` (page 432), `MeasureSpanner` (page 434), `MetronomeMark` (page 436), `MultiMeasureRestNumber` (page 439), `MultiMeasureRestText` (page 442), `NoteName` (page 447), `OttavaBracket` (page 448), `PercentRepeatCounter` (page 452), `RehearsalMark` (page 456), `SostenutoPedal` (page 465), `StanzaNumber` (page 472), `StringNumber` (page 476), `StrokeFinger` (page 477), `SustainPedal` (page 479), `TabNoteHead` (page 485), `TextScript` (page 487), `TupletNumber` (page 500), `UnaCordaPedal` (page 501), and `VoltaBracket` (page 507).

3.2.132 `text-script-interface`

An object that is put above or below a note.

User settable properties:

`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`.

`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.

Internal properties:

`slur` (graphical (layout) object)
: A pointer to a `Slur` object.

This grob interface is used in the following graphical object(s): `BendSpanner` (page 365), `CombineTextScript` (page 377), `Fingering` (page 399), `StringNumber` (page 476), `StrokeFinger` (page 477), and `TextScript` (page 487).

3.2.133 `tie-column-interface`

Object that sets directions of multiple ties in a tied chord.

User settable properties:

`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.

Internal properties:

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

`ties` (array of grobs)
: A grob array of `Tie` objects.

This grob interface is used in the following graphical object(s): `TieColumn` (page 492).

3.2.134 `tie-interface`

A tie - a horizontal curve connecting two noteheads.

The following properties may be set in the `details` list.

`height-limit`
: The maximum height allowed for this tie.

`ratio`
: Parameter for tie shape. The higher this number, the quicker the slur attains its height-limit.

`between-length-limit`
: This detail is currently unused.

`wrong-direction-offset-penalty`
: Demerit for ties that are offset in the wrong direction.

`min-length`
: If the tie is shorter than this amount (in staff-spaces) an increasingly large length penalty is incurred.

`min-length-penalty-factor`
: Demerit factor for tie lengths shorter than `min-length`.

`center-staff-line-clearance`
: If the center of the tie is closer to a staff line than this amount, an increasingly large staff line collision penalty is incurred.

`tip-staff-line-clearance`
: If the tips of the tie are closer to a staff line than this amount, an increasingly large staff line collision penalty is incurred.

`staff-line-collision-penalty`
: Demerit factor for ties whose tips or center come close to staff lines.

`dot-collision-clearance`
: If the tie comes closer to a dot than this amount, an increasingly large dot collision penalty is incurred.

`dot-collision-penalty`
: Demerit factor for ties which come close to dots.

`note-head-gap`
: The distance (in staff-spaces) by which the ends of the tie are offset horizontally from the center line through the note head.

`stem-gap`
: The distance (in staff-spaces) by which the ends of the tie are offset horizontally from a stem which is on the same side of the note head as the tie.

`tie-column-monotonicity-penalty`
: Demerit if the y-position of this tie in the set of ties being considered is less than the y-position of the previous tie.

`tie-tie-collision-distance`
: If this tie is closer than this amount to the previous tie in the set being considered, an increasingly large tie-tie collision penalty is incurred.

`tie-tie-collision-penalty`
: Demerit factor for a tie in the set being considered which is close to the previous one.

`horizontal-distance-penalty-factor`
: Demerit factor for ties in the set being considered which are horizontally distant from the note heads.

`vertical-distance-penalty-factor`
: Demerit factor for ties in the set being considered which are vertically distant from the note heads.

`same-dir-as-stem-penalty`
: Demerit if tie is on the same side as a stem or on the opposite side to the one specified.

`intra-space-threshold`
: If the tie's height (in half staff-spaces) is less than this it is positioned between two adjacent staff lines; otherwise it is positioned to straddle a staff line further from the note heads.

`outer-tie-length-symmetry-penalty-factor`
: Demerit factor for ties horizontally positioned unsymmetrically with respect to the two note heads.

`outer-tie-vertical-distance-symmetry-penalty-factor`
: Demerit factor for ties vertically positioned unsymmetrically with respect to the two note heads.

`outer-tie-vertical-gap`
: Amount (in half staff-spaces) by which a tie is moved away from the note heads if it is closer to either of them than 0.25 half staff-spaces.

`skyline-padding`
: Padding of the skylines around note heads in chords.

`single-tie-region-size`
: The number of candidate ties to generate when only a single tie is required. Successive candidates differ in their initial vertical position by half a staff-space.

`multi-tie-region-size`
: The number of variations that are tried for the extremal ties in a chord. Variations differ in their initial vertical position by half a staff-space.

User settable properties:

`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`.

`control-points` (list of number pairs)
: 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.

`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`.

`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.

`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`.

`head-direction` (direction)
: Are the note heads left or right in a semitie?

`line-thickness` (number)
: For slurs and ties, this is the diameter of the virtual "pen" that draws the two arcs of the curve's outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`neutral-direction` (direction)
: Which direction to take in the center of the staff.

`staff-position` (number)
: Vertical position, measured in half staff spaces, counted from the middle line.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`annotation` (string)
: Annotate a grob for debug purposes.

This grob interface is used in the following graphical object(s): `LaissezVibrerTie` (page 423), `RepeatTie` (page 459), and `Tie` (page 490).

3.2.135 `time-signature-interface`

A time signature, in different styles. The following values for `style` are are recognized:

`C`
: 4/4 and 2/2 are typeset as C and struck C, respectively. All other time signatures are written with two digits. The value `default` is equivalent to `C`.

