# Table of Contents

## 1 Music definitions .................................................. 2

1.1 Music expressions ..................................................... 2
1.1.1 AbsoluteDynamicEvent ........................................... 2
1.1.2 AlternativeEvent .................................................. 2
1.1.3 AnnotateOutputEvent ............................................. 2
1.1.4 ApplyContext ...................................................... 3
1.1.5 ApplyOutputEvent .................................................. 3
1.1.6 ArpeggioEvent ...................................................... 4
1.1.7 ArticulationEvent .................................................. 4
1.1.8 AutoChangeMusic ................................................... 5
1.1.9 BarCheck ............................................................ 5
1.1.10 BassFigureEvent ................................................... 6
1.1.11 BeamEvent ........................................................ 6
1.1.12 BeamForbidEvent ................................................. 6
1.1.13 BendAfterEvent ..................................................... 6
1.1.14 BreakDynamicSpanEvent ......................................... 6
1.1.15 BreathingEvent ..................................................... 7
1.1.16 ClusterNoteEvent ................................................... 7
1.1.17 CompletizeExtenderEvent ...................................... 8
1.1.18 ContextChange ...................................................... 8
1.1.19 ContextSpeccedMusic ............................................. 8
1.1.20 CrescendoEvent .................................................... 9
1.1.21 DecrescendoEvent .................................................. 9
1.1.22 DoublePercentEvent ............................................. 10
1.1.23 DurationLineEvent ............................................... 10
1.1.24 EpisemaEvent ...................................................... 10
1.1.25 Event ............................................................... 11
1.1.26 EventChord ......................................................... 11
1.1.27 ExtenderEvent ...................................................... 12
1.1.28 FingeringEvent .................................................... 12
1.1.29 FootnoteEvent ...................................................... 12
1.1.30 GlissandoEvent ..................................................... 13
1.1.31 GraceMusic ........................................................ 13
1.1.32 HarmonicEvent ..................................................... 13
1.1.33 HyphenEvent ........................................................ 14
1.1.34 KeyChangeEvent ..................................................... 14
1.1.35 LabelEvent ........................................................ 14
1.1.36 LaissezVibrerEvent ............................................... 15
1.1.37 LigatureEvent ....................................................... 15
1.1.38 LineBreakEvent ..................................................... 15
1.1.39 LyricCombineMusic .............................................. 15
1.1.40 LyricEvent ........................................................ 16
1.1.41 MarkEvent .......................................................... 16
1.1.42 MeasureCounterEvent ............................................ 16
1.1.43 MeasureSpannerEvent ............................................ 17
1.1.44 MultiMeasureArticulationEvent ................................ 17
1.1.45 MultiMeasureRestEvent ........................................ 18
1.1.46 MultiMeasureRestMusic .......................................... 18
1.1.47 MultiMeasureTextEvent .................................................. 19
1.1.48 Music ........................................................................ 19
1.1.49 NoteEvent ................................................................. 19
1.1.50 NoteGroupingEvent ..................................................... 20
1.1.51 OttavaMusic ............................................................... 20
1.1.52 OverrideProperty ........................................................ 20
1.1.53 PageBreakEvent .......................................................... 21
1.1.54 PageTurnEvent ............................................................ 21
1.1.55 PartCombineMusic ....................................................... 22
1.1.56 PartCombinePartMusic .................................................. 22
1.1.57 PartialSet ................................................................... 23
1.1.58 PercentEvent .............................................................. 23
1.1.59 PercentRepeatedMusic .................................................. 23
1.1.60 PesOrFlexaEvent .......................................................... 24
1.1.61 PhrasingSlurEvent ......................................................... 24
1.1.62 PostEvents .................................................................. 24
1.1.63 PropertySet ................................................................. 25
1.1.64 PropertyUnset ............................................................. 25
1.1.65 QuoteMusic ................................................................. 25
1.1.66 RelativeOctaveCheck .................................................... 26
1.1.67 RelativeOctaveMusic ..................................................... 26
1.1.68 RepeatSlashEvent ......................................................... 27
1.1.69 RepeatTieEvent ............................................................ 27
1.1.70 RestEvent .................................................................... 27
1.1.71 RevertProperty ............................................................ 28
1.1.72 ScriptEvent ................................................................. 28
1.1.73 SequentialMusic ........................................................... 29
1.1.74 SimultaneousMusic ....................................................... 29
1.1.75 SkipEvent ................................................................... 30
1.1.76 SkipMusic ................................................................... 30
1.1.77 SlurEvent .................................................................... 31
1.1.78 SoloOneEvent ............................................................. 31
1.1.79 SoloTwoEvent ............................................................. 31
1.1.80 SostenutoEvent ............................................................ 32
1.1.81 SpacingSectionEvent ....................................................... 32
1.1.82 SpanEvent .................................................................. 32
1.1.83 StaffSpanEvent ............................................................ 33
1.1.84 StringNumberEvent ...................................................... 33
1.1.85 StrokeFingerEvent ......................................................... 33
1.1.86 SustainEvent ............................................................... 34
1.1.87 TempoChangeEvent ......................................................... 34
1.1.88 TextScriptEvent ........................................................... 34
1.1.89 TextSpanEvent ............................................................. 35
1.1.90 TieEvent ...................................................................... 35
1.1.91 TimeScaledMusic ........................................................ 35
1.1.92 TimeSignatureEvent ....................................................... 36
1.1.93 TimeSignatureMusic ....................................................... 36
1.1.94 TransposedMusic ........................................................ 37
1.1.95 TremoloEvent .............................................................. 37
1.1.96 TremoloRepeatedMusic ............................................... 37
1.1.97 TremoloSpanEvent ....................................................... 38
1.1.98 TrillSpanEvent ............................................................. 38
1.1.99 TupleSpanEvent ........................................................... 39
1.1.100 UnaCordaEvent ......................................................... 39
1.2 Music classes ......................................................... 39
1.1.101 UnfoldedRepeatedMusic ................................. 39
1.1.102 UnisonoEvent ............................................. 40
1.1.103 UnrelativableMusic ........................................ 40
1.1.104 VoiceSeparator .............................................. 41
1.1.105 VoltaRepeatedMusic ........................................ 41
1.1.106 VowelTransitionEvent ..................................... 42

1.2 Music classes ......................................................... 42
1.2.1 absolute-dynamic-event ........................................ 42
1.2.2 alternative-event .............................................. 42
1.2.3 annotate-output-event .......................................... 42
1.2.4 apply-output-event ............................................ 42
1.2.5 arpeggio-event ................................................. 42
1.2.6 articulation-event ............................................. 43
1.2.7 bass-figure-event .............................................. 43
1.2.8 beam-event .................................................. 43
1.2.9 beam-forbid-event ............................................ 43
1.2.10 bend-after-event ............................................. 43
1.2.11 break-dynamic-span-event .................................. 43
1.2.12 break-event .................................................. 43
1.2.13 break-span-event ............................................. 43
1.2.14 breathing-event .............................................. 43
1.2.15 cluster-note-event ........................................... 44
1.2.16 completize-extender-event .................................. 44
1.2.17 crescendo-event .............................................. 44
1.2.18 decrescendo-event ........................................... 44
1.2.19 double-percent-event ........................................ 44
1.2.20 duration-line-event .......................................... 44
1.2.21 dynamic-event ............................................... 44
1.2.22 episema-event ............................................... 44
1.2.23 extender-event ............................................... 44
1.2.24 fingering-event .............................................. 44
1.2.25 footnote-event ............................................... 45
1.2.26 glissando-event ............................................... 45
1.2.27 harmonic-event .............................................. 45
1.2.28 hyphen-event ................................................ 45
1.2.29 key-change-event ............................................ 45
1.2.30 label-event .................................................. 45
1.2.31 laissez-vibrer-event ......................................... 45
1.2.32 layout-instruction-event ..................................... 45
1.2.33 ligature-event ................................................ 45
1.2.34 line-break-event ............................................. 46
1.2.35 lyric-event .................................................. 46
1.2.36 mark-event .................................................. 46
1.2.37 measure-counter-event ....................................... 46
1.2.38 measure-spanner-event ....................................... 46
1.2.39 melodic-event ................................................ 46
1.2.40 multi-measure-articulation-event ......................... 46
1.2.41 multi-measure-rest-event ................................... 46
1.2.42 multi-measure-text-event ................................... 46
1.2.43 music-event .................................................. 46
1.2.44 note-event .................................................. 47
1.2.45 note-grouping-event ......................................... 47
1.2.46 page-break-event ............................................ 48
1.2.47 page-turn-event .............................................. 48
2 Translation .......................................................... 59

2.1 Contexts .......................................................... 59
2.1.1 ChoirStaff ..................................................... 59
2.1.2 ChordNames .................................................. 60
2.1.3 CueVoice ...................................................... 63
2.1.4 Devnull ....................................................... 76
2.1.5 DrumStaff ..................................................... 76
2.1.6 DrumVoice .................................................... 83
2.1.7 Dynamics ..................................................... 95
2.1.8 FiguredBass .................................................. 99
2.1.9 FretBoards ................................................... 101
2.1.10 Global ....................................................... 103
2.1.11 GrandStaff .................................................. 104
2.1.12 GregorianTranscriptionStaff ......................... 106
2.1.13 GregorianTranscriptionVoice ....................... 117
2.1.14 KievanStaff ................................................ 130
2.1.15 KievanVoice ............................................... 141
2.1.16 Lyrics ................................................................. 155
2.1.17 MensuralStaff ....................................................... 157
2.1.18 MensuralVoice ..................................................... 169
2.1.19 NoteNames .......................................................... 182
2.1.20 NullVoice ............................................................. 184
2.1.21 OneStaff ............................................................... 187
2.1.22 PetrucciStaff ......................................................... 188
2.1.23 PetrucciVoice ........................................................ 199
2.1.24 PianoStaff ............................................................ 212
2.1.25 RhythmicStaff ....................................................... 215
2.1.26 Score ................................................................. 219
2.1.27 Staff ................................................................. 240
2.1.28 StaffGroup ........................................................... 251
2.1.29 TabStaff ............................................................... 253
2.1.30 TabVoice .............................................................. 263
2.1.31 VaticanaStaff ........................................................ 276
2.1.32 VaticanaVoice ....................................................... 287
2.1.33 Voice ................................................................. 300

2.2 Engravers and Performers ............................................. 313
  2.2.1 Accidental_engraver ............................................. 313
  2.2.2 Ambitus_engraver ................................................ 314
  2.2.3 Arpeggio_engraver .............................................. 315
  2.2.4 Auto_beam_engraver ............................................ 315
  2.2.5 Axis_group_engraver ........................................... 316
  2.2.6 Balloon_engraver ............................................... 317
  2.2.7 Bar_engraver ..................................................... 317
  2.2.8 Bar_number_engraver ......................................... 317
  2.2.9 Beam_collision_engraver ................................... 319
  2.2.10 Beam_engraver ................................................ 319
  2.2.11 Beam_performer ............................................... 319
  2.2.12 Bend_engraver ................................................ 319
  2.2.13 Break_align_engraver ....................................... 320
  2.2.14 Breathing_sign_engraver ................................... 320
  2.2.15 Chord_name_engraver ..................................... 320
  2.2.16 Chord_tremolo_engraver .................................. 321
  2.2.17 Clef_engraver ................................................ 321
  2.2.18 Cluster_spanner_engraver .................................. 322
  2.2.19 Collision_engraver .......................................... 322
  2.2.20 Completion_heads_engraver ................................ 322
  2.2.21 Completion_rest_engraver ................................ 323
  2.2.22 Concurrent_hairpin_engraver ................................ 324
  2.2.23 Control_track_performer ................................ 324
  2.2.24 Cue_clef_engraver ........................................... 324
  2.2.25 Custos_engraver ............................................... 324
  2.2.26 Default_bar_line_engraver ................................ 325
  2.2.27 Dot_column_engraver ...................................... 325
  2.2.28 Dots_engraver ................................................ 326
  2.2.29 Double_percent_repeat_engraver ............................ 326
  2.2.30 Drum_note_performer ...................................... 326
  2.2.31 Drum_notes_engraver ....................................... 327
  2.2.32 Duration_line_engraver .................................... 327
  2.2.33 Dynamic_align_engraver .................................... 327
  2.2.34 Dynamic_engraver ........................................... 328
  2.2.35 Dynamic_performer ......................................... 328
2.2.36 Episema_engraver ........................................ 329
2.2.37 Extender_engraver ....................................... 329
2.2.38 Figured_bass_engraver .................................. 329
2.2.39 Figured_bass_position_engraver ......................... 330
2.2.40 Fingering_column_engraver ............................. 330
2.2.41 Fingering_engraver ............................... 330
2.2.42 Font_size_engraver ............................... 331
2.2.43 Footnote_engraver ..................................... 331
2.2.44 Forbid_line_break_engraver .............................. 331
2.2.45 Fretboard_engraver ...................................... 331
2.2.46 Glissando_engraver ..................................... 332
2.2.47 Grace_auto_beam_engraver .............................. 333
2.2.48 Grace_beam_engraver .................................... 333
2.2.49 Grace_engraver .................................. 334
2.2.50 Grace_spacing_engraver ................................ 334
2.2.51 Grid_line_span_engraver ................................. 334
2.2.52 Grid_point_engraver ..................................... 334
2.2.53 Grob_pq_engraver ....................................... 334
2.2.54 Horizontal_bracket_engraver .............................. 335
2.2.55 Hyphen_engraver ....................................... 335
2.2.56 Instrument_name_engraver .............................. 335
2.2.57 Instrument_switch_engraver ............................. 336
2.2.58 Keep_alive_together_engraver ......................... 336
2.2.59 Key_engraver .......................................... 336
2.2.60 Key_performer ........................................ 337
2.2.61 Kievian_ligature_engraver ............................... 338
2.2.62 Laissez_vibrer_engraver ................................. 338
2.2.63 Ledger_line_engraver .................................... 338
2.2.64 Ligature_bracket_engraver .............................. 338
2.2.65 Lyric_engraver ........................................ 338
2.2.66 Lyric_performer ........................................ 339
2.2.67 Mark_engraver ....................................... 339
2.2.68 Measure_counter_engraver .............................. 339
2.2.69 Measure_grouping_engraver .............................. 340
2.2.70 Measure_spanner_engraver .............................. 340
2.2.71 Melody_engraver ....................................... 341
2.2.72 Mensural_ligature_engraver ............................. 341
2.2.73 Merge_mnrest_numbers_engraver ....................... 341
2.2.74 Merge_rests_engraver ................................... 341
2.2.75 Metronome_mark_engraver ................................ 341
2.2.76 Midi_control_change_performer ......................... 342
2.2.77 Multi_measure_rest_engraver ............................ 342
2.2.78 New_fingering_engraver ................................ 343
2.2.79 Note_head_line_engraver ................................ 344
2.2.80 Note_heads_engraver .................................... 344
2.2.81 Note_name_engraver .................................... 344
2.2.82 Note_performer ........................................ 345
2.2.83 Note_spacing_engraver .................................. 345
2.2.84 Ottawa_spanner_engraver ................................ 345
2.2.85 Output_property_engraver ............................... 346
2.2.86 Page_turn_engraver .................................... 346
2.2.87 Paper_column_engraver .................................. 346
2.2.88 Parenthesis_engraver .................................... 347
2.2.89 Part_combine_engraver .................................. 347
2.2.90 Percent_repeat_engraver ........................................ 347
2.2.91 Phrasing_slur_engraver ........................................ 348
2.2.92 Piano_pedal_align_engraver ................................. 348
2.2.93 Piano_pedal_engraver ......................................... 348
2.2.94 Piano_pedal_performer ....................................... 349
2.2.95 Pitch_squash_engraver ...................................... 349
2.2.96 Pitched_trill_engraver ...................................... 350
2.2.97 Pure_from_neighbor_engraver ............................... 350
2.2.98 Repeat_acknowledge_engraver ............................... 350
2.2.99 Repeat_tie_engraver ......................................... 351
2.2.100 Rest_collision_engraver ................................... 351
2.2.101 Rest_engraver ................................................ 351
2.2.102 Rhythmic_column_engraver ................................. 352
2.2.103 Script_column_engraver ..................................... 352
2.2.104 Script_engraver ............................................. 352
2.2.105 Script_row_engraver ....................................... 352
2.2.106 Separating_line_group_engraver .......................... 353
2.2.107 Slash_repeat_engraver ..................................... 353
2.2.108 Slur_engraver ................................................ 353
2.2.109 Slur_performer .............................................. 354
2.2.110 Spacing_engraver ............................................ 354
2.2.111 Span_arpeggio_engraver .................................... 354
2.2.112 Span_bar_engraver .......................................... 354
2.2.113 Span_bar_stub_engraver .................................... 355
2.2.114 Span_stem_engraver ........................................ 355
2.2.115 Spanner_break_forbid_engraver ........................... 355
2.2.116 Staff_collecting_engraver .................................. 355
2.2.117 Staff_performer ............................................. 355
2.2.118 Staff_symbol_engraver ...................................... 355
2.2.119 Stanza_number_align_engraver ............................. 356
2.2.120 Stanza_number_engraver .................................... 356
2.2.121 Stem_engraver .............................................. 356
2.2.122 System_start_delimiter_engraver .......................... 357
2.2.123 Tab_note_heads_engraver .................................... 357
2.2.124 Tab_staff_symbol_engraver ................................ 358
2.2.125 Tab_tie_follow_engraver .................................... 358
2.2.126 Tempo_performer .......................................... 358
2.2.127 Text_engraver ................................................ 358
2.2.128 Text_spanner_engraver ...................................... 359
2.2.129 Tie_engraver ................................................ 359
2.2.130 Tie_performer .............................................. 360
2.2.131 Time_signature_engraver .................................. 360
2.2.132 Time_signature_performer ................................ 360
2.2.133 Timing_translator .......................................... 360
2.2.134 Trill_spanner_engraver ..................................... 361
2.2.135 Tuplet_engraver ............................................ 362
2.2.136 Tweak_engraver ............................................ 362
2.2.137 Vaticana_ligature_engraver ............................... 362
2.2.138 Vertical_align_engraver ..................................... 362
2.2.139 Volta_engraver ............................................. 363

2.3 Tunable context properties .................................... 363
2.4 Internal context properties ................................. 376
# Backend

3 All layout objects

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Accidental</td>
<td>378</td>
</tr>
<tr>
<td>3.1.1</td>
<td>Accidental</td>
<td>378</td>
</tr>
<tr>
<td>3.1.2</td>
<td>AccidentalCautionary</td>
<td>379</td>
</tr>
<tr>
<td>3.1.3</td>
<td>AccidentalPlacement</td>
<td>380</td>
</tr>
<tr>
<td>3.1.4</td>
<td>AccidentalSuggestion</td>
<td>381</td>
</tr>
<tr>
<td>3.1.5</td>
<td>Ambitus</td>
<td>382</td>
</tr>
<tr>
<td>3.1.6</td>
<td>AmbitusAccidental</td>
<td>384</td>
</tr>
<tr>
<td>3.1.7</td>
<td>AmbitusLine</td>
<td>385</td>
</tr>
<tr>
<td>3.1.8</td>
<td>AmbitusNoteHead</td>
<td>386</td>
</tr>
<tr>
<td>3.1.9</td>
<td>Arpeggio</td>
<td>387</td>
</tr>
<tr>
<td>3.1.10</td>
<td>BalloonTextItem</td>
<td>389</td>
</tr>
<tr>
<td>3.1.11</td>
<td>BalloonTextSpanner</td>
<td>389</td>
</tr>
<tr>
<td>3.1.12</td>
<td>BarLine</td>
<td>390</td>
</tr>
<tr>
<td>3.1.13</td>
<td>BarNumber</td>
<td>393</td>
</tr>
<tr>
<td>3.1.14</td>
<td>BassFigure</td>
<td>395</td>
</tr>
<tr>
<td>3.1.15</td>
<td>BassFigureAlignment</td>
<td>396</td>
</tr>
<tr>
<td>3.1.16</td>
<td>BassFigureAlignmentPositioning</td>
<td>396</td>
</tr>
<tr>
<td>3.1.17</td>
<td>BassFigureBracket</td>
<td>397</td>
</tr>
<tr>
<td>3.1.18</td>
<td>BassFigureContinuation</td>
<td>398</td>
</tr>
<tr>
<td>3.1.19</td>
<td>BassFigureLine</td>
<td>398</td>
</tr>
<tr>
<td>3.1.20</td>
<td>Beam</td>
<td>399</td>
</tr>
<tr>
<td>3.1.21</td>
<td>BendAfter</td>
<td>401</td>
</tr>
<tr>
<td>3.1.22</td>
<td>BreakAlignGroup</td>
<td>401</td>
</tr>
<tr>
<td>3.1.23</td>
<td>BreakAlignment</td>
<td>402</td>
</tr>
<tr>
<td>3.1.24</td>
<td>BreathingSign</td>
<td>403</td>
</tr>
<tr>
<td>3.1.25</td>
<td>ChordName</td>
<td>405</td>
</tr>
<tr>
<td>3.1.26</td>
<td>Clef</td>
<td>406</td>
</tr>
<tr>
<td>3.1.27</td>
<td>ClefModifier</td>
<td>409</td>
</tr>
<tr>
<td>3.1.28</td>
<td>ClusterSpanner</td>
<td>411</td>
</tr>
<tr>
<td>3.1.29</td>
<td>ClusterSpannerBeacon</td>
<td>411</td>
</tr>
<tr>
<td>3.1.30</td>
<td>CombineTextScript</td>
<td>411</td>
</tr>
<tr>
<td>3.1.31</td>
<td>CueClef</td>
<td>413</td>
</tr>
<tr>
<td>3.1.32</td>
<td>CueEndClef</td>
<td>416</td>
</tr>
<tr>
<td>3.1.33</td>
<td>Custos</td>
<td>419</td>
</tr>
<tr>
<td>3.1.34</td>
<td>DotColumn</td>
<td>420</td>
</tr>
<tr>
<td>3.1.35</td>
<td>Dots</td>
<td>421</td>
</tr>
<tr>
<td>3.1.36</td>
<td>DoublePercentRepeat</td>
<td>422</td>
</tr>
<tr>
<td>3.1.37</td>
<td>DoublePercentRepeatCounter</td>
<td>423</td>
</tr>
<tr>
<td>3.1.38</td>
<td>DoubleRepeatSlash</td>
<td>425</td>
</tr>
<tr>
<td>3.1.39</td>
<td>DurationLine</td>
<td>426</td>
</tr>
<tr>
<td>3.1.40</td>
<td>DynamicLineSpanner</td>
<td>427</td>
</tr>
<tr>
<td>3.1.41</td>
<td>DynamicText</td>
<td>429</td>
</tr>
<tr>
<td>3.1.42</td>
<td>DynamicTextSpanner</td>
<td>430</td>
</tr>
<tr>
<td>3.1.43</td>
<td>Episema</td>
<td>432</td>
</tr>
<tr>
<td>3.1.44</td>
<td>Fingering</td>
<td>433</td>
</tr>
<tr>
<td>3.1.45</td>
<td>FingeringColumn</td>
<td>435</td>
</tr>
<tr>
<td>3.1.46</td>
<td>Flag</td>
<td>435</td>
</tr>
<tr>
<td>3.1.47</td>
<td>FootnoteItem</td>
<td>436</td>
</tr>
<tr>
<td>3.1.48</td>
<td>FootnoteSpanner</td>
<td>437</td>
</tr>
<tr>
<td>3.1.49</td>
<td>FretBoard</td>
<td>438</td>
</tr>
<tr>
<td>3.1.50</td>
<td>Glissando</td>
<td>440</td>
</tr>
<tr>
<td>3.1.51</td>
<td>GraceSpacing</td>
<td>442</td>
</tr>
<tr>
<td>3.1.52</td>
<td>GridLine</td>
<td>442</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>3.1.53</td>
<td>GridPoint</td>
<td>443</td>
</tr>
<tr>
<td>3.1.54</td>
<td>Hairpin</td>
<td>443</td>
</tr>
<tr>
<td>3.1.55</td>
<td>HorizontalBracket</td>
<td>445</td>
</tr>
<tr>
<td>3.1.56</td>
<td>HorizontalBracketText</td>
<td>446</td>
</tr>
<tr>
<td>3.1.57</td>
<td>InstrumentName</td>
<td>447</td>
</tr>
<tr>
<td>3.1.58</td>
<td>InstrumentSwitch</td>
<td>448</td>
</tr>
<tr>
<td>3.1.59</td>
<td>KeyCancellation</td>
<td>449</td>
</tr>
<tr>
<td>3.1.60</td>
<td>KeySignature</td>
<td>452</td>
</tr>
<tr>
<td>3.1.61</td>
<td>KievanLigature</td>
<td>455</td>
</tr>
<tr>
<td>3.1.62</td>
<td>LaissezVibrerTie</td>
<td>455</td>
</tr>
<tr>
<td>3.1.63</td>
<td>LaissezVibrerTieColumn</td>
<td>457</td>
</tr>
<tr>
<td>3.1.64</td>
<td>LedgerLineSpanner</td>
<td>457</td>
</tr>
<tr>
<td>3.1.65</td>
<td>LeftEdge</td>
<td>458</td>
</tr>
<tr>
<td>3.1.66</td>
<td>LigatureBracket</td>
<td>460</td>
</tr>
<tr>
<td>3.1.67</td>
<td>LyricExtender</td>
<td>461</td>
</tr>
<tr>
<td>3.1.68</td>
<td>LyricHyphen</td>
<td>462</td>
</tr>
<tr>
<td>3.1.69</td>
<td>LyricSpace</td>
<td>463</td>
</tr>
<tr>
<td>3.1.70</td>
<td>LyricText</td>
<td>463</td>
</tr>
<tr>
<td>3.1.71</td>
<td>MeasureCounter</td>
<td>465</td>
</tr>
<tr>
<td>3.1.72</td>
<td>MeasureGrouping</td>
<td>467</td>
</tr>
<tr>
<td>3.1.73</td>
<td>MeasureSpanner</td>
<td>468</td>
</tr>
<tr>
<td>3.1.74</td>
<td>MelodyItem</td>
<td>469</td>
</tr>
<tr>
<td>3.1.75</td>
<td>MensuralLigature</td>
<td>469</td>
</tr>
<tr>
<td>3.1.76</td>
<td>MetronomeMark</td>
<td>470</td>
</tr>
<tr>
<td>3.1.77</td>
<td>MultiMeasureRest</td>
<td>472</td>
</tr>
<tr>
<td>3.1.78</td>
<td>MultiMeasureRestNumber</td>
<td>473</td>
</tr>
<tr>
<td>3.1.79</td>
<td>MultiMeasureRestScript</td>
<td>475</td>
</tr>
<tr>
<td>3.1.80</td>
<td>MultiMeasureRestText</td>
<td>476</td>
</tr>
<tr>
<td>3.1.81</td>
<td>NonMusicalPaperColumn</td>
<td>478</td>
</tr>
<tr>
<td>3.1.82</td>
<td>NoteCollision</td>
<td>479</td>
</tr>
<tr>
<td>3.1.83</td>
<td>NoteColumn</td>
<td>480</td>
</tr>
<tr>
<td>3.1.84</td>
<td>NoteHead</td>
<td>480</td>
</tr>
<tr>
<td>3.1.85</td>
<td>NoteName</td>
<td>482</td>
</tr>
<tr>
<td>3.1.86</td>
<td>NoteSpacing</td>
<td>482</td>
</tr>
<tr>
<td>3.1.87</td>
<td>OttavaBracket</td>
<td>483</td>
</tr>
<tr>
<td>3.1.88</td>
<td>PaperColumn</td>
<td>484</td>
</tr>
<tr>
<td>3.1.89</td>
<td>ParenthesesItem</td>
<td>485</td>
</tr>
<tr>
<td>3.1.90</td>
<td>PercentRepeat</td>
<td>486</td>
</tr>
<tr>
<td>3.1.91</td>
<td>PercentRepeatCounter</td>
<td>487</td>
</tr>
<tr>
<td>3.1.92</td>
<td>PhrasingSlur</td>
<td>488</td>
</tr>
<tr>
<td>3.1.93</td>
<td>PianoPedalBracket</td>
<td>490</td>
</tr>
<tr>
<td>3.1.94</td>
<td>RehearsalMark</td>
<td>491</td>
</tr>
<tr>
<td>3.1.95</td>
<td>RepeatSlash</td>
<td>493</td>
</tr>
<tr>
<td>3.1.96</td>
<td>RepeatTie</td>
<td>494</td>
</tr>
<tr>
<td>3.1.97</td>
<td>RepeatTieColumn</td>
<td>495</td>
</tr>
<tr>
<td>3.1.98</td>
<td>Rest</td>
<td>495</td>
</tr>
<tr>
<td>3.1.99</td>
<td>RestCollision</td>
<td>496</td>
</tr>
<tr>
<td>3.1.100</td>
<td>Script</td>
<td>497</td>
</tr>
<tr>
<td>3.1.101</td>
<td>ScriptColumn</td>
<td>498</td>
</tr>
<tr>
<td>3.1.102</td>
<td>ScriptRow</td>
<td>498</td>
</tr>
<tr>
<td>3.1.103</td>
<td>Slur</td>
<td>498</td>
</tr>
<tr>
<td>3.1.104</td>
<td>SostenutoPedal</td>
<td>501</td>
</tr>
<tr>
<td>3.1.105</td>
<td>SostenutoPedalLineSpanner</td>
<td>502</td>
</tr>
<tr>
<td>3.1.106</td>
<td>SpacingSpanner</td>
<td>503</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>3.1.107</td>
<td>SpanBar</td>
<td>504</td>
</tr>
<tr>
<td>3.1.108</td>
<td>SpanBarStub</td>
<td>505</td>
</tr>
<tr>
<td>3.1.109</td>
<td>StaffGrouper</td>
<td>505</td>
</tr>
<tr>
<td>3.1.110</td>
<td>StaffSpacing</td>
<td>506</td>
</tr>
<tr>
<td>3.1.111</td>
<td>StaffSymbol</td>
<td>507</td>
</tr>
<tr>
<td>3.1.112</td>
<td>StanzaNumber</td>
<td>507</td>
</tr>
<tr>
<td>3.1.113</td>
<td>Stem</td>
<td>508</td>
</tr>
<tr>
<td>3.1.114</td>
<td>StemStub</td>
<td>510</td>
</tr>
<tr>
<td>3.1.115</td>
<td>StemTremolo</td>
<td>511</td>
</tr>
<tr>
<td>3.1.116</td>
<td>StringNumber</td>
<td>512</td>
</tr>
<tr>
<td>3.1.117</td>
<td>StrokeFinger</td>
<td>514</td>
</tr>
<tr>
<td>3.1.118</td>
<td>SustainPedal</td>
<td>515</td>
</tr>
<tr>
<td>3.1.119</td>
<td>SustainPedalLineSpanner</td>
<td>516</td>
</tr>
<tr>
<td>3.1.120</td>
<td>System</td>
<td>517</td>
</tr>
<tr>
<td>3.1.121</td>
<td>SystemStartBar</td>
<td>518</td>
</tr>
<tr>
<td>3.1.122</td>
<td>SystemStartBrace</td>
<td>519</td>
</tr>
<tr>
<td>3.1.123</td>
<td>SystemStartBracket</td>
<td>520</td>
</tr>
<tr>
<td>3.1.124</td>
<td>SystemStartSquare</td>
<td>521</td>
</tr>
<tr>
<td>3.1.125</td>
<td>TabNoteHead</td>
<td>522</td>
</tr>
<tr>
<td>3.1.126</td>
<td>TextScript</td>
<td>524</td>
</tr>
<tr>
<td>3.1.127</td>
<td>TextSpanner</td>
<td>526</td>
</tr>
<tr>
<td>3.1.128</td>
<td>Tie</td>
<td>527</td>
</tr>
<tr>
<td>3.1.129</td>
<td>TieColumn</td>
<td>529</td>
</tr>
<tr>
<td>3.1.130</td>
<td>TimeSignature</td>
<td>529</td>
</tr>
<tr>
<td>3.1.131</td>
<td>TrillPitchAccidental</td>
<td>532</td>
</tr>
<tr>
<td>3.1.132</td>
<td>TrillPitchGroup</td>
<td>533</td>
</tr>
<tr>
<td>3.1.133</td>
<td>TrillPitchHead</td>
<td>534</td>
</tr>
<tr>
<td>3.1.134</td>
<td>TrillSpanner</td>
<td>535</td>
</tr>
<tr>
<td>3.1.135</td>
<td>TupletBracket</td>
<td>536</td>
</tr>
<tr>
<td>3.1.136</td>
<td>TupletNumber</td>
<td>538</td>
</tr>
<tr>
<td>3.1.137</td>
<td>UnaCordaPedal</td>
<td>539</td>
</tr>
<tr>
<td>3.1.138</td>
<td>UnaCordaPedalLineSpanner</td>
<td>540</td>
</tr>
<tr>
<td>3.1.139</td>
<td>VaticanaLigature</td>
<td>541</td>
</tr>
<tr>
<td>3.1.140</td>
<td>VerticalAlignment</td>
<td>542</td>
</tr>
<tr>
<td>3.1.141</td>
<td>VerticalAxisGroup</td>
<td>542</td>
</tr>
<tr>
<td>3.1.142</td>
<td>VoiceFollower</td>
<td>544</td>
</tr>
<tr>
<td>3.1.143</td>
<td>VoltaBracket</td>
<td>545</td>
</tr>
<tr>
<td>3.1.144</td>
<td>VoltaBracketSpanner</td>
<td>546</td>
</tr>
<tr>
<td>3.1.145</td>
<td>VowelTransition</td>
<td>548</td>
</tr>
<tr>
<td>3.2</td>
<td>Graphical Object Interfaces</td>
<td>549</td>
</tr>
<tr>
<td>3.2.1</td>
<td>accidental-interface</td>
<td>549</td>
</tr>
<tr>
<td>3.2.2</td>
<td>accidental-placement-interface</td>
<td>550</td>
</tr>
<tr>
<td>3.2.3</td>
<td>accidental-suggestion-interface</td>
<td>550</td>
</tr>
<tr>
<td>3.2.4</td>
<td>align-interface</td>
<td>551</td>
</tr>
<tr>
<td>3.2.5</td>
<td>ambitus-interface</td>
<td>551</td>
</tr>
<tr>
<td>3.2.6</td>
<td>arpeggio-interface</td>
<td>552</td>
</tr>
<tr>
<td>3.2.7</td>
<td>axis-group-interface</td>
<td>553</td>
</tr>
<tr>
<td>3.2.8</td>
<td>balloon-interface</td>
<td>555</td>
</tr>
<tr>
<td>3.2.9</td>
<td>bar-line-interface</td>
<td>555</td>
</tr>
<tr>
<td>3.2.10</td>
<td>bass-figure-alignment-interface</td>
<td>556</td>
</tr>
<tr>
<td>3.2.11</td>
<td>bass-figure-interface</td>
<td>556</td>
</tr>
<tr>
<td>3.2.12</td>
<td>beam-interface</td>
<td>557</td>
</tr>
<tr>
<td>3.2.13</td>
<td>bend-after-interface</td>
<td>559</td>
</tr>
<tr>
<td>3.2.14</td>
<td>break-alignable-interface</td>
<td>560</td>
</tr>
</tbody>
</table>
3.2.69 measure-counter-interface .................................................. 591
3.2.70 measure-grouping-interface .................................................. 592
3.2.71 measure-spanner-interface ..................................................... 592
3.2.72 melody-spanner-interface ..................................................... 593
3.2.73 mensural-ligature-interface .................................................. 593
3.2.74 metronome-mark-interface ................................................... 594
3.2.75 multi-measure-interface ....................................................... 594
3.2.76 multi-measure-rest-interface ................................................ 594
3.2.77 multi-measure-rest-number-interface ..................................... 596
3.2.78 note-collision-interface ....................................................... 596
3.2.79 note-column-interface ......................................................... 597
3.2.80 note-head-interface ............................................................ 598
3.2.81 note-name-interface ............................................................ 598
3.2.82 note-spacing-interface ......................................................... 599
3.2.83 number-interface ............................................................... 599
3.2.84 only-prebreak-interface ....................................................... 599
3.2.85 ottava-bracket-interface ..................................................... 599
3.2.86 outside-staff-axis-group-interface ........................................ 599
3.2.87 outside-staff-interface ....................................................... 600
3.2.88 paper-column-interface ....................................................... 601
3.2.89 parentheses-interface ......................................................... 602
3.2.90 percent-repeat-interface ....................................................... 602
3.2.91 percent-repeat-item-interface .............................................. 603
3.2.92 piano-pedal-bracket-interface .............................................. 603
3.2.93 piano-pedal-interface .......................................................... 604
3.2.94 piano-pedal-script-interface .............................................. 604
3.2.95 pitched-trill-interface ........................................................ 604
3.2.96 pure-from-neighbor-interface .............................................. 604
3.2.97 rest-collision-interface ....................................................... 605
3.2.98 rest-interface ................................................................. 605
3.2.99 rhythmic-grob-interface ....................................................... 606
3.2.100 rhythmic-head-interface .................................................... 606
3.2.101 script-column-interface ..................................................... 606
3.2.102 script-interface ............................................................... 606
3.2.103 self-alignment-interface .................................................... 607
3.2.104 semi-tie-column-interface ................................................ 608
3.2.105 semi-tie-interface ............................................................ 609
3.2.106 separation-item-interface .................................................. 610
3.2.107 side-position-interface ..................................................... 610
3.2.108 slur-interface ................................................................. 612
3.2.109 spaceable-grob ............................................................... 612
3.2.110 spacing-interface ............................................................. 614
3.2.111 spacing-options-interface ................................................ 615
3.2.112 spacing-spanner-interface ................................................. 615
3.2.113 span-bar-interface ............................................................ 616
3.2.114 spanner-interface ............................................................. 617
3.2.115 staff-grouper-interface ..................................................... 618
3.2.116 staff-spacing-interface ...................................................... 619
3.2.117 staff-symbol-interface ..................................................... 619
3.2.118 staff-symbol-refrencer-interface ....................................... 620
3.2.119 stanza-number-interface ................................................... 620
3.2.120 stem-interface ............................................................... 620
3.2.121 stem-tremolo-interface ..................................................... 623
3.2.122 string-number-interface .................................................... 624
This is the Internals Reference (IR) for version 2.22.0 of LilyPond, the GNU music typesetter.
1 Music definitions

1.1 Music expressions

1.1.1 AbsoluteDynamicEvent
Create a dynamic mark.

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

Event classes: Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.21 [dynamic-event], page 44, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.34 [Dynamic_ engraver], page 328, and Section 2.2.35 [Dynamic_ performer], page 328.

Properties:

\begin{itemize}
  \item name (symbol): \texttt{'AbsoluteDynamicEvent}
    \hspace{1cm} Name of this music object.
  \item types (list):
    \begin{itemize}
      \item \texttt{(post-event event dynamic-event absolute-dynamic-event)}
    \end{itemize}
    \hspace{1cm} The types of this music object; determines by what engraver this music expression is processed.
\end{itemize}

1.1.2 AlternativeEvent
Create an alternative event.

Event classes: Section 1.2.2 [alternative-event], page 42, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.8 [Bar_number_engraver], page 317.