`neomensural`
: 2/2, 3/2, 2/4, 3/4, 4/4, 6/4, 9/4, 4/8, 6/8, and 9/8 are typeset with neo-mensural style mensuration marks. All other time signatures are written with two digits.

`mensural`
: 2/2, 3/2, 2/4, 3/4, 4/4, 6/4, 9/4, 4/8, 6/8, and 9/8 are typeset with mensural style mensuration marks. All other time signatures are written with two digits.

`single-digit`
: All time signatures are typeset with a single digit, e.g., 3/2 is written as 3.

`numbered`
: All time signatures are typeset with two digits.

User settable properties:

`fraction` (fraction, as pair)
: Numerator and denominator of a time signature object.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

This grob interface is used in the following graphical object(s): `TimeSignature` (page 492).

3.2.136 trill-pitch-accidental-interface

An accidental for trill pitch.

This grob interface is used in the following graphical object(s): TrillPitchAccidental (page 495).

3.2.137 trill-spanner-interface

A trill spanner.

This grob interface is used in the following graphical object(s): TrillSpanner (page 498).

3.2.138 tuplet-bracket-interface

A bracket with a number in the middle, used for tuplets. When the bracket spans a line break, the value of break-overshoot determines how far it extends beyond the staff. At a line break, the markups in the edge-text are printed at the edges.

User settable properties:

avoid-scripts (boolean)
: If set, a tuplet bracket avoids the scripts associated with the note heads it encompasses.

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-overshoot (pair of numbers)
: How much does a broken spanner stick out of its bounds?

connect-to-neighbor (pair)
: Pair of booleans, indicating whether this grob looks as a continued break.

dashed-edge (boolean)
: If set, the bracket edges are dashed like the rest of the bracket.

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.

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*).

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.

`gap` (dimension, in staff space)
: Size of a gap in a variable symbol.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`positions` (pair of numbers)
: Pair of staff coordinates `(start . end)`, where *start* and *end* are vertical positions 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.

`shorten-pair` (pair of numbers)
: The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

`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.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

`tuplet-slur` (boolean)
: Draw a slur instead of a bracket for tuplets.

`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.

Internal properties:

`note-columns` (array of grobs)
: An array of `NoteColumn` grobs.

`scripts` (array of grobs)
: An array of `Script` objects.

`tuplet-number` (graphical (layout) object)
: The number for a bracket.

`tuplets` (array of grobs)
: An array of smaller tuplet brackets.

This grob interface is used in the following graphical object(s): `LigatureBracket` (page 427), and `TupletBracket` (page 499).

3.2.139 `tuplet-number-interface`

The number for a bracket.

User settable properties:

`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`.

`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`.

`knee-to-beam` (boolean)
: Determines whether a tuplet number will be positioned next to a kneed beam.

Internal properties:

`bracket` (graphical (layout) object)
: The bracket for a number.

This grob interface is used in the following graphical object(s): `TupletNumber` (page 500).

3.2.140 unbreakable-spanner-interface

A spanner that should not be broken across line breaks. Override with `breakable=##t`.

User settable properties:

`breakable` (boolean)
: Allow breaks here.

This grob interface is used in the following graphical object(s): `Beam` (page 362), `DurationLine` (page 390), and `Glissando` (page 406).

3.2.141 vaticana-ligature-interface

A vaticana style Gregorian ligature.

User settable properties:

`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.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`add-cauda` (boolean)
: Does this flexa require an additional cauda on the left side?

`add-join` (boolean)
: Is this ligature head-joined with the next one by a vertical line?

`add-stem` (boolean)
: Is this ligature head a virga and therefore needs an additional stem on the right side?

`delta-position` (number)
: The vertical position difference.

`flexa-height` (dimension, in staff space)
: The height of a flexa shape in a ligature grob (in `staff-space` units).

`flexa-width` (dimension, in staff space)
: The width of a flexa shape in a ligature grob (in `staff-space` units).

`x-offset` (dimension, in staff space)
: Extra horizontal offset for ligature heads.

This grob interface is used in the following graphical object(s): `NoteHead` (page 446), and `VaticanaLigature` (page 504).

3.2.142 `volta-bracket-interface`

Volta bracket with number.

User settable properties:

`dashed-edge` (boolean)
: If set, the bracket edges are dashed like the rest of the bracket.

`height` (dimension, in staff space)
: Height of an object in `staff-space` units.

`shorten-pair` (pair of numbers)
: The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`bars` (array of grobs)
: An array of bar line pointers.

This grob interface is used in the following graphical object(s): `VoltaBracket` (page 507).

3.2.143 `volta-interface`

A volta repeat.

This grob interface is used in the following graphical object(s): `VoltaBracket` (page 507), and `VoltaBracketSpanner` (page 509).

3.3 User backend 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-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 and it is larger than this number, make a kneed beam.

`automatically-numbered` (boolean)
: If set, footnotes are 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.

`bend-me` (boolean)
Decide whether this grob is bent.

`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 breakable item 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)
: This is a vector of 3 lists: `#(`*`end-of-line unbroken start-of-line`*`)`. Each list contains *break-align symbols* that specify an order of breakable items (see Section "break-alignment-interface" in *Internals Reference*).

  For example, this places time signatures before clefs:

```
\override Score.BreakAlignment.break-align-orders =
  #(make-vector 3 '(left-edge
                    cue-end-clef
                    ambitus
                    breathing-sign
                    time-signature
                    clef
                    cue-clef
                    staff-bar
                    key-cancellation
                    key-signature
                    custos))
```

`break-align-symbol` (symbol)
: This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

`break-align-symbols` (list)
: A list of *break-align symbols* that determines which breakable items 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 listed in Section "break-alignment-interface" in *Internals Reference*.