Properties:

\begin{itemize}
  \item name (symbol): \texttt{'AlternativeEvent}
    \hspace{1cm} Name of this music object.
  \item types (list):
    \begin{itemize}
      \item \texttt{(event alternative-event)}
    \end{itemize}
    \hspace{1cm} The types of this music object; determines by what engraver this music expression is processed.
\end{itemize}

1.1.3 AnnotateOutputEvent
Print an annotation of an output element.

Event classes: Section 1.2.3 [annotate-output-event], page 42, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.6 [Balloon_engraver], page 317.

Properties:

\begin{itemize}
  \item name (symbol): \texttt{'AnnotateOutputEvent}
\end{itemize}
Chapter 1: Music definitions

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: Section 1.2.4 [apply-output-event], page 42, Section 1.2.32 [layout-instruction-event], page 45, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.85 [Output property engraver], page 346.

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: Section 1.2.5 [arpeggio-event], page 42, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.3 [Arpeggio engraver], page 315.

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: `notexy`, 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: Section 1.2.6 [articulation-event], page 43, Section 1.2.43 [music-event], page 46, Section 1.2.57 [script-event], page 49, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.82 [Note_performer], page 345, and Section 2.2.104 [Script_ engraver], page 352.

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`. 
Chapter 1: Music definitions

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: Section 1.2.7 [bass-figure-event], page 43, Section 1.2.43 [music-event], page 46, Section 1.2.56 [rhythmic-event], page 49, and Section 1.2.67 [StreamEvent], page 50.

  Accepted by: Section 2.2.38 [Figured_bass_engraver], page 329.

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: Section 1.2.8 [beam-event], page 43, Section 1.2.43 [music-event], page 46, Section 1.2.65 [span-event], page 50, and Section 1.2.67 [StreamEvent], page 50.

  Accepted by: Section 2.2.10 [Beam_engraver], page 319, Section 2.2.11 [Beam_performer], page 319, and Section 2.2.48 [Grace_beam_engraver], page 333.

Properties:

  name (symbol):

  'BeamEvent

  Name of this music object.
Chapter 1: Music definitions

1.1.12 **BeamForbidEvent**

Specify that a note may not auto-beamed.

Event classes: Section 1.2.9 [beam-forbid-event], page 43, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.4 [Auto_beam_engraver], page 315, and Section 2.2.47 [Grace_auto_beam_engraver], page 333.

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: Section 1.2.10 [bend-after-event], page 43, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.12 [Bend_engraver], page 319.

Properties:

- **name** (symbol):
  - `'BendAfterEvent`
    - Name of this music object.

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

1.1.14 **BreakDynamicSpanEvent**

End an alignment spanner for dynamics here.

Event classes: Section 1.2.11 [break-dynamic-span-event], page 43, Section 1.2.13 [break-span-event], page 43, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.34 [Dynamic_engraver], page 328.

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.

1.1.15 BreathingEvent

Create a ‘breath mark’ or ‘comma’.

Syntax: `note\breathe`

Event classes: Section 1.2.14 [breathing-event], page 43, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.14 [Breathing_sign_engraver], page 320, and Section 2.2.82 [Note_performer], page 345.

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.

1.1.16 ClusterNoteEvent

A note that is part of a cluster.

Event classes: Section 1.2.15 [cluster-note-event], page 44, Section 1.2.39 [melodic-event], page 46, Section 1.2.43 [music-event], page 46, Section 1.2.56 [rhythmic-event], page 49, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.18 [Cluster_spanner_engraver], page 322.

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
1.1.17 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: Section 1.2.16 [completize-extender-event], page 44, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.37 [Extender engraver], page 329.

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.

1.1.18 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.

1.1.19 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.

1.1.20 CrescendoEvent

Begin or end a crescendo.

Syntax: note\< . . . note\!
   An alternative syntax is note\cr . . . note\endcr.

Event classes: Section 1.2.17 [crescendo-event], page 44, Section 1.2.43 [music-event],
   page 46, Section 1.2.64 [span-dynamic-event], page 49, Section 1.2.65 [span-event], page 50,
   and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.34 [Dynamic_engraver], page 328, and Section 2.2.35
   [Dynamic_performer], page 328.

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.

1.1.21 DecrescendoEvent

Begin or end a decrescendo.

Syntax: note\> . . . note\!
   An alternative syntax is note\decr . . . note\enddecr.

Event classes: Section 1.2.18 [decrescendo-event], page 44, Section 1.2.43 [music-event],
   page 46, Section 1.2.64 [span-dynamic-event], page 49, Section 1.2.65 [span-event], page 50,
   and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.34 [Dynamic_engraver], page 328, and Section 2.2.35
   [Dynamic_performer], page 328.

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.

### 1.1.22 DoublePercentEvent

Used internally to signal double percent repeats.

Event classes: Section 1.2.19 [double-percent-event], page 44, Section 1.2.43 [music-event], page 46, Section 1.2.56 [rhythmic-event], page 49, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.29 [Double_percent_repeat_engraver], page 326.

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.

### 1.1.23 DurationLineEvent

Initiate a duration line.

Syntax: note-

Event classes: Section 1.2.20 [duration-line-event], page 44, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.32 [Duration_line_engraver], page 327.

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.

### 1.1.24 EpisemaEvent

Begin or end an episema.

Event classes: Section 1.2.22 [episema-event], page 44, Section 1.2.43 [music-event], page 46, Section 1.2.65 [span-event], page 50, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.36 [Episema_engraver], page 329.

Properties:

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

\begin{verbatim}
types (list):
  '(post-event span-event event episema-event)
\end{verbatim}

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

1.1.25 Event

Atomic music event.

Properties:

\begin{verbatim}
name (symbol):
  'Event

Name of this music object.

types (list):
  '(event)
\end{verbatim}

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

1.1.26 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:

\begin{verbatim}
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)
\end{verbatim}

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

Extend lyrics.

Event classes: Section 1.2.23 [extender-event], page 44, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.37 [Extender_engraver], page 329.

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.

1.1.28 **FingeringEvent**

Specify what finger to use for this note.

Event classes: Section 1.2.24 [fingering-event], page 44, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.41 [Fingering_engraver], page 330, Section 2.2.45 [Fretboard_engraver], page 331, and Section 2.2.123 [Tab_note_heads_engraver], page 357.

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.

1.1.29 **FootnoteEvent**

Footnote a grob.

Event classes: Section 1.2.25 [footnote-event], page 45, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

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.
1.1.30 **GlissandoEvent**

Start a glissando on this note.

Event classes: Section 1.2.26 [glissando-event], page 45, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.46 [Glissando_engraver], page 332.

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.

1.1.31 **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 duration of this music.

- **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.

1.1.32 **HarmonicEvent**

Mark a note as harmonic.

Event classes: Section 1.2.27 [harmonic-event], page 45, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

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.

1.1.33 HyphenEvent
A hyphen between lyric syllables.
  Event classes: Section 1.2.28 [hyphen-event], page 45, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.
  Accepted by: Section 2.2.55 [Hyphen engraver], page 335.
  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.

1.1.34 KeyChangeEvent
Change the key signature.
  Syntax: \key name scale
  Event classes: Section 1.2.29 [key-change-event], page 45, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.
  Accepted by: Section 2.2.59 [Key engraver], page 336, and Section 2.2.60 [Key performer], page 337.
  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.

1.1.35 LabelEvent
Place a bookmarking label.
  Event classes: Section 1.2.30 [label-event], page 45, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.
  Accepted by: Section 2.2.87 [Paper_column engraver], page 346.
  Properties:
    name (symbol):
      'LabelEvent
      Name of this music object.
1.1.36 *LaissezVibrerEvent*

Don’t damp this chord.

Syntax: `note\laissezVibrer`

Event classes: Section 1.2.31 [laissez-vibrer-event], page 45, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.62 [Laissez_vibrer_engraver], page 338.

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.

1.1.37 *LigatureEvent*

Start or end a ligature.

Event classes: Section 1.2.33 [ligature-event], page 45, Section 1.2.43 [music-event], page 46, Section 1.2.65 [span-event], page 50, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.61 [Kievan_ligature_engraver], page 338, Section 2.2.64 [Ligature_bracket_engraver], page 338, Section 2.2.72 [Mensural_ligature_engraver], page 341, and Section 2.2.137 [Vaticana_ligature_engraver], page 362.

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.

1.1.38 *LineBreakEvent*

Allow, forbid or force a line break.

Event classes: Section 1.2.12 [break-event], page 43, Section 1.2.34 [line-break-event], page 46, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.86 [Page_turn_engraver], page 346, and Section 2.2.87 [Paper_column_engraver], page 346.

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.

1.1.39 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 0>

The duration of this music.

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.

1.1.40 LyricEvent

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

Event classes: Section 1.2.35 [lyric-event], page 46, Section 1.2.43 [music-event], page 46, Section 1.2.56 [rhythmic-event], page 49, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.65 [Lyric engraver], page 338, and Section 2.2.66 [Lyric performer], page 339.

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.

1.1.41 MarkEvent

Insert a rehearsal mark.

Syntax: \mark marker

Example: \mark "A"
Event classes: Section 1.2.36 [mark-event], page 46, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.
Accepted by: Section 2.2.67 [Mark_engraver], page 339.
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.

1.1.42 MeasureCounterEvent
Used to signal the start and end of a measure count.
Event classes: Section 1.2.37 [measure-counter-event], page 46, Section 1.2.43 [music-event], page 46, Section 1.2.65 [span-event], page 50, and Section 1.2.67 [StreamEvent], page 50.
Accepted by: Section 2.2.68 [Measure_counter_engraver], page 339.
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.

1.1.43 MeasureSpannerEvent
Used to signal the start and end of a measure spanner.
Event classes: Section 1.2.38 [measure-spanner-event], page 46, Section 1.2.43 [music-event], page 46, Section 1.2.65 [span-event], page 50, and Section 1.2.67 [StreamEvent], page 50.
Accepted by: Section 2.2.70 [Measure_spanner_engraver], page 340.
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.

1.1.44 MultiMeasureArticulationEvent
Articulations on multi-measure rests.
Event classes: Section 1.2.40 [multi-measure-articulation-event], page 46, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.
Accepted by: Section 2.2.77 [Multi_measure_rest_engraver], page 342.
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.

1.1.45 MultiMeasureRestEvent
Used internally by MultiMeasureRestMusic to signal rests.

  Event classes: Section 1.2.41 [multi-measure-rest-event], page 46, Section 1.2.43 [music-event], page 46, Section 1.2.56 [rhythmic-event], page 49, and Section 1.2.67 [StreamEvent], page 50.

  Accepted by: Section 2.2.77 [Multi_measure_rest_engraver], page 342.

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.

1.1.46 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.
1.1.47 MultiMeasureTextEvent

Texts on multi-measure rests.

Syntax: \r\markup { \roman "bla" }

Note the explicit font switch.

Event classes: Section 1.2.42 [multi-measure-text-event], page 46, Section 1.2.43 [music-event], page 46, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.77 [Multi_measure_rest_engraver], page 342.

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.

1.1.48 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.

1.1.49 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 1.1.26 [EventChord], page 11.

Event classes: Section 1.2.39 [melodic-event], page 46, Section 1.2.43 [music-event], page 46, Section 1.2.44 [note-event], page 47, Section 1.2.56 [rhythmic-event], page 49, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.15 [Chord_name_engraver], page 320, Section 2.2.20 [Completion_heads_engraver], page 322, Section 2.2.30 [Drum_note_performer], page 326, Section 2.2.31 [Drum_notes_engraver], page 327, Section 2.2.45 [Fretboard_engraver], page 331, Section 2.2.80 [Note_heads_engraver], page 344, Section 2.2.81 [Note_name_engraver], page 344, Section 2.2.82 [Note_performer], page 345, Section 2.2.89 [Part_combine_engraver], page 347, Section 2.2.91 [Phrasing_slur_engraver], page 348, Section 2.2.108 [Slur_engraver], page 353, and Section 2.2.123 [Tab_note_heads_engraver], page 357.

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.

1.1.50 NoteGroupingEvent
Start or stop grouping brackets.
  Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.45 [note-grouping-event], page 47, and Section 1.2.67 [StreamEvent], page 50.
  Accepted by: Section 2.2.54 [Horizontal_bracket_engraver], page 335.
  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.

1.1.51 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.

1.1.52 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.

1.1.53 PageBreakEvent
Allow, forbid or force a page break.

Event classes: Section 1.2.12 [break-event], page 43, Section 1.2.43 [music-event], page 46,
Section 1.2.46 [page-break-event], page 48, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.86 [Page_turn GPI engraver], page 346, and Section 2.2.87 [Paper_column GPI engraver], page 346.

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.

1.1.54 PageTurnEvent
Allow, forbid or force a page turn.

Event classes: Section 1.2.12 [break-event], page 43, Section 1.2.43 [music-event], page 46,
Section 1.2.47 [page-turn-event], page 48, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.86 [Page_turn GPI engraver], page 346, and Section 2.2.87 [Paper_column GPI engraver], page 346.

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.
1.1.55 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.

1.1.56 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.
1.1.57 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.

1.1.58 PercentEvent

Used internally to signal percent repeats.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.50 [percent-event], page 48,
and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.90 [Percent_repeat_engraver], page 347.

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.

1.1.59 PercentRepeatedMusic

Repeats encoded by percents and slashes.

Properties:

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

length-callback (procedure):
  ly:repeated-music::unfolded-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:repeated-music::first-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.

1.1.60 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: Section 1.2.43 [music-event], page 46, Section 1.2.51 [pes-or-flexa-event], page 48, and Section 1.2.67 [StreamEvent], page 50.

  Accepted by: Section 2.2.137 [Vaticana_ligature_engraver], page 362.

  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.

1.1.61 PhrasingSlurEvent
Start or end phrasing slur.

  Syntax: note\( ( and note\)

  Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.52 [phrasing-slur-event], page 48, Section 1.2.65 [span-event], page 50, and Section 1.2.67 [StreamEvent], page 50.

  Accepted by: Section 2.2.91 [Phrasing_slur_engraver], page 348.

  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.

1.1.62 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.

1.1.63 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.

1.1.64 PropertyUnset
Restore the default setting for a context property. See Section 1.1.63 [PropertySet], page 25.

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.

1.1.65 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.

1.1.66 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.

1.1.67 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.
Chapter 1: Music definitions

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.

1.1.68 RepeatSlashEvent

Used internally to signal beat repeats.

    Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.53 [repeat-slash-event],
    page 48, Section 1.2.56 [rhythmic-event], page 49, and Section 1.2.67 [StreamEvent], page 50.
    Accepted by: Section 2.2.107 [Slash_repeat_engraver], page 353.
    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.

1.1.69 RepeatTieEvent

Ties for starting a second volta bracket.

    Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.54 [repeat-tie-event], page 48,
    and Section 1.2.67 [StreamEvent], page 50.
    Accepted by: Section 2.2.99 [Repeat_tie_engraver], page 351.
    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.

1.1.70 RestEvent

A Rest.

    Syntax: r4 for a quarter rest.
    Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.55 [rest-event], page 48,
    Section 1.2.56 [rhythmic-event], page 49, and Section 1.2.67 [StreamEvent], page 50.
Accepted by: Section 2.2.15 [Chord_name_ engraver], page 320, Section 2.2.21 [Completion_rest_ engraver], page 323, Section 2.2.38 [Figured_bass_ engraver], page 329, and Section 2.2.101 [Rest_ engraver], page 351.

Properties:

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

name (symbol):
  \texttt{RestEvent}
  Name of this music object.

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

1.1.71 RevertProperty

The opposite of Section 1.1.52 [OverrideProperty], page 20: remove a previously added property from a graphical object definition.

Properties:

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

name (symbol):
  \texttt{RevertProperty}
  Name of this music object.

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

1.1.72 ScriptEvent

Add an articulation mark to a note.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.57 [script-event], page 49, and Section 1.2.67 [StreamEvent], page 50.

Not accepted by any engraver or performer.

Properties:

name (symbol):
  \texttt{ScriptEvent}
  Name of this music object.

types (list):
  \texttt{'(event)}
  The types of this music object; determines by what engraver this music expression is processed.
1.1.73 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.scml.

- **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.scml.

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

1.1.74 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.scml.

- **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):

```sml
ly:music-sequence::simultaneous-relative-callback
```

How to transform a piece of music to relative pitches.

`types` (list):

```sml
'(simultaneous-music)
```

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

### 1.1.75 SkipEvent

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

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

**Event classes:** Section 1.2.43 [music-event], page 46, Section 1.2.56 [rhythmic-event], page 49, Section 1.2.58 [skip-event], page 49, and Section 1.2.67 [StreamEvent], page 50.

Not accepted by any engraver or performer.

**Properties:**

`iterator-ctor` (procedure):

```sml
ly:rhythmic-music-iterator::constructor
```

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

`name` (symbol):

```sml
'SkipEvent
```

Name of this music object.

`types` (list):

```sml
'(event rhythmic-event skip-event)
```

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

### 1.1.76 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):

```sml
ly:simple-music-iterator::constructor
```

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

`length-callback` (procedure):

```sml
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):

```sml
'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.

1.1.77 SlurEvent

Start or end slur.

Syntax: note ( and note)

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.59 [slur-event], page 49,
Section 1.2.65 [span-event], page 50, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.108 [Slur engraver], page 353, and Section 2.2.109 [Slur performer],
page 354.

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.

1.1.78 SoloOneEvent

Print 'Solo 1'.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.48 [part-combine-event],
page 48, Section 1.2.60 [solo-one-event], page 49, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.89 [Part combine engraver], page 347.

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.

1.1.79 SoloTwoEvent

Print 'Solo 2'.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.48 [part-combine-event],
page 48, Section 1.2.61 [solo-two-event], page 49, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.89 [Part combine engraver], page 347.

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.

1.1.80 SostenutoEvent
Depress or release sostenuto pedal.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.49 [pedal-event], page 48, Section 1.2.62 [sostenuto-event], page 49, Section 1.2.65 [span-event], page 50, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.93 [Piano_pedal_engraver], page 348, and Section 2.2.94 [Piano_pedal_performer], page 349.

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.

1.1.81 SpacingSectionEvent
Start a new spacing section.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.63 [spacing-section-event], page 49, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.110 [Spacing_engraver], page 354.

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.

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

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.65 [span-event], page 50, and Section 1.2.67 [StreamEvent], page 50.

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.

1.1.83 StaffSpanEvent
Start or stop a staff symbol.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.65 [span-event], page 50, Section 1.2.66 [staff-span-event], page 50, and Section 1.2.67 [StreamEvent], page 50.

Accepted by: Section 2.2.118 [Staff symbol engraver], page 355.

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.

1.1.84 StringNumberEvent
Specify on which string to play this note.

Syntax: \number

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.68 [string-number-event], page 51.

Accepted by: Section 2.2.45 [Fretboard engraver], page 331, and Section 2.2.123 [Tab note heads engraver], page 357.

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.

1.1.85 StrokeFingerEvent
Specify with which finger to pluck a string.

Syntax: \rightHandFinger text

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.69 [stroke-finger-event], page 51.

Not accepted by any engraver or performer.

Properties:
  name (symbol):
    'StrokeFingerEvent
    Name of this music object.
Chapter 1: Music definitions

1.1.86 SustainEvent
Depress or release sustain pedal.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.49 [pedal-event], page 48, Section 1.2.65 [span-event], page 50, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.70 [sustain-event], page 51.

Accepted by: Section 2.2.93 [Piano_pedal_engraver], page 348, and Section 2.2.94 [Piano_pedal_performer], page 349.

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.

1.1.87 TempoChangeEvent
A metronome mark or tempo indication.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.71 [tempo-change-event], page 51.

Accepted by: Section 2.2.75 [Metronome_mark_engraver], page 341.

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.

1.1.88 TextScriptEvent
Print text.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.57 [script-event], page 49, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.72 [text-script-event], page 51.

Accepted by: Section 2.2.127 [Text_engraver], page 358.

Properties:

name (symbol):
'TextScriptEvent
Name of this music object.
Chapter 1: Music definitions

1.1.89 TextSpanEvent

Start a text spanner, for example, an octavation.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.65 [span-event], page 50, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.73 [text-span-event], page 51.

Accepted by: Section 2.2.128 [Text_spanner_engraver], page 359.

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.

1.1.90 TieEvent

A tie.

Syntax: `note~`

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.74 [tie-event], page 51.

Accepted by: Section 2.2.82 [Note_performer], page 345, Section 2.2.129 [Tie_engraver], page 359, and Section 2.2.130 [Tie_performer], page 360.

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.

1.1.91 TimeScaledMusic

Multiply durations, as in tuplets.