`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.

`chord-dots-limit` (integer)
: Limits the column of dots on each chord to the height of the chord plus `chord-dots-limit` staff-positions.

`circled-tip` (boolean)
: Put a circle at start/end of hairpins (al/del niente).

`clef-alignments` (list)
: An alist of parent-alignments that should be used for clef modifiers with various clefs

`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-interfaces` (list)
: A list of interfaces for which automatic beam-collision resolution is run.

`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 of number pairs)
: 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 `0.1` and `1.0` (continuous line). If set to `0.0`, a dotted line is produced

`dash-period` (number)
: The length of one dash together with whitespace. If negative, no line is drawn at all.

`dashed-edge` (boolean)
: If set, the bracket edges are dashed like the rest of the bracket.

`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.

`double-stem-separation` (number)
: The distance between the two stems of a half note in tablature when using `\tabFullNotation`, not counting the width of the stems themselves, expressed as a multiple of the default height of a staff-space in the traditional five-line staff.

`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`*).

`endpoint-alignments` (pair of numbers)
: A pair of numbers representing the alignments of an object's endpoints. E.g., the ends of a hairpin relative to `NoteColumn` grobs.

`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.

`flag-style` (symbol)
: The style of the flag to be used with `MetronomeMark`. Available are `'modern-straight-flag`, `'old-straight-flag`, `flat-flag`, `mensural` and `'default`

`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-features` (list)
: Opentype features.

`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. If the context property `fontSize` is set, its value is added to this before the glyph is printed. 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-distance` – Multiplier to adjust the distance between frets. Default 1.0.
  - `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.
  - `fret-label-horizontal-offset` – The offset of the fret label from the center of the fret in direction orthogonal to strings. Default 0.
  - `handedness` – Print the fret-diagram left- or right-handed. `-1`, `LEFT` for left ; `1`, `RIGHT` for right. Default `RIGHT`.
  - `paren-padding` – The padding for the parenthesis. Default 0.05.

- `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-distance` – Multiplier to adjust the distance between strings. Default 1.0.
- `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, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`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.

`ignore-ambitus` (boolean)
: If set, don't consider this notehead for ambitus calculation.

`ignore-collision` (boolean)
: If set, don't do note collision resolution on this `NoteColumn`.

`implicit` (boolean)
: Is this an implicit bass figure?

`inspect-quants` (pair of numbers)
: If debugging is set, set beam and slur position to a (quantized) position that is as close as possible to this value, and print the demerits for the inspected position in the output.

`keep-inside-line` (boolean)
: If set, this column cannot have objects sticking into the margin.

`kern` (dimension, in staff space)
: The space between individual elements in any compound bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to `Staff.StaffSymbol.thickness`).

`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.

`knee-to-beam` (boolean)
: Determines whether a tuplet number will be positioned next to a kneed beam.

`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)
: Vertical positions of ledger lines. When set on a `StaffSymbol` grob it defines a repeating pattern of ledger lines and any parenthesized groups will always be shown together.

`ledger-positions-function` (any type)
: A quoted Scheme procedure that takes a `StaffSymbol` grob and the vertical position of a note head as arguments and returns a list of ledger line positions.

`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 (each unit represents half a `staff-space`).

`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)
: For slurs and ties, this is the diameter of the virtual "pen" that draws the two arcs of the curve's outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`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-symbol-separation` (number)
: The maximum distance between symbols making up a church rest.

`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-after-break` (dimension, in staff space)
: If set, try to make a broken spanner starting a line this long. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance to the notehead.

`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 and keys.

`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-collision-threshold` (dimension, in staff space)
: Simultaneous notes that are this close or closer in units of `staff-space` will be identified as vertically colliding. Used by `Stem` grobs for notes in the same voice, and `NoteCollision` grobs for notes in different voices. Default value 1.

`note-names` (vector)
: Vector of strings containing names for easy-notation note heads.

`number-type` (symbol)
: Numbering style. Choices include `roman-lower`, `roman-upper` and `arabic`.

`output-attributes` (list)
: An alist of attributes for the grob, to be included in output files. When the SVG typesetting backend is used, the attributes are assigned to a group (`<g>`) containing all of the stencils that comprise a given grob. For example,

```
'((id . 123) (class . foo) (data-whatever . "bar"))
```

produces

```
<g id="123" class="foo" data-whatever="bar"> ... </g>
```

In the Postscript backend, where there is no way to group items, the setting of the `output-attributes` property has no effect.

`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-number` (number)
: Page number on which this system ends up.

`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`.

`parent-alignment-X` (number)
: Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If unset, the value from `self-alignment-X` property will be used.

`parent-alignment-Y` (number)
: Like `parent-alignment-X` but for the Y axis.

`parenthesis-friends` (list)
: A list of Grob types, as symbols. When parentheses enclose a Grob that has 'parenthesis-friends, the parentheses widen to include any child Grobs with type among 'parenthesis-friends.

`parenthesized` (boolean)
: Parenthesize this grob.

`positions` (pair of numbers)
: Pair of staff coordinates (*start* . *end*), where *start* and *end* are vertical positions 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.

`rank-on-page` (number)
: 0-based index of the system on a page.

`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?

`remove-layer` (index or symbol)
: When set as a positive integer, the `Keep_alive_together_engraver` removes all `VerticalAxisGroup` grobs with a `remove-layer` larger than the smallest retained `remove-layer`. Set to `#f` to make a layer independent of the `Keep_alive_together_engraver`. Set to `'()`, the layer does not participate in the layering decisions. The property can also be set as a symbol for common behaviors: `#'any` to keep the layer alive with any other layer in the group; `#'above` or `#'below` to keep the layer alive with the context immediately before or after it, respectively.

`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.

`segno-kern` (number)
: The space between the two thin lines of the segno bar line symbol, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`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 - the unit is half the object width.

`self-alignment-Y` (number)
: Like `self-alignment-X` but for the Y axis.

`shape` (symbol)
: This setting determines what shape a grob has. Valid choices depend on the `stencil` callback reading this property.

`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 on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

`shortest-duration-space` (number)
: Start with this multiple of `spacing-increment` space for the shortest duration. 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)
: The ratio of the size of the object to its default 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)
: An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for *`break-align-symbol`* are listed in Section "break-alignment-interface" in *Internals Reference*. Additionally, three special break-align symbols available to `space-alist` are:

`first-note`
: used when the grob is just left of the first note on a line

`next-note`
: used when the grob is just left of any other note; if not set, the value of `first-note` gets used

`right-edge`
: used when the grob is the last item on the line (only compatible with the `extra-space` spacing style)

Choices for *`spacing-style`* are:

`extra-space`
: Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

`minimum-space`
: Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

`fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

`minimum-fixed-space`
: Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

`semi-fixed-space`
: Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

`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` (dimension, in staff space)
: The unit of length for note-spacing. 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` (index or symbol)
: 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)
: Thickness of the thick line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`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 centered on the note head (the default position of most scripts); `1.0` means centered on the stem. Interpolated values are possible.

`toward-stem-shift-in-column` (number)
: Amount by which a script is shifted toward the stem if its direction coincides with the stem direction and it is associated with a `ScriptColumn` object. `0.0` means centered on the note head (the default position of most scripts); `1.0` means centered on the stem. Interpolated values are possible.

`transparent` (boolean)
: This makes the grob invisible.

`tuplet-slur` (boolean)
: Draw a slur instead of a bracket for tuplets.

`uniform-stretching` (boolean)
: If set, items stretch proportionally to their natural separation based on 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.

`voiced-position` (number)
: The staff-position of a voiced `Rest`, negative if the rest has `direction DOWN`.

`when` (moment)
: Global time step associated with this column.

`whiteout` (boolean-or-number)
: If a number or true, the grob is printed over a white background to white-out underlying material, if the grob is visible. A number indicates how far the white background extends beyond the bounding box of the grob as a multiple of the staff-line thickness. The `LyricHyphen` grob uses a special implementation of whiteout: A positive number indicates how far the white background extends beyond the bounding box in multiples of `line-thickness`. The shape of the background is determined by `whiteout-style`. Usually `#f` by default.

`whiteout-style` (symbol)
: Determines the shape of the `whiteout` background. Available are `'outline`, `'rounded-box`, and the default `'box`. There is one exception: Use `'special` for `LyricHyphen`.

`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-align-on-main-noteheads` (boolean)
: If true, this grob will ignore suspended noteheads when aligning itself on NoteColumn.

`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 spanner line can be constructed from a whole number of squiggles.

3.4 Internal backend properties

`accidental-grob` (graphical (layout) object)
: The accidental for this note.

`accidental-grobs` (list)
: An alist with `(`*`notename . groblist`*`)` entries.

`add-cauda` (boolean)
: Does this flexa require an additional cauda on the left side?

`add-join` (boolean)
: Is this ligature head-joined with the next one by a vertical line?

`add-stem` (boolean)
: Is this ligature head a virga and therefore needs an additional stem on the right side?

`adjacent-pure-heights` (pair)
: A pair of vectors. Used by a `VerticalAxisGroup` to cache the `Y-extent`s of different column ranges.

`adjacent-spanners` (array of grobs)
: An array of directly neighboring dynamic spanners.

`all-elements` (array of grobs)
: An array of all grobs in this line. Its function is to protect objects from being garbage collected.

`annotation` (string)
: Annotate a grob for debug purposes.

`ascendens` (boolean)
: Is this neume of ascending type?

`auctum` (boolean)
: Is this neume liquescentically augmented?

`axis-group-parent-X` (graphical (layout) object)
: Containing X axis group.

`axis-group-parent-Y` (graphical (layout) object)
: Containing Y axis group.

`bars` (array of grobs)
: An array of bar line pointers.

`beam` (graphical (layout) object)
: A pointer to the beam, if applicable.

`beam-segments` (list)
: Internal representation of beam segments.

`begin-of-line-visible` (boolean)
: Set to make `ChordName` or `FretBoard` be visible only at beginning of line or at chord changes.

`bound-alignment-interfaces` (list)
: Interfaces to be used for positioning elements that align with a column.

`bounded-by-me` (array of grobs)
: An array of spanners that have this column as start/begin point. Only columns that have grobs or act as bounds are spaced.

`bracket` (graphical (layout) object)
: The bracket for a number.

`bracket-text` (graphical (layout) object)
: The text for an analysis bracket.

`c0-position` (integer)
: An integer indicating the position of middle C.

`cause` (any type)
: Any kind of causation objects (i.e., music, or perhaps translator) that was the cause for this grob.

`cavum` (boolean)
: Is this neume outlined?

`columns` (array of grobs)
: An array of grobs, typically containing `PaperColumn` or `NoteColumn` objects.

`concurrent-hairpins` (array of grobs)
: All concurrent hairpins.

`conditional-elements` (array of grobs)
: Internal use only.

`context-info` (integer)
: Within a ligature, the final glyph or shape of a head may be affected by the left and/or right neighbour head. `context-info` holds for each head such information about the left and right neighbour, encoded as a bit mask.

`covered-grobs` (array of grobs)
: Grobs that could potentially collide with a beam.