Syntax: `\times \text{fraction} \text{music}`, e.g., `\times \frac{2}{3} \{ \ldots \}` 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`. 

```plaintext
(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.

1.1.89 TextSpanEvent

Start a text spanner, for example, an octavation.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.65 [span-event], page 50, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.73 [text-span-event], page 51.

Accepted by: Section 2.2.128 [Text_spanner_engraver], page 359.

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.

1.1.90 TieEvent

A tie.

Syntax: `note~`

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.74 [tie-event], page 51.

Accepted by: Section 2.2.82 [Note_performer], page 345, Section 2.2.129 [Tie_engraver], page 359, and Section 2.2.130 [Tie_performer], page 360.

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.

1.1.91 TimeScaledMusic

Multiply durations, as in tuplets.

Syntax: `\times \text{fraction} \text{music}`, e.g., `\times \frac{2}{3} \{ \ldots \}` 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.

1.1.92 TimeSignatureEvent
An event created when setting a new time signature

   Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.75 [time-signature-event], page 51.
   Accepted by: Section 2.2.131 [Time_signature_engraver], page 360.

   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.

1.1.93 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.
1.1.94 TransposedMusic

Music that has been transposed.

Properties:

- **iterator-ctor** (procedure):
  
  \texttt{ly:music-wrapper-iterator::constructor}
  
  Function to construct a \texttt{music-event-iterator} object for this music.

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

- **name** (symbol):
  
  'TransposedMusic
  
  Name of this music object.

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

- **to-relative-callback** (procedure):
  
  \texttt{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.

1.1.95 TremoloEvent

Unmeasured tremolo.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.76 [tremolo-event], page 51.

Accepted by: Section 2.2.121 [Stem_engraver], page 356.

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.

1.1.96 TremoloRepeatedMusic

Repeated notes denoted by tremolo beams.

Properties:

- **iterator-ctor** (procedure):
  
  \texttt{ly:chord-tremolo-iterator::constructor}
  
  Function to construct a \texttt{music-event-iterator} object for this music.
length-callback (procedure):
    ly:repeated-music::unfolded-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:repeated-music::first-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.

1.1.97 TremoloSpanEvent
Tremolo over two stems.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.65 [span-event], page 50,
Section 1.2.67 [StreamEvent], page 50, and Section 1.2.77 [tremolo-span-event], page 52.

Accepted by: Section 2.2.16 [Chord_tremolo_ engraver], page 321.
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.

1.1.98 TrillSpanEvent
Start a trill spanner.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.65 [span-event], page 50,
Section 1.2.67 [StreamEvent], page 50, and Section 1.2.78 [trill-span-event], page 52.

Accepted by: Section 2.2.134 [Trill_spanner_ engraver], page 361.
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.
1.1.99 TupletSpanEvent
Used internally to signal where tuplet brackets start and stop.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.65 [span-event], page 50, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.79 [tuplet-span-event], page 52.

Accepted by: Section 2.2.121 [Stem_engraver], page 356, and Section 2.2.135 [Tuplet_engraver], page 362.

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.

1.1.100 UnaCordaEvent
Depress or release una-corda pedal.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.49 [pedal-event], page 48, Section 1.2.65 [span-event], page 50, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.80 [una-corda-event], page 52.

Accepted by: Section 2.2.93 [Piano_pedal_engraver], page 348, and Section 2.2.94 [Piano_pedal_performer], page 349.

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.

1.1.101 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:repeated-music::unfolded-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:repeated-music::first-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.

### 1.1.102 UnisonoEvent

Print 'a 2'.

Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.48 [part-combine-event], page 48, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.81 [unisono-event], page 52.

Accepted by: Section 2.2.89 [Part combine engraver], page 347.

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.

### 1.1.103 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.
Chapter 1: Music definitions

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.

1.1.104 VoiceSeparator
Separate polyphonic voices in simultaneous music.
   Syntax: \\n   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.

1.1.105 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.

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

   length-callback (procedure):
      ly:repeated-music::volta-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:repeated-music::first-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.

1.1.106 VowelTransitionEvent
A vowel transition between lyric syllables.
   Event classes: Section 1.2.43 [music-event], page 46, Section 1.2.67 [StreamEvent], page 50, and Section 1.2.82 [vowel-transition-event], page 52.
   Accepted by: Section 2.2.55 [Hyphen-engraver], page 335.
   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 Section 1.1.1 [AbsoluteDynamicEvent], page 2.
   Accepted by: Section 2.2.34 [Dynamic-engraver], page 328, and Section 2.2.35 [Dynamic_performer], page 328.

1.2.2 alternative-event
Music event type `alternative-event` is in music objects of type Section 1.1.2 [AlternativeEvent], page 2.
   Accepted by: Section 2.2.8 [Bar_number_engraver], page 317.

1.2.3 annotate-output-event
Music event type `annotate-output-event` is in music objects of type Section 1.1.3 [AnnotateOutputEvent], page 2.
   Accepted by: Section 2.2.6 [Balloon_engraver], page 317.

1.2.4 apply-output-event
Music event type `apply-output-event` is in music objects of type Section 1.1.5 [ApplyOutputEvent], page 3.
   Accepted by: Section 2.2.85 [Output_property_engraver], page 346.

1.2.5 arpeggio-event
Music event type `arpeggio-event` is in music objects of type Section 1.1.6 [ArpeggioEvent], page 3.
   Accepted by: Section 2.2.3 [Arpeggio_engraver], page 315.
1.2.6 articulation-event
Music event type `articulation-event` is in music objects of type Section 1.1.7 [Articulation-Event], page 4.
   Accepted by: Section 2.2.82 [Note_performer], page 345, and Section 2.2.104 [Script_engraver], page 352.

1.2.7 bass-figure-event
Music event type `bass-figure-event` is in music objects of type Section 1.1.10 [BassFigureEvent], page 5.
   Accepted by: Section 2.2.38 [Figured_bass_engraver], page 329.

1.2.8 beam-event
Music event type `beam-event` is in music objects of type Section 1.1.11 [BeamEvent], page 5.
   Accepted by: Section 2.2.10 [Beam_engraver], page 319, Section 2.2.11 [Beam_performer], page 319, and Section 2.2.48 [Grace_beam_engraver], page 333.

1.2.9 beam-forbid-event
Music event type `beam-forbid-event` is in music objects of type Section 1.1.12 [BeamForbidEvent], page 6.
   Accepted by: Section 2.2.4 [Auto_beam_engraver], page 315, and Section 2.2.47 [Grace_auto_beam_engraver], page 333.

1.2.10 bend-after-event
Music event type `bend-after-event` is in music objects of type Section 1.1.13 [BendAfterEvent], page 6.
   Accepted by: Section 2.2.12 [Bend_engraver], page 319.

1.2.11 break-dynamic-span-event
Music event type `break-dynamic-span-event` is in music objects of type Section 1.1.14 [Break-DynamicSpanEvent], page 6.
   Not accepted by any engraver or performer.

1.2.12 break-event
Music event type `break-event` is in music objects of type Section 1.1.38 [LineBreakEvent], page 15, Section 1.1.53 [PageBreakEvent], page 21, and Section 1.1.54 [PageTurnEvent], page 21.
   Accepted by: Section 2.2.86 [Page_turn_engraver], page 346, and Section 2.2.87 [Paper_column_engraver], page 346.

1.2.13 break-span-event
Music event type `break-span-event` is in music objects of type Section 1.1.14 [BreakDynamic-SpanEvent], page 6.
   Accepted by: Section 2.2.34 [Dynamic_engraver], page 328.

1.2.14 breathing-event
Music event type `breathing-event` is in music objects of type Section 1.1.15 [BreathingEvent], page 7.
   Accepted by: Section 2.2.14 [Breathing_sign_engraver], page 320, and Section 2.2.82 [Note_performer], page 345.
1.2.15 cluster-note-event
Music event type \texttt{cluster-note-event} is in music objects of type Section 1.1.16 \texttt{[Cluster-NoteEvent]}, page 7.

Accepted by: Section 2.2.18 \texttt{[Cluster_spanner_engraver]}, page 322.

1.2.16 completize-extender-event
Music event type \texttt{completize-extender-event} is in music objects of type Section 1.1.17 \texttt{[CompletitizeExtenderEvent]}, page 8.

Accepted by: Section 2.2.37 \texttt{[Extender_engraver]}, page 329.

1.2.17 crescendo-event
Music event type \texttt{crescendo-event} is in music objects of type Section 1.1.19 \texttt{[CrescendoEvent]}, page 9.

Accepted by: Section 2.2.35 \texttt{[Dynamic_performer]}, page 328.

1.2.18 decrescendo-event
Music event type \texttt{decrescendo-event} is in music objects of type Section 1.1.21 \texttt{[Decrescendo-Event]}, page 9.

Accepted by: Section 2.2.35 \texttt{[Dynamic_performer]}, page 328.

1.2.19 double-percent-event
Music event type \texttt{double-percent-event} is in music objects of type Section 1.1.22 \texttt{[DoublePercentEvent]}, page 10.

Accepted by: Section 2.2.29 \texttt{[Double_percent_repeat_engraver]}, page 326.

1.2.20 duration-line-event
Music event type \texttt{duration-line-event} is in music objects of type Section 1.1.23 \texttt{[DurationLineEvent]}, page 10.

Accepted by: Section 2.2.32 \texttt{[Duration_line_engraver]}, page 327.

1.2.21 dynamic-event
Music event type \texttt{dynamic-event} is in music objects of type Section 1.1.1 \texttt{[AbsoluteDynamicEvent]}, page 2.

Not accepted by any engraver or performer.

1.2.22 episema-event
Music event type \texttt{episema-event} is in music objects of type Section 1.1.24 \texttt{[EpisemaEvent]}, page 10.

Accepted by: Section 2.2.36 \texttt{[Episema_engraver]}, page 329.

1.2.23 extender-event
Music event type \texttt{extender-event} is in music objects of type Section 1.1.27 \texttt{[ExtenderEvent]}, page 12.

Accepted by: Section 2.2.37 \texttt{[Extender_engraver]}, page 329.

1.2.24 fingering-event
Music event type \texttt{fingering-event} is in music objects of type Section 1.1.28 \texttt{[FingeringEvent]}, page 12.

Accepted by: Section 2.2.41 \texttt{[Fingering_engraver]}, page 330, Section 2.2.45 \texttt{[Fretboard_engraver]}, page 331, and Section 2.2.123 \texttt{[Tab_note_heads_engraver]}, page 357.
1.2.25 **footnote-event**
Music event type *footnote-event* is in music objects of type Section 1.1.29 [FootnoteEvent], page 12.

Not accepted by any engraver or performer.

1.2.26 **glissando-event**
Music event type *glissando-event* is in music objects of type Section 1.1.30 [GlissandoEvent], page 13.

Accepted by: Section 2.2.46 [Glissando_engraver], page 332.

1.2.27 **harmonic-event**
Music event type *harmonic-event* is in music objects of type Section 1.1.32 [HarmonicEvent], page 13.

Not accepted by any engraver or performer.

1.2.28 **hyphen-event**
Music event type *hyphen-event* is in music objects of type Section 1.1.33 [HyphenEvent], page 14.

Accepted by: Section 2.2.55 [Hyphen_engraver], page 335.

1.2.29 **key-change-event**
Music event type *key-change-event* is in music objects of type Section 1.1.34 [KeyChangeEvent], page 14.

Accepted by: Section 2.2.59 [Key_engraver], page 336, and Section 2.2.60 [Key_performer], page 337.

1.2.30 **label-event**
Music event type *label-event* is in music objects of type Section 1.1.35 [LabelEvent], page 14.

Accepted by: Section 2.2.87 [Paper_column_engraver], page 346.

1.2.31 **laissez-vibrer-event**
Music event type *laissez-vibrer-event* is in music objects of type Section 1.1.36 [LaissezVibrerEvent], page 15.

Accepted by: Section 2.2.62 [Laissez_vibrer_engraver], page 338.

1.2.32 **layout-instruction-event**
Music event type *layout-instruction-event* is in music objects of type Section 1.1.5 [ApplyOutputEvent], page 3.

Not accepted by any engraver or performer.

1.2.33 **ligature-event**
Music event type *ligature-event* is in music objects of type Section 1.1.37 [LigatureEvent], page 15.

Accepted by: Section 2.2.61 [Kievan_ligature_engraver], page 338, Section 2.2.64 [Ligature_bracket_engraver], page 338, Section 2.2.72 [Mensural_ligature_engraver], page 341, and Section 2.2.137 [Vaticana_ligature_engraver], page 362.
1.2.34 line-break-event
Music event type line-break-event is in music objects of type Section 1.1.38 [LineBreakEvent], page 15.
Not accepted by any engraver or performer.

1.2.35 lyric-event
Music event type lyric-event is in music objects of type Section 1.1.40 [LyricEvent], page 16.
Accepted by: Section 2.2.65 [Lyric_engraver], page 338, and Section 2.2.66 [Lyric_performer], page 339.

1.2.36 mark-event
Music event type mark-event is in music objects of type Section 1.1.41 [MarkEvent], page 16.
Accepted by: Section 2.2.67 [Mark_engraver], page 339.

1.2.37 measure-counter-event
Music event type measure-counter-event is in music objects of type Section 1.1.42 [MeasureCounterEvent], page 17.
Accepted by: Section 2.2.68 [Measure_counter_ engraver], page 339.

1.2.38 measure-spanner-event
Music event type measure-spanner-event is in music objects of type Section 1.1.43 [MeasureSpannerEvent], page 17.
Accepted by: Section 2.2.70 [Measure_spanner_ engraver], page 340.

1.2.39 melodic-event
Music event type melodic-event is in music objects of type Section 1.1.16 [ClusterNoteEvent], page 7, and Section 1.1.49 [NoteEvent], page 19.
Not accepted by any engraver or performer.

1.2.40 multi-measure-articulation-event
Music event type multi-measure-articulation-event is in music objects of type Section 1.1.44 [MultiMeasureArticulationEvent], page 17.
Accepted by: Section 2.2.77 [Multi_measure_rest_ engraver], page 342.

1.2.41 multi-measure-rest-event
Music event type multi-measure-rest-event is in music objects of type Section 1.1.45 [MultiMeasureRestEvent], page 18.
Accepted by: Section 2.2.77 [Multi_measure_rest_ engraver], page 342.

1.2.42 multi-measure-text-event
Music event type multi-measure-text-event is in music objects of type Section 1.1.47 [MultiMeasureTextEvent], page 19.
Accepted by: Section 2.2.77 [Multi_measure_rest_ engraver], page 342.

1.2.43 music-event
Music event type music-event is in music objects of type Section 1.1.1 [AbsoluteDynamicEvent], page 2, Section 1.1.2 [AlternativeEvent], page 2, Section 1.1.3 [AnnotateOutputEvent], page 2, Section 1.1.5 [ApplyOutputEvent], page 3, Section 1.1.6 [ArpeggioEvent], page 3,
Section 1.1.7 [ArticulationEvent], page 4, Section 1.1.10 [BassFigureEvent], page 5, Section 1.1.11 [BeamEvent], page 5, Section 1.1.12 [BeamForbidEvent], page 6, Section 1.1.13 [BendAfterEvent], page 6, Section 1.1.14 [BreakDynamicSpanEvent], page 6, Section 1.1.15 [BreathingEvent], page 7, Section 1.1.16 [ClusterNoteEvent], page 7, Section 1.1.17 [CompleatizeExtenderEvent], page 8, Section 1.1.20 [CrescendoEvent], page 9, Section 1.1.21 [DecrescendoEvent], page 9, Section 1.1.22 [DoublePercentEvent], page 10, Section 1.1.23 [DurationLineEvent], page 10, Section 1.1.24 [EpisemaEvent], page 10, Section 1.1.27 [ExtenderEvent], page 12, Section 1.1.28 [FingeringEvent], page 12, Section 1.1.29 [FootnoteEvent], page 12, Section 1.1.30 [GlissandoEvent], page 13, Section 1.1.32 [HarmonicEvent], page 13, Section 1.1.33 [HyphenEvent], page 14, Section 1.1.34 [KeyChangeEvent], page 14, Section 1.1.35 [LabelEvent], page 14, Section 1.1.36 [LaissezVibrerEvent], page 15, Section 1.1.37 [LigatureEvent], page 15, Section 1.1.38 [LineBreakEvent], page 15, Section 1.1.40 [LyricEvent], page 16, Section 1.1.41 [MarkEvent], page 16, Section 1.1.42 [MeasureCounterEvent], page 17, Section 1.1.43 [MeasureSpannerEvent], page 17, Section 1.1.44 [MultiMeasureArticulationEvent], page 17, Section 1.1.45 [MultiMeasureRestEvent], page 18, Section 1.1.47 [MultiMeasureTextEvent], page 19, Section 1.1.49 [NoteEvent], page 19, Section 1.1.50 [NoteGroupingEvent], page 20, Section 1.1.53 [PageBreakEvent], page 21, Section 1.1.54 [PageTurnEvent], page 21, Section 1.1.58 [PercentEvent], page 23, Section 1.1.60 [PesOrFlexaEvent], page 24, Section 1.1.61 [PhrasingSlurEvent], page 24, Section 1.1.68 [RepeatSlashEvent], page 27, Section 1.1.69 [RepeatTieEvent], page 27, Section 1.1.70 [RestEvent], page 27, Section 1.1.72 [ScriptEvent], page 28, Section 1.1.75 [SkipEvent], page 30, Section 1.1.77 [SlurEvent], page 31, Section 1.1.78 [SoloOneEvent], page 31, Section 1.1.79 [SoloTwoEvent], page 31, Section 1.1.80 [SostenutoEvent], page 32, Section 1.1.81 [Spacing-SectionEvent], page 32, Section 1.1.82 [SpanEvent], page 32, Section 1.1.83 [StaffSpanEvent], page 33, Section 1.1.84 [StringNumberEvent], page 33, Section 1.1.85 [StrokeFingerEvent], page 33, Section 1.1.86 [SustainEvent], page 34, Section 1.1.87 [TempoChangeEvent], page 34, Section 1.1.88 [TextScriptEvent], page 34, Section 1.1.89 [TextSpanEvent], page 35, Section 1.1.90 [TieEvent], page 35, Section 1.1.92 [TimeSignatureEvent], page 36, Section 1.1.95 [TremoloEvent], page 37, Section 1.1.97 [TremoloSpanEvent], page 38, Section 1.1.98 [TrillSpanEvent], page 38, Section 1.1.99 [TupletSpanEvent], page 39, Section 1.1.100 [UnaCordaEvent], page 39, Section 1.1.102 [UnisonoEvent], page 40, and Section 1.1.106 [VowelTransitionEvent], page 42.

Not accepted by any engraver or performer.

1.2.44 note-event

Music event type note-event is in music objects of type Section 1.1.49 [NoteEvent], page 19.

Accepted by: Section 2.2.15 [Chord_name engraver], page 320, Section 2.2.20 [Completion_heads engraver], page 322, Section 2.2.30 [Drum_note performer], page 326, Section 2.2.31 [Drum_notes engraver], page 327, Section 2.2.45 [Fretboard engraver], page 331, Section 2.2.80 [Note_heads engraver], page 344, Section 2.2.81 [Note_name engraver], page 344, Section 2.2.82 [Note_performer], page 345, Section 2.2.89 [Part_combine engraver], page 347, Section 2.2.91 [Phrasing_slur engraver], page 348, Section 2.2.108 [Slur engraver], page 353, and Section 2.2.123 [Tab_note_heads engraver], page 357.

1.2.45 note-grouping-event

Music event type note-grouping-event is in music objects of type Section 1.1.50 [Note-GroupingEvent], page 20.

Accepted by: Section 2.2.54 [Horizontal_bracket engraver], page 335.
1.2.46 page-break-event
Music event type page-break-event is in music objects of type Section 1.1.53 [PageBreakEvent], page 21.
Not accepted by any engraver or performer.

1.2.47 page-turn-event
Music event type page-turn-event is in music objects of type Section 1.1.54 [PageTurnEvent], page 21.
Not accepted by any engraver or performer.

1.2.48 part-combine-event
Music event type part-combine-event is in music objects of type Section 1.1.78 [SoloOneEvent], page 31, Section 1.1.79 [SoloTwoEvent], page 31, and Section 1.1.102 [UnisonoEvent], page 40.
Accepted by: Section 2.2.89 [Part_combine_engraver], page 347.

1.2.49 pedal-event
Music event type pedal-event is in music objects of type Section 1.1.80 [SostenutoEvent], page 32, Section 1.1.86 [SustainEvent], page 34, and Section 1.1.100 [UnaCordaEvent], page 39.
Not accepted by any engraver or performer.

1.2.50 percent-event
Music event type percent-event is in music objects of type Section 1.1.58 [PercentEvent], page 23.
Accepted by: Section 2.2.90 [Percent_repeat_engraver], page 347.

1.2.51 pes-or-flexa-event
Music event type pes-or-flexa-event is in music objects of type Section 1.1.60 [PesOrFlexaEvent], page 24.
Accepted by: Section 2.2.137 [Vaticana_ligature_engraver], page 362.

1.2.52 phrasing-slur-event
Music event type phrasing-slur-event is in music objects of type Section 1.1.61 [PhrasingSlurEvent], page 24.
Accepted by: Section 2.2.91 [Phrasing_slur_engraver], page 348.

1.2.53 repeat-slash-event
Music event type repeat-slash-event is in music objects of type Section 1.1.68 [RepeatSlashEvent], page 27.
Accepted by: Section 2.2.107 [Slash_repeat_engraver], page 353.

1.2.54 repeat-tie-event
Music event type repeat-tie-event is in music objects of type Section 1.1.69 [RepeatTieEvent], page 27.
Accepted by: Section 2.2.99 [Repeat_tie_engraver], page 351.

1.2.55 rest-event
Music event type rest-event is in music objects of type Section 1.1.70 [RestEvent], page 27.
Accepted by: Section 2.2.15 [Chord_name_engraver], page 320, Section 2.2.21 [Completion_rest_engraver], page 323, Section 2.2.38 [Figured_bass_engraver], page 329, and Section 2.2.101 [Rest_engraver], page 351.
1.2.56 rhythmic-event
Music event type rhythmic-event is in music objects of type Section 1.1.10 [BassFigureEvent], page 5, Section 1.1.16 [ClusterNoteEvent], page 7, Section 1.1.22 [DoublePercentEvent], page 10, Section 1.1.40 [LyricEvent], page 16, Section 1.1.45 [MultiMeasureRestEvent], page 18, Section 1.1.49 [NoteEvent], page 19, Section 1.1.68 [RepeatSlashEvent], page 27, Section 1.1.70 [RestEvent], page 27, and Section 1.1.75 [SkipEvent], page 30.
Not accepted by any engraver or performer.

1.2.57 script-event
Music event type script-event is in music objects of type Section 1.1.7 [ArticulationEvent], page 4, Section 1.1.72 [ScriptEvent], page 28, and Section 1.1.88 [TextScriptEvent], page 34.
Not accepted by any engraver or performer.

1.2.58 skip-event
Music event type skip-event is in music objects of type Section 1.1.75 [SkipEvent], page 30.
Not accepted by any engraver or performer.

1.2.59 slur-event
Music event type slur-event is in music objects of type Section 1.1.77 [SlurEvent], page 31.
Accepted by: Section 2.2.108 [Slur_ engraver], page 353, and Section 2.2.109 [Slur_ performer], page 354.

1.2.60 solo-one-event
Music event type solo-one-event is in music objects of type Section 1.1.78 [SoloOneEvent], page 31.
Not accepted by any engraver or performer.

1.2.61 solo-two-event
Music event type solo-two-event is in music objects of type Section 1.1.79 [SoloTwoEvent], page 31.
Not accepted by any engraver or performer.

1.2.62 sostenuto-event
Music event type sostenuto-event is in music objects of type Section 1.1.80 [SostenutoEvent], page 32.
Accepted by: Section 2.2.93 [Piano Pedal_ engraver], page 348, and Section 2.2.94 [Piano Pedal_ performer], page 349.

1.2.63 spacing-section-event
Music event type spacing-section-event is in music objects of type Section 1.1.81 [SpacingSectionEvent], page 32.
Accepted by: Section 2.2.110 [Spacing_ engraver], page 354.

1.2.64 span-dynamic-event
Music event type span-dynamic-event is in music objects of type Section 1.1.20 [CrescendoEvent], page 9, and Section 1.1.21 [DecrescendoEvent], page 9.
Accepted by: Section 2.2.34 [Dynamic_ engraver], page 328.
Chapter 1: Music definitions

1.2.65 span-event

Music event type `span-event` is in music objects of type Section 1.1.11 `BeamEvent`, page 5, Section 1.1.20 `CrescendoEvent`, page 9, Section 1.1.21 `DecrescendoEvent`, page 9, Section 1.1.24 `EpisemaEvent`, page 10, Section 1.1.37 `LigatureEvent`, page 15, Section 1.1.42 `MeasureCounterEvent`, page 17, Section 1.1.43 `MeasureSpannerEvent`, page 17, Section 1.1.61 `PhrasingSlurEvent`, page 24, Section 1.1.77 `SlurEvent`, page 31, Section 1.1.80 `SostenutoEvent`, page 32, Section 1.1.82 `SpanEvent`, page 32, Section 1.1.83 `StaffSpanEvent`, page 33, Section 1.1.86 `SustainEvent`, page 34, Section 1.1.89 `TextSpanEvent`, page 35, Section 1.1.97 `TremoloSpanEvent`, page 38, Section 1.1.98 `TrillSpanEvent`, page 38, Section 1.1.99 `TupletSpanEvent`, page 39, and Section 1.1.100 `UnaCordaEvent`, page 39.

Not accepted by any engraver or performer.

1.2.66 staff-span-event

Music event type `staff-span-event` is in music objects of type Section 1.1.83 `StaffSpanEvent`, page 33.

Accepted by: Section 2.2.118 `StaffSymbolEngraver`, page 355.

1.2.67 StreamEvent

Music event type `StreamEvent` is in music objects of type Section 1.1.1 `AbsoluteDynamicEvent`, page 2, Section 1.1.2 `AlternativeEvent`, page 2, Section 1.1.3 `AnnotateOutputEvent`, page 2, Section 1.1.5 `ApplyOutputEvent`, page 3, Section 1.1.6 `ArpeggioEvent`, page 3, Section 1.1.7 `ArticulationEvent`, page 4, Section 1.1.10 `BassFigureEvent`, page 5, Section 1.1.11 `BeamEvent`, page 5, Section 1.1.12 `BeamForbidEvent`, page 6, Section 1.1.13 `BendAfterEvent`, page 6, Section 1.1.14 `BreakDynamicSpanEvent`, page 6, Section 1.1.15 `BreathingEvent`, page 7, Section 1.1.16 `ClusterNoteEvent`, page 7, Section 1.1.17 `CompletizeExtenderEvent`, page 8, Section 1.1.20 `CrescendoEvent`, page 9, Section 1.1.21 `DecrescendoEvent`, page 9, Section 1.1.22 `DoublePercentEvent`, page 10, Section 1.1.23 `DurationLineEvent`, page 10, Section 1.1.24 `EpisemaEvent`, page 10, Section 1.1.27 `ExtenderEvent`, page 12, Section 1.1.28 `FingeringEvent`, page 12, Section 1.1.29 `FootnoteEvent`, page 12, Section 1.1.30 `GlissandoEvent`, page 13, Section 1.1.32 `HarmonicEvent`, page 13, Section 1.1.33 `HyphenEvent`, page 14, Section 1.1.34 `KeyChangeEvent`, page 14, Section 1.1.35 `LabelEvent`, page 14, Section 1.1.36 `LaissezVibrerEvent`, page 15, Section 1.1.37 `LigatureEvent`, page 15, Section 1.1.38 `LineBreakEvent`, page 15, Section 1.1.40 `LyricEvent`, page 16, Section 1.1.41 `MarkEvent`, page 16, Section 1.1.42 `MeasureCounterEvent`, page 17, Section 1.1.43 `MeasureSpannerEvent`, page 17, Section 1.1.44 `MultiMeasureArticulationEvent`, page 17, Section 1.1.45 `MultiMeasureRestEvent`, page 18, Section 1.1.47 `MultiMeasureTextEvent`, page 19, Section 1.1.49 `NoteEvent`, page 19, Section 1.1.50 `NoteGroupingEvent`, page 20, Section 1.1.53 `PageChangeEvent`, page 21, Section 1.1.54 `PageTurnEvent`, page 21, Section 1.1.58 `PercentEvent`, page 23, Section 1.1.60 `PesOrFlexaEvent`, page 24, Section 1.1.61 `PhrasingSlurEvent`, page 24, Section 1.1.68 `RepeatSlashEvent`, page 27, Section 1.1.69 `RepeatTieEvent`, page 27, Section 1.1.70 `RestEvent`, page 27, Section 1.1.72 `ScriptEvent`, page 28, Section 1.1.75 `SkipEvent`, page 30, Section 1.1.77 `SlurEvent`, page 31, Section 1.1.78 `SoloOneEvent`, page 31, Section 1.1.79 `SoloTwoEvent`, page 31, Section 1.1.80 `SostenutoEvent`, page 32, Section 1.1.81 `SpacingSectionEvent`, page 32, Section 1.1.82 `SpanEvent`, page 32, Section 1.1.83 `StaffSpanEvent`, page 33, Section 1.1.84 `StringNumberEvent`, page 33, Section 1.1.85 `StrokeFingerEvent`, page 33, Section 1.1.86 `SustainEvent`, page 34, Section 1.1.87 `TempoChangeEvent`, page 34, Section 1.1.88 `TextScriptEvent`, page 34, Section 1.1.89 `TextSpanEvent`, page 35, Section 1.1.90 `TieEvent`, page 35, Section 1.1.92 `TimeSignatureEvent`, page 36, Section 1.1.95 `TremoloEvent`, page 37, Section 1.1.97 `TremoloSpanEvent`, page 38, Section 1.1.98 `TrillSpanEvent`, page 38, Section 1.1.99 `TupletSpanEvent`, page 39, Section 1.1.100 `UnaCordaEvent`, page 39.
1.2.68 string-number-event

Music event type string-number-event is in music objects of type Section 1.1.84 [StringNumberEvent], page 33.

Accepted by: Section 2.2.45 [Fretboard_engraver], page 331, and Section 2.2.123 [Tab_note_heads_engraver], page 357.

1.2.69 stroke-finger-event

Music event type stroke-finger-event is in music objects of type Section 1.1.85 [StrokeFingerEvent], page 33.

Not accepted by any engraver or performer.

1.2.70 sustain-event

Music event type sustain-event is in music objects of type Section 1.1.86 [SustainEvent], page 34.

Accepted by: Section 2.2.93 [Piano_pedal_engraver], page 348, and Section 2.2.94 [Piano_pedal_performer], page 349.

1.2.71 tempo-change-event

Music event type tempo-change-event is in music objects of type Section 1.1.87 [TempoChangeEvent], page 34.

Accepted by: Section 2.2.75 [Metronome_mark_engraver], page 341.

1.2.72 text-script-event

Music event type text-script-event is in music objects of type Section 1.1.88 [TextScriptEvent], page 34.

Accepted by: Section 2.2.127 [Text_engraver], page 358.

1.2.73 text-span-event

Music event type text-span-event is in music objects of type Section 1.1.89 [TextSpanEvent], page 35.

Accepted by: Section 2.2.128 [Text_spanner_engraver], page 359.

1.2.74 tie-event

Music event type tie-event is in music objects of type Section 1.1.90 [TieEvent], page 35.

Accepted by: Section 2.2.82 [Note_performer], page 345, Section 2.2.129 [Tie_engraver], page 359, and Section 2.2.130 [Tie_performer], page 360.

1.2.75 time-signature-event

Music event type time-signature-event is in music objects of type Section 1.1.92 [TimeSignatureEvent], page 36.

Accepted by: Section 2.2.131 [Time_signature_engraver], page 360.

1.2.76 tremolo-event

Music event type tremolo-event is in music objects of type Section 1.1.95 [TremoloEvent], page 37.

Accepted by: Section 2.2.121 [Stem_engraver], page 356.
1.2.77 tremolo-span-event
Music event type tremolo-span-event is in music objects of type Section 1.1.97 [TremoloSpanEvent], page 38.

Accepted by: Section 2.2.16 [Chord_tremolo_engraver], page 321.

1.2.78 trill-span-event
Music event type trill-span-event is in music objects of type Section 1.1.98 [TrillSpanEvent], page 38.

Accepted by: Section 2.2.134 [Trill_spanner_engraver], page 361.

1.2.79 tuplet-span-event
Music event type tuplet-span-event is in music objects of type Section 1.1.99 [TupletSpanEvent], page 39.

Accepted by: Section 2.2.121 [Stem_engraver], page 356, and Section 2.2.135 [Tuplet_engraver], page 362.

1.2.80 una-corda-event
Music event type una-corda-event is in music objects of type Section 1.1.100 [UnaCordaEvent], page 39.

Accepted by: Section 2.2.93 [Piano_pedal_engraver], page 348, and Section 2.2.94 [Piano_pedal_performer], page 349.

1.2.81 unisono-event
Music event type unisono-event is in music objects of type Section 1.1.102 [UnisonoEvent], page 40.

Not accepted by any engraver or performer.

1.2.82 vowel-transition-event
Music event type vowel-transition-event is in music objects of type Section 1.1.106 [VowelTransitionEvent], page 42.

Accepted by: Section 2.2.55 [Hyphen_engraver], page 335.

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.

class (context)
   The context to which an event is sent.

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

class (string)
   Name of context.

class-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 or 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.

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 duration of this music.

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 nega-
  tive.

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.
Chapter 1: Music definitions

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-repeats (list)
   A list that is transformed into a volta repeat element list.

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):

Section 3.1.57 [InstrumentName], page 447, Section 3.1.121 [SystemStartBar], page 518, Section 3.1.122 [SystemStartBrace], page 519, Section 3.1.123 [SystemStartBracket], page 520, Section 3.1.124 [SystemStartSquare], page 521, and Section 3.1.140 [VerticalAlignment], page 542.

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 Section 2.1.27 [Staff], page 240.

Context ChoirStaff can contain Section 2.1.1 [ChoirStaff], page 59, Section 2.1.2 [Chord-Names], page 60, Section 2.1.5 [DrumStaff], page 76, Section 2.1.7 [Dynamics], page 95, Section 2.1.8 [FiguredBass], page 99, Section 2.1.11 [GrandStaff], page 104, Section 2.1.16 [Lyrics], page 155, Section 2.1.21 [OneStaff], page 187, Section 2.1.24 [PianoStaff], page 212, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, and Section 2.1.28 [StaffGroup], page 251.

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

Section 2.2.56 [Instrument_name_engraver], page 335
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):
Section 3.1.57 [InstrumentName], page 447.

Section 2.2.122 [System_start_delimiter_engraver], page 357
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):
Section 3.1.121 [SystemStartBar], page 518, Section 3.1.122 [SystemStartBrace], page 519, Section 3.1.123 [SystemStartBracket], page 520, and Section 3.1.124 [SystemStartSquare], page 521.

Section 2.2.138 [Vertical_align_engraver], page 362
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):
Section 3.1.140 [VerticalAlignment], page 542.

2.1.2 ChordNames
Typesets chord names.
This context also accepts commands for the following context(s):
Staff.
This context creates the following layout object(s):
Section 3.1.25 [ChordName], page 405, Section 3.1.110 [StaffSpacing], page 506, and Section 3.1.141 [VerticalAxisGroup], page 542.

This context sets the following properties:

- Set grob-property `font-size` in Section 3.1.89 [ParenthesesItem], page 485, to 1.5.
- Set grob-property `nonstaff-nonstaff-spacing.padding` in Section 3.1.141 [VerticalAxisGroup], page 542, to 0.5.
- Set grob-property `nonstaff-relatedstaff-spacing.padding` in Section 3.1.141 [VerticalAxisGroup], page 542, to 0.5.
- Set grob-property `remove-empty` in Section 3.1.141 [VerticalAxisGroup], page 542, to `#t`.
- Set grob-property `remove-first` in Section 3.1.141 [VerticalAxisGroup], page 542, to `#t`.
- Set grob-property `staff-affinity` in Section 3.1.141 [VerticalAxisGroup], page 542, 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):

Section 2.2.5 [Axis_group_engraver], page 316
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):
Section 3.1.141 [VerticalAxisGroup], page 542.

Section 2.2.15 [Chord_name_engraver], page 320
Catch note and rest events and generate the appropriate chordname.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.55 [rest-event], page 48,
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 Chord-Names context.

Properties (write)

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

This engraver creates the following layout object(s):
Section 3.1.25 [ChordName], page 405.

Section 2.2.85 [Output_property_ engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.106 [Separating_line_group_ engraver], page 353
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):
Section 3.1.110 [StaffSpacing], page 506.
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.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 387, Section 3.1.20 [Beam], page 399, Section 3.1.21 [BendAfter], page 401, Section 3.1.24 [BreathingSign], page 403, Section 3.1.28 [ClusterSpanner], page 411, Section 3.1.29 [ClusterSpannerBeacon], page 411, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.35 [Dots], page 421, Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.40 [DynamicLineSpanner], page 427, Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, Section 3.1.44 [Fingering], page 433, Section 3.1.46 [Flag], page 435, Section 3.1.50 [Glissando], page 440, Section 3.1.54 [Hairpin], page 443, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.62 [LaissezVibrerTie], page 455, Section 3.1.63 [LaissezVibrerTieColumn], page 457, Section 3.1.66 [LigatureBracket], page 460, Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, Section 3.1.80 [MultiMeasureRestText], page 476, Section 3.1.83 [NoteColumn], page 480, Section 3.1.84 [NoteHead], page 480, Section 3.1.86 [NoteSpacing], page 482, Section 3.1.90 [PercentRepeat], page 486, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.92 [PhrasingSlur], page 488, Section 3.1.95 [RepeatSlash], page 493, Section 3.1.96 [RepeatTie], page 494, Section 3.1.97 [RepeatTieColumn], page 495, Section 3.1.98 [Rest], page 495, Section 3.1.100 [Script], page 497, Section 3.1.101 [ScriptColumn], page 498, Section 3.1.103 [Slur], page 498, Section 3.1.113 [Stem], page 508, Section 3.1.114 [StemStub], page 510, Section 3.1.115 [StemTremolo], page 511, Section 3.1.116 [StringNumber], page 512, Section 3.1.117 [StrokeFinger], page 514, Section 3.1.126 [TextScript], page 524, Section 3.1.127 [TextSpanner], page 526, Section 3.1.128 [Tie], page 527, Section 3.1.129 [TieColumn], page 529, Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, Section 3.1.133 [TrillPitchHead], page 534, Section 3.1.134 [TrillSpanner], page 535, Section 3.1.135 [TupletBracket], page 536, Section 3.1.136 [TupletNumber], page 538, and Section 3.1.142 [VoiceFollower], page 544.

This context sets the following properties:

- Set grob-property `beam-thickness` in Section 3.1.20 [Beam], page 399, to 0.35.
- Set grob-property `beam-thickness` in Section 3.1.115 [StemTremolo], page 511, to 0.35.
- Set grob-property `ignore-ambitus` in Section 3.1.84 [NoteHead], page 480, to 0.
- Set grob-property `length-fraction` in Section 3.1.20 [Beam], page 399, to 0.629960524947437.
- Set grob-property `length-fraction` in Section 3.1.113 [Stem], page 508, 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):

Section 2.2.3 [Arpeggio_engraver], page 315

Generate an Arpeggio symbol.
Music types accepted:
Section 1.2.5 [arpeggio-event], page 42,
This engraver creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 387.

Section 2.2.4 [Auto_beam_engraver], page 315
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 2.2.121 [Stem_engraver], page 356, properties stemLeftBeamCount and stemRightBeamCount.
Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
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):
Section 3.1.20 [Beam], page 399.

Section 2.2.10 [Beam_engraver], page 319
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
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 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):
Section 3.1.20 [Beam], page 399.

Section 2.2.12 [Bend_engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.21 [BendAfter], page 401.

Section 2.2.14 [Breathing_sign_engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.24 [BreathingSign], page 403.

Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.77 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.18 [Cluster_spanner_engraver], page 322
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.28 [ClusterSpanner], page 411, and Section 3.1.29 [ClusterSpannerBeacon], page 411.

Section 2.2.28 [Dots_engraver], page 326
Create Section 3.1.35 [Dots], page 421, objects for Section 3.2.100 [rhythmic-head-interface], page 606s.
This engraver creates the following layout object(s):
Section 3.1.35 [Dots], page 421.
Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
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):
Section 3.1.36 [DoublePercentRepeat], page 422, and Section 3.1.37 [DoublePercentRepeatCounter], page 423.

Section 2.2.33 [Dynamic_align_engraver], page 327
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):
Section 3.1.40 [DynamicLineSpanner], page 427.

Section 2.2.34 [Dynamic_engraver], page 328
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 43, and Section 1.2.64 [span-dynamic-event], page 49,
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):
   Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, and Section 3.1.54 [Hairpin], page 443.

Section 2.2.41 [Fingering_engraver], page 330
   Create fingering scripts.
   Music types accepted:
   Section 1.2.24 [fingering-event], page 44,
   This engraver creates the following layout object(s):
   Section 3.1.44 [Fingering], page 433.

Section 2.2.42 [Font_size_engraver], page 331
   Put fontSize into font-size grob property.
   Properties (read)
   fontSize (number)
      The relative size of all grobs in a context.

Section 2.2.44 [Forbid_line_break_engraver], page 331
   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.

Section 2.2.46 [Glissando_engraver], page 332
   Engrave glissandi.
   Music types accepted:
   Section 1.2.26 [glissando-event], page 45,
   Properties (read)
   glissandoMap (list)
      A map in the form of ´((source1 . target1) (source2 . target2) (source3 . target3) ... ) 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):
Section 3.1.50 [Glissando], page 440.

Section 2.2.47 [Grace_auto_beam_engraver], page 333
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:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

\autoBeaming (boolean)
  If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.48 [Grace_beam_engraver], page 333
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engravés beams when we are at grace points in time.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
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 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):
Section 3.1.20 [Beam], page 399.

Section 2.2.49 [Grace_engraver], page 334
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.
Section 2.2.53 [Grob_pq_engraver], page 334
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.).

Section 2.2.57 [Instrument_switch_engraver], page 336
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):
Section 3.1.58 [InstrumentSwitch], page 448.

Section 2.2.62 [Laissez_vibrer_engraver], page 338
Create laissez vibrer items.
Music types accepted:
Section 1.2.31 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.62 [LaissezVibrerTie], page 455, and Section 3.1.63 [LaissezVibrerTieColumn], page 457.

Section 2.2.64 [Ligature_bracket_engraver], page 338
Handle Ligature_events by engraving Ligature brackets.
Music types accepted:
Section 1.2.33 [ligature-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.66 [LigatureBracket], page 460.

Section 2.2.77 [Multi_measure_rest_engraver], page 342
Engrave multi-measure rests that are produced with ‘R’. It reads `measurePosition` and `internalBarNumber` to determine what number to print over the Section 3.1.77 [MultiMeasureRest], page 472.
Music types accepted:
Section 1.2.40 [multi-measure-articulation-event], page 46, Section 1.2.41 [multi-measure-rest-event], page 46, and Section 1.2.42 [multi-measure-text-event], page 46,
Properties (read)

\texttt{currentCommandColumn} (graphical (layout) object)

Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\texttt{internalBarNumber} (integer)

Contains the current bar number. This property is used for internal timekeeping, among others by the \texttt{Accidental\_engraver}.

\texttt{measurePosition} (moment)

How much of the current measure have we had. This can be set manually to create incomplete measures.

\texttt{restNumberThreshold} (number)

If a multimeasure rest has more measures than this, a number is printed.

\texttt{whichBar} (string)

This property is read to determine what type of bar line to create.

Example:

\begin{verbatim}
\set Staff\_whichBar = ".\|:
\end{verbatim}

This will create a start-repeat bar in this staff only. Valid values are described in \texttt{scm/bar-line.scm}.

This engraver creates the following layout object(s):

Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, and Section 3.1.80 [MultiMeasureRestText], page 476.

Section 2.2.78 [New\_fingering\_engraver], page 343

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)

\texttt{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.

\texttt{harmonicDots} (boolean)

If set, harmonic notes in dotted chords get dots.

\texttt{stringNumberOrientations} (list)

See \texttt{fingeringOrientations}.

\texttt{strokeFingerOrientations} (list)

See \texttt{fingeringOrientations}.

This engraver creates the following layout object(s):

Section 3.1.44 [Fingering], page 433, Section 3.1.100 [Script], page 497, Section 3.1.116 [StringNumber], page 512, and Section 3.1.117 [StrokeFinger], page 514.
Section 2.2.79 [Note_heads_line_ engraver], page 344
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):
Section 3.1.142 [VoiceFollower], page 544.

Section 2.2.80 [Note_heads_ engraver], page 344
Generate note heads.
Music types accepted:
Section 1.2.44 [note-event], page 47,
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):
Section 3.1.84 [NoteHead], page 480.

Section 2.2.83 [Note_spacing_ engraver], page 345
Generate NoteSpacing, an object linking horizontal lines for use in spacing.
This engraver creates the following layout object(s):
Section 3.1.86 [NoteSpacing], page 482.

Section 2.2.85 [Output_property_ engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.89 [Part_combine_ engraver], page 347
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.48 [part-combine-event], page 48,
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?

soloIIIText (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):
Section 3.1.30 [CombineTextScript], page 411.

Section 2.2.90 [Percent_repeat_engraver], page 347
Make whole measure repeats.
Music types accepted:
Section 1.2.50 [percent-event], page 48,
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):
Section 3.1.90 [PercentRepeat], page 486, and Section 3.1.91 [PercentRepeatCounter], page 487.

Section 2.2.91 [Phrasing_slur_engraver], page 348
Print phrasing slurs. Similar to Section 2.2.108 [Slur_engraver], page 353.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.52 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.92 [PhrasingSlur], page 488.

Section 2.2.96 [Pitched_trill_engraver], page 350
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, and Section 3.1.133 [TrillPitchHead], page 534.

Section 2.2.99 [Repeat_tie_engraver], page 351
Create repeat ties.
Music types accepted:
Section 1.2.54 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.96 [RepeatTie], page 494, and Section 3.1.97 [RepeatTieColumn], page 495.

Section 2.2.101 [Rest_engraver], page 351
Engrave rests.
Music types accepted:
Section 1.2.55 [rest-event], page 48,
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):
Section 3.1.98 [Rest], page 495.

Section 2.2.102 [Rhythmic_column_engraver], page 352
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.83 [NoteColumn], page 480.

Section 2.2.103 [Script_column_engraver], page 352
Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.101 [ScriptColumn], page 498.

Section 2.2.104 [Script_engraver], page 352
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
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):
Section 3.1.100 [Script], page 497.

Section 2.2.107 [Slash_repeat_engraver], page 353
Make beat repeats.
Music types accepted:
Section 1.2.53 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.38 [DoubleRepeatSlash], page 425, and Section 3.1.95 [RepeatSlash], page 493.
Section 2.2.108 [Slur engraver], page 353
Build slur grobs from slur events.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.59 [slur-event], page 49,
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):
Section 3.1.103 [Slur], page 498.

Section 2.2.115 [Spanner_break_forbid_engraver], page 355
Forbid breaks in certain spanners.

Section 2.2.121 [Stem engraver], page 356
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.
Music types accepted:
Section 1.2.76 [tremolo-event], page 51, and Section 1.2.79 [tuplet-span-event], page 52,
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):
Section 3.1.46 [Flag], page 435, Section 3.1.113 [Stem], page 508, Section 3.1.114 [StemStub], page 510, and Section 3.1.115 [StemTremolo], page 511.

Section 2.2.127 [Text engraver], page 358
Create text scripts.
Music types accepted:
Section 1.2.72 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.126 [TextScript], page 524.

Section 2.2.128 [Text_spanner_engraver], page 359
Create text spanner from an event.
Music types accepted:
Section 1.2.73 [text-span-event], page 51,
Properties (read)

\texttt{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):
Section 3.1.127 [TextSpanner], page 526.

Section 2.2.129 [Tie_engraver], page 359
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.74 [tie-event], page 51,
Properties (read)

\texttt{skipTypesetting} (boolean)
If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

\texttt{tieWaitForNote} (boolean)
If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

\texttt{tieMelismaBusy} (boolean)
Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn], page 529.

Section 2.2.134 [Trill_spanner_engraver], page 361
Create trill spanner from an event.
Music types accepted:
Section 1.2.78 [trill-span-event], page 52,
Properties (read)

\texttt{currentCommandColumn} (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\texttt{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):
Section 3.1.134 [TrillSpanner], page 535.

Section 2.2.135 [Tuplet_engraver], page 362
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.79 [tuplet-span-event], page 52,
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):
Section 3.1.135 [TupletBracket], page 536, and Section 3.1.136 [Tuplet-Number], page 538.

2.1.4 Devnull
Silently discards all musical information given to this context.
This context also accepts commands for the following context(s):
Staff and Voice.
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.
This context creates the following layout object(s):
Section 3.1.12 [BarLine], page 390, Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigureAlignment], page 396, Section 3.1.16 [BassFigureAlignmentPositioning], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, Section 3.1.19 [BassFigureLine], page 398, Section 3.1.26 [Clef], page 406, Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, Section 3.1.32 [CueEndClef], page 416, Section 3.1.34 [DotColumn], page 420, Section 3.1.45 [FingeringColumn], page 435, Section 3.1.57 [InstrumentName], page 447, Section 3.1.64 [LedgerLineSpanner], page 457, Section 3.1.82 [NoteCollision], page 479, Section 3.1.99 [RestCollision], page 496, Section 3.1.102 [ScriptRow], page 498, Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.110 [StaffSpacing], page 506, Section 3.1.111 [StaffSymbol], page 507, Section 3.1.119 [SustainPedalLineSpanner], page 516, Section 3.1.130 [TimeSignature], page 529, Section 3.1.138 [UnaCordaPedalLineSpanner], page 540, and Section 3.1.141 [VerticalAxisGroup], page 542.
This context sets the following properties:
- Set grob-property `staff-padding` in Section 3.1.100 [Script], page 497, 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 Section 2.1.6 [DrumVoice], page 83.

Context DrumStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, and Section 2.1.20 [NullVoice], page 184.

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

**Section 2.2.5 [Axis_group_engraver], page 316**

- 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):

**Section 3.1.141 [VerticalAxisGroup], page 542**

**Section 2.2.7 [Bar_engraver], page 317**

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):
Section 3.1.12 [BarLine], page 390.

**Section 2.2.17 [Clef_engraver], page 321**
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):
Section 3.1.26 [Clef], page 406, and Section 3.1.27 [ClefModifier], page 409.

**Section 2.2.19 [Collision_engraver], page 322**
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):
Section 3.1.82 [NoteCollision], page 479.
Section 2.2.24 [Cue_clef_engraver], page 324
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):
Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, and Section 3.1.32 [CueEndClef], page 416.

Section 2.2.27 [Dot_column_engraver], page 325
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):
Section 3.1.34 [DotColumn], page 420.

Section 2.2.38 [Figured_bass_engraver], page 329
Make figured bass numbers.

Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.55 [rest-event], page 48,

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):
Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigure-Alignment], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, and Section 3.1.19 [BassFigureLine], page 398.

Section 2.2.39 [Figured_bass_position_engraver], page 330
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
Section 3.1.16 [BassFigureAlignmentPositioning], page 396.

Section 2.2.40 [Fingering_column_engraver], page 330
Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.45 [FingeringColumn], page 435.

Section 2.2.42 [Font_size_engraver], page 331
Put fontSize into font-size grob property.
Properties (read)
fontSize (number)
The relative size of all grobs in a context.

Section 2.2.53 [Grob_pq_engraver], page 334
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.).
Section 2.2.56 [Instrument_name_engraver], page 335
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):
Section 3.1.57 [InstrumentName], page 447.

Section 2.2.63 [Ledger_line_engraver], page 338
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):
Section 3.1.64 [LedgerLineSpanner], page 457.

Section 2.2.73 [Merge_mmrest_numbers_engraver], page 341
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.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.

Music types accepted:
Section 1.2.4 [apply-output-event], page 42.

Section 2.2.92 [Piano_pedal_align_engraver], page 348
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):
Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.119 [SustainPedalLineSpanner], page 516, and Section 3.1.138 [UnaCordaPedalLineSpanner], page 540.
Section 2.2.97 [Pure_from_neighbor_engraver], page 350
Coordinates items that get their pure heights from their neighbors.

Section 2.2.100 [Rest_collision_engraver], page 351
Handle collisions of rests.
Properties (read)

    busyGrobs (list)
    A queue of \texttt{(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):
Section 3.1.99 [RestCollision], page 496.

Section 2.2.105 [Script_row_engraver], page 352
Determine order in horizontal side position elements.
This engraver creates the following layout object(s):
Section 3.1.102 [ScriptRow], page 498.

Section 2.2.106 [Separating_line_group_engraver], page 353
Generate objects for computing spacing parameters.
Properties (read)

    createSpacing (boolean)
    Create \texttt{StaffSpacing} objects? Should be set
    for staves.

Properties (write)

    hasStaffSpacing (boolean)
    True if the current \texttt{CommandColumn} contains
    items that will affect spacing.

This engraver creates the following layout object(s):
Section 3.1.110 [StaffSpacing], page 506.

Section 2.2.116 [Staff_collecting_engraver], page 355
Maintain the \texttt{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.

Section 2.2.118 [Staff_symbol_engraver], page 355
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.66 [staff-span-event], page 50,
This engraver creates the following layout object(s):
Section 3.1.111 [StaffSymbol], page 507.
Section 2.2.131 [Time_signature_ engraver], page 360
Create a Section 3.1.130 [TimeSignature], page 529, whenever timeSignatureFraction changes.

Music types accepted:
Section 1.2.75 [time-signature-event], page 51,

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):
Section 3.1.130 [TimeSignature], page 529.

2.1.6 DrumVoice
A voice on a percussion staff.

This context also accepts commands for the following context(s):
Voice.

This context creates the following layout object(s):
Section 3.1.20 [Beam], page 399, Section 3.1.21 [BendAfter], page 401, Section 3.1.24 [BreathingSign], page 403, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.35 [Dots], page 421, Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.40 [DynamicLineSpanner], page 427, Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, Section 3.1.46 [Flag], page 435, Section 3.1.54 [Hairpin], page 443, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.62 [LaissezVibrerTie], page 455, Section 3.1.63 [LaissezVibrerTieColumn], page 457, Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, Section 3.1.80 [MultiMeasureRestText], page 476, Section 3.1.83 [NoteColumn], page 480, Section 3.1.84 [NoteHead], page 480, Section 3.1.86 [NoteSpacing], page 482, Section 3.1.90 [PercentRepeat], page 486, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.92 [PhrasingSlur], page 488, Section 3.1.95 [RepeatSlash], page 493, Section 3.1.96 [RepeatTie], page 494, Section 3.1.97 [RepeatTieColumn], page 495, Section 3.1.98 [Rest], page 495, Section 3.1.100 [Script], page 497, Section 3.1.101 [ScriptColumn], page 498, Section 3.1.103 [Slur], page 498, Section 3.1.113 [Stem], page 508, Section 3.1.114 [StemStub], page 510, Section 3.1.115 [StemTremolo], page 511, Section 3.1.126 [TextScript], page 524, Section 3.1.127 [TextSpanner], page 526, Section 3.1.128 [Tie], page 527, Section 3.1.129 [TieColumn], page 529, Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, Section 3.1.133 [TrillPitchHead], page 534, Section 3.1.134 [TrillSpanner], page 535, Section 3.1.135 [TupletBracket], page 536, and Section 3.1.136 [TupletNumber], page 538.

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):

**Section 2.2.4 [Auto_beam_engraver], page 315**

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 2.2.121 [Stem_engraver], page 356, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,

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):
Section 3.1.20 [Beam], page 399.

**Section 2.2.10 [Beam_engraver], page 319**

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted:
Section 1.2.8 [beam-event], page 43,

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):
Section 3.1.20 [Beam], page 399.

Section 2.2.12 [Bend_engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.21 [BendAfter], page 401.

Section 2.2.14 [Breathing_sign_engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.24 [BreathingSign], page 403.

Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.77 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.28 [Dots_engraver], page 326
Create Section 3.1.35 [Dots], page 421, objects for Section 3.2.100 [rhythmic-head-interface], page 606s.
This engraver creates the following layout object(s):
Section 3.1.35 [Dots], page 421.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
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):
Section 3.1.36 [DoublePercentRepeat], page 422, and Section 3.1.37 [DoublePercentRepeatCounter], page 423.

Section 2.2.31 [Drum_notes_engraver], page 327

Generate drum note heads.

Music types accepted:
Section 1.2.44 [note-event], page 47,

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):
Section 3.1.84 [NoteHead], page 480, and Section 3.1.100 [Script], page 497.

Section 2.2.33 [Dynamic_align_engraver], page 327

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):
Section 3.1.40 [DynamicLineSpanner], page 427.

Section 2.2.34 [Dynamic_engraver], page 328

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 43, and Section 1.2.64 [span-dynamic-event], page 49,
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):
Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, and Section 3.1.54 [Hairpin], page 443.

Section 2.2.42 [Font_size_engraver], page 331
Put fontSize into font-size grob property.

Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.44 [Forbid_line_break_engraver], page 331
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.

Section 2.2.47 [Grace_auto_beam_engraver], page 333
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:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

**autoBeaming** (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

**Section 2.2.48 [Grace_beam_engraver], page 333**
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:
Section 1.2.8 [beam-event], page 43,

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):
Section 3.1.20 [Beam], page 399.

**Section 2.2.49 [Grace_engraver], page 334**
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.

**Section 2.2.53 [Grob_pq_engraver], page 334**
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)
Chapter 2: Translation

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.).

Section 2.2.53 [Grob_pq_engraver], page 334
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.).

Section 2.2.57 [Instrument_switch_engraver], page 336
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):
Section 3.1.58 [InstrumentSwitch], page 448.

Section 2.2.62 [Laissez_vibrer_engraver], page 338
Create laissez vibrer items.
Music types accepted:
Section 1.2.31 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.62 [LaissezVibrerTie], page 455, and Section 3.1.63 [LaissezVibrerTieColumn], page 457.

Section 2.2.77 [Multi_measure_rest_engraver], page 342
Engrave multi-measure rests that are produced with ‘R’. It reads
measurePosition and internalBarNumber to determine what number
to print over the Section 3.1.77 [MultiMeasureRest], page 472.
Music types accepted:
Section 1.2.40 [multi-measure-articulation-event], page 46,
Section 1.2.41 [multi-measure-rest-event], page 46, and Section 1.2.42
[multi-measure-text-event], page 46,
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 bar number. This property is used for internal timekeeping, among others by the Accidental_engraver.

measurePosition (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

restNumberThreshold (number)
If a multimeasure rest has more measures than this, a number is printed.

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):
Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, and Section 3.1.80 [MultiMeasureRestText], page 476.

Section 2.2.83 [Note_spacing_engraver], page 345
Generate NoteSpacing, an object linking horizontal lines for use in spacing.
This engraver creates the following layout object(s):
Section 3.1.86 [NoteSpacing], page 482.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.89 [Part_combine_engraver], page 347
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.48 [part-combine-event], page 48,
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):
Section 3.1.30 [CombineTextScript], page 411.

**Section 2.2.90 [Percent_repeat_ engraver], page 347**
Make whole measure repeats.
Music types accepted:
Section 1.2.50 [percent-event], page 48,
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):
Section 3.1.90 [PercentRepeat], page 486, and Section 3.1.91 [PercentRepeatCounter], page 487.

**Section 2.2.91 [Phrasing_slur_ engraver], page 348**
Print phrasing slurs. Similar to Section 2.2.108 [Slur_ engraver], page 353.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.52 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.92 [PhrasingSlur], page 488.

**Section 2.2.96 [Pitched_trill_ engraver], page 350**
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, and Section 3.1.133 [TrillPitchHead], page 534.

**Section 2.2.99 [Repeat_tie_ engraver], page 351**
Create repeat ties.
Music types accepted:
Section 1.2.54 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.96 [RepeatTie], page 494, and Section 3.1.97 [RepeatTieColumn], page 495.

Section 2.2.101 [Rest engraver], page 351
Engrave rests.
Music types accepted:
Section 1.2.55 [rest-event], page 48,
Properties (read)

\begin{verbatim}
middleCPosition (number)
The place of the middle C, measured in half
staff-spaces. Usually determined by looking at
middleCClefPosition and middleCOffset.
\end{verbatim}

This engraver creates the following layout object(s):
Section 3.1.98 [Rest], page 495.

Section 2.2.102 [Rhythmic_column engraver], page 352
Generate NoteColumn, an object that groups stems, note heads, and
rests.
This engraver creates the following layout object(s):
Section 3.1.83 [NoteColumn], page 480.

Section 2.2.103 [Script_column engraver], page 352
Find potentially colliding scripts and put them into a ScriptColumn
object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.101 [ScriptColumn], page 498.

Section 2.2.104 [Script engraver], page 352
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)

\begin{verbatim}
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.
\end{verbatim}

This engraver creates the following layout object(s):
Section 3.1.100 [Script], page 497.

Section 2.2.107 [Slash_repeat engraver], page 353
Make beat repeats.
Music types accepted:
Section 1.2.53 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.38 [DoubleRepeatSlash], page 425, and Section 3.1.95 [Re-
peatSlash], page 493.
Section 2.2.108 [Slur_engraver], page 353
Build slur grobs from slur events.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.59 [slur-event], page 49,
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):
Section 3.1.103 [Slur], page 498.

Section 2.2.115 [Spanner_break_forbid_engraver], page 355
Forbid breaks in certain spanners.

Section 2.2.121 [Stem_engraver], page 356
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.
Music types accepted:
Section 1.2.76 [tremolo-event], page 51, and Section 1.2.79 [tuplet-span-event], page 52,
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):
Section 3.1.46 [Flag], page 435, Section 3.1.113 [Stem], page 508, Section 3.1.114 [StemStub], page 510, and Section 3.1.115 [StemTremolo], page 511.

Section 2.2.127 [Text_engraver], page 358
Create text scripts.
Music types accepted:
Section 1.2.72 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.126 [TextScript], page 524.

**Section 2.2.128 [Text_spawner_engraver], page 359**
Create text spanner from an event.
Music types accepted:
Section 1.2.73 [text-span-event], page 51,
Properties (read)

```plaintext
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):
Section 3.1.127 [TextSpanner], page 526.