`cross-staff` (boolean)
: True for grobs whose `Y-extent` depends on inter-staff spacing. The extent is measured relative to the grobs's parent staff (more generally, its `VerticalAxisGroup`) so this boolean flags grobs that are not rigidly fixed to their parent staff. Beams that join notes from two staves are `cross-staff`. Grobs that are positioned around

such beams are also `cross-staff`. Grobs that are grouping objects, however, like `VerticalAxisGroups` will not in general be marked `cross-staff` when some of the members of the group are `cross-staff`.

`delta-position` (number)
: The vertical position difference.

`deminutum` (boolean)
: Is this neume deminished?

`descendens` (boolean)
: Is this neume of descendent type?

`direction-source` (graphical (layout) object)
: In case `side-relative-direction` is set, which grob to get the direction from.

`display-cautionary` (boolean)
: Should the grob be displayed as a cautionary grob?

`dot` (graphical (layout) object)
: A reference to a `Dots` object.

`dots` (array of grobs)
: Multiple `Dots` objects.

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

`encompass-objects` (array of grobs)
: Objects that a slur should avoid in addition to notes and stems.

`figures` (array of grobs)
: Figured bass objects for continuation line.

`flag` (graphical (layout) object)
: A pointer to a `Flag` object.

`flexa-height` (dimension, in staff space)
: The height of a flexa shape in a ligature grob (in `staff-space` units).

`flexa-interval` (integer)
: The interval spanned by the two notes of a flexa shape (1 is a second, 7 is an octave).

`flexa-width` (dimension, in staff space)
: The width of a flexa shape in a ligature grob (in `staff-space` units).

`font` (font metric)
: A cached font metric object.

`footnote-stencil` (stencil)
: The stencil of a system's footnotes.

`footnotes-after-line-breaking` (array of grobs)
: Footnote grobs of a broken system.

`footnotes-before-line-breaking` (array of grobs)
: Footnote grobs of a whole system.

`forced` (boolean)
: Manually forced accidental.

`french-beaming-stem-adjustment` (dimension, in staff space)
: Stem will be shortened by this amount of space in case of French beaming style.

`glissando-index` (integer)
: The index of a glissando in its note column.

`grace-spacing` (graphical (layout) object)
: A run of grace notes.

`has-span-bar` (pair)
: A pair of grobs containing the span bars to be drawn below and above the staff. If no span bar is in a position, the respective element is set to `#f`.

`head-width` (dimension, in staff space)
: The width of this ligature head.

`heads` (array of grobs)
: An array of note heads.

`ideal-distances` (list)
: (*obj* . (*dist* . *strength*)) pairs.

`important-column-ranks` (vector)
: A cache of columns that contain `items-worth-living` data.

`in-note-direction` (direction)
: Direction to place in-notes above a system.

`in-note-padding` (number)
: Padding between in-notes.

`in-note-stencil` (stencil)
: The stencil of a system's in-notes.

`inclinatum` (boolean)
: Is this neume an inclinatum?

`interfaces` (list)
: A list of symbols indicating the interfaces supported by this object. It is initialized from the `meta` field.

`items-worth-living` (array of grobs)
: An array of interesting items. If empty in a particular staff, then that staff is erased.

`keep-alive-with` (array of grobs)
: An array of other `VerticalAxisGroup`s. If any of them are alive, then we will stay alive.

`least-squares-dy` (number)
: The ideal beam slope, without damping.

`left-items` (array of grobs)
: Grobs organized on the left by a spacing object.

`left-neighbor` (graphical (layout) object)
: The right-most column that has a spacing-wish for this column.

`ligature-flexa` (boolean)
: request joining note to the previous one in a flexa.

`linea` (boolean)
: Attach vertical lines to this neume?

`make-dead-when` (array of grobs)
: An array of other `VerticalAxisGroup`s. If any of them are alive, then we will turn dead.

`maybe-loose` (boolean)
: Used to mark a breakable column that is loose if and only if it is in the middle of a line.

`melody-spanner` (graphical (layout) object)
: The `MelodyItem` object for a stem.

`meta` (list)
: Provide meta information. It is an alist with the entries `name` and `interfaces`.

`minimum-distances` (list)
: A list of rods that have the format `(obj . dist)`.

`minimum-translations-alist` (list)
: An list of translations for a given start and end point.

`neighbors` (array of grobs)
: The X-axis neighbors of a grob. Used by the pure-from-neighbor-interface to determine various grob heights.

`normal-stems` (array of grobs)
: An array of visible stems.

`note-collision` (graphical (layout) object)
: The `NoteCollision` object of a dot column.

`note-columns` (array of grobs)
: An array of `NoteColumn` grobs.

`note-head` (graphical (layout) object)
: A single note head.

`note-heads` (array of grobs)
: An array of note head grobs.

`numbering-assertion-function` (any type)
: The function used to assert that footnotes are receiving correct automatic numbers.

`oriscus` (boolean)
: Is this neume an oriscus?

`pedal-text` (graphical (layout) object)
: A pointer to the text of a mixed-style piano pedal.

`pes-or-flexa` (boolean)
: Shall this neume be joined with the previous head?

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

`prefix-set` (number)
: A bit mask that holds all Gregorian head prefixes, such as `\virga` or `\quilisma`.

`primitive` (integer)
: A pointer to a ligature primitive, i.e., an item similar to a note head that is part of a ligature.

`pure-relevant-grobs` (array of grobs)
: All the grobs (items and spanners) that are relevant for finding the `pure-Y-extent`

`pure-relevant-items` (array of grobs)
: A subset of elements that are relevant for finding the `pure-Y-extent`.

`pure-relevant-spanners` (array of grobs)
: A subset of elements that are relevant for finding the `pure-Y-extent`.

`pure-Y-common` (graphical (layout) object)
: A cache of the `common_refpoint_of_array` of the `elements` grob set.

`pure-Y-extent` (pair of numbers)
: The estimated height of a system.

`pure-Y-offset-in-progress` (boolean)
: A debugging aid for catching cyclic dependencies.

`quantize-position` (boolean)
: If set, a vertical alignment is aligned to be within staff spaces.

`quantized-positions` (pair of numbers)
: The beam positions after quanting.

`quilisma` (boolean)
: Is this neume a quilisma?

`rest` (graphical (layout) object)
: A pointer to a `Rest` object.

`rest-collision` (graphical (layout) object)
: A rest collision that a rest is in.

`rests` (array of grobs)
: An array of rest objects.

`right-items` (array of grobs)
: Grobs organized on the right by a spacing object.

`right-neighbor` (graphical (layout) object)
: See `left-neighbor`.

`script-column` (graphical (layout) object)
: A `ScriptColumn` associated with a `Script` object.

`script-stencil` (pair)
: A pair `(`*`type`* `.` *`arg`*`)` which acts as an index for looking up a `Stencil` object.

`scripts` (array of grobs)
: An array of `Script` objects.

`shorten` (dimension, in staff space)
: The amount of space that a stem is shortened. Internally used to distribute beam shortening over stems.

`side-support-elements` (array of grobs)
: The side support, an array of grobs.

`slur` (graphical (layout) object)
: A pointer to a `Slur` object.

`space-increment` (dimension, in staff space)
: The amount by which the total duration of a multimeasure rest affects horizontal spacing. Each doubling of the duration adds `space-increment` to the length of the bar.

`spacing` (graphical (layout) object)
: The spacing spanner governing this section.

`spacing-wishes` (array of grobs)
: An array of note spacing or staff spacing objects.

`span-start` (boolean)
: Is the note head at the start of a spanner?

`spanner-broken` (boolean)
: Indicates whether spanner alignment should be broken after the current spanner.

`spanner-placement` (direction)
: The place of an annotation on a spanner. `LEFT` is for the first spanner, and `RIGHT` is for the last. `CENTER` will place it on the broken spanner that falls closest to the center of the length of the entire spanner, although this behavior is unpredictable in situations with lots of rhythmic diversity. For predictable results, use `LEFT` and `RIGHT`.

`staff-grouper` (graphical (layout) object)
: The staff grouper we belong to.

`staff-symbol` (graphical (layout) object)
: The staff symbol grob that we are in.

`stem` (graphical (layout) object)
: A pointer to a `Stem` object.

`stem-info` (pair)
: A cache of stem parameters.

`stems` (array of grobs)
: An array of stem objects.

`stropha` (boolean)
: Is this neume a stropha?

`system-Y-offset` (number)
: The Y-offset (relative to the bottom of the top-margin of the page) of the system to which this staff belongs.

`tie` (graphical (layout) object)
: A pointer to a `Tie` object.

`ties` (array of grobs)
: A grob array of `Tie` objects.

`tremolo-flag` (graphical (layout) object)
: The tremolo object on a stem.

`tuplet-number` (graphical (layout) object)
: The number for a bracket.

`tuplet-start` (boolean)
: Is stem at the start of a tuplet?

`tuplets` (array of grobs)
: An array of smaller tuplet brackets.

`vertical-alignment` (graphical (layout) object)
: The VerticalAlignment in a System.

`vertical-skyline-elements` (array of grobs)
: An array of grobs used to create vertical skylines.

`virga` (boolean)
: Is this neume a virga?

`X-common` (graphical (layout) object)
: Common reference point for axis group.

`x-offset` (dimension, in staff space)
: Extra horizontal offset for ligature heads.

`Y-common` (graphical (layout) object)
: See `X-common`.

4 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` *callback disp cl* [Function]
Add the single-argument procedure *callback* as listener to the dispatcher *disp*. Whenever *disp* hears an event of class *cl*, it calls *callback* with it.

`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:angle` *x y* [Function]
Calculates angle in degrees of given vector. With one argument, *x* is a number pair indicating the vector. With two arguments, *x* and *y* specify the respective coordinates.

`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: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: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-matched-pop-property` *context grob cell* [Function]
This undoes a particular `\override`, `\once \override` or `\once \revert` when given the specific alist pair to undo.

`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 `\temporary \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]
Is *d* a dimension? 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:directed` *direction magnitude* [Function]
Calculates an `(x . y)` pair with optional *magnitude* (defaulting to `1.0`) and *direction* specified either as an angle in degrees or a coordinate pair giving the direction. If *magnitude* is a pair, the respective coordinates are scaled independently, useful for ellipse drawings.

`ly:disconnect-dispatchers` *to from* [Function]
Stop the dispatcher *to* listening to events from *from*.

`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: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: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:extract-subfont-from-collection` *collection-file-name idx subfont-file-name* [Function]
Extract the subfont of index *idx* in TrueType collection (TTC) or OpenType/CFF collection (OTC) file *collection_file_name* and write it to file *subfont_file_name*.

`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:generic-bound-extent` *grob common* [Function]
Determine the extent of *grob* relative to *common* along the X axis, finding its extent as a bound when it a has `bound-alignment-interfaces` property list set and otherwise the full extent.

`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-cff-offset` *font-file-name idx* [Function]
Get the offset of 'CFF' table for *font_file_name*, returning it as an integer. The optional *idx* argument is useful for OpenType/CFF collections (OTC) only; it specifies the font index within the OTC. The default value of *idx* is 0.