**Section 2.2.129 [Tie_engraver], page 359**
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.74 [tie-event], page 51,
Properties (read)

```plaintext
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)

```plaintext
tieMelismaBusy (boolean)
  Signal whether a tie is present.
```

This engraver creates the following layout object(s):
Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn], page 529.

**Section 2.2.134 [Trill_spawner_engraver], page 361**
Create trill spanner from an event.
Music types accepted:
Section 1.2.78 [trill-span-event], page 52,
Properties (read)

```plaintext
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):
Section 3.1.134 [TrillSpanner], page 535.

Section 2.2.135 [Tuplet_engraver], page 362
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.79 [tuplet-span-event], page 52,
Properties (read)
  \texttt{tupletFullLength} (boolean)
  If set, the tuplet is printed up to the start of
  the next note.
  \texttt{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):
Section 3.1.135 [TupletBracket], page 536, and Section 3.1.136 [Tuplet-
Number], page 538.

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.
  This context creates the following layout object(s):
Section 3.1.12 [BarLine], page 390, Section 3.1.40 [DynamicLineSpanner], page 427,
Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430,
Section 3.1.54 [Hairpin], page 443, Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.100
[Script], page 497, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.118 [SustainPedal],
page 515, Section 3.1.126 [TextScript], page 524, Section 3.1.127 [TextSpanner], page 526,
Section 3.1.137 [UnaCordaPedal], page 539, and Section 3.1.141 [VerticalAxisGroup], page 542.
  This context sets the following properties:
  \begin{itemize}
  \item Set grob-property \texttt{font-shape} in Section 3.1.126 [TextScript], page 524, to \texttt{italic}.
  \item Set grob-property \texttt{nonstaff-relatedstaff-spacing} in Section 3.1.141 [VerticalAxisGroup], page 542, to:
    \texttt{((basic-distance . 5) (padding . 0.5))}
  \item Set grob-property \texttt{outside-staff-priority} in Section 3.1.40 [DynamicLineSpanner],
    page 427, to \texttt{#f}.
  \item Set grob-property \texttt{outside-staff-priority} in Section 3.1.41 [DynamicText], page 429, to
    \texttt{#f}.
  \item Set grob-property \texttt{outside-staff-priority} in Section 3.1.54 [Hairpin], page 443, to \texttt{#f}.
  \item Set grob-property \texttt{staff-affinity} in Section 3.1.141 [VerticalAxisGroup], page 542, to 0.
  \item Set grob-property \texttt{Y-offset} in Section 3.1.40 [DynamicLineSpanner], page 427, to 0.
  \item Set translator property \texttt{pedalSustainStrings} to:
    \texttt{"Ped." "*Ped." "*"}
  \item Set translator property \texttt{pedalUnaCordaStrings} to:
    \texttt{"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):

Section 2.2.5 [Axis_group_engraver], page 316
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):
Section 3.1.141 [VerticalAxisGroup], page 542.

Section 2.2.7 [Bar_engraver], page 317
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):
Section 3.1.12 [BarLine], page 390.
Section 2.2.33 [Dynamic_align_engraver], page 327
Align hairpins and dynamic texts on a horizontal line.

Properties (read)

\texttt{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):
Section 3.1.40 [DynamicLineSpanner], page 427.

Section 2.2.34 [Dynamic_engraver], page 328
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 43, and Section 1.2.64 [span-dynamic-event], page 49,

Properties (read)

\texttt{crescendoSpanner (symbol)}
The type of spanner to be used for crescendi. Available values are ‘hairpin’ and ‘text’. If unset, a hairpin crescendo is used.

\texttt{crescendoText (markup)}
The text to print at start of non-hairpin crescendo, i.e., ‘cresc.’.

\texttt{currentMusicalColumn (graphical (layout) object)}
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

\texttt{decrescendoSpanner (symbol)}
The type of spanner to be used for decrescendi. Available values are ‘hairpin’ and ‘text’. If unset, a hairpin decrescendo is used.

\texttt{decrescendoText (markup)}
The text to print at start of non-hairpin decrescendo, i.e., ‘dim.’.

This engraver creates the following layout object(s):
Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, and Section 3.1.54 [Hairpin], page 443.

Section 2.2.42 [Font_size_engraver], page 331
Put \texttt{fontSize} into \texttt{font-size} grob property.

Properties (read)

\texttt{fontSize (number)}
The relative size of all grobs in a context.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.

Music types accepted:
Section 1.2.4 [apply-output-event], page 42,
Section 2.2.93 [Piano_pedal_engraver], page 348

Engrave piano pedal symbols and brackets.

Music types accepted:
Section 1.2.62 [sostenuto-event], page 49, Section 1.2.70 [sustain-event], page 51, and Section 1.2.80 [una-corda-event], page 52,

Properties (read)

```plaintext
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):
Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.118 [SustainPedal], page 515, and Section 3.1.137 [UnaCordaPedal], page 539.

Section 2.2.104 [Script_engraver], page 352

Handle note scripted articulations.

Music types accepted:
Section 1.2.6 [articulation-event], page 43,

Properties (read)

```plaintext
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):
Section 3.1.100 [Script], page 497.

Section 2.2.127 [Text_engraver], page 358

Create text scripts.

Music types accepted:
Section 1.2.72 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.126 [TextScript], page 524.

Section 2.2.128 [Text_spanner_engraver], page 359
Create text spanner from an event.
Music types accepted:
Section 1.2.73 [text-span-event], page 51,
Properties (read)

\[
\text{currentMusicalColumn} \quad \text{(graphical \ (layout) \ \object)}
\]
Grob that is X-parent to all non-breakable
items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.127 [TextSpanner], page 526.

2.1.8 FiguredBass
A context for printing a figured bass line.
This context creates the following layout object(s):
Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigureAlignment], page 396,
Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398,
Section 3.1.19 [BassFigureLine], page 398, Section 3.1.110 [StaffSpacing], page 506, and
Section 3.1.141 [VerticalAxisGroup], page 542.
This context sets the following properties:
• Set grob-property nonstaff-nonstaff-spacing.padding in Section 3.1.141 [VerticalAxisGroup], page 542, to 0.5.
• Set grob-property nonstaff-relatedstaff-spacing.padding in Section 3.1.141 [VerticalAxisGroup], page 542, to 0.5.
• Set grob-property remove-empty in Section 3.1.141 [VerticalAxisGroup], page 542, to #t.
• Set grob-property remove-first in Section 3.1.141 [VerticalAxisGroup], page 542, to #t.
• Set grob-property staff-affinity in Section 3.1.141 [VerticalAxisGroup], page 542, 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):
Section 2.2.5 [Axis_group_engraver], page 316
Group all objects created in this context in a VerticalAxisGroup span-
er.
Properties (read)

\[
\text{currentCommandColumn} \quad \text{(graphical \ (layout) \ \object)}
\]
Grob that is X-parent to all current breakable
(clef, key signature, etc.) items.

\[
\text{hasAxisGroup} \quad \text{(boolean)}
\]
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):
Section 3.1.141 [VerticalAxisGroup], page 542.

**Section 2.2.38 [Figured_bass_engraver], page 329**
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.55 [rest-event], page 48,

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):
Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigure-Alignment], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, and Section 3.1.19 [BassFigureLine], page 398.

**Section 2.2.106 [Separating_line_group_engraver], page 353**
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):
Section 3.1.110 [StaffSpacing], page 506.

### 2.1.9 FretBoards

A context for displaying fret diagrams.

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

This context creates the following layout object(s):
Section 3.1.49 [FretBoard], page 438, Section 3.1.57 [InstrumentName], page 447, Section 3.1.110 [StaffSpacing], page 506, and Section 3.1.141 [VerticalAxisGroup], page 542.

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):

**Section 2.2.5 [Axis_group_engraver], page 316**
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):
Section 3.1.141 [VerticalAxisGroup], page 542.
Section 2.2.42 [Font_size_ engraver], page 331  
Put fontSize into font-size grob property.

Properties (read)

fontSize (number)  
The relative size of all grobs in a context.

Section 2.2.45 [Fretboard_ engraver], page 331  
Generate fret diagram from one or more events of type NoteEvent.

Music types accepted:
Section 1.2.24 [fingering-event], page 44, Section 1.2.44 [note-event], page 47, and Section 1.2.68 [string-number-event], page 51,

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):
Section 3.1.49 [FretBoard], page 438.

Section 2.2.56 [Instrument_name_engraver], page 335
Create a system start text for instrument or vocal names.
Properties (read)

\begin{verbatim}
  currentCommandColumn (graphical (layout) object)
  \end{verbatim}
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\begin{verbatim}
  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.
\end{verbatim}

\begin{verbatim}
  shortInstrumentName (markup)
  See instrumentName.
\end{verbatim}

\begin{verbatim}
  shortVocalName (markup)
  Name of a vocal line, short version.
\end{verbatim}

\begin{verbatim}
  vocalName (markup)
  Name of a vocal line.
\end{verbatim}

This engraver creates the following layout object(s):
Section 3.1.57 [InstrumentName], page 447.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.106 [Separating_line_group_engraver], page 353
Generate objects for computing spacing parameters.
Properties (read)

\begin{verbatim}
  createSpacing (boolean)
  Create StaffSpacing objects? Should be set for staves.
\end{verbatim}

Properties (write)

\begin{verbatim}
  hasStaffSpacing (boolean)
  True if the current CommandColumn contains items that will affect spacing.
\end{verbatim}

This engraver creates the following layout object(s):
Section 3.1.110 [StaffSpacing], page 506.

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 Section 2.1.26 [Score], page 219.

Context Global can contain Section 2.1.26 [Score], page 219.

### 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):

- Section 3.1.9 [Arpeggio], page 387
- Section 3.1.57 [InstrumentName], page 447
- Section 3.1.107 [SpanBar], page 504
- Section 3.1.108 [SpanBarStub], page 505
- Section 3.1.121 [SystemStartBar], page 518
- Section 3.1.122 [SystemStartBracket], page 520
- Section 3.1.124 [SystemStartSquare], page 521
- Section 3.1.140 [VerticalAlignment], page 542

This context sets the following properties:

- Set grob-property `extra-spacing-width` in Section 3.1.41 [DynamicText], page 429, to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localAlterations` 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 Section 2.1.27 [Staff], page 240.

Context GrandStaff can contain Section 2.1.2 [ChordNames], page 60
- Section 2.1.5 [DrumStaff], page 76
- Section 2.1.7 [Dynamics], page 95
- Section 2.1.8 [FiguredBass], page 99
- Section 2.1.16 [Lyrics], page 155
- Section 2.1.25 [RhythmicStaff], page 215
- Section 2.1.27 [Staff], page 240
- Section 2.1.29 [TabStaff], page 253

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

- Section 2.2.56 [Instrument_name_engraver], page 335

  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):
Section 3.1.57 [InstrumentName], page 447.

Section 2.2.111 [Span_arpeggio_engraver], page 354
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):
Section 3.1.9 [Arpeggio], page 387.

Section 2.2.112 [Span_bar_engraver], page 354
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):
Section 3.1.107 [SpanBar], page 504.

Section 2.2.113 [Span_bar_stub_engraver], page 355
Make stubs for span bars in all contexts that the span bars cross.
This engraver creates the following layout object(s):
Section 3.1.108 [SpanBarStub], page 505.

Section 2.2.122 [System_start_delimiter_engraver], page 357
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):
Section 3.1.121 [SystemStartBar], page 518, Section 3.1.122 [SystemStartBrace], page 519, Section 3.1.123 [SystemStartBracket], page 520, and Section 3.1.124 [SystemStartSquare], page 521.

Section 2.2.138 [Vertical_align_engraver], page 362
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):
Section 3.1.140 [VerticalAlignment], page 542.

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.

This context creates the following layout object(s):
Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379,
Section 3.1.3 [AccidentalPlacement], page 380, Section 3.1.4 [AccidentalSuggestion], page 381,
Section 3.1.12 [BarLine], page 390, Section 3.1.14 [BassFigure], page 395, Section 3.1.15
[BassFigureAlignment], page 396, Section 3.1.16 [BassFigureAlignmentPositioning], page 396,
Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation],
page 398, Section 3.1.19 [BassFigureLine], page 398, Section 3.1.26 [Clef], page 406,
Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, Section 3.1.32
[CueEndClef], page 416, Section 3.1.34 [DotColumn], page 420, Section 3.1.45 [FingeringColumn],
page 435, Section 3.1.57 [InstrumentName], page 447, Section 3.1.59 [KeyCancellation],
page 449, Section 3.1.60 [KeySignature], page 452, Section 3.1.64 [LedgerLineSpanner],
page 457, Section 3.1.82 [NoteCollision], page 479, Section 3.1.87 [OttavaBracket], page 483,
Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.99 [RestCollision], page 496,
Section 3.1.102 [ScriptRow], page 498, Section 3.1.104 [SostenutoPedal], page 501,
Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.110 [StaffSpacing],
page 506, Section 3.1.111 [StaffSymbol], page 507, Section 3.1.118 [SustainPedal], page 515,
Section 3.1.119 [SustainPedalLineSpanner], page 516, Section 3.1.130 [TimeSignature], page 529,
Section 3.1.137 [UnaCordaPedal], page 539, Section 3.1.138 [UnaCordaPedalLineSpanner],
page 540, and Section 3.1.141 [VerticalAxisGroup], page 542.

This context sets the following properties:
• Set grob-property transparent in Section 3.1.12 [BarLine], page 390, to #t.
• 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 Section 2.1.13 [GregorianTranscriptionVoice], page 117.

Context GregorianTranscriptionStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, and Section 2.1.20 [NullVoice], page 184.

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

Section 2.2.1 [Accidental_engraver], page 313
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.

\textbf{autoCautionaries} (list)
List similar to \texttt{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.

\textbf{extraNatural} (boolean)
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

\textbf{harmonicAccidentals} (boolean)
If set, harmonic notes in chords get accidentals.

\textbf{internalBarNumber} (integer)
Contains the current bar number. This property is used for internal timekeeping, among others by the \texttt{Accidental_ engraver}.

\textbf{keyAlterations} (list)
The current key signature. This is an alist containing \texttt{(step . alter)} or \texttt{((octave . step) . alter)}, where \texttt{step} is a number in the range 0 to 6 and \texttt{alter} a fraction, denoting alteration. For alterations, use symbols, e.g. \texttt{keyAlterations = #`((6 . ,FLAT))}.

\textbf{localAlterations} (list)
The key signature at this point in the measure. The format is the same as for \texttt{keyAlterations}, but can also contain \texttt{(((octave . name) . (alter barnumber . measureposition))}} pairs.

This engraver creates the following layout object(s):
Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379, Section 3.1.3 [AccidentalPlacement], page 380, and Section 3.1.4 [AccidentalSuggestion], page 381.

Section 2.2.5 [Axis_ group_ engraver], page 316
Group all objects created in this context in a \texttt{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):
Section 3.1.141 [VerticalAxisGroup], page 542.

**Section 2.2.7 [Bar_engraver], page 317**
Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a line break 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:
```latex
\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):
Section 3.1.12 [BarLine], page 390.

**Section 2.2.17 [Clef_engraver], page 321**
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):
Section 3.1.26 [Clef], page 406, and Section 3.1.27 [ClefModifier], page 409.

Section 2.2.19 [Collision_engraver], page 322
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):
Section 3.1.82 [NoteCollision], page 479.

Section 2.2.24 [Cue_clef_engraver], page 324
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):
Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, and Section 3.1.32 [CueEndClef], page 416.

Section 2.2.27 [Dot_column_engraver], page 325
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):
Section 3.1.34 [DotColumn], page 420.

Section 2.2.38 [Figured_bass_engraver], page 329
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.55 [rest-event], page 48,
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):
Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigureAlignment], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, and Section 3.1.19 [BassFigureLine], page 398.

Section 2.2.39 [Figured_bass_position_engraver], page 330
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
Section 3.1.16 [BassFigureAlignmentPositioning], page 396.
Section 2.2.40 [Fingering_column_engraver], page 330
Find potentially colliding scripts and put them into a FingeringColumn
object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.45 [FingeringColumn], page 435.

Section 2.2.42 [Font_size_engraver], page 331
Put fontSize into font-size grob property.
Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.53 [Grob_pq_engraver], page 334
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.).

Section 2.2.56 [Instrument_name_engraver], page 335
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):
Section 3.1.57 [InstrumentName], page 447.
Section 2.2.59 [Key_engraver], page 336
Engrave a key signature.

Music types accepted:
Section 1.2.29 [key-change-event], page 45,
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):
Section 3.1.59 [KeyCancellation], page 449, and Section 3.1.60 [KeySignature], page 452.

**Section 2.2.63 [Ledger_line_engraver], page 338**
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s):
Section 3.1.64 [LedgerLineSpanner], page 457.

**Section 2.2.73 [Merge_mmrest_numbers_engraver], page 341**
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.

**Section 2.2.84 [Ottava_spanner_engraver], page 345**
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):
Section 3.1.87 [OttavaBracket], page 483.

**Section 2.2.85 [Output_property_engraver], page 346**
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

**Section 2.2.92 [Piano_pedal_align_engraver], page 348**
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):
Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.119
[SustainPedalLineSpanner], page 516, and Section 3.1.138 [UnaCor-
daPedalLineSpanner], page 540.

Section 2.2.93 [Piano_pedal_engraver], page 348
Engrave piano pedal symbols and brackets.

Music types accepted:
Section 1.2.62 [sostenuto-event], page 49, Section 1.2.70 [sustain-event],
page 51, and Section 1.2.80 [una-corda-event], page 52,

Properties (read)

\texttt{currentCommandColumn} (graphical (layout)
object)
\hspace{1cm} Grob that is X-parent to all current breakable
\hspace{1cm} (clef, key signature, etc.) items.

\texttt{pedalSostenutoStrings} (list)
\hspace{1cm} See \texttt{pedalSustainStrings}.

\texttt{pedalSostenutoStyle} (symbol)
\hspace{1cm} See \texttt{pedalSustainStyle}.

\texttt{pedalSustainStrings} (list)
\hspace{1cm} A list of strings to print for sustain-pedal. For-
\hspace{1cm} mat is (up updown down), where each of the
\hspace{1cm} three is the string to print when this is done
\hspace{1cm} with the pedal.

\texttt{pedalSustainStyle} (symbol)
\hspace{1cm} A symbol that indicates how to print sustain
\hspace{1cm} pedals: text, bracket or mixed (both).

\texttt{pedalUnaCordaStrings} (list)
\hspace{1cm} See \texttt{pedalSustainStrings}.

\texttt{pedalUnaCordaStyle} (symbol)
\hspace{1cm} See \texttt{pedalSustainStyle}.

This engraver creates the following layout object(s):
Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.104 [Sostenu-
toPedal], page 501, Section 3.1.118 [SustainPedal], page 515, and
Section 3.1.137 [UnaCordaPedal], page 539.

Section 2.2.97 [Pure_from_neighbor_engraver], page 350
Coordinates items that get their pure heights from their neighbors.

Section 2.2.100 [Rest_collision_engraver], page 351
Handle collisions of rests.

Properties (read)

\texttt{busyGrosbs} (list)
\hspace{1cm} A queue of (end-moment . grob) cons cells.
\hspace{1cm} This is for internal (C++) use only. This prop-
\hspace{1cm} erty contains the grobs which are still busy (e.g.
\hspace{1cm} note heads, spanners, etc.).
This engraver creates the following layout object(s):
Section 3.1.99 [RestCollision], page 496.

Section 2.2.105 [Script_row_engraver], page 352
Determine order in horizontal side position elements.
This engraver creates the following layout object(s):
Section 3.1.102 [ScriptRow], page 498.

Section 2.2.106 [Separating_line_group_engraver], page 353
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):
Section 3.1.110 [StaffSpacing], page 506.

Section 2.2.116 [Staff_collecting_engraver], page 355
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.

Section 2.2.118 [Staff_symbol_engraver], page 355
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.66 [staff-span-event], page 50,
This engraver creates the following layout object(s):
Section 3.1.111 [StaffSymbol], page 507.

Section 2.2.131 [Time_signature_engraver], page 360
Create a Section 3.1.130 [TimeSignature], page 529, whenever timeSignatureFraction changes.
Music types accepted:
Section 1.2.75 [time-signature-event], page 51,
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, \( (4 \cdot 4) \) is a 4/4 time signature.

This engraver creates the following layout object(s):
Section 3.1.130 [TimeSignature], page 529.

### 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.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 387, Section 3.1.20 [Beam], page 399, Section 3.1.21 [BendAfter], page 401, Section 3.1.24 [BreathingSign], page 403, Section 3.1.28 [ClusterSpanner], page 411, Section 3.1.29 [ClusterSpannerBeacon], page 411, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.35 [Dots], page 421, Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.40 [DynamicLineSpanner], page 427, Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, Section 3.1.43 [Episema], page 432, Section 3.1.44 [Fingering], page 433, Section 3.1.46 [Flag], page 435, Section 3.1.50 [Glissando], page 440, Section 3.1.54 [Hairpin], page 443, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.62 [LaissezVibrerTie], page 455, Section 3.1.63 [LaissezVibrerTieColumn], page 457, Section 3.1.66 [LigatureBracket], page 460, Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, Section 3.1.80 [MultiMeasureRestText], page 476, Section 3.1.83 [NoteColumn], page 480, Section 3.1.84 [NoteHead], page 480, Section 3.1.86 [NoteSpacing], page 482, Section 3.1.90 [PercentRepeat], page 486, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.92 [PhrasingSlur], page 488, Section 3.1.95 [RepeatSlash], page 493, Section 3.1.96 [RepeatTie], page 494, Section 3.1.97 [RepeatTieColumn], page 495, Section 3.1.98 [Rest], page 495, Section 3.1.100 [Script], page 497, Section 3.1.101 [ScriptColumn], page 498, Section 3.1.103 [Shu], page 498, Section 3.1.113 [Stem], page 508, Section 3.1.114 [StemStub], page 510, Section 3.1.115 [StemTremolo], page 511, Section 3.1.116 [StringNumber], page 512, Section 3.1.117 [StrokeFinger], page 514, Section 3.1.126 [TextScript], page 524, Section 3.1.127 [TextSpanner], page 526, Section 3.1.128 [Tie], page 527, Section 3.1.129 [TieColumn], page 529, Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, Section 3.1.133 [TrillPitchHead], page 534, Section 3.1.134 [TrillSpanner], page 535, Section 3.1.135 [TupletBracket], page 536, Section 3.1.136 [TupletNumber], page 538, and Section 3.1.142 [VoiceFollower], page 544.

This context sets the following properties:
- Set grob-property padding in Section 3.1.100 [Script], page 497, to 0.5.
- Set grob-property transparent in Section 3.1.66 [LigatureBracket], page 460, 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):
Section 2.2.3 [Arpeggio_engraver], page 315
Generate an Arpeggio symbol.
Music types accepted:
Section 1.2.5 [arpeggio-event], page 42,
This engraver creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 387.

Section 2.2.4 [Auto_beam_engraver], page 315
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 2.2.121 [Stem_engraver], page 356, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
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):
Section 3.1.20 [Beam], page 399.

Section 2.2.10 [Beam_engraver], page 319
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
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):
Section 3.1.20 [Beam], page 399.

**Section 2.2.12 [Bend_engraver], page 319**
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.21 [BendAfter], page 401.

**Section 2.2.14 [Breathing_sign_engraver], page 320**
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.24 [BreathingSign], page 403.

**Section 2.2.16 [Chord_tremolo_engraver], page 321**
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.77 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

**Section 2.2.18 [Cluster_spanner_engraver], page 322**
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.28 [ClusterSpanner], page 411, and Section 3.1.29 [ClusterSpannerBeacon], page 411.

**Section 2.2.28 [Dots_engraver], page 326**
Create Section 3.1.35 [Dots], page 421, objects for Section 3.2.100 [rhythmic-head-interface], page 606s.
This engraver creates the following layout object(s):
Section 3.1.35 [Dots], page 421.
Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
Properties (read)

\texttt{countPercentRepeats} (boolean)
If set, produce counters for percent repeats.

\texttt{measureLength} (moment)
Length of one measure in the current time signature.

\texttt{repeatCountVisibility} (procedure)
A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when \texttt{countPercentRepeats} is set.

Properties (write)

\texttt{forbidBreak} (boolean)
If set to \texttt{#t}, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.36 [DoublePercentRepeat], page 422, and Section 3.1.37 [DoublePercentRepeatCounter], page 423.

Section 2.2.33 [Dynamic_align_engraver], page 327
Align hairpins and dynamic texts on a horizontal line.
Properties (read)

\texttt{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):
Section 3.1.40 [DynamicLineSpanner], page 427.

Section 2.2.34 [Dynamic_engraver], page 328
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 43, and Section 1.2.64 [span-dynamic-event], page 49,
Properties (read)

\texttt{crescendoSpanner} (symbol)
The type of spanner to be used for crescendi. Available values are ‘hairpin’ and ‘text’. If unset, a hairpin crescendo is used.

\texttt{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):
Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, and Section 3.1.54 [Hairpin], page 443.

Section 2.2.36 [Episema_engraver], page 329
Create an Editio Vaticana-style episema line.
Music types accepted:
Section 1.2.22 [episema-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.43 [Episema], page 432.

Section 2.2.41 [Fingering_engraver], page 330
Create fingering scripts.
Music types accepted:
Section 1.2.24 [fingering-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.44 [Fingering], page 433.

Section 2.2.42 [Font_size_engraver], page 331
Put fontSize into font-size grob property.
Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.44 [Forbid_line_break_engraver], page 331
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.
Section 2.2.46 [Glissando_engraver], page 332
Engrave glissandi.

Music types accepted:
Section 1.2.26 [glissando-event], page 45,
Properties (read)

\texttt{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):
Section 3.1.50 [Glissando], page 440.

Section 2.2.47 [Grace_auto_beam_engraver], page 333
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or \texttt{noBeam} will block autobeaming, just like setting the context property 'autoBeaming' to ##f.

Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

\texttt{autoBeaming} (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.48 [Grace_beam_engraver], page 333
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:
Section 1.2.8 [beam-event], page 43,
Properties (read)

\texttt{baseMoment} (moment)
Smallest unit of time that will stand on its own as a subdivided section.

\texttt{beamMelismaBusy} (boolean)
Signal if a beam is present.

\texttt{beatStructure} (list)
List of \texttt{baseMoment}s that are combined to make beats.

\texttt{subdivideBeams} (boolean)
If set, multiple beams will be subdivided at \texttt{baseMoment} positions by only drawing one beam over the beat.
This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.49 [Grace_engraver], page 334
Set font size and other properties for grace notes.
Properties (read)

\texttt{graceSettings} (list)
Overides for grace notes. This property should be manipulated through the \texttt{add-grace-property} function.

Section 2.2.53 [Grob_pq_engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

\texttt{busyGrobs} (list)
A queue of \texttt{(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)

\texttt{busyGrobs} (list)
A queue of \texttt{(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.).

Section 2.2.57 [Instrument_switch_engraver], page 336
Create a cue text for taking instrument.
Properties (read)

\texttt{instrumentCueName} (markup)
The name to print if another instrument is to be taken.

This engraver creates the following layout object(s):
Section 3.1.58 [InstrumentSwitch], page 448.

Section 2.2.62 [Laissez_vibrer_engraver], page 338
Create laissez vibrer items.
Music types accepted:
Section 1.2.31 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.62 [LaissezVibrerTie], page 455, and Section 3.1.63 [LaissezVibrerTieColumn], page 457.

Section 2.2.64 [Ligature_bracket_engraver], page 338
Handle Ligature\_events by engraving Ligature brackets.
Music types accepted:
Section 1.2.33 [ligature-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.66 [LigatureBracket], page 460.
Section 2.2.77 [Multi_measure_rest_engraver], page 342

Engrave multi-measure rests that are produced with ‘R’. It reads \texttt{measurePosition} and \texttt{internalBarNumber} to determine what number to print over the Section 3.1.77 [MultiMeasureRest], page 472.

Music types accepted:

Section 1.2.40 [multi-measure-articulation-event], page 46, Section 1.2.41 [multi-measure-rest-event], page 46, and Section 1.2.42 [multi-measure-text-event], page 46,

Properties (read)

\begin{itemize}
\item \texttt{currentCommandColumn} (graphical (layout) object)
  
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
\item \texttt{internalBarNumber} (integer)
  
  Contains the current bar number. This property is used for internal timekeeping, among others by the \texttt{Accidental_engraver}.
\item \texttt{measurePosition} (moment)
  
  How much of the current measure have we had. This can be set manually to create incomplete measures.
\item \texttt{restNumberThreshold} (number)
  
  If a multimeasure rest has more measures than this, a number is printed.
\item \texttt{whichBar} (string)
  
  This property is read to determine what type of bar line to create.
  
  Example:
  \begin{verbatim}
  \set Staff.whichBar = ".|:"
  \end{verbatim}
  
  This will create a start-repeat bar in this staff only. Valid values are described in \texttt{scm/bar-line.scm}.
\end{itemize}

This engraver creates the following layout object(s):

Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, and Section 3.1.80 [MultiMeasureRestText], page 476.

Section 2.2.78 [New_fingering_engraver], page 343

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)

\begin{itemize}
\item \texttt{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.
\item \texttt{harmonicDots} (boolean)
  
  If set, harmonic notes in dotted chords get dots.
\end{itemize}
stringNumberOrientations (list)
  See fingeringOrientations.

strokeFingerOrientations (list)
  See fingeringOrientations.

This engraver creates the following layout object(s):
Section 3.1.44 [Fingering], page 433, Section 3.1.100 [Script], page 497,
Section 3.1.116 [StringNumber], page 512, and Section 3.1.117
[StrokeFinger], page 514.

Section 2.2.79 [Note_head_line_engraver], page 344
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):
Section 3.1.142 [VoiceFollower], page 544.

Section 2.2.80 [Note_heads_engraver], page 344
Generate note heads.
Music types accepted:
Section 1.2.44 [note-event], page 47,
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):
Section 3.1.84 [NoteHead], page 480.

Section 2.2.83 [Note_spacing_engraver], page 345
Generate NoteSpacing, an object linking horizontal lines for use in
spacing.
This engraver creates the following layout object(s):
Section 3.1.86 [NoteSpacing], page 482.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.89 [Part_combine_engraver], page 347
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’,
‘Solo II’, and ‘unisono’.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.48 [part-combine-event], page 48,

Properties (read)

\texttt{aDueText} (markup)
  
  Text to print at a unisono passage.

\texttt{partCombineTextsOnNote} (boolean)
  
  Print part-combine texts only on the next note rather than immediately on rests or skips.

\texttt{printPartCombineTexts} (boolean)
  
  Set ‘Solo’ and ‘A due’ texts in the part combiner?

\texttt{soloIIIText} (markup)
  
  The text for the start of a solo for voice ‘two’ when part-combining.

\texttt{soloText} (markup)
  
  The text for the start of a solo when part-combining.

This engraver creates the following layout object(s):

Section 3.1.30 [CombineTextScript], page 411.

\textbf{Section 2.2.90 [Percent_repeat_engraver], page 347}

Make whole measure repeats.

Music types accepted:
Section 1.2.50 [percent-event], page 48,

Properties (read)

\texttt{countPercentRepeats} (boolean)
  
  If set, produce counters for percent repeats.

\texttt{currentCommandColumn} (graphical (layout) object)
  
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\texttt{repeatCountVisibility} (procedure)
  
  A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when \texttt{countPercentRepeats} is set.

This engraver creates the following layout object(s):

Section 3.1.90 [PercentRepeat], page 486, and Section 3.1.91 [PercentRepeatCounter], page 487.

\textbf{Section 2.2.91 [Phrasing_slur_engraver], page 348}

Print phrasing slurs. Similar to Section 2.2.108 [Slur_engraver], page 353.

Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.52 [phrasing-slur-event], page 48,

This engraver creates the following layout object(s):

Section 3.1.92 [PhrasingSlur], page 488.
Section 2.2.96 [Pitched_trill_engraver], page 350
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, and Section 3.1.133 [TrillPitchHead], page 534.

Section 2.2.99 [Repeat_tie_engraver], page 351
Create repeat ties.
Music types accepted:
Section 1.2.54 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.96 [RepeatTie], page 494, and Section 3.1.97 [RepeatTieColumn], page 495.

Section 2.2.101 [Rest_engraver], page 351
Engrave rests.
Music types accepted:
Section 1.2.55 [rest-event], page 48,
Properties (read)

\[\text{middleCPosition} \ (\text{number})\]
The place of the middle C, measured in half staff-spaces. Usually determined by looking at
\[\text{middleCClefPosition} \quad \text{and} \quad \text{middleCOffset}.\]
This engraver creates the following layout object(s):
Section 3.1.98 [Rest], page 495.

Section 2.2.102 [Rhythmic_column_engraver], page 352
Generate \text{NoteColumn}, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.83 [NoteColumn], page 480.

Section 2.2.103 [Script_column_engraver], page 352
Find potentially colliding scripts and put them into a \text{ScriptColumn} object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.101 [ScriptColumn], page 498.

Section 2.2.104 [Script_engraver], page 352
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)

\[\text{scriptDefinitions} \ (\text{list})\]
The description of scripts. This is used by the \text{Script_engraver} for typesetting note-superscripts and subscripts. See \text{scm/script.scm} for more information.
This engraver creates the following layout object(s):
Section 3.1.100 [Script], page 497.
Section 2.2.107 [Slash_repeat_engraver], page 353
Make beat repeats.

Music types accepted:
Section 1.2.53 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.38 [DoubleRepeatSlash], page 425, and Section 3.1.95 [RepeatSlash], page 493.

Section 2.2.108 [Slur_engraver], page 353
Build slur grobs from slur events.

Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.59 [slur-event], page 49,
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):
Section 3.1.103 [Slur], page 498.

Section 2.2.115 [Spanner_break_forbid_engraver], page 355
Forbid breaks in certain spanners.

Section 2.2.121 [Stem_engraver], page 356
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:
Section 1.2.76 [tremolo-event], page 51, and Section 1.2.79 [tuplet-span-event], page 52,
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):
Section 3.1.46 [Flag], page 435, Section 3.1.113 [Stem], page 508,
Section 3.1.114 [StemStub], page 510, and Section 3.1.115
[StemTremolo], page 511.

Section 2.2.127 [Text_engraver], page 358
Create text scripts.
Music types accepted:
Section 1.2.72 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.126 [TextScript], page 524.

Section 2.2.128 [Text_spanner_engraver], page 359
Create text spanner from an event.
Music types accepted:
Section 1.2.73 [text-span-event], page 51,
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):
Section 3.1.127 [TextSpanner], page 526.

Section 2.2.129 [Tie_engraver], page 359
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.74 [tie-event], page 51,
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):
Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn],
page 529.

Section 2.2.134 [Trill_spanner_engraver], page 361
Create trill spanner from an event.
Music types accepted:
Section 1.2.78 [trill-span-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.).

This engraver creates the following layout object(s):
Section 3.1.134 [TrillSpanner], page 535.

**Section 2.2.135 [Tuplet_engraver], page 362**
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.79 [tuplet-span-event], page 52,
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):
Section 3.1.135 [TupletBracket], page 536, and Section 3.1.136 [Tuplet-Number], page 538.

**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.

This context creates the following layout object(s):
Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379, Section 3.1.3 [AccidentalPlacement], page 380, Section 3.1.4 [AccidentalSuggestion], page 381, Section 3.1.12 [BarLine], page 390, Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigureAlignment], page 396, Section 3.1.16 [BassFigureAlignmentPositioning], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, Section 3.1.19 [BassFigureLine], page 398, Section 3.1.26 [Clef], page 406, Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, Section 3.1.32 [CueEndClef], page 416, Section 3.1.34 [DotColumn], page 420, Section 3.1.45 [FingeringColumn], page 435, Section 3.1.57 [InstrumentName], page 447, Section 3.1.59 [KeyCancellation], page 449, Section 3.1.60 [KeySignature], page 452, Section 3.1.64 [LedgerLineSpanner], page 457, Section 3.1.82 [NoteCollision], page 479, Section 3.1.87 [OttavaBracket], page 483, Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.99 [RestCollision], page 496, Section 3.1.102 [ScriptRow], page 498, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.110 [StaffSpacing], page 506, Section 3.1.111 [StaffSymbol], page 507, Section 3.1.118 [SustainPedal], page 515,
Section 3.1.119 [SustainPedalLineSpanner], page 516, Section 3.1.137 [UnaCordaPedal], page 539, Section 3.1.138 [UnaCordaPedalLineSpanner], page 540, and Section 3.1.141 [VerticalAxisGroup], page 542.

This context sets the following properties:

- Set translator property `autoAccidentals` to:
  
  ```lisp
  '(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:
  