`ly:get-context-mods` *contextmod* [Function]
Returns the list of context modifications stored in *contextmod*.

`ly:get-font-format` *font-file-name idx* [Function]
Get the font format for *font_file_name*, returning it as a symbol. The optional *idx* argument is useful for TrueType Collections (TTC) and OpenType/CFF collections (OTC) only; it specifies the font index within the TTC/OTC. The default value of *idx* is 0.

`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: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?` *x* [Function]
Is *x* a `Grob_properties` object?

`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-spanned-rank-interval` *grob* [Function]
Returns a pair with the `rank` of the furthest left column and the `rank` of the furthest right column spanned by `grob`.

`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:gulp-file-utf8` *name size* [Function]
Read *size* characters from the file *name*, and return its contents in a string decoded from UTF-8. If *size* is undefined, the entire file is read. The file is looked up using the search path.

`ly:has-glyph-names?` *font-file-name idx* [Function]
Does the font for *font_file_name* have glyph names? The optional *idx* argument is useful for TrueType Collections (TTC) and OpenType/CFF collections (OTC) only; it specifies the font index within the TTC/OTC. The default value of *idx* is 0.

`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* a `Input` object?

`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: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:item-get-column` *it* [Function]
Return the `PaperColumn` or `NonMusicalPaperColumn` associated with this `Item`.

`ly:iterator?` *x* [Function]
Is *x* a `Music_iterator` object?

`ly:length` *x y* [Function]
Calculates magnitude of given vector. With one argument, *x* is a number pair indicating the vector. With two arguments, *x* and *y* specify the respective coordinates.

`ly:lily-lexer?` *x* [Function]
Is *x* a `Lily_lexer` object?

`ly:lily-parser?` *x* [Function]
Is *x* a `Lily_parser` object?

`ly:line-interface::line` *grob startx starty endx endy* [Function]
Make a line using layout information from grob *grob*.

`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-grob-properties` *alist* [Function]
This packages the given property list *alist* in a grob property container stored in a context property with the name of a grob.

`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 alist default-callback* [Function]
Create an outputter dumping to `port`. `alist` should map symbols to procedures. See `output-ps.scm` for an example. If `default_callback` is given, it is called for unsupported expressions

`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-rotation` *angle center* [Function]
Make a transform rotating by *angle* in degrees. If *center* is given as a pair of coordinates, it is the center of the rotation, otherwise the rotation is around (0 . 0).

`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-scaling` *scale scaley* [Function]
Create a scaling transform from argument *scale* and optionally *scaley*. When both arguments are given, they must be real and give the scale in *x* and *y* direction. If only *scale* is given, it may also be complex to indicate a scaled rotation in the manner of complex number rotations, or a pair of reals for specifying different scales in *x* and *y* direction like with the first calling convention.

`ly:make-score` *music* [Function]
Return score with *music* encapsulated in it.

`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-transform` *xx yx xy yy x0 y0* [Function]
Create a transform. Without options, it is an identity transform. Given four arguments *xx*, *yx*, *xy*, and *yy*, it is a linear transform, given six arguments (with *x0* and *y0* last), it is an affine transform. Transforms can be called as functions on other transforms (concatening them) or on points given either as complex number or real number pair. See also `ly:make-rotation`, `ly:make-scaling`, and `ly:make-translation`.

`ly:make-translation` *x y* [Function]
Make a transform translating by *x* and *y*. If only *x* is given, it can also be a complex number or a pair of numbers indicating the offset to use.

`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 scale *factor*.

`ly:music-deep-copy` *m origin* [Function]
Copy *m* and all sub expressions of *m*. *m* may be an arbitrary type; cons cells and music are copied recursively. If *origin* is given, it is used as the origin for one level of music by calling `ly:set-origin!` on the copy.

`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` object?

`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-start` *mus* [Function]
Get the start of music expression *mus* and return it as a `Moment` object.

`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 direction* [Function]
Get attachment in *font-metric* for attaching a stem to notehead *glyph-name* in the direction *direction* (default UP).

`ly:number->string` *s* [Function]
Convert *s* to a string without generating many decimals.

`ly:one-line-auto-height-breaking` *pb* [Function]
Put each score on a single line, and put each line on its own page. Modify the paper-width setting so that every page is wider than the widest line. Modify the paper-height setting to fit the height of the tallest line.

`ly:one-line-breaking` *pb* [Function]
Put each score on a single line, and put each line on its own page. Modify the paper-width setting so that every page is wider than the widest line.

`ly:one-page-breaking` *pb* [Function]
Put each score on a single page. The paper-height settings are modified so each score fits on one page, and the height of the page matches the height of the full score.

`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 idx* [Function]
Convert the contents of an OTF file to a CFF file, returning it as a string. The optional *idx* argument is useful for OpenType/CFF collections (OTC) only; it specifies the font index within the OTC. The default value of *idx* is 0.

`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?` *x* [Function]
Is *x* a `Output_def` object?

`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-output-scheme` *outputter expr* [Function]
Output *expr* to the paper 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-column::break-align-width` *col align-syms* [Function]
Determine the extent along the X-axis of a grob used for break-alignment organized by column *col*. The grob is specified by *align-syms*, which contains either a single `break-align-symbol` or a list of such symbols.

`ly:paper-column::print` [Function]
Optional stencil for `PaperColumn` or `NonMusicalPaperColumn`. Draws the `rank` `number` of each column, its moment in time, a blue arrow showing the ideal distance, and a red arrow showing the minimum distance between columns.

`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-init` *name* [Function]
Parse the init file `name`.

`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 error flag for *parser*, defaulting to current parser.

`ly:parser-clone` *closures location* [Function]
Return a clone of current parser. 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!` *symbol val* [Function]
Bind *symbol* to *val* in current parser's module.

`ly:parser-error` *msg input* [Function]
Display an error message and make current parser fail. Without a current parser, trigger an ordinary error.

`ly:parser-has-error?` *parser* [Function]
Does *parser* (defaulting to current parser) have an error flag?

`ly:parser-include-string` *ly-code* [Function]
Include the string *ly-code* into the input stream for current parser. Can only be used in immediate Scheme expressions (`$` instead of `#`).

`ly:parser-lookup` *symbol* [Function]
Look up *symbol* in current parser's module. Return `'()` if not defined.

`ly:parser-output-name` *parser* [Function]
Return the base name of the output file. If `parser` is left off, use currently active parser.

`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` *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-headers` *performance* [Function]
Return the list of headers with the innermost first.

`ly:performance-write` *performance filename name* [Function]
Write *performance* to *filename* storing *name* as the name of the performance in the file metadata.

`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 *root* transposed by *delta* equals *pitch*.

`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:pure-call` *data grob start end rest* [Function]
Convert property *data* (unpure-pure container or procedure) to value in a pure context defined by *grob*, *start*, *end*, and possibly *rest* arguments.

`ly:randomize-rand-seed` [Function]
Randomize C random generator.

`ly:register-stencil-expression` *symbol* [Function]
Add *symbol* as head of a stencil expression.

`ly:register-translator` *creator name description* [Function]
Register a translator *creator* (usually a descriptive alist or a function/closure returning one when given a context argument) with the given symbol *name* and the given *description* alist.

`ly:relative-group-extent` *elements common axis* [Function]
Determine the extent of *elements* relative to *common* in the *axis* direction.

`ly:rename-file` *oldname newname* [Function]
Rename *oldname* to *newname*. In contrast to Guile's rename-file, this replaces the destination if it already exists. On Windows, fall back to copying the file contents if *newname* cannot be deleted.

`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 extroversion* [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*. Optional*extroversion* shifts the outline outward, with thedefault of `-1.0` keeping the outer boundary ofthe outline just inside of the polygon.

`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:separation-item::print` [Function]
Optional stencil for `PaperColumn` or `NonMusicalPaperColumn`. This function draws `horizontal-skylines` of each `PaperColumn`, showing the shapes used to determine the minimum distances between `PaperColumns` at the note-spacing step, before staves have been spaced (vertically) on the page.

`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-creation-callback` *cb* [Function]
Specify a procedure that will be called every time a new grob is created. The callback will receive as arguments the grob that was created, the name of the C++ source file that caused the grob to be created, and the corresponding line number in the C++ source file. Call with `#f` as argument to unset the callback.

`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. Call with `#f` as argument to unset the callback.

`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-origin!` *m origin* [Function]
This sets the origin given in *origin* to *m*. *m* will typically be a music expression or a list of music. List structures are searched recursively, but recursion stops at the changed music expressions themselves. *origin* is generally of type `ly:input-location?`, defaulting to `(*location*)`. Other valid values for `origin` are a music expression which is then used as the source of location information, or `#f` or `'()` in which case no action is performed. The return value is *m* itself.

`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. Call with `#f` as argument to unset the callback.

`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: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:source-files` *parser-smob* [Function]
A list of input files that have been opened up to here, including the files that have been closed already. a PARSER may optionally be specified.

`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 current staff-line thickness in the staff associated with *grob*, expressed as a multiple of the current staff-space height.

`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 current staff-space height in the staff associated with *grob*, expressed as a multiple of the default height of a staff-space in the traditional five-line staff.

`ly:stderr-redirect` *fd-or-file-name mode* [Function]
Redirect stderr to *fd* if the first parameter is an integer, or 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-in-color` *stc r g b a* [Function]
Put *stc* in a different color.Accepts either three values for *r*,*g*, *b* and an optional valuefor *a*, or a single CSS-like string.

`ly:stencil-outline` *stil outline* [Function]
Return a stencil with the stencil expression (inking) of stencil *stil* but with outline and dimensions from stencil *outline*.

`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 stencil *stil* using the horizontal and vertical scaling factors *x* and *y*. Negative values will flip or mirror *stil* without changing its origin; this may result in collisions unless it is repositioned.

`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:transform?` *x* [Function]
Is *x* a `Transform` object?

`ly:transform->list` *transform* [Function]
Convert a transform matrix to a list of six values. Values are *xx*, *yx*, *xy*, *yy*, *x0*, *y0*.

`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` *creator* [Function]
Return an alist of properties of translator definition *creator*.

`ly:translator-group?` *x* [Function]
Is *x* a `Translator_group` object?

`ly:translator-name` *creator* [Function]
Return the type name of the translator definition *creator*. The name is a symbol.

`ly:transpose-key-alist` *l pit* [Function]
Make a new key alist of *l* transposed by pitch *pit*.

`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:type1->pfa` *type1-file-name* [Function]
Convert the contents of a Type 1 font in PFB format to PFA format. If the file is already in PFA format, pass through it.

`ly:unit` [Function]
Return the unit used for lengths as a string.

`ly:unpure-call` *data grob rest* [Function]
Convert property *data* (unpure-pure container or procedure) to value in an unpure context defined by *grob* and possibly *rest* arguments.

`ly:unpure-pure-container?` *x* [Function]
Is *x* a `Unpure_pure_container` object?

`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 A Indices

A.1 Concept index

(Index is nonexistent)

A.2 Function index

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