  ```lisp
  '((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 Section 2.1.15 [KievanVoice], page 141.

Context KievanStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.15 [KievanVoice], page 141, and Section 2.1.20 [NullVoice], page 184.

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

Section 2.2.1 [Accidental_engraver], page 313

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 bar number. 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):

Section 2.2.5 [Axis_group_engraver], page 316
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):

Section 3.1.141 [VerticalAxisGroup], page 542.
Section 2.2.7 [Bar_engraver], page 317
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):
Section 3.1.12 [BarLine], page 390.

Section 2.2.17 [Clef_engraver], page 321
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):
Section 3.1.26 [Clef], page 406, and Section 3.1.27 [ClefModifier], page 409.
Section 2.2.19 [Collision_ engraver], page 322
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):
Section 3.1.82 [NoteCollision], page 479.

Section 2.2.24 [Cue_clef_ engraver], page 324
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):
Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, and Section 3.1.32 [CueEndClef], page 416.

Section 2.2.27 [Dot_column_ engraver], page 325
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):
Section 3.1.34 [DotColumn], page 420.

Section 2.2.38 [Figured_bass_ engraver], page 329
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.55 [rest-event], page 48,
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):
Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigure-Alignment], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, and Section 3.1.19 [BassFigureLine], page 398.

Section 2.2.39 [Figured_bass_position_engraver], page 330
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
Section 3.1.16 [BassFigureAlignmentPositioning], page 396.

Section 2.2.40 [Fingering_column_engraver], page 330
Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.45 [FingeringColumn], page 435.

Section 2.2.42 [Font_size_engraver], page 331
Put fontSize into font-size grob property.
Properties (read)

**fontSize** (number)
The relative size of all grobs in a context.

Section 2.2.53 [Grob_pq_engraver], page 334
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.).

Section 2.2.56 [Instrument_name_engraver], page 335
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):

Section 3.1.57 [InstrumentName], page 447.

Section 2.2.59 [Key_engraver], page 336
Engrave a key signature.

Music types accepted:
Section 1.2.29 [key-change-event], page 45,

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):
Section 3.1.59 [KeyCancellation], page 449, and Section 3.1.60 [KeySignature], page 452.

Section 2.2.63 [Ledger_line_engraver], page 338
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):
Section 3.1.64 [LedgerLineSpanner], page 457.

Section 2.2.73 [Merge_mmrest_numbers_engraver], page 341
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.

Section 2.2.84 [Ottava_spanner_ engraver], page 345
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):
Section 3.1.87 [OttavaBracket], page 483.

Section 2.2.85 [Output_property_ engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.92 [Piano_pedal_align_ engraver], page 348
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):
Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.119 [SustainPedalLineSpanner], page 516, and Section 3.1.138 [UnaCordaPedalLineSpanner], page 540.

Section 2.2.93 [Piano_pedal_ engraver], page 348
Engrave piano pedal symbols and brackets.
Music types accepted:
Section 1.2.62 [sostenuto-event], page 49, Section 1.2.70 [sustain-event], page 51, and Section 1.2.80 [una-corda-event], page 52,

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):
Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.118 [SustainPedal], page 515, and Section 3.1.137 [UnaCordaPedal], page 539.

Section 2.2.97 [Pure_from_neighbor_engraver], page 350
  Coordinates items that get their pure heights from their neighbors.

Section 2.2.100 [Rest_collision_engraver], page 351
  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):
Section 3.1.99 [RestCollision], page 496.

Section 2.2.105 [Script_row_engraver], page 352
  Determine order in horizontal side position elements.

This engraver creates the following layout object(s):
Section 3.1.102 [ScriptRow], page 498.

Section 2.2.106 [Separating_line_group_engraver], page 353
  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):
Section 3.1.110 [StaffSpacing], page 506.

Section 2.2.116 [Staff_collecting_engraver], page 355
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.

Section 2.2.118 [Staff_symbol_engraver], page 355
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.66 [staff-span-event], page 50,
This engraver creates the following layout object(s):
Section 3.1.111 [StaffSymbol], page 507.

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.

This context creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 387, Section 3.1.20 [Beam], page 399, Section 3.1.21
[BendAfter], page 401, Section 3.1.24 [BreathingSign], page 403, Section 3.1.28 [ClusterSpanner], page 411, Section 3.1.29 [ClusterSpannerBeacon], page 411, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.35 [Dots], page 421, Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.40 [DynamicLineSpanner], page 427, Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, Section 3.1.44 [Fingering], page 433, Section 3.1.46 [Flag], page 435, Section 3.1.50 [Glissando], page 440, Section 3.1.54 [Hairpin], page 443, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.61 [KievanLigature], page 455, Section 3.1.62 [LaissezVibrerTie], page 455, Section 3.1.63 [LaissezVibrerTieColumn], page 457, Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, Section 3.1.80 [MultiMeasureRestText], page 476, Section 3.1.83 [NoteColumn], page 480, Section 3.1.84 [NoteHead], page 480, Section 3.1.86 [NoteSpacing], page 482, Section 3.1.90 [PercentRepeat], page 486, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.92 [PhrasingSlur], page 488, Section 3.1.95 [RepeatSlash], page 493, Section 3.1.96 [RepeatTie], page 494, Section 3.1.97 [RepeatTieColumn], page 495, Section 3.1.98 [Rest], page 495, Section 3.1.100 [Script], page 497, Section 3.1.101 [ScriptColumn], page 498, Section 3.1.103 [Slur], page 498, Section 3.1.113 [Stem], page 508, Section 3.1.114 [StemStub], page 510, Section 3.1.115 [StemTremolo], page 511, Section 3.1.116 [StringNumber], page 512, Section 3.1.117 [StrokeFinger], page 514, Section 3.1.126 [TextScript], page 524, Section 3.1.127 [TextSpanner], page 526, Section 3.1.128 [Tie], page 527, Section 3.1.129 [TieColumn], page 529, Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, Section 3.1.133 [TrillPitchHead], page 534, Section 3.1.134 [TrillSpanner], page 535, Section 3.1.135 [TupletBracket], page 536, Section 3.1.136 [TupletNumber], page 538, and Section 3.1.142 [VoiceFollower], page 544.
This context sets the following properties:

- Set grob-property `duration-log` in Section 3.1.84 [NoteHead], page 480, to `note-head::calc-kievan-duration-log`.
- Set grob-property `glyph-name-alist` in Section 3.1.1 [Accidental], page 378, to:
  ```lisp
  '((-1/2 . "accidentals.kievanM1")
   (1/2 . "accidentals.kievan1"))
  ```
- Set grob-property `length` in Section 3.1.113 [Stem], page 508, to 0.0.
- Set grob-property `positions` in Section 3.1.20 [Beam], page 399, to `beam::get-kievan-positions`.
- Set grob-property `quantized-positions` in Section 3.1.20 [Beam], page 399, to `beam::get-kievan-quantized-positions`.
- Set grob-property `stencil` in Section 3.1.46 [Flag], page 435, to `#f`.
- Set grob-property `stencil` in Section 3.1.103 [Slur], page 498, to `#f`.
- Set grob-property `stencil` in Section 3.1.113 [Stem], page 508, to `#f`.
- Set grob-property `style` in Section 3.1.35 [Dots], page 421, to `'kievan`.
- Set grob-property `style` in Section 3.1.84 [NoteHead], page 480, to `'kievan`.
- Set grob-property `style` in Section 3.1.98 [Rest], page 495, to `'mensural`.
- Set grob-property `X-offset` in Section 3.1.113 [Stem], page 508, 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):

**Section 2.2.3 [Arpeggio_engraver], page 315**

Generate an Arpeggio symbol.

Music types accepted:

Section 1.2.5 [arpeggio-event], page 42,
This engraver creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 387.

**Section 2.2.4 [Auto_beam_engraver], page 315**

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 2.2.121 [Stem_engraver], page 356, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted:

Section 1.2.9 [beam-forbid-event], page 43,
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 list 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):
Section 3.1.20 [Beam], page 399.

Section 2.2.10 [Beam_engraver], page 319
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
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 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.

Properties (write)
   forbidBreak (boolean)
      If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.12 [Bend_engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.21 [BendAfter], page 401.
Section 2.2.14 [Breathing_sign_engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.24 [BreathingSign], page 403.

Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.77 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.18 [Cluster_spanner_engraver], page 322
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.28 [ClusterSpanner], page 411, and Section 3.1.29 [ClusterSpannerBeacon], page 411.

Section 2.2.28 [Dots_engraver], page 326
Create Section 3.1.35 [Dots], page 421, objects for Section 3.2.100 [rhythmic-head-interface], page 606s.
This engraver creates the following layout object(s):
Section 3.1.35 [Dots], page 421.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
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):
Section 3.1.36 [DoublePercentRepeat], page 422, and Section 3.1.37 [DoublePercentRepeatCounter], page 423.
Section 2.2.33 [Dynamic_align_engraver], page 327
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):
Section 3.1.40 [DynamicLineSpanner], page 427.

Section 2.2.34 [Dynamic_engraver], page 328
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 43, and Section 1.2.64 [span-dynamic-event], page 49,

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):
Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, and Section 3.1.54 [Hairpin], page 443.

Section 2.2.41 [Fingering_engraver], page 330
Create fingering scripts.

Music types accepted:
Section 1.2.24 [fingering-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.44 [Fingering], page 433.

Section 2.2.42 [Font_size_engraver], page 331
Put `fontSize` into `font-size` grob property.
Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

Section 2.2.44 [Forbid_line_break_engraver], page 331

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.

Section 2.2.46 [Glissando_engraver], page 332

Engrave glissandi.

Music types accepted:

Section 1.2.26 [glissando-event], page 45,

Properties (read)

`glissandoMap` (list)

A map in the form of `''((source1 . target1)
(source2 . target2) (source . 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):

Section 3.1.50 [Glissando], page 440.

Section 2.2.47 [Grace_auto_beam_engraver], page 333

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:

Section 1.2.9 [beam-forbid-event], page 43,

Properties (read)

`autoBeaming` (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s):

Section 3.1.20 [Beam], page 399.

Section 2.2.48 [Grace_beam_engraver], page 333

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:
Section 1.2.8 [beam-event], page 43,
Properties (read)

```plaintext
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 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):
Section 3.1.20 [Beam], page 399.

**Section 2.2.49 [Grace_engraver], page 334**
Set font size and other properties for grace notes.
Properties (read)

```plaintext
graceSettings (list)
  Overrides for grace notes. This property should be manipulated through the add-grace-property function.
```

**Section 2.2.53 [Grob_pq_engraver], page 334**
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

```plaintext
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)

```plaintext
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.).
```

**Section 2.2.57 [Instrument_switch_engraver], page 336**
Create a cue text for taking instrument.
Properties (read)

```plaintext
instrumentCueName (markup)
  The name to print if another instrument is to be taken.
```
This engraver creates the following layout object(s):
Section 3.1.58 [InstrumentSwitch], page 448.

Section 2.2.61 [Kievan_ligature_engraver], page 338
Handle Kievan_ligature_events by glueing Kievan heads together.
Music types accepted:
Section 1.2.33 [ligature-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.61 [KievanLigature], page 455.

Section 2.2.62 [Laissez_vibrer_engraver], page 338
Create laissez vibrer items.
Music types accepted:
Section 1.2.31 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.62 [LaissezVibrerTie], page 455, and Section 3.1.63 [LaissezVibrerTieColumn], page 457.

Section 2.2.77 [Multi_measure_rest_engraver], page 342
Engrave multi-measure rests that are produced with ‘R’. It reads measurePosition and internalBarNumber to determine what number to print over the Section 3.1.77 [MultiMeasureRest], page 472.
Music types accepted:
Section 1.2.40 [multi-measure-articulation-event], page 46,
Section 1.2.41 [multi-measure-rest-event], page 46, and Section 1.2.42 [multi-measure-text-event], page 46,
Properties (read)

\texttt{currentCommandColumn} (graphical (layout) object)
\begin{itemize}
\item Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
\end{itemize}

\texttt{internalBarNumber} (integer)
\begin{itemize}
\item Contains the current bar number. This property is used for internal timekeeping, among others by the \texttt{Accidental_engraver}.
\end{itemize}

\texttt{measurePosition} (moment)
\begin{itemize}
\item How much of the current measure have we had. This can be set manually to create incomplete measures.
\end{itemize}

\texttt{restNumberThreshold} (number)
\begin{itemize}
\item If a multimeasure rest has more measures than this, a number is printed.
\end{itemize}

\texttt{whichBar} (string)
\begin{itemize}
\item This property is read to determine what type of bar line to create.
\item Example:
\begin{verbatim}
\set Staff.whichBar = ".|:
\end{verbatim}
\end{itemize}
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):
Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, and Section 3.1.80 [MultiMeasureRestText], page 476.

**Section 2.2.78 [New_fingering_engraver], page 343**
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):
Section 3.1.44 [Fingering], page 433, Section 3.1.100 [Script], page 497, Section 3.1.116 [StringNumber], page 512, and Section 3.1.117 [StrokeFinger], page 514.

**Section 2.2.79 [Note_head_line_engraver], page 344**
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):
Section 3.1.142 [VoiceFollower], page 544.

**Section 2.2.80 [Note_heads_engraver], page 344**
Generate note heads.

Music types accepted:
Section 1.2.44 [note-event], page 47,

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):
Section 3.1.84 [NoteHead], page 480.

Section 2.2.83 [Note_spacing_engraver], page 345
Generate NoteSpacing, an object linking horizontal lines for use in spacing.
This engraver creates the following layout object(s):
Section 3.1.86 [NoteSpacing], page 482.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.89 [Part_combine_engraver], page 347
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.48 [part-combine-event], page 48,
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):
Section 3.1.30 [CombineTextScript], page 411.

Section 2.2.90 [Percent_repeat_engraver], page 347
Make whole measure repeats.
Music types accepted:
Section 1.2.50 [percent-event], page 48,
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):

Section 3.1.90 [PercentRepeat], page 486, and Section 3.1.91 [PercentRepeatCounter], page 487.

Section 2.2.91 [Phrasing_slur_engraver], page 348
Print phrasing slurs. Similar to Section 2.2.108 [Slur_engraver], page 353.

Music types accepted:

Section 1.2.44 [note-event], page 47, and Section 1.2.52 [phrasing-slur-event], page 48,

This engraver creates the following layout object(s):

Section 3.1.92 [PhrasingSlur], page 488.

Section 2.2.96 [Pitched_trill_engraver], page 350
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s):

Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, and Section 3.1.133 [TrillPitchHead], page 534.

Section 2.2.99 [Repeat_tie_engraver], page 351
Create repeat ties.

Music types accepted:

Section 1.2.54 [repeat-tie-event], page 48,

This engraver creates the following layout object(s):

Section 3.1.96 [RepeatTie], page 494, and Section 3.1.97 [RepeatTieColumn], page 495.

Section 2.2.101 [Rest_engraver], page 351
Engrave rests.

Music types accepted:

Section 1.2.55 [rest-event], page 48,

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):

Section 3.1.98 [Rest], page 495.
Section 2.2.102 [Rhythmic_column_engraver], page 352
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.83 [NoteColumn], page 480.

Section 2.2.103 [Script_column_engraver], page 352
Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.101 [ScriptColumn], page 498.

Section 2.2.104 [Script_engraver], page 352
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
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):
Section 3.1.100 [Script], page 497.

Section 2.2.107 [Slash_repeat_engraver], page 353
Make beat repeats.
Music types accepted:
Section 1.2.53 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.38 [DoubleRepeatSlash], page 425, and Section 3.1.95 [RepeatSlash], page 493.

Section 2.2.108 [Slur_engraver], page 353
Build slur grobs from slur events.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.59 [slur-event], page 49,
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):
Section 3.1.103 [Slur], page 498.

Section 2.2.115 [Spanner_break_forbid_engraver], page 355
Forbid breaks in certain spanners.
Section 2.2.121 [Stem_engraver], page 356
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.
Music types accepted:
Section 1.2.76 [tremolo-event], page 51, and Section 1.2.79 [tuplet-span-event], page 52,
Properties (read)

\texttt{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.

\texttt{stemRightBeamCount} (integer)
See \texttt{stemLeftBeamCount}.

\texttt{whichBar} (string)
This property is read to determine what type of bar line to create.
Example:

\texttt{\set Staff\whichBar = ".|:"}
This will create a start-repeat bar in this staff only. Valid values are described in \texttt{scm/bar-line.scm}.

This engraver creates the following layout object(s):
Section 3.1.46 [Flag], page 435, Section 3.1.113 [Stem], page 508, Section 3.1.114 [StemStub], page 510, and Section 3.1.115 [StemTremolo], page 511.

Section 2.2.127 [Text_engraver], page 358
Create text scripts.
Music types accepted:
Section 1.2.72 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.126 [TextScript], page 524.

Section 2.2.128 [Text_spanner_engraver], page 359
Create text spanner from an event.
Music types accepted:
Section 1.2.73 [text-span-event], page 51,
Properties (read)

\texttt{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):
Section 3.1.127 [TextSpanner], page 526.

Section 2.2.129 [Tie_engraver], page 359
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.74 [tie-event], page 51,
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):
Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn],
page 529.

Section 2.2.134 [Trill_spanner_engraver], page 361
Create trill spanner from an event.
Music types accepted:
Section 1.2.78 [trill-span-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.).

This engraver creates the following layout object(s):
Section 3.1.134 [TrillSpanner], page 535.

Section 2.2.135 [Tuplet_engraver], page 362
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.79 [tuplet-span-event], page 52,
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.
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):
Section 3.1.57 [InstrumentName], page 447, Section 3.1.67 [LyricExtender], page 461, Section 3.1.68 [LyricHyphen], page 462, Section 3.1.69 [LyricSpace], page 463, Section 3.1.70 [LyricText], page 463, Section 3.1.112 [StanzaNumber], page 507, Section 3.1.141 [VerticalAxisGroup], page 542, and Section 3.1.145 [VowelTransition], page 548.

This context sets the following properties:

- Set grob-property bar-extent in Section 3.1.12 [BarLine], page 390, to: '(-0.05 . 0.05)
- Set grob-property font-size in Section 3.1.57 [InstrumentName], page 447, to 1.0.
- Set grob-property nonstaff-nonstaff-spacing in Section 3.1.141 [VerticalAxisGroup], page 542, to:
  '((basic-distance . 0)
   (minimum-distance . 2.8)
   (padding . 0.2)
   (stretchability . 0))
- Set grob-property nonstaff-relatedstaff-spacing in Section 3.1.141 [VerticalAxisGroup], page 542, to:
  '((basic-distance . 5.5)
   (padding . 0.5)
   (stretchability . 1))
- Set grob-property nonstaff-unrelatedstaff-spacing.padding in Section 3.1.141 [VerticalAxisGroup], page 542, to 1.5.
- Set grob-property remove-empty in Section 3.1.141 [VerticalAxisGroup], page 542, to #t.
- Set grob-property remove-first in Section 3.1.141 [VerticalAxisGroup], page 542, to #t.
- Set grob-property self-alignment-Y in Section 3.1.57 [InstrumentName], page 447, to #f.
- Set grob-property staff-affinity in Section 3.1.141 [VerticalAxisGroup], page 542, to 1.
- Set translator property instrumentName to '().
- Set translator property searchForVoice to #f.
- Set translator property shortInstrumentName to '().
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):
Section 3.1.141 [VerticalAxisGroup], page 542.

Section 2.2.37 [Extender_ engraver], page 329
Create lyric extenders.
Music types accepted:
Section 1.2.16 [completize-extender-event], page 44, and Section 1.2.23 [extender-event], page 44,
Properties (read)

extendsOverRests (boolean)
Whether to continue extenders as they cross a rest.

This engraver creates the following layout object(s):
Section 3.1.67 [LyricExtender], page 461.

Section 2.2.42 [Font_size_ engraver], page 331
Put fontSize into font-size grob property.
Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.55 [Hyphen_ engraver], page 335
Create lyric hyphens, vowel transitions and distance constraints between words.
Music types accepted:
Section 1.2.28 [hyphen-event], page 45, and Section 1.2.82 [vowel-transition-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.68 [LyricHyphen], page 462, Section 3.1.69 [LyricSpace], page 463, and Section 3.1.145 [VowelTransition], page 548.

Section 2.2.56 [Instrument_name_ engraver], page 335
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.

tvocalName (markup)
Name of a vocal line.

This engraver creates the following layout object(s):
Section 3.1.57 [InstrumentName], page 447.

Section 2.2.65 [Lyric_engraver], page 338
Engrave text for lyrics.
Music types accepted:
Section 1.2.35 [lyric-event], page 46,
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):
Section 3.1.70 [LyricText], page 463.

Section 2.2.97 [Pure_from_neighbor_engraver], page 350
Coordinates items that get their pure heights from their neighbors.

Section 2.2.120 [Stanza_number_engraver], page 356
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):
Section 3.1.112 [StanzaNumber], page 507.

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.

This context creates the following layout object(s):

Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379, Section 3.1.3 [AccidentalPlacement], page 380, Section 3.1.4 [AccidentalSuggestion], page 381, Section 3.1.12 [BarLine], page 390, Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigureAlignment], page 396, Section 3.1.16 [BassFigureAlignmentPositioning], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, Section 3.1.19 [BassFigureLine], page 398, Section 3.1.26 [Clef], page 406, Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, Section 3.1.32 [CueEndClef], page 416, Section 3.1.33 [Custos], page 419, Section 3.1.34 [DotColumn], page 420, Section 3.1.45 [FingeringColumn], page 435, Section 3.1.57 [InstrumentName], page 447, Section 3.1.59 [KeyCancellation], page 449, Section 3.1.60 [KeySignature], page 452, Section 3.1.64 [LedgerLineSpanner], page 457, Section 3.1.82 [NoteCollision], page 479, Section 3.1.87 [OttavaBracket], page 483, Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.99 [RestCollision], page 496, Section 3.1.102 [ScriptRow], page 498, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.110 [StaffSpacing], page 506, Section 3.1.111 [StaffSymbol], page 507, Section 3.1.118 [SustainPedal], page 515, Section 3.1.119 [SustainPedalLineSpanner], page 516, Section 3.1.130 [TimeSignature], page 529, Section 3.1.137 [UnaCordaPedal], page 539, Section 3.1.138 [UnaCordaPedalLineSpanner], page 540, and Section 3.1.141 [VerticalAxisGroup], page 542.

This context sets the following properties:

- Set grob-property `glyph-name-alist` in Section 3.1.4 [AccidentalSuggestion], page 381, to:
  
  `((-1/2 . "accidentals.mensuralM1")
   (0 . "accidentals.vaticana0")
   (1/2 . "accidentals.mensural1"))`

- Set grob-property `glyph-name-alist` in Section 3.1.1 [Accidental], page 378, to:
  
  `((-1/2 . "accidentals.mensuralM1")
   (0 . "accidentals.vaticana0")
   (1/2 . "accidentals.mensural1"))`

- Set grob-property `glyph-name-alist` in Section 3.1.60 [KeySignature], page 452, to:

  `((-1/2 . "accidentals.mensuralM1")
   (0 . "accidentals.vaticana0")
   (1/2 . "accidentals.mensural1"))`

- Set grob-property `neutral-direction` in Section 3.1.33 [Custos], page 419, to `-1`.

- Set grob-property `neutral-position` in Section 3.1.33 [Custos], page 419, to `3`.

- Set grob-property `style` in Section 3.1.33 [Custos], page 419, to `'mensural`.

- Set grob-property `style` in Section 3.1.130 [TimeSignature], page 529, to `'mensural`.

- Set grob-property `thickness` in Section 3.1.130 [TimeSignature], page 529, 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 `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 Section 2.1.18 [MensuralVoice], page 169.

Context MensuralStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.18 [MensuralVoice], page 169, and Section 2.1.20 [NullVoice], page 184.

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

Section 2.2.1 [Accidental_engraver], page 313
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.

`s 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 \((\text{octave} \ . \ 	ext{name}) \ . (\text{alter \ barnumber} \ . \ 	ext{measureposition})\) pairs.

Properties (write)

\text{localAlterations} \ (\text{list})
\begin{itemize}
  \item The key signature at this point in the measure.
  \item The format is the same as for \text{keyAlterations},
  but can also contain \((\text{octave} \ . \ 	ext{name}) \ . (\text{alter \ barnumber} \ . \ 	ext{measureposition})\) pairs.
\end{itemize}

This engraver creates the following layout object(s):

Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379, Section 3.1.3 [AccidentalPlacement], page 380, and Section 3.1.4 [AccidentalSuggestion], page 381.

Section 2.2.5 [Axis\_group\_engraver], page 316

Group all objects created in this context in a \text{VerticalAxisGroup} spanner.

Properties (read)

\text{currentCommandColumn} \ (\text{graphical \ (layout) \ object})
\begin{itemize}
  \item Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
\end{itemize}

\text{hasAxisGroup} \ (\text{boolean})
\begin{itemize}
  \item True if the current context is contained in an axis group.
\end{itemize}

\text{keepAliveInterfaces} \ (\text{list})
\begin{itemize}
  \item A list of symbols, signifying grob interfaces that are worth keeping a staff with \text{remove-empty} set around for.
\end{itemize}

Properties (write)

\text{hasAxisGroup} \ (\text{boolean})
\begin{itemize}
  \item True if the current context is contained in an axis group.
\end{itemize}

This engraver creates the following layout object(s):

Section 3.1.141 [VerticalAxisGroup], page 542.

Section 2.2.7 [Bar\_engraver], page 317

Create barlines. This engraver is controlled through the \text{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)

\text{whichBar} \ (\text{string})
\begin{itemize}
  \item This property is read to determine what type of bar line to create.
  \item Example:
    \begin{verbatim}
    \set Staff.whichBar = ".|:
    \end{verbatim}
\end{itemize}
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):

Section 3.1.12 [BarLine], page 390.

Section 2.2.17 [Clef_engraver], page 321
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):

Section 3.1.26 [Clef], page 406, and Section 3.1.27 [ClefModifier], page 409.

Section 2.2.19 [Collision_engraver], page 322
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):

Section 3.1.82 [NoteCollision], page 479.

Section 2.2.24 [Cue_clef_engraver], page 324
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):
Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, and Section 3.1.32 [CueEndClef], page 416.

**Section 2.2.25 [Custos_engraver], page 324**
Engrave custodes.
This engraver creates the following layout object(s):
Section 3.1.33 [Custos], page 419.

**Section 2.2.27 [Dot_column_engraver], page 325**
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):
Section 3.1.34 [DotColumn], page 420.

**Section 2.2.38 [Figured_bass_engraver], page 329**
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.55 [rest-event], page 48,
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):
Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigureAlignment], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, and Section 3.1.19 [BassFigureLine], page 398.

Section 2.2.39 [Figured_bass_position_engraver], page 330
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
Section 3.1.16 [BassFigureAlignmentPositioning], page 396.

Section 2.2.40 [Fingering_column_engraver], page 330
Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.45 [FingeringColumn], page 435.

Section 2.2.42 [Font_size_engraver], page 331
Put fontSize into font-size grob property.
Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.53 [Grob_pq_engraver], page 334
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.).

Section 2.2.56 [Instrument_name_engraver], page 335
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):

Section 3.1.57 [InstrumentName], page 447.

Section 2.2.59 [Key_engraver], page 336
Engrave a key signature.

Music types accepted:
Section 1.2.29 [key-change-event], page 45,
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 \textit{alter} a fraction, denoting alteration. For alterations, use symbols, e.g.
\texttt{keyAlterations = \#\((6 \,, \text{FLAT})\)).

\textbf{lastKeyAlterations (list)}

Last key signature before a key signature change.

\textbf{middleCClefPosition (number)}

The position of the middle C, as determined only by the clef. This can be calculated by looking at \texttt{clefPosition} and \texttt{clefGlyph}.

\textbf{printKeyCancellation (boolean)}

Print restoration alterations before a key signature change.

\textbf{Properties (write)}

\texttt{keyAlterations (list)}

The current key signature. This is an alist containing \texttt{(step . alter)} or \texttt{(octave . step . alter)}, where \texttt{step} is a number in the range 0 to 6 and \texttt{alter} a fraction, denoting alteration. For alterations, use symbols, e.g.
\texttt{keyAlterations = \#\((6 \,, \text{FLAT})\)).

\textbf{lastKeyAlterations (list)}

Last key signature before a key signature change.

\textbf{tonic (pitch)}

The tonic of the current scale.

This engraver creates the following layout object(s):
- Section 3.1.59 [KeyCancellation], page 449, and Section 3.1.60 [KeySignature], page 452.

\textbf{Section 2.2.63 [Ledger_line_engraver], page 338}

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):
- Section 3.1.64 [LedgerLineSpanner], page 457.

\textbf{Section 2.2.73 [Merge_mmrest_numbers_engraver], page 341}

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.

\textbf{Section 2.2.84 [Ottava_spanner_engraver], page 345}

Create a text spanner when the ottavation property changes.

\textbf{Properties (read)}

\texttt{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):
Section 3.1.87 [OttavaBracket], page 483.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.92 [Piano_pedal_align_engraver], page 348
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):
Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.119
[SustainPedalLineSpanner], page 516, and Section 3.1.138 [UnaCordaPedalLineSpanner], page 540.

Section 2.2.93 [Piano_pedal_engraver], page 348
Engrave piano pedal symbols and brackets.
Music types accepted:
Section 1.2.62 [sostenuto-event], page 49, Section 1.2.70 [sustain-event],
page 51, and Section 1.2.80 [una-corda-event], page 52,
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):
Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.118 [SustainPedal], page 515, and Section 3.1.137 [UnaCordaPedal], page 539.

Section 2.2.97 [Pure_from_neighbor_engraver], page 350
Coordinates items that get their pure heights from their neighbors.

Section 2.2.100 [Rest_collision_engraver], page 351
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):
Section 3.1.99 [RestCollision], page 496.

Section 2.2.105 [Script_row_engraver], page 352
Determine order in horizontal side position elements.
This engraver creates the following layout object(s):
Section 3.1.102 [ScriptRow], page 498.

Section 2.2.106 [Separating_line_group_engraver], page 353
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):
Section 3.1.110 [StaffSpacing], page 506.

Section 2.2.116 [Staff_collecting_engraver], page 355
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.
Section 2.2.118 [Staff_symbol_engraver], page 355

Create the constellation of five (default) staff lines.

Music types accepted:
Section 1.2.66 [staff-span-event], page 50,
This engraver creates the following layout object(s):
Section 3.1.111 [StaffSymbol], page 507.

Section 2.2.131 [Time_signature_engraver], page 360

Create a Section 3.1.130 [TimeSignature], page 529, whenever
\( \text{timeSignatureFraction} \) changes.

Music types accepted:
Section 1.2.75 [time-signature-event], page 51,
Properties (read)

\( \text{initialTimeSignatureVisibility} \) (vector)
break visibility for the initial time signature.

\( \text{partialBusy} \) (boolean)
Signal that \( \text{partial} \) acts at the current timestep.

\( \text{timeSignatureFraction} \) (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):
Section 3.1.130 [TimeSignature], page 529.

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.

This context creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 387, Section 3.1.20 [Beam], page 399, Section 3.1.21 [BendAfter], page 401, Section 3.1.24 [BreathingSign], page 403, Section 3.1.28 [ClusterSpanner], page 411, Section 3.1.29 [ClusterSpannerBeacon], page 411, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.35 [Dots], page 421, Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.40 [DynamicLineSpanner], page 427, Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, Section 3.1.44 [Fingering], page 433, Section 3.1.46 [Flag], page 435, Section 3.1.50 [Glissando], page 440, Section 3.1.54 [Hairpin], page 443, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.62 [LaissezVibrerTie], page 455, Section 3.1.63 [LaissezVibrerTieColumn], page 457, Section 3.1.75 [MensuralLigature], page 469, Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, Section 3.1.80 [MultiMeasureRestText], page 476, Section 3.1.83 [NoteColumn], page 480, Section 3.1.84 [NoteHead], page 480, Section 3.1.86 [NoteSpacing], page 482, Section 3.1.90 [PercentRepeat], page 486, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.92 [PhrasingSlur], page 488, Section 3.1.95 [RepeatSlash], page 493, Section 3.1.96 [RepeatTie], page 494, Section 3.1.97 [RepeatTieColumn], page 495, Section 3.1.98 [Rest], page 495, Section 3.1.100 [Script], page 497, Section 3.1.101 [ScriptColumn], page 498, Section 3.1.113
This context sets the following properties:

- Set grob-property **style** in Section 3.1.46 [Flag], page 435, to `'mensural`.
- Set grob-property **style** in Section 3.1.84 [NoteHead], page 480, to `'mensural`.
- Set grob-property **style** in Section 3.1.98 [Rest], page 495, 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):

**Section 2.2.3 [Arpeggio_engraver], page 315**

Generate an Arpeggio symbol.

Music types accepted:
Section 1.2.5 [arpeggio-event], page 42,

This engraver creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 387.

**Section 2.2.4 [Auto_beam_engraver], page 315**

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 2.2.121 [Stem_engraver], page 356, properties **stemLeftBeamCount** and **stemRightBeamCount**.

Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,

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):
Section 3.1.20 [Beam], page 399.

Section 2.2.10 [Beam_engraver], page 319
Handle Beam events by engraving beams. If omitted, then notes are
printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,

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 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):
Section 3.1.20 [Beam], page 399.

Section 2.2.12 [Bend_engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.21 [BendAfter], page 401.

Section 2.2.14 [Breathing_sign_engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.24 [BreathingSign], page 403.

Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.77 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.18 [Cluster_spanner_engraver], page 322
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.20 [ClusterSpanner], page 411, and Section 3.1.29 [ClusterSpannerBeacon], page 411.

Section 2.2.28 [Dots_engraver], page 326
Create Section 3.1.35 [Dots], page 421, objects for Section 3.2.100 [rhythmic-head-interface], page 606s.
This engraver creates the following layout object(s):
Section 3.1.35 [Dots], page 421.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
Properties (read)

\begin{itemize}
\item \texttt{countPercentRepeats} (boolean)
  If set, produce counters for percent repeats.
\item \texttt{measureLength} (moment)
  Length of one measure in the current time signature.
\item \texttt{repeatCountVisibility} (procedure)
  A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when \texttt{countPercentRepeats} is set.
\end{itemize}

Properties (write)

\begin{itemize}
\item \texttt{forbidBreak} (boolean)
  If set to \#t, prevent a line break at this point.
\end{itemize}

This engraver creates the following layout object(s):
Section 3.1.36 [DoublePercentRepeat], page 422, and Section 3.1.37 [DoublePercentRepeatCounter], page 423.

Section 2.2.33 [Dynamic_align_engraver], page 327
Align hairpins and dynamic texts on a horizontal line.
Properties (read)

\begin{itemize}
\item \texttt{currentMusicalColumn} (graphical (layout) object)
  Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
\end{itemize}
This engraver creates the following layout object(s):
Section 3.1.40 [DynamicLineSpanner], page 427.

Section 2.2.34 [Dynamic_engraver], page 328
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 43, and Section 1.2.64 [span-dynamic-event], page 49,
Properties (read)

\texttt{crescendoSpanner} (symbol)
The type of spanner to be used for crescendi. Available values are ‘hairpin’ and ‘text’. If unset, a hairpin crescendo is used.

\texttt{crescendoText} (markup)
The text to print at start of non-hairpin crescendo, i.e., ‘cresc.’.

\texttt{currentMusicalColumn} (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

\texttt{decrescendoSpanner} (symbol)
The type of spanner to be used for decrescendi. Available values are ‘hairpin’ and ‘text’. If unset, a hairpin decrescendo is used.

\texttt{decrescendoText} (markup)
The text to print at start of non-hairpin decrescendo, i.e., ‘dim.’.

This engraver creates the following layout object(s):
Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, and Section 3.1.54 [Hairpin], page 443.

Section 2.2.41 [Fingering_engraver], page 330
Create fingering scripts.
Music types accepted:
Section 1.2.24 [fingering-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.44 [Fingering], page 433.

Section 2.2.42 [Font_size_engraver], page 331
Put \texttt{fontSize} into \texttt{font-size} grob property.
Properties (read)

\texttt{fontSize} (number)
The relative size of all grobs in a context.

Section 2.2.44 [Forbid_line_break_engraver], page 331
Forbid line breaks when note heads are still playing at some point.
Properties (read)

**busyGrobs** (list)
A queue of \((\text{end-moment . grob})\) 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.

Section 2.2.46 [Glissando_engraver], page 332
Engrave glissandi.
Music types accepted:
Section 1.2.26 [glissando-event], page 45,

Properties (read)

**glissandoMap** (list)
A map in the form of \'(\{(source1 . target1) (source2 . target2) (source\_n . target\_n)\}\) 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):
Section 3.1.50 [Glissando], page 440.

Section 2.2.47 [Grace_auto_beam_engraver], page 333
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:
Section 1.2.9 [beam-forbid-event], page 43,

Properties (read)

**autoBeaming** (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.48 [Grace_beam_engraver], page 333
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only enranges beams when we are at grace points in time.
Music types accepted:
Section 1.2.8 [beam-event], page 43,

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 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):
Section 3.1.20 [Beam], page 399.

Section 2.2.49 [Grace_engraver], page 334
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.

Section 2.2.53 [Grob_pq_engraver], page 334
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.).

Section 2.2.57 [Instrument_switch_engraver], page 336
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):
Section 3.1.58 [InstrumentSwitch], page 448.

Section 2.2.62 [Laissez_vibrer_engraver], page 338
Create laissez vibrer items.
Music types accepted:
Section 1.2.31 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s): Section 3.1.62 [LaissezVibrerTie], page 455, and Section 3.1.63 [LaissezVibrerTieColumn], page 457.

Section 2.2.72 [Mensural_ligature_engraver], page 341
Handle Mensural_ligature_events by gluing special ligature heads together.
Music types accepted:
Section 1.2.33 [ligature-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.75 [MensuralLigature], page 469.

Section 2.2.77 [Multi_measure_rest_engraver], page 342
Engrave multi-measure rests that are produced with ‘R’. It reads measurePosition and internalBarNumber to determine what number to print over the Section 3.1.77 [MultiMeasureRest], page 472.
Music types accepted:
Section 1.2.40 [multi-measure-articulation-event], page 46, Section 1.2.41 [multi-measure-rest-event], page 46, and Section 1.2.42 [multi-measure-text-event], page 46,
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.

measurePosition (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

restNumberThreshold (number)
If a multimeasure rest has more measures than this, a number is printed.

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): Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, and Section 3.1.80 [MultiMeasureRestText], page 476.
Section 2.2.78 [New_fingering_engraver], page 343
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):
Section 3.1.44 [Fingering], page 433, Section 3.1.100 [Script], page 497, Section 3.1.116 [StringNumber], page 512, and Section 3.1.117 [StrokeFinger], page 514.

Section 2.2.79 [Note_head_line_engraver], page 344
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):
Section 3.1.142 [VoiceFollower], page 544.

Section 2.2.80 [Note_heads_engraver], page 344
Generate note heads.
Music types accepted:
Section 1.2.44 [note-event], page 47,

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):
Section 3.1.84 [NoteHead], page 480.

Section 2.2.83 [Note_spacing_engraver], page 345
Generate NoteSpacing, an object linking horizontal lines for use in spacing.
This engraver creates the following layout object(s):
Section 3.1.86 [NoteSpacing], page 482.

**Section 2.2.85 [Output_property_engraver], page 346**
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

**Section 2.2.89 [Part_combine_engraver], page 347**
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.48 [part-combine-event], page 48,
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):
Section 3.1.30 [CombineTextScript], page 411.

**Section 2.2.90 [Percent_repeat_engraver], page 347**
Make whole measure repeats.
Music types accepted:
Section 1.2.50 [percent-event], page 48,
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):
Section 3.1.90 [PercentRepeat], page 486, and Section 3.1.91 [PercentRepeatCounter], page 487.

Section 2.2.91 [Phrasing_slur_engraver], page 348
Print phrasing slurs. Similar to Section 2.2.108 [Slur_engraver], page 353.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.52 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.92 [PhrasingSlur], page 488.

Section 2.2.96 [Pitched_trill_engraver], page 350
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, and Section 3.1.133 [TrillPitchHead], page 534.

Section 2.2.99 [Repeat_tie_engraver], page 351
Create repeat ties.
Music types accepted:
Section 1.2.54 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.96 [RepeatTie], page 494, and Section 3.1.97 [RepeatTieColumn], page 495.

Section 2.2.101 [Rest_engraver], page 351
Engrave rests.
Music types accepted:
Section 1.2.55 [rest-event], page 48,
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):
Section 3.1.98 [Rest], page 495.

Section 2.2.102 [Rhythmic_column_engraver], page 352
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.83 [NoteColumn], page 480.

Section 2.2.103 [Script_column_engraver], page 352
Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.101 [ScriptColumn], page 498.
Section 2.2.104 [Script_engraver], page 352
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
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):
Section 3.1.100 [Script], page 497.

Section 2.2.107 [Slash_repeat_engraver], page 353
Make beat repeats.
Music types accepted:
Section 1.2.53 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.38 [DoubleRepeatSlash], page 425, and Section 3.1.95 [RepeatSlash], page 493.

Section 2.2.115 [Spanner_break_forbid_engraver], page 355
Forbid breaks in certain spanners.

Section 2.2.121 [Stem_engraver], page 356
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.
Music types accepted:
Section 1.2.76 [tremolo-event], page 51, and Section 1.2.79 [tuplet-span-event], page 52,
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):
Section 2.2.127 [Text_engraver], page 358
Create text scripts.
Music types accepted:
Section 1.2.72 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.126 [TextScript], page 524.

Section 2.2.128 [Text_spanner_engraver], page 359
Create text spanner from an event.
Music types accepted:
Section 1.2.73 [text-span-event], page 51,
Properties (read)
\begin{verbatim}
currentMusicalColumn (graphical (layout) object)
\end{verbatim}
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
This engraver creates the following layout object(s):
Section 3.1.127 [TextSpanner], page 526.

Section 2.2.129 [Tie_engraver], page 359
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.74 [tie-event], page 51,
Properties (read)
\begin{verbatim}
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.
\end{verbatim}
Properties (write)
\begin{verbatim}
tieMelismaBusy (boolean)
Signal whether a tie is present.
\end{verbatim}
This engraver creates the following layout object(s):
Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn], page 529.

Section 2.2.134 [Trill_spanner_engraver], page 361
Create trill spanner from an event.
Music types accepted:
Section 1.2.78 [trill-span-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.).

This engraver creates the following layout object(s):
Section 3.1.134 [TrillSpanner], page 535.

Section 2.2.135 [Tuplet_engraver], page 362
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.79 [tuplet-span-event], page 52,
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):
Section 3.1.135 [TupletBracket], page 536, and Section 3.1.136 [Tuplet-
Number], page 538.

2.1.19 NoteNames

A context for printing the names of notes.

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

This context creates the following layout object(s):
Section 3.1.85 [NoteName], page 482, Section 3.1.110 [StaffSpacing], page 506, Section 3.1.128
[Tie], page 527, Section 3.1.129 [TieColumn], page 529, and Section 3.1.141 [VerticalAxisGroup],
page 542.

This context sets the following properties:
• Set grob-property nonstaff-nonstaff-spacing in Section 3.1.141 [VerticalAxisGroup],
page 542, to:
'((basic-distance . 0)
 (minimum-distance . 2.8)
 (padding . 0.2)
 (stretchability . 0))

• Set grob-property nonstaff-relatedstaff-spacing in Section 3.1.141 [VerticalAxis-
Group], page 542, to:
'((basic-distance . 5.5)
 (padding . 0.5)
 (stretchability . 1))
• Set grob-property `nonstaff-unrelatedstaff-spacing.padding` in Section 3.1.141 [VerticalAxisGroup], page 542, to 1.5.

• Set grob-property `staff-affinity` in Section 3.1.141 [VerticalAxisGroup], page 542, 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):

Section 2.2.5 [Axis_group_engraver], page 316
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):
Section 3.1.141 [VerticalAxisGroup], page 542.

Section 2.2.81 [Note_name_engraver], page 344
Print pitches as words.
Music types accepted:
Section 1.2.44 [note-event], page 47,

Properties (read)

`noteNameFunction` (procedure)
Function used to convert pitches into strings and markups.

`noteNameSeparator` (string)
String used to separate simultaneous Note-Name 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):
Section 3.1.85 [NoteName], page 482.

Section 2.2.106 [Separating_line_group_engraver], page 353
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):
Section 3.1.110 [StaffSpacing], page 506.

Section 2.2.129 [Tie_engraver], page 359
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.74 [tie-event], page 51,
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):
Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn], page 529.

2.1.20 NullVoice

For aligning lyrics without printing notes
This context also accepts commands for the following context(s):
Staff and Voice.
This context creates the following layout object(s):
Section 3.1.20 [Beam], page 399, Section 3.1.84 [NoteHead], page 480, Section 3.1.103 [Slur], page 498, Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn], page 529.
This context sets the following properties:

• Set grob-property no-ledgers in Section 3.1.84 [NoteHead], page 480, to #t.
• Set grob-property stencil in Section 3.1.20 [Beam], page 399, to #f.
• Set grob-property stencil in Section 3.1.84 [NoteHead], page 480, to #f.
• Set grob-property stencil in Section 3.1.103 [Slur], page 498, to #f.
• Set grob-property stencil in Section 3.1.128 [Tie], page 527, to #f.
• Set grob-property X-extent in Section 3.1.84 [NoteHead], page 480, 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):

Section 2.2.10 [Beam_engraver], page 319
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
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 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.

Properties (write)

  forbidBreak (boolean)
  If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.53 [Grob_pq_engraver], page 334
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.).

Section 2.2.80 [Note_heads_engraver], page 344
Generate note heads.
Music types accepted:
Section 1.2.44 [note-event], page 47,
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):
Section 3.1.84 [NoteHead], page 480.

Section 2.2.95 [Pitch_squash_engraver], page 349
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.

Section 2.2.108 [Slur_engraver], page 353
Build slur grobs from slur events.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.59 [slur-event], page 49,
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):
Section 3.1.103 [Slur], page 498.

Section 2.2.129 [Tie_engraver], page 359
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.74 [tie-event], page 51,

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):
Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn], page 529.

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):
Section 3.1.141 [VerticalAxisGroup], page 542.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Section 2.1.27 [Staff], page 240.

Context OneStaff can contain Section 2.1.2 [ChordNames], page 60, Section 2.1.5 [DrumStaff], page 76, Section 2.1.7 [Dynamics], page 95, Section 2.1.8 [FiguredBass], page 99, Section 2.1.9 [FretBoards], page 101, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.16 [Lyrics], page 155, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.19 [NoteNames], page 182, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

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

Section 2.2.5 [Axis_group_engraver], page 316
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):
Section 3.1.141 [VerticalAxisGroup], page 542.

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.

   This context creates the following layout object(s):
   Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379,
   Section 3.1.3 [AccidentalPlacement], page 380, Section 3.1.4 [AccidentalSuggestion], page 381,
   Section 3.1.12 [BarLine], page 390, Section 3.1.14 [BassFigure], page 395, Section 3.1.15
   [BassFigureAlignment], page 396, Section 3.1.16 [BassFigureAlignmentPositioning], page 396,
   Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation],
   page 398, Section 3.1.19 [BassFigureLine], page 398, Section 3.1.26 [Clef], page 406,
   Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, Section 3.1.32
   [CueEndClef], page 416, Section 3.1.33 [Custos], page 419, Section 3.1.34 [DotColumn],
   page 420, Section 3.1.45 [FingeringColumn], page 435, Section 3.1.57 [InstrumentName],
   page 447, Section 3.1.59 [KeyCancellation], page 449, Section 3.1.60 [KeySignature],
   page 452, Section 3.1.64 [LedgerLineSpanner], page 457, Section 3.1.82 [NoteCollision],
   page 479, Section 3.1.87 [OttavaBracket], page 483, Section 3.1.93 [PianoPedalBracket],
   page 490, Section 3.1.99 [RestCollision], page 496, Section 3.1.102 [ScriptRow], page 498,
   Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.105 [SostenutoPedalLineSpanner],
   page 502, Section 3.1.110 [StaffSpacing], page 506, Section 3.1.111 [StaffSymbol], page 507,
   Section 3.1.118 [SustainPedal], page 515, Section 3.1.119 [SustainPedalLineSpanner],
   page 516, Section 3.1.130 [TimeSignature], page 529, Section 3.1.137 [UnaCordaPedal],
   page 539, Section 3.1.138 [UnaCordaPedalLineSpanner], page 540, and Section 3.1.141
   [VerticalAxisGroup], page 542.

   This context sets the following properties:
   • Set grob-property neutral-direction in Section 3.1.33 [Custos], page 419, to -1.
   • Set grob-property neutral-position in Section 3.1.33 [Custos], page 419, to 3.
   • Set grob-property style in Section 3.1.33 [Custos], page 419, to 'mensural'.
   • 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 \texttt{createSpacing} to \#t.
• Set translator property \texttt{extraNatural} to \#f.
• Set translator property \texttt{ignoreFiguredBassRest} to \#f.
• Set translator property \texttt{instrumentName} to '()'.
• Set translator property \texttt{localAlterations} to '()'.
• Set translator property \texttt{middleCClefPosition} to -6.
• Set translator property \texttt{middleCPosition} to -6.
• Set translator property \texttt{ottavationMarkups} to:
  
  \begin{verbatim}
  '(((4 . "29")
    (3 . "22")
    (2 . "15")
    (1 . "8")
    (-1 . "8")
    (-2 . "15")
    (-3 . "22")
    (-4 . "29"))
  \end{verbatim}

• Set translator property \texttt{printKeyCancellation} to \#f.
• Set translator property \texttt{shortInstrumentName} to '()'.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Section 2.1.23 [PetrucciVoice], page 199.

Context PetrucciStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.20 [NullVoice], page 184, and Section 2.1.23 [PetrucciVoice], page 199.

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

\begin{verbatim}
Section 2.2.1 [Accidental_engraver], page 313
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 \texttt{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 con-
text in which the following rules are
to be applied. For example, if context is Section "Score" in Internals
Reference then all staves share acc-
cidentals, and if context is Section "Staff" in Internals Reference then
\end{verbatim}
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 bar number. 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):
Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautions], page 379, Section 3.1.3 [AccidentalPlacement], page 380, and Section 3.1.4 [AccidentalSuggestion], page 381.

Section 2.2.5 [Axis_group_engraver], page 316
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):
Section 3.1.141 [VerticalAxisGroup], page 542.

Section 2.2.7 [Bar_engraver], page 317
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)

\begin{itemize}
\item \texttt{forbidBreak} (boolean)
  \begin{itemize}
  \item If set to \texttt{#t}, prevent a line break at this point.
  \end{itemize}
\end{itemize}

This engraver creates the following layout object(s):
Section 3.1.12 [BarLine], page 390.

Section 2.2.17 [Clef_engraver], page 321
Determine and set reference point for pitches.

Properties (read)

\begin{itemize}
\item \texttt{clefGlyph} (string)
  \begin{itemize}
  \item Name of the symbol within the music font.
  \end{itemize}
\item \texttt{clefPosition} (number)
  \begin{itemize}
  \item Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.
  \end{itemize}
\item \texttt{clefTransposition} (integer)
  \begin{itemize}
  \item Add this much extra transposition. Values of 7 and -7 are common.
  \end{itemize}
\item \texttt{clefTranspositionStyle} (symbol)
  \begin{itemize}
  \item Determines the way the ClefModifier grob is displayed. Possible values are \texttt{`default'}, \texttt{`parenthesized'} and \texttt{`bracketed'}.
  \end{itemize}
\item \texttt{explicitClefVisibility} (vector)
  \begin{itemize}
  \item \texttt{`break-visibility'} function for clef changes.
  \end{itemize}
\item \texttt{forceClef} (boolean)
  \begin{itemize}
  \item 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.
  \end{itemize}
\end{itemize}

This engraver creates the following layout object(s):
Section 3.1.26 [Clef], page 406, and Section 3.1.27 [ClefModifier], page 409.

Section 2.2.19 [Collision_engraver], page 322
Collect \texttt{NoteColumns}, and as soon as there are two or more, put them in a \texttt{NoteCollision} object.
This engraver creates the following layout object(s):
Section 3.1.82 [NoteCollision], page 479.

Section 2.2.24 [Cue_clef_engraver], page 324
Determine and set reference point for pitches in cued voices.

Properties (read)

\begin{itemize}
\item \texttt{clefTransposition} (integer)
  \begin{itemize}
  \item Add this much extra transposition. Values of 7 and -7 are common.
  \end{itemize}
\end{itemize}
**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):
Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, and Section 3.1.32 [CueEndClef], page 416.

**Section 2.2.25 [Custos_engraver], page 324**
Engrave custodes.
This engraver creates the following layout object(s):
Section 3.1.33 [Custos], page 419.

**Section 2.2.27 [Dot_column_engraver], page 325**
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):
Section 3.1.34 [DotColumn], page 420.

**Section 2.2.38 [Figured_bass_engraver], page 329**
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.55 [rest-event], page 48,
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):
Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigure-Alignment], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, and Section 3.1.19 [BassFigureLine], page 398.

Section 2.2.39 [Figured_bass_position_engraver], page 330
   Position figured bass alignments over notes.

This engraver creates the following layout object(s):
Section 3.1.16 [BassFigureAlignmentPositioning], page 396.

Section 2.2.40 [Fingering_column_engraver], page 330
   Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.

This engraver creates the following layout object(s):
Section 3.1.45 [FingeringColumn], page 435.

Section 2.2.42 [Font_size_engraver], page 331
   Put fontSize into font-size grob property.

Properties (read)
   fontSize (number)
      The relative size of all grobs in a context.

Section 2.2.53 [Grob_pq_engraver], page 334
   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.).

Section 2.2.56 [Instrument_name_engraver], page 335
   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):
Section 3.1.57 [InstrumentName], page 447.

**Section 2.2.59 [Key_engraver], page 336**
Engrave a key signature.
Music types accepted:
Section 1.2.29 [key-change-event], page 45,
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 analist 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):
Section 3.1.59 [KeyCancellation], page 449, and Section 3.1.60 [KeySignature], page 452.

Section 2.2.63 [Ledger_line_engraver], page 338
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s):
Section 3.1.64 [LedgerLineSpanner], page 457.

Section 2.2.73 [Merge_mmrest_numbers_engraver], page 341
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.

Section 2.2.84 [Ottava_spanner_engraver], page 345
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):
Section 3.1.87 [OttavaBracket], page 483.

Section 2.2.85 [Output_property_engraver], page 346

Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.92 [Piano_pedal_align_engraver], page 348

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):
Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.119 [SustainPedalLineSpanner], page 516, and Section 3.1.138 [UnaCordaPedalLineSpanner], page 540.

Section 2.2.93 [Piano_pedal_engraver], page 348

Engrave piano pedal symbols and brackets.
Music types accepted:
Section 1.2.62 [sostenuto-event], page 49, Section 1.2.70 [sustain-event], page 51, and Section 1.2.80 [una-corda-event], page 52,
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):
Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.118 [SustainPedal], page 515, and Section 3.1.137 [UnaCordaPedal], page 539.

Section 2.2.97 [Pure_from_neighbor_engraver], page 350
Coordinates items that get their pure heights from their neighbors.

Section 2.2.100 [Rest_collision_engraver], page 351
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):
Section 3.1.99 [RestCollision], page 496.

Section 2.2.105 [Script_row_engraver], page 352
Determine order in horizontal side position elements.
This engraver creates the following layout object(s):
Section 3.1.102 [ScriptRow], page 498.

Section 2.2.106 [Separating_line_group_engraver], page 353
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):
Section 3.1.110 [StaffSpacing], page 506.

Section 2.2.116 [Staff_collecting_engraver], page 355
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.
Section 2.2.118 [Staff_symbol_engraver], page 355
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.66 [staff-span-event], page 50,
This engraver creates the following layout object(s):
Section 3.1.111 [StaffSymbol], page 507.

Section 2.2.131 [Time_signature_engraver], page 360
Create a Section 3.1.130 [TimeSignature], page 529, whenever
timeSignatureFraction changes.
Music types accepted:
Section 1.2.75 [time-signature-event], page 51,
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 signa-
ture.

This engraver creates the following layout object(s):
Section 3.1.130 [TimeSignature], page 529.

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.
This context creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 387, Section 3.1.20 [Beam], page 399, Section 3.1.21 [BendAfter], page 401, Section 3.1.24 [BreathingSign], page 403, Section 3.1.28 [ClusterSpanner], page 411, Section 3.1.29 [ClusterSpannerBeacon], page 411, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.35 [Dots], page 421, Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.40 [DynamicLineSpanner], page 427, Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, Section 3.1.44 [Fingering], page 433, Section 3.1.46 [Flag], page 435, Section 3.1.50 [Glissando], page 440, Section 3.1.54 [Hairpin], page 443, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.62 [LaissezVibrerTie], page 455, Section 3.1.63 [LaissezVibrerTieColumn], page 457, Section 3.1.75 [MensuralLigature], page 469, Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, Section 3.1.80 [MultiMeasureRestText], page 476, Section 3.1.83 [NoteColumn], page 480, Section 3.1.84 [NoteHead], page 480, Section 3.1.86 [NoteSpacing], page 482, Section 3.1.90 [PercentRepeat], page 486, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.92 [PhrasingSlur], page 488, Section 3.1.95 [RepeatSlash], page 493, Section 3.1.96 [RepeatTie], page 494, Section 3.1.97 [RepeatTieColumn], page 495, Section 3.1.98 [Rest], page 495, Section 3.1.100 [Script], page 497, Section 3.1.101 [ScriptColumn], page 498, Section 3.1.103
This context sets the following properties:

- Set grob-property `length` in Section 3.1.113 [Stem], page 508, to 5.
- Set grob-property `style` in Section 3.1.84 [NoteHead], page 480, to `petrucci`.
- Set grob-property `style` in Section 3.1.98 [Rest], page 495, to `mensural`.
- Set grob-property `thickness` in Section 3.1.113 [Stem], page 508, 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):

**Section 2.2.3 [Arpeggio_engraver], page 315**

Generate an Arpeggio symbol.

Music types accepted:

- Section 1.2.5 [arpeggio-event], page 42,
- This engraver creates the following layout object(s):
  - Section 3.1.9 [Arpeggio], page 387.

**Section 2.2.4 [Auto_beam_engraver], page 315**

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 2.2.121 [Stem_engraver], page 356, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted:

- Section 1.2.9 [beam-forbid-event], page 43,
- 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):
Section 3.1.20 [Beam], page 399.

Section 2.2.10 [Beam_engraver], page 319
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
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 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.

Properties (write)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.12 [Bend_engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.21 [BendAfter], page 401.

Section 2.2.14 [Breathing_sign_engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.24 [BreathingSign], page 403.
Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.77 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.18 [Cluster_spanner_engraver], page 322
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.28 [ClusterSpanner], page 411, and Section 3.1.29 [ClusterSpannerBeacon], page 411.

Section 2.2.28 [Dots_engraver], page 326
Create Section 3.1.35 [Dots], page 421, objects for Section 3.2.100 [rhythmic-head-interface], page 606s.
This engraver creates the following layout object(s):
Section 3.1.35 [Dots], page 421.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
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):
Section 3.1.36 [DoublePercentRepeat], page 422, and Section 3.1.37 [DoublePercentRepeatCounter], page 423.

Section 2.2.33 [Dynamic_align_engraver], page 327
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):
Section 3.1.40 [DynamicLineSpanner], page 427.

Section 2.2.34 [Dynamic_engraver], page 328
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 43, and Section 1.2.64 [span-dynamic-event], page 49,
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):
Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, and Section 3.1.54 [Hairpin], page 443.

Section 2.2.41 [Fingering_engraver], page 330
Create fingering scripts.
Music types accepted:
Section 1.2.24 [fingering-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.44 [Fingering], page 433.

Section 2.2.42 [Font_size_engraver], page 331
Put fontSize into font-size grob property.
Properties (read)
  fontSize (number)
    The relative size of all grobs in a context.

Section 2.2.44 [Forbid_line_break_engraver], page 331
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.

Section 2.2.46 [Glissando_ engraver], page 332
Engrave glissandi.
Music types accepted:
Section 1.2.26 [glissando-event], page 45,
Properties (read)

**glissandoMap** (list)
A map in the form of '((source1 . target1)
(source2 . target2) (sourcen . targetn)) show-
ing 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):
Section 3.1.50 [Glissando], page 440.

Section 2.2.47 [Grace_auto_beam_ engraver], page 333
Generates one autobeam group across an entire grace phrase. As usual,
any manual beaming or \noBeam will block autobeaming, just like set-
ting the context property 'autoBeaming' to ##f.
Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

**autoBeaming** (boolean)
If set to true then beams are generated auto-
matically.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.48 [Grace_beam_ engraver], page 333
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:
Section 1.2.8 [beam-event], page 43,
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 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):
Section 3.1.20 [Beam], page 399.

Section 2.2.49 [Grace.engraver], page 334
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.

Section 2.2.53 [Grob_pq.engraver], page 334
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.).

Section 2.2.57 [Instrument_switch_engraver], page 336
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):
Section 3.1.58 [InstrumentSwitch], page 448.

Section 2.2.62 [Laissez_vibrer_engraver], page 338
Create laissez vibrer items.
Music types accepted:
Section 1.2.31 [laissez-vibrer-event], page 45,
Chapter 2: Translation

This engraver creates the following layout object(s):
Section 3.1.62 [LaissezVibrerTie], page 455, and Section 3.1.63 [LaissezVibrerTieColumn], page 457.

Section 2.2.72 [Mensural_ligature_engraver], page 341
Handle Mensural_ligature_events by gluing special ligature heads together.
Music types accepted:
Section 1.2.33 [ligature-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.75 [MensuralLigature], page 469.

Section 2.2.77 [Multi_measure_rest_engraver], page 342
Engrave multi-measure rests that are produced with ‘R’. It reads measurePosition and internalBarNumber to determine what number to print over the Section 3.1.77 [MultiMeasureRest], page 472.
Music types accepted:
Section 1.2.40 [multi-measure-articulation-event], page 46, Section 1.2.41 [multi-measure-rest-event], page 46, and Section 1.2.42 [multi-measure-text-event], page 46,
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.

measurePosition (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

restNumberThreshold (number)
If a multimeasure rest has more measures than this, a number is printed.

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):
Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, and Section 3.1.80 [MultiMeasureRestText], page 476.
Section 2.2.78 [New_fingering_engraver], page 343
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):
Section 3.1.44 [Fingering], page 433, Section 3.1.100 [Script], page 497, Section 3.1.116 [StringNumber], page 512, and Section 3.1.117 [StrokeFinger], page 514.

Section 2.2.79 [Note_head_line_engraver], page 344
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):
Section 3.1.142 [VoiceFollower], page 544.

Section 2.2.80 [Note_heads_engraver], page 344
Generate note heads.
Music types accepted:
Section 1.2.44 [note-event], page 47,
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):
Section 3.1.84 [NoteHead], page 480.

Section 2.2.83 [Note_spacing_engraver], page 345
Generate NoteSpacing, an object linking horizontal lines for use in spacing.
This engraver creates the following layout object(s):
Section 3.1.86 [NoteSpacing], page 482.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.89 [Part_combine_engraver], page 347
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.48 [part-combine-event], page 48,
Properties (read)

\texttt{aDueText} (markup)
Text to print at a unisono passage.

\texttt{partCombineTextsOnNote} (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.

\texttt{printPartCombineTexts} (boolean)
Set ‘Solo’ and ‘A due’ texts in the part combiner?

\texttt{soloIIText} (markup)
The text for the start of a solo for voice ‘two’ when part-combining.

\texttt{soloText} (markup)
The text for the start of a solo when part-combining.

This engraver creates the following layout object(s):
Section 3.1.30 [CombineTextScript], page 411.

Section 2.2.90 [Percent_repeat_engraver], page 347
Make whole measure repeats.
Music types accepted:
Section 1.2.50 [percent-event], page 48,
Properties (read)

\texttt{countPercentRepeats} (boolean)
If set, produce counters for percent repeats.

\texttt{currentCommandColumn} (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\texttt{repeatCountVisibility} (procedure)
A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when \texttt{countPercentRepeats} is set.
This engraver creates the following layout object(s):
Section 3.1.90 [PercentRepeat], page 486, and Section 3.1.91 [PercentRepeatCounter], page 487.

Section 2.2.91 [Phrasing_slur_engraver], page 348
Print phrasing slurs. Similar to Section 2.2.108 [Slur_engraver], page 353.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.52 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.92 [PhrasingSlur], page 488.

Section 2.2.96 [Pitched_trill_engraver], page 350
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, and Section 3.1.133 [TrillPitchHead], page 534.

Section 2.2.99 [Repeat_tie_engraver], page 351
Create repeat ties.
Music types accepted:
Section 1.2.54 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.96 [RepeatTie], page 494, and Section 3.1.97 [RepeatTieColumn], page 495.

Section 2.2.101 [Rest_engraver], page 351
Engrave rests.
Music types accepted:
Section 1.2.55 [rest-event], page 48,
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):
Section 3.1.98 [Rest], page 495.

Section 2.2.102 [Rhythmic_column_engraver], page 352
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.83 [NoteColumn], page 480.

Section 2.2.103 [Script_column_engraver], page 352
Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.101 [ScriptColumn], page 498.
Section 2.2.104 [Script_engraver], page 352
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
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):
Section 3.1.100 [Script], page 497.

Section 2.2.107 [Slash_repeat_engraver], page 353
Make beat repeats.
Music types accepted:
Section 1.2.53 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.38 [DoubleRepeatSlash], page 425, and Section 3.1.95 [Re-
peatSlash], page 493.

Section 2.2.108 [Slur_engraver], page 353
Build slur grobs from slur events.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.59 [slur-event],
page 49,
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):
Section 3.1.103 [Slur], page 498.

Section 2.2.115 [Spanner_break_forbid_engraver], page 355
Forbid breaks in certain spanners.

Section 2.2.121 [Stem_engraver], page 356
Create stems, flags and single-stem tremolos. It also works together
with the beam engraver for overriding beaming.
Music types accepted:
Section 1.2.76 [tremolo-event], page 51, and Section 1.2.79 [tuplet-span-
event], page 52,
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):
Section 3.1.46 [Flag], page 435, Section 3.1.113 [Stem], page 508,
Section 3.1.114 [StemStub], page 510, and Section 3.1.115 [StemTremolo], page 511.

Section 2.2.127 [Text_ engraver], page 358
Create text scripts.
Music types accepted:
Section 1.2.72 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.126 [TextScript], page 524.

Section 2.2.128 [Text_spanner_ engraver], page 359
Create text spanner from an event.
Music types accepted:
Section 1.2.73 [text-span-event], page 51,
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):
Section 3.1.127 [TextSpanner], page 526.

Section 2.2.129 [Tie_ engraver], page 359
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.74 [tie-event], page 51,
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)

\textit{tieMelismaBusy} (boolean)

Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn], page 529.

\textbf{Section 2.2.134 [Trill\_spanner\_engraver], page 361}
Create trill spanner from an event.
Music types accepted:
Section 1.2.78 [trill-span-event], page 52,
Properties (read)

\textit{currentCommandColumn} (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\textit{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):
Section 3.1.134 [TrillSpanner], page 535.

\textbf{Section 2.2.135 [Tuplet\_engraver], page 362}
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.79 [tuplet-span-event], page 52,
Properties (read)

\textit{tupletFullLength} (boolean)
If set, the tuplet is printed up to the start of the next note.

\textit{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):
Section 3.1.135 [TupletBracket], page 536, and Section 3.1.136 [Tuplet-Number], page 538.

\textbf{2.1.24 PianoStaff}
Just like \textit{GrandStaff}, but the staves are only removed together, never separately.

This context also accepts commands for the following context(s):
\textit{GrandStaff}.

This context creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 387, Section 3.1.57 [InstrumentName], page 447, Section 3.1.107 [SpanBar], page 504, Section 3.1.108 [SpanBarStub], page 505, Section 3.1.121
Chapter 2: Translation

This context sets the following properties:

- Set grob-property `extra-spacing-width` in Section 3.1.41 [DynamicText], page 429, to \#f.
- Set translator property `instrumentName` to '( ).
- Set translator property `shortInstrumentName` 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 Section 2.1.27 [Staff], page 240.

Context PianoStaff can contain Section 2.1.2 [ChordNames], page 60, Section 2.1.5 [Drum-Staff], page 76, Section 2.1.7 [Dynamics], page 95, Section 2.1.8 [FiguredBass], page 99, Section 2.1.16 [Lyrics], page 155, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, and Section 2.1.29 [TabStaff], page 253.

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

Section 2.2.56 [Instrument_name_engraver], page 335
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):

Section 3.1.57 [InstrumentName], page 447.

Section 2.2.58 [Keep_alive_together_engraver], page 336
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.

Section 2.2.111 [Span_arpeggio_engraver], page 354
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):
Section 3.1.9 [Arpeggio], page 387.

Section 2.2.112 [Span_bar_engraver], page 354
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):
Section 3.1.107 [SpanBar], page 504.

Section 2.2.113 [Span_bar_stub_engraver], page 355
Make stubs for span bars in all contexts that the span bars cross.
This engraver creates the following layout object(s):
Section 3.1.108 [SpanBarStub], page 505.

Section 2.2.122 [System_start_delimiter_engraver], page 357
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):
Section 3.1.121 [SystemStartBar], page 518, Section 3.1.122 [SystemStartBrace], page 519, Section 3.1.123 [SystemStartBracket], page 520, and Section 3.1.124 [SystemStartSquare], page 521.

Section 2.2.138 [Vertical_align_engraver], page 362
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):
Section 3.1.140 [VerticalAlignment], page 542.

Section 2.2.138 [Vertical_align_engraver], page 362
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):
Section 3.1.140 [VerticalAlignment], page 542.

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.

This context creates the following layout object(s):
Section 3.1.12 [BarLine], page 390, Section 3.1.34 [DotColumn], page 420, Section 3.1.57 [InstrumentName], page 447, Section 3.1.64 [LedgerLineSpanner], page 457, Section 3.1.110 [StaffSpacing], page 506, Section 3.1.111 [StaffSymbol], page 507, Section 3.1.130 [TimeSignature], page 529, and Section 3.1.141 [VerticalAxisGroup], page 542.

This context sets the following properties:
• Set grob-property line-count in Section 3.1.111 [StaffSymbol], page 507, to 1.
• Set grob-property neutral-direction in Section 3.1.20 [Beam], page 399, to 1.
• Set grob-property neutral-direction in Section 3.1.113 [Stem], page 508, to 1.
• Set grob-property staff-padding in Section 3.1.143 [VoltaBracket], page 545, 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 Section 2.1.33 [Voice], page 300.

Context RhythmicStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.20 [NullVoice], page 184, and Section 2.1.33 [Voice], page 300.

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

Section 2.2.5 [Axis_group_engraver], page 316
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):
Section 3.1.141 [VerticalAxisGroup], page 542.

Section 2.2.7 [Bar_engraver], page 317
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):
Section 3.1.12 [BarLine], page 390.
Section 2.2.27 [Dot_column_engraver], page 325
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):
Section 3.1.34 [DotColumn], page 420.

Section 2.2.42 [Font_size_engraver], page 331
Put \texttt{fontSize} into \texttt{font-size} grob property.

Properties (read)
\begin{verbatim}
fontSize (number)
The relative size of all grobs in a context.
\end{verbatim}

Section 2.2.56 [Instrument_name_engraver], page 335
Create a system start text for instrument or vocal names.

Properties (read)
\begin{verbatim}
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 \texttt{instrumentName} property labels the staff in the first system, and the \texttt{shortInstrumentName} property labels following lines.

shortInstrumentName (markup)
See \texttt{instrumentName}.

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

vocalName (markup)
Name of a vocal line.
\end{verbatim}

This engraver creates the following layout object(s):
Section 3.1.57 [InstrumentName], page 447.

Section 2.2.63 [Ledger_line_engraver], page 338
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s):
Section 3.1.64 [LedgerLineSpanner], page 457.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.95 [Pitch_squash_engraver], page 349
Set the vertical position of note heads to \texttt{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.

Section 2.2.106 [Separating_line_group_engraver], page 353
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):
Section 3.1.110 [StaffSpacing], page 506.

Section 2.2.118 [Staff_symbol_engraver], page 355
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.66 [staff-span-event], page 50.
This engraver creates the following layout object(s):
Section 3.1.111 [StaffSymbol], page 507.

Section 2.2.131 [Time_signature_engraver], page 360
Create a Section 3.1.130 [TimeSignature], page 529, whenever timeSignatureFraction changes.
Music types accepted:
Section 1.2.75 [time-signature-event], page 51,

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):
Section 3.1.130 [TimeSignature], page 529.
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.

This context also accepts commands for the following context(s):

- **Timing**

This context creates the following layout object(s):

- Section 3.1.13 [BarNumber], page 393, Section 3.1.22 [BreakAlignGroup], page 401,
- Section 3.1.23 [BreakAlignment], page 402, Section 3.1.47 [FootnoteItem], page 436,
- Section 3.1.48 [FootnoteSpanner], page 437, Section 3.1.51 [GraceSpacing], page 442,
- Section 3.1.65 [LeftEdge], page 458, Section 3.1.76 [MetronomeMark], page 470, Section 3.1.81 [NonMusicalPaperColumn], page 478, Section 3.1.88 [PaperColumn], page 484, Section 3.1.89 [ParenthesesItem], page 485, Section 3.1.94 [RehearsalMark], page 491, Section 3.1.106 [SpacingSpanner], page 503, Section 3.1.121 [SystemStartBar], page 518, Section 3.1.122 [SystemStartBrace], page 519, Section 3.1.123 [SystemStartBracket], page 520, Section 3.1.124 [SystemStartSquare], page 521, Section 3.1.140 [VerticalAlignment], page 542, Section 3.1.143 [VoltaBracket], page 545, and Section 3.1.144 [VoltaBracketSpanner], page 546.

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 fontsize-markup (layout props increment arg)>)}

  2
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 `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:
• 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)
Chapter 2: Translation

224
(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))

("heel"
(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 "rheel" . "rheel")
(padding . 0.2)
(avoid-slur around)
(direction 1))
("rtoe"
(script-stencil feta "rtoe" . "rtoe")
(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 slashChordSeparator to:
  "'("/")"
- 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 `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 8)))
   ((3 . 2)
    (beamExceptions (end (1/32 8 8 8 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 4 4 4 4)))
   ((4 . 8) (beatStructure 2 2))
   ((6 . 4)
    (beamExceptions (end (1/16 4 4 4 4 4 4)))
   ((8 . 4)
    (beamExceptions (end (1/8 4 4 4 4 4 4)))
   ((9 . 4)
    (beamExceptions (end (1/32 8 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 8 8 8)))))

• Set translator property `topLevelAlignment` to `#t`.
• Set translator property `timeSignatureFraction` to: `'(4 . 4)`
• Set translator property `timeSignatureSettings` to:
  `'(((2 . 2) (beamExceptions (end (1/32 8 8 8 8 8)))
   ((3 . 2)
    (beamExceptions (end (1/32 8 8 8 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 4 4 4 4)))
   ((4 . 8) (beatStructure 2 2))
   ((6 . 4)
    (beamExceptions (end (1/16 4 4 4 4 4 4)))
   ((8 . 4)
    (beamExceptions (end (1/8 4 4 4 4 4 4)))
   ((9 . 4)
    (beamExceptions (end (1/32 8 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 8 8 8)))))

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Section 2.1.27 [Staff], page 240.

Context Score can contain Section 2.1.1 [ChoirStaff], page 59, Section 2.1.2 [ChordNames], page 60, Section 2.1.4 [Devnull], page 76, Section 2.1.5 [DrumStaff], page 76, Section 2.1.7 [Dynamics], page 95, Section 2.1.8 [FiguredBass], page 99, Section 2.1.9 [FretBoards], page 101, Section 2.1.11 [GrandStaff], page 104, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.16 [Lyrics], page 155, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.19 [NoteNames], page 182, Section 2.1.21 [OneStaff], page 187, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.24 [PianoStaff], page 212, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.28 [StaffGroup], page 251, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

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

Section 2.2.8 [Bar_number_engraver], page 317
A bar number is created whenever `measurePosition` is zero and when there is a bar line (i.e., when `whichBar` is set). 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 2.2.116 [Staff_collecting_engraver], page 355.
Music types accepted:
Section 1.2.2 [alternative-event], page 42.

Properties (read)

**alternativeNumberingStyle** *(symbol)*
The style of an alternative’s bar numbers. Can be **numbers** for going back to the same number or **numbers-with-letters** for going back to the same number with letter suffixes. No setting will not go back in measure-number time.

**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**
Assuming $n$ is value 2, for example, this enables bar numbers for bars 2, 4, 6, etc.
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 bar number. This property is incremented at every bar line.

**stavesFound** (list of grobs)
A list of all staff symbols found.

**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)

**currentBarNumber** (integer)
Contains the current bar number. This property is incremented at every bar line.

This engraver creates the following layout object(s):
Section 3.1.13 [BarNumber], page 393.

Section 2.2.9 [Beam_collision_engraver], page 319
Help beams avoid colliding with notes and clefs in other voices.

Section 2.2.13 [Break_align_engraver], page 320
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):
Section 3.1.22 [BreakAlignGroup], page 401, Section 3.1.23 [BreakAlignment], page 402, and Section 3.1.65 [LeftEdge], page 458.

Section 2.2.22 [Concurrent_hairpin_engraver], page 324
Collect concurrent hairpins.

Section 2.2.26 [Default_bar_line_engraver], page 325
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 2.2.133 [Timing_translator], page 360.

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.

**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.

**timing** (boolean)
Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

**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`.

Section 2.2.43 [Footnote_ engraver], page 331
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):
Section 3.1.47 [FootnoteItem], page 436, and Section 3.1.48 [FootnoteSpanner], page 437.

Section 2.2.50 [Grace_spacing_ engraver], page 334
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):
Section 3.1.51 [GraceSpacing], page 442.

Section 2.2.67 [Mark_engraver], page 339
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 2.2.116 [Staff_collecting_engraver], page 355, must move along, otherwise all marks end up on the same Y location.

Music types accepted:
Section 1.2.36 [mark-event], page 46,
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):
Section 3.1.94 [RehearsalMark], page 491.

Section 2.2.75 [Metronome_mark_engraver], page 341
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 2.2.116 [Staff_collecting_engraver], page 355.

Music types accepted:
Section 1.2.71 [tempo-change-event], page 51,
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):
Section 3.1.76 [MetronomeMark], page 470.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.87 [Paper_column_engraver], page 346
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:
Section 1.2.12 [break-event], page 43, and Section 1.2.30 [label-event], page 45,
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):
Section 3.1.81 [NonMusicalPaperColumn], page 478, and Section 3.1.88 [PaperColumn], page 484.

Section 2.2.88 [Parenthesis_engraver], page 347
Parenthesize objects whose music cause has the parenthesize property.
This engraver creates the following layout object(s):
Section 3.1.89 [ParenthesesItem], page 485.

Section 2.2.98 [Repeat_acknowledge_engraver], page 350
Acknowledge repeated music, and convert the contents of repeatCommands into an appropriate setting for whichBar.
Properties (read)
   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.

derRepeatSegnoType (string)
Set the default bar line for the combinations ending of repeat with segno. Default is ‘:|.S’.

derRepeatType (string)
Set the default bar line for the ending of repeats.

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.

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.

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.

Section 2.2.110 [Spacing_engraver], page 354
Make a SpacingSpanner and do bookkeeping of shortest starting and playing notes.
Music types accepted:
Section 1.2.63 [spacing-section-event], page 49,  
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):
Section 3.1.106 [SpacingSpanner], page 503.

Section 2.2.116 [Staff_collecting_engraver], page 355
Maintain the stavesFound variable.

Properties (read)

\begin{verbatim}
stavesFound (list of grobs)
A list of all staff-symbols found.
\end{verbatim}

Properties (write)

\begin{verbatim}
stavesFound (list of grobs)
A list of all staff-symbols found.
\end{verbatim}

Section 2.2.119 [Stanza_number_align_engraver], page 356
This engraver ensures that stanza numbers are neatly aligned.

Section 2.2.122 [System_start_delimiter_engraver], page 357
Create a system start delimiter (i.e., a SystemStartBar,
SystemStartBrace, SystemStartBracket or SystemStartSquare
spanner).

Properties (read)

\begin{verbatim}
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.
\end{verbatim}

This engraver creates the following layout object(s):
Section 3.1.121 [SystemStartBar], page 518, Section 3.1.122 [System-
StartBrace], page 519, Section 3.1.123 [SystemStartBracket], page 520,
and Section 3.1.124 [SystemStartSquare], page 521.

Section 2.2.133 [Timing_translator], page 360
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.

Properties (read)

\begin{verbatim}
baseMoment (moment)
Smallest unit of time that will stand on its own
as a subdivided section.

currentBarNumber (integer)
Contains the current bar number. This property
is incremented at every bar line.
\end{verbatim}
internalBarNumber (integer)
Contains the current bar number. 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)

baseMoment (moment)
Smallest unit of time that will stand on its own as a subdivided section.

currentBarNumber (integer)
Contains the current bar number. This property is incremented at every bar line.

internalBarNumber (integer)
Contains the current bar number. 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.

Section 2.2.136 [Tweak_engraver], page 362
Read the tweaks property from the originating event, and set properties.

Section 2.2.138 [Vertical_align_engraver], page 362
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):
Section 3.1.140 [VerticalAlignment], page 542.

Section 2.2.139 [Volta engraver], page 363
Make volta brackets.

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):
Section 3.1.143 [VoltaBracket], page 545, and Section 3.1.144 [VoltaBracketSpanner], page 546.

2.1.27 Staff
Handles clefs, bar lines, keys, accidentals. It can contain Voice contexts.

This context creates the following layout object(s):
Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379, Section 3.1.3 [AccidentalPlacement], page 380, Section 3.1.4 [AccidentalSuggestion], page 381, Section 3.1.12 [BarLine], page 390, Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigureAlignment], page 396, Section 3.1.16 [BassFigureAlignmentPositioning], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, Section 3.1.19 [BassFigureLine], page 398, Section 3.1.26 [Clef], page 406, Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, Section 3.1.32 [CueEndClef], page 416, Section 3.1.34 [DotColumn], page 420, Section 3.1.45 [FingeringColumn], page 435, Section 3.1.57 [InstrumentName], page 447, Section 3.1.59 [KeyCancellation], page 449, Section 3.1.60 [KeySignature], page 452, Section 3.1.64 [LedgerLineSpanner], page 457, Section 3.1.82 [NoteCollision], page 479, Section 3.1.87 [OttavaBracket], page 483, Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.99 [RestCollision], page 496, Section 3.1.102 [ScriptRow], page 498, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.110 [StaffSpacing], page 506, Section 3.1.111 [StaffSymbol], page 507, Section 3.1.118 [SustainPedal], page 515, Section 3.1.119 [SustainPedalLineSpanner], page 516, Section 3.1.130 [TimeSignature], page 529, Section 3.1.137 [UnaCordaPedal], page 539, Section 3.1.138 [UnaCordaPedalLineSpanner], page 540, and Section 3.1.141 [VerticalAxisGroup], page 542.
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 Section 2.1.33 [Voice], page 300.

Context Staff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.20 [NullVoice], page 184, and Section 2.1.33 [Voice], page 300.

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

Section 2.2.1 [Accidental_engraver], page 313
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)

```plaintext
accidentalGrouping (symbol)
If set to 'voice, accidentals on the same note in different octaves may be horizontally staggered if in different voices.
```

```plaintext
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.
```

```plaintext
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.
```
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 bar number. 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):
Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379, Section 3.1.3 [AccidentalPlacement], page 380, and Section 3.1.4 [AccidentalSuggestion], page 381.

Section 2.2.5 [Axis_group_engraver], page 316
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):
Section 3.1.141 [VerticalAxisGroup], page 542.

Section 2.2.7 [Bar_engraver], page 317
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):
Section 3.1.12 [BarLine], page 390.

Section 2.2.17 [Clef_engraver], page 321
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):
Section 3.1.26 [Clef], page 406, and Section 3.1.27 [ClefModifier], page 409.

Section 2.2.19 [Collision_engraver], page 322
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):
Section 3.1.82 [NoteCollision], page 479.

Section 2.2.24 [Cue_clef_engraver], page 324
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):
Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, and Section 3.1.32 [CueEndClef], page 416.

Section 2.2.27 [Dot_column_engraver], page 325
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):
Section 3.1.34 [DotColumn], page 420.

Section 2.2.38 [Figured_bass_engraver], page 329
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.55 [rest-event], page 48,
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):
Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigure-Alignment], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, and Section 3.1.19 [BassFigureLine], page 398.

Section 2.2.39 [Figured_bass_position_engraver], page 330
  Position figured bass alignments over notes.
  This engraver creates the following layout object(s):
  Section 3.1.16 [BassFigureAlignmentPositioning], page 396.

Section 2.2.40 [Fingering_column_engraver], page 330
  Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.
  This engraver creates the following layout object(s):
  Section 3.1.45 [FingeringColumn], page 435.

Section 2.2.42 [Font_size_engraver], page 331
  Put fontSize into font-size grob property.
  Properties (read)

  fontSize (number)
    The relative size of all grobs in a context.

Section 2.2.53 [Grob_pq_engraver], page 334
  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.).

Section 2.2.56 [Instrument_name_engraver], page 335
  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):
Section 3.1.57 [InstrumentName], page 447.

Section 2.2.59 [Key_engraver], page 336
Engrave a key signature.
Music types accepted:
Section 1.2.29 [key-change-event], page 45,
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 \textit{alter} a fraction, denoting alteration. For alterations, use symbols, e.g.
\texttt{keyAlterations = #\texttt{‘(6 . ,FLAT))}.}

\texttt{lastKeyAlterations} (list)

Last key signature before a key signature change.

\texttt{middleCClefPosition} (number)

The position of the middle C, as determined only by the clef. This can be calculated by looking at \texttt{clefPosition} and \texttt{clefGlyph}.

\texttt{printKeyCancellation} (boolean)

Print restoration alterations before a key signature change.

\textbf{Properties (write)}

\texttt{keyAlterations} (list)

The current key signature. This is an al-
list containing \texttt{(step . alter)} or \texttt{((octave . step) . alter)}, where \texttt{step} is a number in the range 0 to 6 and \texttt{alter} a fraction, denoting alteration. For alterations, use symbols, e.g.
\texttt{keyAlterations = #‘(6 . ,FLAT)).}

\texttt{lastKeyAlterations} (list)

Last key signature before a key signature change.

\texttt{tonic} (pitch)

The tonic of the current scale.

This engraver creates the following layout object(s):

\texttt{Section 3.1.59 [KeyCancellation], page 449, and Section 3.1.60 [KeySig-nature], page 452.}

\textbf{Section 2.2.63 [Ledger_line_engraver], page 338}

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):

\texttt{Section 3.1.64 [LedgerLineSpanner], page 457.}

\textbf{Section 2.2.73 [Merge_mmrest_numbers_engraver], page 341}

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.

\textbf{Section 2.2.84 [Ottava_spanner_engraver], page 345}

Create a text spanner when the ottavation property changes.

\textbf{Properties (read)}

\texttt{currentMusicalColumn} (graphical (layout) object)

Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
Chapter 2: Translation

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):
Section 3.1.87 [OttavaBracket], page 483.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.92 [Piano_pedal_align_engraver], page 348
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):
Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.119 [SustainPedalLineSpanner], page 516, and Section 3.1.138 [UnaCordaPedalLineSpanner], page 540.

Section 2.2.93 [Piano_pedal_engraver], page 348
Engrave piano pedal symbols and brackets.
Music types accepted:
Section 1.2.62 [sostenuto-event], page 49, Section 1.2.70 [sustain-event], page 51, and Section 1.2.80 [una-corda-event], page 52,
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):
Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.118 [SustainPedal], page 515, and Section 3.1.137 [UnaCordaPedal], page 539.

Section 2.2.97 [Pure_from_neighbor_engraver], page 350
Coordinates items that get their pure heights from their neighbors.

Section 2.2.100 [Rest_collision_engraver], page 351
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):
Section 3.1.99 [RestCollision], page 496.

Section 2.2.105 [Script_row_engraver], page 352
Determine order in horizontal side position elements.
This engraver creates the following layout object(s):
Section 3.1.102 [ScriptRow], page 498.

Section 2.2.106 [Separating_line_group_engraver], page 353
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):
Section 3.1.110 [StaffSpacing], page 506.

Section 2.2.116 [Staff_collecting_engraver], page 355
Maintain the stavesFound variable.
Properties (read)

stavesFound (list of grobs)
A list of grobs found.

Properties (write)

stavesFound (list of grobs)
A list of all staff-symbols found.
Section 2.2.118 [Staff_symbol_engraver], page 355
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.66 [staff-span-event], page 50,
This engraver creates the following layout object(s):
Section 3.1.111 [StaffSymbol], page 507.

Section 2.2.131 [Time_signature_engraver], page 360
Create a Section 3.1.130 [TimeSignature], page 529, whenever
timeSignatureFraction changes.
Music types accepted:
Section 1.2.75 [time-signature-event], page 51,
Properties (read)

\texttt{initialTimeSignatureVisibility} (vector)
break visibility for the initial time signature.

\texttt{partialBusy} (boolean)
Signal that \texttt{\partial} acts at the current timestep.

\texttt{timeSignatureFraction} (fraction, as pair)
A pair of numbers, signifying the time signature. For example, \texttt{'(4 . 4)} is a 4/4 time signature.

This engraver creates the following layout object(s):
Section 3.1.130 [TimeSignature], page 529.

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. \texttt{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):
Section 3.1.9 [Arpeggio], page 387, Section 3.1.57 [InstrumentName], page 447, Section 3.1.107 [SpanBar], page 504, Section 3.1.108 [SpanBarStub], page 505, Section 3.1.121 [SystemStartBar], page 518, Section 3.1.122 [SystemStartBrace], page 519, Section 3.1.123 [SystemStartBracket], page 520, Section 3.1.124 [SystemStartSquare], page 521, and Section 3.1.140 [VerticalAlignment], page 542.

This context sets the following properties:
• Set grob-property \texttt{extra-spacing-width} in Section 3.1.41 [DynamicText], page 429, to \texttt{\#f}.
• Set translator property \texttt{instrumentName} to '() .
• Set translator property \texttt{shortInstrumentName} to '() .
• Set translator property \texttt{systemStartDelimiter} to 'SystemStartBracket .
• Set translator property \texttt{topLevelAlignment} to \texttt{\#f}.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Section 2.1.27 [Staff], page 240.

Context StaffGroup can contain Section 2.1.1 [ChoirStaff], page 59, Section 2.1.2 [ChordNames], page 60, Section 2.1.5 [DrumStaff], page 76, Section 2.1.8 [FiguredBass], page 99, Section 2.1.9 [FretBoards], page 101, Section 2.1.11 [GrandStaff], page 104, Section 2.1.16
Section 2.2.56 [Instrument_name_engraver], page 335
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):
Section 3.1.57 [InstrumentName], page 447.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.111 [Span_arpeggio_engraver], page 354
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):
Section 3.1.9 [Arpeggio], page 387.

Section 2.2.112 [Span_bar_engraver], page 354
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):
Section 3.1.107 [SpanBar], page 504.

Section 2.2.113 [Span_bar_stub_engraver], page 355
Make stubs for span bars in all contexts that the span bars cross.
This engraver creates the following layout object(s):
Section 3.1.108 [SpanBarStub], page 505.
Section 2.2.122 [System_start_delimiter_engraver], page 357
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):
- Section 3.1.121 [SystemStartBar], page 518, Section 3.1.122 [System-StartBrace], page 519, Section 3.1.123 [SystemStartBracket], page 520, and Section 3.1.124 [SystemStartSquare], page 521.

Section 2.2.138 [Vertical_align_engraver], page 362
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):
- Section 3.1.140 [VerticalAlignment], page 542.

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.

This context creates the following layout object(s):
- Section 3.1.12 [BarLine], page 390, Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigureAlignment], page 396, Section 3.1.16 [BassFigureAlignmentPositioning], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, Section 3.1.19 [BassFigureLine], page 398, Section 3.1.26 [Clef], page 406, Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, Section 3.1.32
This context sets the following properties:

- Set grob-property `after-line-breaking` in Section 3.1.96 [RepeatTie], page 494, to `repeat-tie::handle-tab-note-head`.
- Set grob-property `after-line-breaking` in Section 3.1.128 [Tie], page 527, to `tie::handle-tab-note-head`.
- Set grob-property `avoid-note-head` in Section 3.1.113 [Stem], page 508, to `#t`.
- Set grob-property `beam-thickness` in Section 3.1.20 [Beam], page 399, to `0.32`.
- Set grob-property `beam-thickness` in Section 3.1.115 [StemTremolo], page 511, to `0.32`.
- Set grob-property `beam-width` in Section 3.1.115 [StemTremolo], page 511, to `stem-tremolo::calc-tab-width`.
- Set grob-property `bound-details.left` in Section 3.1.50 [Glissando], page 440, to:
  `'(attach-dir . 1) (padding . 0.3))`
- Set grob-property `bound-details.right` in Section 3.1.50 [Glissando], page 440, to:
  `'(attach-dir . -1) (padding . 0.3))`
- Set grob-property `details` in Section 3.1.113 [Stem], page 508, 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 Section 3.1.50 [Glissando], page 440, to `glissando::calc-tab-extra-dy`.
- Set grob-property `glyph-name` in Section 3.1.125 [TabNoteHead], page 522, to `tab-note-head::calc-glyph-name`.
- Set grob-property `ignore-collision` in Section 3.1.83 [NoteColumn], page 480, to `#t`.
- Set grob-property `length-fraction` in Section 3.1.20 [Beam], page 399, to `0.62`.
- Set grob-property `length-fraction` in Section 3.1.115 [StemTremolo], page 511, to `#<procedure #f (grob)>`.
- Set grob-property `no-stem-extend` in Section 3.1.113 [Stem], page 508, to `#t`.
- Set grob-property `staff-space` in Section 3.1.111 [StaffSymbol], page 507, to `1.5`.
- Set grob-property `stencil` in Section 3.1.9 [Arpeggio], page 387, to `#f`.
- Set grob-property `stencil` in Section 3.1.20 [Beam], page 399, to `#f`.
- Set grob-property `stencil` in Section 3.1.26 [Clef], page 406, to `clef::print-modern-tab-if-set`.
- Set grob-property `stencil` in Section 3.1.35 [Dots], page 421, to `#f`.
- Set grob-property `stencil` in Section 3.1.42 [DynamicTextSpanner], page 430, to `#f`. 
• Set grob-property stencil in Section 3.1.41 [DynamicText], page 429, to #f.
• Set grob-property stencil in Section 3.1.46 [Flag], page 435, to #f.
• Set grob-property stencil in Section 3.1.50 [Glissando], page 440, to glissando::draw-tab-glissando.
• Set grob-property stencil in Section 3.1.54 [Hairpin], page 443, to #f.
• Set grob-property stencil in Section 3.1.62 [LaissezVibrerTie], page 455, to #f.
• Set grob-property stencil in Section 3.1.78 [MultiMeasureRestNumber], page 473, to #f.
• Set grob-property stencil in Section 3.1.79 [MultiMeasureRestScript], page 475, to #f.
• Set grob-property stencil in Section 3.1.80 [MultiMeasureRestText], page 476, to #f.
• Set grob-property stencil in Section 3.1.82 [MultiMeasureRest], page 472, to #f.
• Set grob-property stencil in Section 3.1.92 [PhrasingSlur], page 488, to #f.
• Set grob-property stencil in Section 3.1.96 [RepeatTie], page 494, to #f.
• Set grob-property stencil in Section 3.1.98 [Rest], page 495, to #f.
• Set grob-property stencil in Section 3.1.100 [Script], page 497, to #f.
• Set grob-property stencil in Section 3.1.103 [Slur], page 498, to slur::draw-tab-slur.
• Set grob-property stencil in Section 3.1.115 [StemTremolo], page 511, to #f.
• Set grob-property stencil in Section 3.1.113 [Stem], page 508, to #f.
• Set grob-property stencil in Section 3.1.125 [TabNoteHead], page 522, to tab-note-head::whiteout-if-style-set.
• Set grob-property stencil in Section 3.1.126 [TextScript], page 524, to #f.
• Set grob-property stencil in Section 3.1.127 [TextSpanner], page 526, to #f.
• Set grob-property stencil in Section 3.1.128 [Tie], page 527, to #f.
• Set grob-property stencil in Section 3.1.130 [TimeSignature], page 529, to #f.
• Set grob-property stencil in Section 3.1.135 [TupletBracket], page 536, to #f.
• Set grob-property stencil in Section 3.1.136 [TupletNumber], page 538, to #f.
• Set grob-property style in Section 3.1.46 [Flag], page 435, 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 Section 2.1.30 [TabVoice], page 263.

Context TabStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.20 [NullVoice], page 184, and Section 2.1.30 [TabVoice], page 263.

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

Section 2.2.5 [Axis_group_engraver], page 316
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):

Section 3.1.141 [VerticalAxisGroup], page 542.

Section 2.2.7 [Bar_engraver], page 317
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):
Section 3.1.12 [BarLine], page 390.

Section 2.2.17 [Clef_ engraver], page 321
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):
Section 3.1.26 [Clef], page 406, and Section 3.1.27 [ClefModifier],
page 409.

Section 2.2.19 [Collision_ engraver], page 322
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):
Section 3.1.82 [NoteCollision], page 479.

Section 2.2.24 [Cue_clef_ engraver], page 324
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):
Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, and Section 3.1.32 [CueEndClef], page 416.

**Section 2.2.27 [Dot_column_engraver], page 325**
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):
Section 3.1.34 [DotColumn], page 420.

**Section 2.2.38 [Figured_bass_engraver], page 329**
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.55 [rest-event], page 48,
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):
Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigure-Alignment], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, and Section 3.1.19 [BassFigureLine], page 398.

Section 2.2.39 [Figured_bass_position_engraver], page 330
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
Section 3.1.16 [BassFigureAlignmentPositioning], page 396.

Section 2.2.40 [Fingering_column_engraver], page 330
Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.45 [FingeringColumn], page 435.

Section 2.2.42 [Font_size_engraver], page 331
Put fontSize into font-size grob property.
Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.53 [Grob_pq_engraver], page 334
Administrstes 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.).

Section 2.2.56 [Instrument_name_engraver], page 335
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
\texttt{shortInstrumentName} property labels
following lines.

\texttt{shortInstrumentName} (markup)
See \texttt{instrumentName}.

\texttt{shortVocalName} (markup)
Name of a vocal line, short version.

\texttt{vocalName} (markup)
Name of a vocal line.

This engraver creates the following layout object(s):
Section 3.1.57 [\texttt{InstrumentName}], page 447.

Section 2.2.63 [\texttt{Ledger\_line\_engraver}], page 338
Create the spanner to draw ledger lines, and notices objects that need
ledger lines.
This engraver creates the following layout object(s):
Section 3.1.64 [\texttt{LedgerLineSpanner}], page 457.

Section 2.2.73 [\texttt{Merge\_mmrest\_numbers\_engraver}], page 341
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.

Section 2.2.85 [\texttt{Output\_property\_engraver}], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [\texttt{apply\_output\_event}], page 42,

Section 2.2.92 [\texttt{Piano\_pedal\_align\_engraver}], page 348
Align piano pedal symbols and brackets.
Properties (read)

\texttt{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):
Section 3.1.105 [\texttt{SostenutoPedalLineSpanner}], page 502, Section 3.1.119
[\texttt{SustainPedalLineSpanner}], page 516, and Section 3.1.138 [\texttt{UnaCor-
daPedalLineSpanner}], page 540.

Section 2.2.93 [\texttt{Piano\_pedal\_engraver}], page 348
Engrave piano pedal symbols and brackets.
Music types accepted:
Section 1.2.62 [\texttt{sostenuto\_event}], page 49, Section 1.2.70 [\texttt{sustain\_event}],
page 51, and Section 1.2.80 [\texttt{una\_corda\_event}], page 52,
Properties (read)

\texttt{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):
Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.118 [SustainPedal], page 515, and Section 3.1.137 [UnaCordaPedal], page 539.

Section 2.2.97 [Pure_from_neighbor_ engraver], page 350
   Coordinates items that get their pure heights from their neighbors.

Section 2.2.100 [Rest_collision_ engraver], page 351
   Handle collisions of rests.
   Properties (read)

   busyGrosb (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):
   Section 3.1.99 [RestCollision], page 496.

Section 2.2.105 [Script_row_ engraver], page 352
   Determine order in horizontal side position elements.
   This engraver creates the following layout object(s):
   Section 3.1.102 [ScriptRow], page 498.

Section 2.2.106 [Separating_line_group_ engraver], page 353
   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):
Section 3.1.110 [StaffSpacing], page 506.

Section 2.2.116 [Staff_collecting_engraver], page 355
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.

Section 2.2.118 [Staff_symbol_engraver], page 355
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.66 [staff-span-event], page 50,
This engraver creates the following layout object(s):
Section 3.1.111 [StaffSymbol], page 507.

Section 2.2.124 [Tab_staff_symbol_engraver], page 358
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):
Section 3.1.111 [StaffSymbol], page 507.

Section 2.2.131 [Time_signature_engraver], page 360
Create a Section 3.1.130 [TimeSignature], page 529, whenever
timeSignatureFraction changes.
Music types accepted:
Section 1.2.75 [time-signature-event], page 51,
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 signa-
ture. For example, ' (4 . 4) is a 4/4 time sig-
nature.

This engraver creates the following layout object(s):
Section 3.1.130 [TimeSignature], page 529.
2.1.30 TabVoice

Context for drawing notes in a Tab staff.

This context also accepts commands for the following context(s):

Voice.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 387, Section 3.1.20 [Beam], page 399, Section 3.1.21 [BendAfter], page 401, Section 3.1.24 [BreathingSign], page 403, Section 3.1.28 [ClusterSpanner], page 411, Section 3.1.29 [ClusterSpannerBeacon], page 411, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.35 [Dots], page 421, Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.40 [DynamicLineSpanner], page 427, Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, Section 3.1.46 [Flag], page 435, Section 3.1.50 [Glissando], page 440, Section 3.1.54 [Hairpin], page 443, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.62 [LaissezVibrerTie], page 455, Section 3.1.63 [LaissezVibrerTieColumn], page 457, Section 3.1.66 [LigatureBracket], page 460, Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, Section 3.1.80 [MultiMeasureRestText], page 476, Section 3.1.83 [NoteColumn], page 480, Section 3.1.86 [NoteSpacing], page 482, Section 3.1.90 [PercentRepeat], page 486, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.92 [PhrasingSlur], page 488, Section 3.1.95 [RepeatSlash], page 493, Section 3.1.96 [RepeatTie], page 494, Section 3.1.97 [RepeatTieColumn], page 495, Section 3.1.98 [Rest], page 495, Section 3.1.100 [Script], page 497, Section 3.1.101 [ScriptColumn], page 498, Section 3.1.103 [Slur], page 498, Section 3.1.113 [Stem], page 508, Section 3.1.114 [StemStub], page 510, Section 3.1.115 [StemTremolo], page 511, Section 3.1.125 [TabNoteHead], page 522, Section 3.1.126 [TextScript], page 524, Section 3.1.127 [TextSpanner], page 526, Section 3.1.128 [Tie], page 527, Section 3.1.129 [TieColumn], page 529, Section 3.1.134 [TrillSpanner], page 535, Section 3.1.135 [TupletBracket], page 536, Section 3.1.136 [TupletNumber], page 538, and Section 3.1.142 [VoiceFollower], page 544.

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):

Section 2.2.3 [Arpeggio_engraver], page 315
Generate an Arpeggio symbol.

Music types accepted:

Section 1.2.5 [arpeggio-event], page 42,
This engraver creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 387.

Section 2.2.4 [Auto_beam_engraver], page 315
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 2.2.121 [Stem_engraver], page 356, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted:

Section 1.2.9 [beam-forbid-event], page 43,
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):
Section 3.1.20 [Beam], page 399.

Section 2.2.10 [Beam_engraver], page 319
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
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 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.

Properties (write)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.
Section 2.2.12 [Bend_engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.21 [BendAfter], page 401.

Section 2.2.14 [Breathing_sign_engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.24 [BreathingSign], page 403.

Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.77 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.18 [Cluster_spanner_engraver], page 322
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.28 [ClusterSpanner], page 411, and Section 3.1.29 [ClusterSpannerBeacon], page 411.

Section 2.2.28 [Dots_engraver], page 326
Create Section 3.1.35 [Dots], page 421, objects for Section 3.2.100 [rhythmic-head-interface], page 606s.
This engraver creates the following layout object(s):
Section 3.1.35 [Dots], page 421.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
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):
Section 3.1.36 [DoublePercentRepeat], page 422, and Section 3.1.37 [DoublePercentRepeatCounter], page 423.

Section 2.2.33 [Dynamic_align_engraver], page 327
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):
Section 3.1.40 [DynamicLineSpanner], page 427.

Section 2.2.34 [Dynamic_engraver], page 328
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 43, and Section 1.2.64 [span-dynamic-event], page 49,

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):
Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, and Section 3.1.54 [Hairpin], page 443.

Section 2.2.42 [Font_size_engraver], page 331
Put fontSize into font-size grob property.
Properties (read)

\texttt{fontSize} (number)

The relative size of all grobs in a context.

Section 2.2.44 [Forbid\_line\_break\_engraver], page 331

Forbid line breaks when note heads are still playing at some point.

Properties (read)

\texttt{busyGrobs} (list)

A queue of \texttt{(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)

\texttt{forbidBreak} (boolean)

If set to \texttt{#t}, prevent a line break at this point.

Section 2.2.46 [Glissando\_engraver], page 332

Engrave glissandi.

Music types accepted:

Section 1.2.26 [glissando\_event], page 45,

Properties (read)

\texttt{glissandoMap} (list)

A map in the form of \texttt{’((source1 . target1) (source2 . target2) (source\_n . target\_n))} showing the glissandi to be drawn for note columns.

The value \texttt{’()} will default to \texttt{’((0 . 0) (1 . 1) (n . n))}, where \texttt{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):

Section 3.1.50 [Glissando], page 440.

Section 2.2.47 [Grace\_auto\_beam\_engraver], page 333

Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or \texttt{\noBeam} will block autobeamng, just like setting the context property \texttt{‘autoBeaming’} to \texttt{##f}.

Music types accepted:

Section 1.2.9 [beam\_forbid\_event], page 43,

Properties (read)

\texttt{autoBeaming} (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s):

Section 3.1.20 [Beam], page 399.

Section 2.2.48 [Grace\_beam\_engraver], page 333

Handle \texttt{Beam} events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only enigraves beams when we are at grace points in time.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
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 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):
Section 3.1.20 [Beam], page 399.

Section 2.2.49 [Grace_engraver], page 334
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.

Section 2.2.53 [Grob_pq_engraver], page 334
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.).

Section 2.2.57 [Instrument_switch_engraver], page 336
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):
Section 3.1.58 [InstrumentSwitch], page 448.

Section 2.2.62 [Laissez_vibrer_engraver], page 338
Create laissez vibrer items.
Music types accepted:
Section 1.2.31 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.62 [LaissezVibrerTie], page 455, and Section 3.1.63 [LaissezVibrerTieColumn], page 457.

Section 2.2.64 [Ligature_bracket_engraver], page 338
Handle Ligature_events by engraving Ligature brackets.
Music types accepted:
Section 1.2.33 [ligature-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.66 [LigatureBracket], page 460.

Section 2.2.77 [Multi_measure_rest_engraver], page 342
Engrave multi-measure rests that are produced with 'R'. It reads measurePosition and internalBarNumber to determine what number to print over the Section 3.1.77 [MultiMeasureRest], page 472.
Music types accepted:
Section 1.2.40 [multi-measure-articulation-event], page 46,
Section 1.2.41 [multi-measure-rest-event], page 46, and Section 1.2.42 [multi-measure-text-event], page 46,
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 bar number. This property is used for internal timekeeping, among others by the Accidental_engraver.

  measurePosition (moment)
    How much of the current measure have we had. This can be set manually to create incomplete measures.

  restNumberThreshold (number)
    If a multimeasure rest has more measures than this, a number is printed.

  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):

Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, and Section 3.1.80 [MultiMeasureRestText], page 476.

**Section 2.2.79 [Note_head_line_engraver], page 344**

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):

Section 3.1.142 [VoiceFollower], page 544.

**Section 2.2.83 [Note_spacing_engraver], page 345**

Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s):

Section 3.1.86 [NoteSpacing], page 482.

**Section 2.2.85 [Output_property_engraver], page 346**

Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.4 [apply-output-event], page 42.

**Section 2.2.89 [Part_combine_engraver], page 347**

Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted:

Section 1.2.44 [note-event], page 47, and Section 1.2.48 [part-combine-event], page 48.

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):
Section 3.1.30 [CombineTextScript], page 411.

Section 2.2.90 [Percent_repeat_engraver], page 347
Make whole measure repeats.
Music types accepted:
Section 1.2.50 [percent-event], page 48,
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):
Section 3.1.90 [PercentRepeat], page 486, and Section 3.1.91 [PercentRepeatCounter], page 487.

Section 2.2.91 [Phrasing_slur_engraver], page 348
Print phrasing slurs. Similar to Section 2.2.108 [Slur_engraver], page 353.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.52 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.92 [PhrasingSlur], page 488.

Section 2.2.99 [Repeat_tie_engraver], page 351
Create repeat ties.
Music types accepted:
Section 1.2.54 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.96 [RepeatTie], page 494, and Section 3.1.97 [RepeatTieColumn], page 495.

Section 2.2.101 [Rest_engraver], page 351
Engrave rests.
Music types accepted:
Section 1.2.55 [rest-event], page 48,
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):
Section 3.1.98 [Rest], page 495.

Section 2.2.102 [Rhythmic_column_engraver], page 352
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.83 [NoteColumn], page 480.

Section 2.2.103 [Script_column_engraver], page 352
Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.101 [ScriptColumn], page 498.

Section 2.2.104 [Script_engraver], page 352
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)

\texttt{scriptDefinitions} (list)
The description of scripts. This is used by the \texttt{Script_engraver} for typesetting note-superscripts and subscripts. See \texttt{scm/script.scm} for more information.

This engraver creates the following layout object(s):
Section 3.1.100 [Script], page 497.

Section 2.2.107 [Slash_repeat_engraver], page 353
Make beat repeats.
Music types accepted:
Section 1.2.53 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.38 [DoubleRepeatSlash], page 425, and Section 3.1.95 [RepeatSlash], page 493.

Section 2.2.108 [Slur_engraver], page 353
Build slur grobs from slur events.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.59 [slur-event], page 49,
Properties (read)

\texttt{doubleSlurs} (boolean)
If set, two slurs are created for every slurred note, one above and one below the chord.

\texttt{slurMelismaBusy} (boolean)
Signal if a slur is present.

This engraver creates the following layout object(s):
Section 3.1.103 [Slur], page 498.
Section 2.2.115 [Spanner_break_forbid engraver], page 355
Forbid breaks in certain spanners.

Section 2.2.121 [Stem engraver], page 356
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:
Section 1.2.76 [tremolo-event], page 51, and Section 1.2.79 [tuplet-span-event], page 52,

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):
Section 3.1.46 [Flag], page 435, Section 3.1.113 [Stem], page 508, Section 3.1.114 [StemStub], page 510, and Section 3.1.115 [StemTremolo], page 511.

Section 2.2.123 [Tab_note_heads engraver], page 357
Generate one or more tablature note heads from event of type NoteEvent.

Music types accepted:
Section 1.2.24 [fingering-event], page 44, Section 1.2.44 [note-event], page 47, and Section 1.2.68 [string-number-event], page 51,

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):
Section 3.1.125 [TabNoteHead], page 522.

Section 2.2.125 [Tab_tie_follow_engraver], page 358
Adjust TabNoteHead properties when a tie is followed by a slur or glissando.

Section 2.2.127 [Text_engraver], page 358
Create text scripts.
Music types accepted:
Section 1.2.72 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.126 [TextScript], page 524.

Section 2.2.128 [Text_spanner_engraver], page 359
Create text spanner from an event.
Music types accepted:
Section 1.2.73 [text-span-event], page 51,
Properties (read)

\texttt{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):
Section 3.1.127 [TextSpanner], page 526.

\textbf{Section 2.2.129 [Tie_engraver], page 359}
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.74 [tie-event], page 51,
Properties (read)

\texttt{skipTypesetting} (boolean)
If true, no typesetting is done, speeding up
the interpretation phase. Useful for debugging
large scores.

\texttt{tieWaitForNote} (boolean)
If true, tied notes do not have to follow each
other directly. This can be used for writing out
arpeggios.

Properties (write)

\texttt{tieMelismaBusy} (boolean)
Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn],
page 529.

\textbf{Section 2.2.134 [Trill_spanner_engraver], page 361}
Create trill spanner from an event.
Music types accepted:
Section 1.2.78 [trill-span-event], page 52,
Properties (read)

\texttt{currentCommandColumn} (graphical (layout)
object)
Grob that is X-parent to all current breakable
(clef, key signature, etc.) items.

\texttt{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):
Section 3.1.134 [TrillSpanner], page 535.
Section 2.2.135 [Tuplet_engraver], page 362

Catch tuplet events and generate appropriate bracket.

Music types accepted:
Section 1.2.79 [tuplet-span-event], page 52,

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):
Section 3.1.135 [TupletBracket], page 536, and Section 3.1.136 [TupletNumber], page 538.

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.

This context creates the following layout object(s):
Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379, Section 3.1.3 [AccidentalPlacement], page 380, Section 3.1.4 [AccidentalSuggestion], page 381, Section 3.1.12 [BarLine], page 390, Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigureAlignment], page 396, Section 3.1.16 [BassFigureAlignmentPositioning], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, Section 3.1.19 [BassFigureLine], page 398, Section 3.1.26 [Clef], page 406, Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, Section 3.1.32 [CueEndClef], page 416, Section 3.1.33 [Custos], page 419, Section 3.1.34 [DotColumn], page 420, Section 3.1.45 [FingeringColumn], page 435, Section 3.1.57 [InstrumentName], page 447, Section 3.1.59 [KeyCancellation], page 449, Section 3.1.60 [KeySignature], page 452, Section 3.1.64 [LedgerLineSpanner], page 457, Section 3.1.82 [NoteCollision], page 479, Section 3.1.87 [OttavaBracket], page 483, Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.99 [RestCollision], page 496, Section 3.1.102 [ScriptRow], page 498, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.110 [StaffSpacing], page 506, Section 3.1.111 [StaffSymbol], page 507, Section 3.1.118 [SustainPedal], page 515, Section 3.1.119 [SustainPedalLineSpanner], page 516, Section 3.1.137 [UnaCordaPedal], page 539, Section 3.1.138 [UnaCordaPedalLineSpanner], page 540, and Section 3.1.141 [VerticalAxisGroup], page 542.

This context sets the following properties:
• Set grob-property glyph-name-alist in Section 3.1.1 [Accidental], page 378, to:
  '((-1/2 . "accidentals.vaticanaM1")
   (0 . "accidentals.vaticana0")
   (1/2 . "accidentals.mensural1"))
• Set grob-property glyph-name-alist in Section 3.1.60 [KeySignature], page 452, to:
  '((-1/2 . "accidentals.vaticanaM1")
(0 . "accidentals.vaticana0")
(1/2 . "accidentals.mensural1")

• Set grob-property line-count in Section 3.1.111 [StaffSymbol], page 507, to 4.
• Set grob-property neutral-direction in Section 3.1.33 [Custos], page 419, to -1.
• Set grob-property neutral-position in Section 3.1.33 [Custos], page 419, to 3.
• Set grob-property style in Section 3.1.33 [Custos], page 419, to 'vaticana.
• Set grob-property style in Section 3.1.35 [Dots], page 421, to 'vaticana.
• Set grob-property thickness in Section 3.1.111 [StaffSymbol], page 507, to 0.6.
• Set grob-property transparent in Section 3.1.12 [BarLine], page 390, to #t.
• 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 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 Section 2.1.32 [VaticanaVoice], page 287.

Context VaticanaStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.20 [NullVoice], page 184, and Section 2.1.32 [VaticanaVoice], page 287.

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

Section 2.2.1 [Accidental_engraver], page 313
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 al-
ist 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) . (al-
ter 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) . (al-
ter barnumber . measureposition)) pairs.

This engraver creates the following layout object(s):
Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautio-

nary], page 379, Section 3.1.3 [AccidentalPlacement], page 380, and
Section 3.1.4 [AccidentalSuggestion], page 381.

Section 2.2.5 [Axis_group_engraver], page 316
Group all objects created in this context in a VerticalAxisGroup span-
ner.

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):
Section 3.1.141 [VerticalAxisGroup], page 542.
Section 2.2.7 [Bar_engraver], page 317
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):
Section 3.1.12 [BarLine], page 390.

Section 2.2.17 [Clef_engraver], page 321
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):
Section 3.1.26 [Clef], page 406, and Section 3.1.27 [ClefModifier], page 409.
Section 2.2.19 [Collision_engraver], page 322
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):
Section 3.1.82 [NoteCollision], page 479.

Section 2.2.24 [Cue_clef_engraver], page 324
Determine and set reference point for pitches in cued voices.
Properties (read)

\begin{verbatim}
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.
\end{verbatim}

This engraver creates the following layout object(s):
Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, and Section 3.1.32 [CueEndClef], page 416.

Section 2.2.25 [Custos_engraver], page 324
Engrave custodes.
This engraver creates the following layout object(s):
Section 3.1.33 [Custos], page 419.

Section 2.2.27 [Dot_column_engraver], page 325
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):
Section 3.1.34 [DotColumn], page 420.
Section 2.2.38 [Figured_bass_engraver], page 329
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.55 [rest-event], page 48,
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):
Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigure-Alignment], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, and Section 3.1.19 [BassFigureLine], page 398.

Section 2.2.39 [Figured_bass_position_engraver], page 330
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
Section 3.1.16 [BassFigureAlignmentPositioning], page 396.

Section 2.2.40 [Fingering_column_engraver], page 330
Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.45 [FingeringColumn], page 435.

Section 2.2.42 [Font_size_engraver], page 331
Put fontSize into font-size grob property.
Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.53 [Grob_pq_engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

`busyGrobs` (list)
A queue of \texttt{(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 \texttt{(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.).

Section 2.2.56 [Instrument_name_engraver], page 335
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):
Section 3.1.57 [InstrumentName], page 447.

Section 2.2.59 [Key_engraver], page 336
Engrave a key signature.
Music types accepted:
Section 1.2.29 [key-change-event], page 45,

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):
Section 3.1.59 [KeyCancellation], page 449, and Section 3.1.60 [KeySignature], page 452.
Section 2.2.63 [Ledger_line_engraver], page 338
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s):
Section 3.1.64 [LedgerLineSpanner], page 457.

Section 2.2.73 [Merge_mmrest_numbers_engraver], page 341
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.

Section 2.2.84 [Ottava_spanner_engraver], page 345
Create a text spanner when the ottavation property changes.
Properties (read)

\[
\text{currentMusicalColumn} \quad \text{(graphical (layout) object)}
\]
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

\[
\text{middleCOffset} \quad \text{(number)}
\]
The offset of middle C from the position given by \text{middleCClefPosition} This is used for ottava brackets.

\[
\text{ottavation} \quad \text{(markup)}
\]
If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s):
Section 3.1.87 [OttavaBracket], page 483.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.92 [Piano_pedal_align_engraver], page 348
Align piano pedal symbols and brackets.
Properties (read)

\[
\text{currentCommandColumn} \quad \text{(graphical (layout) object)}
\]
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

This engraver creates the following layout object(s):
Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.119
[SustainPedalLineSpanner], page 516, and Section 3.1.138 [UnaCordaPedalLineSpanner], page 540.

Section 2.2.93 [Piano_pedal_engraver], page 348
Engrave piano pedal symbols and brackets.
Music types accepted:
Section 1.2.62 [sostenuto-event], page 49, Section 1.2.70 [sustain-event],
page 51, and Section 1.2.80 [una-corda-event], page 52,
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 \( \text{up updown down} \), 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):
- Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.118 [SustainPedal], page 515, and Section 3.1.137 [UnaCordaPedal], page 539.

**Section 2.2.97** [Pure_from_neighbor_engraver], page 350
Coordinates items that get their pure heights from their neighbors.

**Section 2.2.100** [Rest_collision_engraver], page 351
Handle collisions of rests.

Properties (read)

**busyGrobs** (list)
A queue of \( \text{end-moment . grob} \) 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):
- Section 3.1.99 [RestCollision], page 496.

**Section 2.2.105** [Script_row_engraver], page 352
Determine order in horizontal side position elements.
This engraver creates the following layout object(s):
- Section 3.1.102 [ScriptRow], page 498.

**Section 2.2.106** [Separating_line_group_engraver], page 353
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):
Section 3.1.110 [StaffSpacing], page 506.

Section 2.2.116 [Staff_collecting_engraver], page 355
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.

Section 2.2.118 [Staff_symbol_engraver], page 355
Create the constellation of five (default) staff lines.

Music types accepted:
Section 1.2.66 [staff-span-event], page 50,
This engraver creates the following layout object(s):
Section 3.1.111 [StaffSymbol], page 507.

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.

This context creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 387, Section 3.1.20 [Beam], page 399, Section 3.1.21 [BendAfter], page 401, Section 3.1.24 [BreathingSign], page 403, Section 3.1.28 [ClusterSpanner], page 411, Section 3.1.29 [ClusterSpannerBeacon], page 411, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.34 [DotColumn], page 420, Section 3.1.35 [Dots], page 421, Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.40 [DynamicLineSpanner], page 427, Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, Section 3.1.43 [Episema], page 432, Section 3.1.44 [Fingering], page 433, Section 3.1.50 [Glissando], page 440, Section 3.1.54 [Hairpin], page 443, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.62 [LaissezVibrerTie], page 455, Section 3.1.63 [LaissezVibrerTieColumn], page 457, Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, Section 3.1.80 [MultiMeasureRestText], page 476, Section 3.1.83 [NoteColumn], page 480, Section 3.1.84 [NoteHead], page 480, Section 3.1.86 [NoteSpacing], page 482, Section 3.1.90 [PercentRepeat], page 486, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.92
This context sets the following properties:

- Set grob-property `padding` in Section 3.1.100 [Script], page 497, to 0.5.
- Set grob-property `style` in Section 3.1.84 [NoteHead], page 480, 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):

**Section 2.2.3 [Arpeggio_engraver], page 315**
Generate an Arpeggio symbol.
Music types accepted:
Section 1.2.5 [arpeggio-event], page 42,
This engraver creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 387.

**Section 2.2.4 [Auto_beam_engraver], page 315**
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 2.2.121 [Stem_engraver],
page 356, properties `stemLeftBeamCount` and `stemRightBeamCount`.
Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
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):
Section 3.1.20 [Beam], page 399.

Section 2.2.10 [Beam_ engraver], page 319
Handle Beam events by engraving beams. If omitted, then notes are
printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
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 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.

Properties (write)

   forbidBreak (boolean)
      If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.12 [Bend_ engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.21 [BendAfter], page 401.

Section 2.2.14 [Breathing_sign_ engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.24 [BreathingSign], page 403.

Section 2.2.16 [Chord_tremolo_ engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.77 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.18 [Cluster_spanner_engraver], page 322
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.28 [ClusterSpanner], page 411, and Section 3.1.29 [ClusterSpannerBeacon], page 411.

Section 2.2.28 [Dots_ engraver], page 326
Create Section 3.1.35 [Dots], page 421, objects for Section 3.2.100 [rhythmic-head-interface], page 606s.
This engraver creates the following layout object(s):
Section 3.1.35 [Dots], page 421.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
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):
Section 3.1.36 [DoublePercentRepeat], page 422, and Section 3.1.37 [DoublePercentRepeatCounter], page 423.

Section 2.2.33 [Dynamic_align_engraver], page 327
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):
Section 3.1.40 [DynamicLineSpanner], page 427.

**Section 2.2.34 [Dynamic_engraver], page 328**
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 43, and Section 1.2.64 [span-dynamic-event], page 49.

**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):
Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, and Section 3.1.54 [Hairpin], page 443.

**Section 2.2.36 [Episema_engraver], page 329**
Create an *Editio Vaticana*-style episema line.
Music types accepted:
Section 1.2.22 [episema-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.43 [Episema], page 432.

**Section 2.2.41 [Fingering_engraver], page 330**
Create fingering scripts.
Music types accepted:
Section 1.2.24 [fingering-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.44 [Fingering], page 433.

**Section 2.2.42 [Font_size_engraver], page 331**
Put `fontSize` into `font-size` grob property.
Properties (read)

*fontSize* (number)

The relative size of all grobs in a context.

**Section 2.2.44 [Forbid_line_break_engraver], page 331**

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.

**Section 2.2.46 [Glissando_engraver], page 332**

Engrave glissandi.

Music types accepted:

**Section 1.2.26 [glissando-event], page 45,**

Properties (read)

*glissandoMap* (list)

A map in the form of `'(source1 . target1) (source2 . target2) (source . 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):

**Section 3.1.50 [Glissando], page 440.**

**Section 2.2.47 [Grace_auto_beam_engraver], page 333**

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:

**Section 1.2.9 [beam-forbid-event], page 43,**

Properties (read)

*autoBeaming* (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s):

**Section 3.1.20 [Beam], page 399.**

**Section 2.2.48 [Grace_beam_engraver], page 333**

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:
Section 1.2.8 [beam-event], page 43,
Properties (read)

\texttt{baseMoment} \ (\texttt{moment})
Smallest unit of time that will stand on its own
as a subdivided section.

\texttt{beamMelismaBusy} \ (\texttt{boolean})
Signal if a beam is present.

\texttt{beatStructure} \ (\texttt{list})
List of base\texttt{Moments} that are combined to make
beats.

\texttt{subdivideBeams} \ (\texttt{boolean})
If set, multiple beams will be subdivided at
\texttt{baseMoment} positions by only drawing one
beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

\textbf{Section 2.2.49 [Grace\_engraver], page 334}
Set font size and other properties for grace notes.
Properties (read)

\texttt{graceSettings} \ (\texttt{list})
Overrides for grace notes. This property
should be manipulated through the
\texttt{add-grace-property} function.

\textbf{Section 2.2.53 [Grob\_pq\_engraver], page 334}
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

\texttt{busyGrobs} \ (\texttt{list})
A queue of (end-moment . grob) cons cells.
This is for internal (C++) use only. This prop-
terty contains the grobs which are still busy (e.g.
ote heads, spanners, etc.).

Properties (write)

\texttt{busyGrobs} \ (\texttt{list})
A queue of (end-moment . grob) cons cells.
This is for internal (C++) use only. This prop-
terty contains the grobs which are still busy (e.g.
ote heads, spanners, etc.).

\textbf{Section 2.2.57 [Instrument\_switch\_engraver], page 336}
Create a cue text for taking instrument.
Properties (read)

\texttt{instrumentCueName} \ (\texttt{markup})
The name to print if another instrument is to
be taken.
This engraver creates the following layout object(s):
Section 3.1.58 [InstrumentSwitch], page 448.

Section 2.2.62 [Laissez_vibrer_engraver], page 338
Create laissez vibrer items.
Music types accepted:
Section 1.2.31 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.62 [LaissezVibrerTie], page 455, and Section 3.1.63 [LaissezVibrerTieColumn], page 457.

Section 2.2.77 [Multi_measure_rest_engraver], page 342
Engrave multi-measure rests that are produced with ‘R’. It reads measurePosition and internalBarNumber to determine what number to print over the Section 3.1.77 [MultiMeasureRest], page 472.
Music types accepted:
Section 1.2.40 [multi-measure-articulation-event], page 46,
Section 1.2.41 [multi-measure-rest-event], page 46, and Section 1.2.42 [multi-measure-text-event], page 46,
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.

 measurePosition (moment)
    How much of the current measure have we had. This can be set manually to create incomplete measures.

 restNumberThreshold (number)
    If a multimeasure rest has more measures than this, a number is printed.

 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):
Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, and Section 3.1.80 [MultiMeasureRestText], page 476.
Section 2.2.78 [New_fingering_engraver], page 343
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):
Section 3.1.44 [Fingering], page 433, Section 3.1.100 [Script], page 497, Section 3.1.116 [StringNumber], page 512, and Section 3.1.117 [StrokeFinger], page 514.

Section 2.2.79 [Note_head_line_engraver], page 344
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):
Section 3.1.142 [VoiceFollower], page 544.

Section 2.2.80 [Note_heads_engraver], page 344
Generate note heads.

Music types accepted:
Section 1.2.44 [note-event], page 47,

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):
Section 3.1.84 [NoteHead], page 480.

Section 2.2.83 [Note_spacing_engraver], page 345
Generate NoteSpacing, an object linking horizontal lines for use in spacing.
This engraver creates the following layout object(s):
Section 3.1.86 [NoteSpacing], page 482.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.89 [Part_combine_engraver], page 347
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.48 [part-combine-event], page 48,

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):
Section 3.1.30 [CombineTextScript], page 411.

Section 2.2.90 [Percent_repeat_engraver], page 347
Make whole measure repeats.
Music types accepted:
Section 1.2.50 [percent-event], page 48,

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):
Section 3.1.90 [PercentRepeat], page 486, and Section 3.1.91 [PercentRepeatCounter], page 487.

Section 2.2.91 [Phrasing_slur_engraver], page 348
Print phrasing slurs. Similar to Section 2.2.108 [Slur_engraver], page 353.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.52 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.92 [PhrasingSlur], page 488.

Section 2.2.96 [Pitched_trill_engraver], page 350
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, and Section 3.1.133 [TrillPitchHead], page 534.

Section 2.2.99 [Repeat_tie_engraver], page 351
Create repeat ties.
Music types accepted:
Section 1.2.54 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.96 [RepeatTie], page 494, and Section 3.1.97 [RepeatTieColumn], page 495.

Section 2.2.101 [Rest_engraver], page 351
Engrave rests.
Music types accepted:
Section 1.2.55 [rest-event], page 48,
Properties (read)

\[
\text{middleCPosition} \text{ (number)}
\]
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):
Section 3.1.98 [Rest], page 495.

Section 2.2.102 [Rhythmic_column_engraver], page 352
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.83 [NoteColumn], page 480.

Section 2.2.103 [Script_column_engraver], page 352
Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.101 [ScriptColumn], page 498.
Section 2.2.104 [Script_engraver], page 352
Handle note scripted articulations.

Music types accepted:
Section 1.2.6 [articulation-event], page 43,

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):
Section 3.1.100 [Script], page 497.

Section 2.2.107 [Slash_repeat_engraver], page 353
Make beat repeats.

Music types accepted:
Section 1.2.53 [repeat-slash-event], page 48,

This engraver creates the following layout object(s):
Section 3.1.38 [DoubleRepeatSlash], page 425, and Section 3.1.95 [RepeatSlash], page 493.

Section 2.2.115 [Spanner_break_forbid_engraver], page 355
Forbid breaks in certain spanners.

Section 2.2.127 [Text_engraver], page 358
Create text scripts.

Music types accepted:
Section 1.2.72 [text-script-event], page 51,

This engraver creates the following layout object(s):
Section 3.1.126 [TextScript], page 524.

Section 2.2.129 [Tie_engraver], page 359
Generate ties between note heads of equal pitch.

Music types accepted:
Section 1.2.74 [tie-event], page 51,

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):

Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn], page 529.

Section 2.2.134 [Trill_spanner_ engraver], page 361
Create trill spanner from an event.

Music types accepted:
Section 1.2.78 [trill-span-event], page 52,
Properties (read)

\[
\textbf{currentCommandColumn} \text{ (graphical (layout) object)}
\]
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\[
\textbf{currentMusicalColumn} \text{ (graphical (layout) object)}
\]
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.134 [TrillSpanner], page 535.

Section 2.2.135 [Tuplet_ engraver], page 362
Catch tuplet events and generate appropriate bracket.

Music types accepted:
Section 1.2.79 [tuplet-span-event], page 52,
Properties (read)

\[
\textbf{tupletFullLength} \text{ (boolean)}
\]
If set, the tuplet is printed up to the start of the next note.

\[
\textbf{tupletFullLengthNote} \text{ (boolean)}
\]
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):
Section 3.1.135 [TupletBracket], page 536, and Section 3.1.136 [Tuplet-Number], page 538.

Section 2.2.137 [Vaticana_ligature_ engraver], page 362
Handle ligatures by gluing special ligature heads together.

Music types accepted:
Section 1.2.33 [ligature-event], page 45, and Section 1.2.51 [pes-or-flexa-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.34 [DotColumn], page 420, and Section 3.1.139 [VaticanaLigature], page 541.
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):

Section 3.1.9 [Arpeggio], page 387, Section 3.1.20 [Beam], page 399, Section 3.1.21 [BendAfter], page 401, Section 3.1.24 [BreathingSign], page 403, Section 3.1.28 [ClusterSpanner], page 411, Section 3.1.29 [ClusterSpannerBeacon], page 411, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.35 [Dots], page 421, Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.40 [DynamicLineSpanner], page 427, Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, Section 3.1.44 [Fingering], page 433, Section 3.1.46 [Flag], page 435, Section 3.1.50 [Glissando], page 440, Section 3.1.54 [Hairpin], page 443, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.62 [LaissezVibrerTie], page 455, Section 3.1.63 [LaissezVibrerTieColumn], page 457, Section 3.1.66 [LigatureBracket], page 460, Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, Section 3.1.80 [MultiMeasureRestText], page 476, Section 3.1.83 [NoteColumn], page 480, Section 3.1.84 [NoteHead], page 480, Section 3.1.86 [NoteSpacing], page 482, Section 3.1.90 [PercentRepeat], page 486, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.92 [PhrasingSlur], page 488, Section 3.1.95 [RepeatSlash], page 493, Section 3.1.96 [RepeatTie], page 494, Section 3.1.97 [RepeatTieColumn], page 495, Section 3.1.98 [Rest], page 495, Section 3.1.100 [Script], page 497, Section 3.1.101 [ScriptColumn], page 498, Section 3.1.103 [Slur], page 498, Section 3.1.113 [Stem], page 508, Section 3.1.114 [StemStub], page 510, Section 3.1.115 [StemTremolo], page 511, Section 3.1.116 [StringNumber], page 512, Section 3.1.117 [StrokeFinger], page 514, Section 3.1.126 [TextScript], page 524, Section 3.1.127 [TextSpanner], page 526, Section 3.1.128 [TextStems], page 527, Section 3.1.129 [Tie], page 527, Section 3.1.131 [TieColumn], page 529, Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, Section 3.1.133 [TrillPitchHead], page 534, Section 3.1.134 [TrillSpanner], page 535, Section 3.1.135 [TupletBracket], page 536, Section 3.1.136 [TupletNumber], page 538, and Section 3.1.142 [VoiceFollower], page 544.

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):

Section 2.2.3 [Arpeggio_engraver], page 315
Generate an Arpeggio symbol.
Music types accepted:
Section 1.2.5 [arpeggio-event], page 42,
This engraver creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 387.

Section 2.2.4 [Auto_beam_engraver], page 315
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 2.2.121 [Stem_engraver], page 356, properties stemLeftBeamCount and stemRightBeamCount.
Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
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):
Section 3.1.20 [Beam], page 399.

Section 2.2.10 [Beam_engraver], page 319
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted:
Section 1.2.8 [beam-event], page 43,

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):
Section 3.1.20 [Beam], page 399.

Section 2.2.12 [Bend_engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.21 [BendAfter], page 401.

Section 2.2.14 [Breathing_sign_engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.24 [BreathingSign], page 403.

Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.77 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.18 [Cluster_spanner_engraver], page 322
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.28 [ClusterSpanner], page 411, and Section 3.1.29 [ClusterSpannerBeacon], page 411.

Section 2.2.28 [Dots_engraver], page 326
Create Section 3.1.35 [Dots], page 421, objects for Section 3.2.100 [rhythmic-head-interface], page 606s.
This engraver creates the following layout object(s):
Section 3.1.35 [Dots], page 421.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
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):
Section 3.1.36 [DoublePercentRepeat], page 422, and Section 3.1.37 [DoublePercentRepeatCounter], page 423.

Section 2.2.33 [Dynamic_align_engraver], page 327
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):
Section 3.1.40 [DynamicLineSpanner], page 427.

Section 2.2.34 [Dynamic_engraver], page 328
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 43, and Section 1.2.64 [span-dynamic-event], page 49,

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):
Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, and Section 3.1.54 [Hairpin], page 443.

Section 2.2.41 [Fingering_engraver], page 330
Create fingering scripts.
Music types accepted:
Section 1.2.24 [fingering-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.44 [Fingering], page 433.

Section 2.2.42 [Font_size_engraver], page 331
Put fontSize into font-size grob property.
Properties (read)

```
fontSize (number)
```

The relative size of all grobs in a context.

Section 2.2.44 [Forbid_line_break_engraver], page 331
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.

Section 2.2.46 [Glissando_engraver], page 332
Engrave glissandi.
Music types accepted:
Section 1.2.26 [glissando-event], page 45,
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 '()), 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):
Section 3.1.50 [Glissando], page 440.

Section 2.2.47 [Grace_auto_beam_engraver], page 333
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:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)
  autoBeaming (boolean)
    If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Section 2.2.48 [Grace_beam_engraver], page 333
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:
Section 1.2.8 [beam-event], page 43,
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 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):
Section 3.1.20 [Beam], page 399.

Section 2.2.49 [Grace_engraver], page 334
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.

Section 2.2.53 [Grob_pq_engraver], page 334
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 \(\text{end-moment} . \text{grob}\) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Section 2.2.57 [Instrument_switch_engraver], page 336
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):
Section 3.1.58 [InstrumentSwitch], page 448.

Section 2.2.62 [Laissez_vibrer_engraver], page 338
Create laissez vibrer items.
Music types accepted:
Section 1.2.31 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.62 [LaissezVibrerTie], page 455, and Section 3.1.63 [LaissezVibrerTieColumn], page 457.

Section 2.2.64 [Ligature_bracket_engraver], page 338
Handle \text{Ligature\_events} by engraving \text{Ligature} brackets.
Music types accepted:
Section 1.2.33 [ligature-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.66 [LigatureBracket], page 460.

Section 2.2.77 [Multi_measure_rest_engraver], page 342
Engrave multi-measure rests that are produced with ‘R’. It reads \text{measurePosition} and \text{internalBarNumber} to determine what number to print over the Section 3.1.77 [MultiMeasureRest], page 472.
Music types accepted:
Section 1.2.40 [multi-measure-articulation-event], page 46, Section 1.2.41 [multi-measure-rest-event], page 46, and Section 1.2.42 [multi-measure-text-event], page 46,

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 \text{Accidental\_engraver}. 
measurePosition (moment)
   How much of the current measure have we had.
   This can be set manually to create incomplete measures.

restNumberThreshold (number)
   If a multimeasure rest has more measures than this, a number is printed.

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):
Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, and Section 3.1.80 [MultiMeasureRestText], page 476.

Section 2.2.78 [New_fingering_engraver], page 343
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):
Section 3.1.44 [Fingering], page 433, Section 3.1.100 [Script], page 497, Section 3.1.116 [StringNumber], page 512, and Section 3.1.117 [StrokeFinger], page 514.

Section 2.2.79 [Note_head_line_engraver], page 344
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):
Section 3.1.142 [VoiceFollower], page 544.

Section 2.2.80 [Note_heads_engraver], page 344
Generate note heads.
Music types accepted:
Section 1.2.44 [note-event], page 47,
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):
Section 3.1.84 [NoteHead], page 480.

Section 2.2.83 [Note_spacing_engraver], page 345
Generate NoteSpacing, an object linking horizontal lines for use in spacing.
This engraver creates the following layout object(s):
Section 3.1.86 [NoteSpacing], page 482.

Section 2.2.85 [Output_property_engraver], page 346
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Section 2.2.89 [Part_combine_engraver], page 347
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.48 [part-combine-event], page 48,
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.
Chapter 2: Translation

soloText (markup)
The text for the start of a solo when part-

This engraver creates the following layout object(s):
Section 3.1.30 [CombineTextScript], page 411.

Section 2.2.90 [Percent_repeat_engraver], page 347
Make whole measure repeats.
Music types accepted:
Section 1.2.50 [percent-event], page 48,
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):
Section 3.1.90 [PercentRepeat], page 486, and Section 3.1.91 [PercentRepeatCounter], page 487.

Section 2.2.91 [Phrasing_slur_engraver], page 348
Print phrasing slurs. Similar to Section 2.2.108 [Slur_engraver], page 353.
Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.52 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.92 [PhrasingSlur], page 488.

Section 2.2.96 [Pitched_trill_engraver], page 350
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, and Section 3.1.133 [TrillPitchHead], page 534.

Section 2.2.99 [Repeat_tie_engraver], page 351
Create repeat ties.
Music types accepted:
Section 1.2.54 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.96 [RepeatTie], page 494, and Section 3.1.97 [RepeatTieColumn], page 495.
Section 2.2.101 [Rest_engraver], page 351
Engrave rests.

Music types accepted:
Section 1.2.55 [rest-event], page 48,

Properties (read)

\textbf{middleCPosition} (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at \texttt{middleCClefPosition} and \texttt{middleCOffset}.

This engraver creates the following layout object(s):
Section 3.1.98 [Rest], page 495.

Section 2.2.102 [Rhythmic_column_engraver], page 352
Generate \texttt{NoteColumn}, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s):
Section 3.1.83 [NoteColumn], page 480.

Section 2.2.103 [Script_column_engraver], page 352
Find potentially colliding scripts and put them into a \texttt{ScriptColumn} object; that will fix the collisions.

This engraver creates the following layout object(s):
Section 3.1.101 [ScriptColumn], page 498.

Section 2.2.104 [Script_engraver], page 352
Handle note scripted articulations.

Music types accepted:
Section 1.2.6 [articulation-event], page 43,

Properties (read)

\textbf{scriptDefinitions} (list)
The description of scripts. This is used by the \texttt{Script_engraver} for typesetting note-superscripts and subscripts. See \texttt{scm/script.scm} for more information.

This engraver creates the following layout object(s):
Section 3.1.100 [Script], page 497.

Section 2.2.107 [Slash_repeat_engraver], page 353
Make beat repeats.

Music types accepted:
Section 1.2.53 [repeat-slash-event], page 48,

This engraver creates the following layout object(s):
Section 3.1.38 [DoubleRepeatSlash], page 425, and Section 3.1.95 [RepeatSlash], page 493.

Section 2.2.108 [Slur_engraver], page 353
Build slur grobs from slur events.

Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.59 [slur-event], page 49,
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):
Section 3.1.103 [Slur], page 498.

Section 2.2.115 [Spanner_break_forbid_engraver], page 355
Forbid breaks in certain spanners.

Section 2.2.121 [Stem_engraver], page 356
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:
Section 1.2.76 [tremolo-event], page 51, and Section 1.2.79 [tuplet-span-event], page 52,
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):
Section 3.1.46 [Flag], page 435, Section 3.1.113 [Stem], page 508,
Section 3.1.114 [StemStub], page 510, and Section 3.1.115 [StemTremolo], page 511.

Section 2.2.127 [Text_engraver], page 358
Create text scripts.

Music types accepted:
Section 1.2.72 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.126 [TextScript], page 524.
Section 2.2.128 [Text_spanner_engraver], page 359
Create text spanner from an event.
Music types accepted:
Section 1.2.73 [text-span-event], page 51,
Properties (read)

\texttt{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):
Section 3.1.127 [TextSpanner], page 526.

Section 2.2.129 [Tie_engraver], page 359
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.74 [tie-event], page 51,
Properties (read)

\texttt{skipTypesetting} (boolean)
If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

\texttt{tieWaitForNote} (boolean)
If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

\texttt{tieMelismaBusy} (boolean)
Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn], page 529.

Section 2.2.134 [Trill_spanner_engraver], page 361
Create trill spanner from an event.
Music types accepted:
Section 1.2.78 [trill-span-event], page 52,
Properties (read)

\texttt{currentCommandColumn} (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\texttt{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):
Section 3.1.134 [TrillSpanner], page 535.
Section 2.2.135 [Tuplet_ engraver], page 362
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.79 [tuplet-span-event], page 52,
Properties (read)

\texttt{tupletFullLength} (boolean)
If set, the tuplet is printed up to the start of the next note.

\texttt{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):
Section 3.1.135 [TupletBracket], page 536, and Section 3.1.136 [Tuplet-Number], page 538.

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 \texttt{\override} them at Voice.
Properties (read)

\texttt{accidentalGrouping} (symbol)
If set to \texttt{\"voice\}, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

\texttt{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.

\texttt{symbol} The symbol is the name of the context in which the following rules are to be applied. For example, if \texttt{context} is Section “Score” in Internals Reference then all staves share accidentals, and if \texttt{context} is Section “Staff” in Internals Reference then all voices in the same staff share accidentals, but staves do not.

\texttt{procedure} The procedure represents an accidental rule to be applied to the previously specified context.
The procedure takes the following arguments:

\texttt{context} The current context to which the rule should be applied.
\texttt{pitch} The pitch of the note to be evaluated.
\texttt{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.

code

(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.

code

(extraNatural (boolean))
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

code

(harmonicAccidentals (boolean))
If set, harmonic notes in chords get accidentals.

code

(internalBarNumber (integer))
Contains the current barnumber. This property is used for internal timekeeping, among others by the Accidental_engraver.

code

(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)).

code

(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):

Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379, Section 3.1.3 [AccidentalPlacement], page 380, and Section 3.1.4 [AccidentalSuggestion], page 381.

Accidental_engraver is part of the following context(s): Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, and Section 2.1.31 [VaticanaStaff], page 276.

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. \( \text{keyAlterations} = \#\ce{(6, FLAT)} \).

\( \text{middleCClefPosition} \) (number)
The position of the middle C, as determined only by the clef. This can be calculated by looking at clefPosition and clefGlyph.

\( \text{middleCCuePosition} \) (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.

\( \text{middleCOffset} \) (number)
The offset of middle C from the position given by middleCClefPosition. This is used for ottava brackets.

\( \text{middleCPosition} \) (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

\( \text{staffLineLayoutFunction} \) (procedure)
Layout of staff lines, traditional, or semitone.

This engraver creates the following layout object(s):

Section 3.1.3 [AccidentalPlacement], page 380, Section 3.1.5 [Ambitus], page 383, Section 3.1.6 [AmbitusAccidental], page 384, Section 3.1.7 [AmbitusLine], page 385, and Section 3.1.8 [AmbitusNoteHead], page 386.

\( \text{Ambitus_engraver} \) is not part of any context.

### 2.2.3 Arpeggio_engraver

Generate an Arpeggio symbol.

Music types accepted:

Section 1.2.5 [arpeggio-event], page 42,

This engraver creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 387.

\( \text{Arpeggio_engraver} \) is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

### 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 2.2.121 [Stem_engraver], page 356, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted:

Section 1.2.9 [beam-forbid-event], page 43,

Properties (read)

\( \text{autoBeaming} \) (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):
Section 3.1.20 [Beam], page 399.

Auto_beam_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

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, et c.) 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):
Section 3.1.141 [VerticalAxisGroup], page 542.

Axis_group_engraver is part of the following context(s): Section 2.1.2 [ChordNames], page 60, Section 2.1.5 [DrumStaff], page 76, Section 2.1.7 [Dynamics], page 95, Section 2.1.8 [FiguredBass], page 99, Section 2.1.9 [FretBoards], page 101, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.16 [Lyrics], page 155, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.19 [NoteNames], page 182, Section 2.1.21 [OneStaff], page 187, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.
2.2.6 Balloon_engraver

Create balloon texts.

Music types accepted:
Section 1.2.3 [annotate-output-event], page 42,
This engraver creates the following layout object(s):
Section 3.1.10 [BalloonTextItem], page 389.
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):
Section 3.1.12 [BarLine], page 390.
Bar_engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.7 [Dynamics], page 95, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.8 Bar_number_engraver

A bar number is created whenever measurePosition is zero and when there is a bar line (i.e., when whichBar is set). 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 2.2.116 [Staff_collecting_engraver], page 355.

Music types accepted:
Section 1.2.2 [alternative-event], page 42,
Properties (read)

alternativeNumberingStyle (symbol)
The style of an alternative’s bar numbers. Can be numbers for going back to the same number or numbers-with-letters for going back to the same number with letter suffixes. No setting will not go back in measure-number time.

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 bar number. This property is incremented at every bar line.

stavesFound (list of grobs)
A list of all staff-symbols found.

whichBar (string)
This property is read to determine what type of bar line to create.
Example:
\set Staff.whichBar = "\.1:"
This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

Properties (write)

currentBarNumber (integer)
Contains the current bar number. This property is incremented at every bar line.

This engraver creates the following layout object(s):
Section 3.1.13 [BarNumber], page 393.

Bar_number_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.
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): Section 2.1.26 [Score], page 219.

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:
Section 1.2.8 [beam-event], page 43,
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 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.

Properties (write)

- forbidBreak (boolean)
  If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

Beam_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievianVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.20 [NullVoice], page 184, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.11 Beam_performer

Music types accepted:
Section 1.2.8 [beam-event], page 43,

Beam_performer is not part of any context.

2.2.12 Bend_engraver
Create fall spanners.

Music types accepted:
Section 1.2.10 [bend-after-event], page 43,

This engraver creates the following layout object(s):
Section 3.1.21 [BendAfter], page 401.

Bend_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievianVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.
2.2.13 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):

Section 3.1.22 [BreakAlignGroup], page 401, Section 3.1.23 [BreakAlignment], page 402, and Section 3.1.65 [LeftEdge], page 458.

Break_align_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.14 Breathing_sign_engraver

Create a breathing sign.

Music types accepted:

Section 1.2.14 [breathing-event], page 43,

This engraver creates the following layout object(s):

Section 3.1.24 [BreathingSign], page 403.

Breathing_sign_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.15 Chord_name_engraver

Catch note and rest events and generate the appropriate chordName.

Music types accepted:

Section 1.2.44 [note-event], page 47, and Section 1.2.55 [rest-event], page 48,

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):
Section 3.1.25 [ChordName], page 405.
Chord_name_engraver is part of the following context(s): Section 2.1.2 [ChordNames], page 60.

2.2.16 Chord_tremolo_engraver
Generate beams for tremolo repeats.
   Music types accepted:
      Section 1.2.77 [tremolo-span-event], page 52,
   This engraver creates the following layout object(s):
      Section 3.1.20 [Beam], page 399.
Chord_tremolo_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.17 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):
Section 3.1.26 [Clef], page 406, and Section 3.1.27 [ClefModifier], page 409.
Clef_engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.
2.2.18 Cluster_spanner_engraver

Engrave a cluster using Spanner notation.

Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.28 [ClusterSpanner], page 411, and Section 3.1.29 [ClusterSpannerBeacon], page 411.

Cluster_spanner_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.19 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):
Section 3.1.82 [NoteCollision], page 479.

Collision_engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.20 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:
Section 1.2.44 [note-event], page 47,
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):
Section 3.1.84 [NoteHead], page 480, Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn], page 529.
Completion_heads_engraver is not part of any context.

2.2.21 Completion_rest_engraver
This engraver replaces Rest_engraver. It plays some trickery to break long rests into the next measure.

Music types accepted:
Section 1.2.55 [rest-event], page 48,

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):
Section 3.1.98 [Rest], page 495.
Completion_rest_engraver is not part of any context.
2.2.22 Concurrent_hairpin_ engraver

Collect concurrent hairpins.

Concurrent_hairpin_ engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.23 Control_track_performer

Control_track_performer is not part of any context.

2.2.24 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):

Section 3.1.27 [ClefModifier], page 409, Section 3.1.31 [CueClef], page 413, and Section 3.1.32 [CueEndClef], page 416.

Cue_clef_ engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.25 Custos_ engraver

Engrave custodes.

This engraver creates the following layout object(s):

Section 3.1.33 [Custos], page 419.

Custos_ engraver is part of the following context(s): Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, and Section 2.1.31 [VaticanaStaff], page 276.
2.2.26 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 2.2.133 [Timing_translator], page 360.

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.

- **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.

- **timing** (boolean)
  
  Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

- **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): Section 2.1.26 [Score], page 219.

2.2.27 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):

Section 3.1.34 [DotColumn], page 420.

Dot_column_engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.
2.2.28 Dots_engraver

Create Section 3.1.35 [Dots], page 421, objects for Section 3.2.100 [rhythmic-head-interface], page 606s.

This engraver creates the following layout object(s):

Section 3.1.35 [Dots], page 421.

Dots_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.29 Double_percent_repeat_engraver

Make double measure repeats.

Music types accepted:

Section 1.2.19 [double-percent-event], page 44,

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):

Section 3.1.36 [DoublePercentRepeat], page 422, and Section 3.1.37 [DoublePercentRepeat-Counter], page 423.

Double_percent_repeat_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.30 Drum_note_performer

Play drum notes.

Music types accepted:

Section 1.2.44 [note-event], page 47,

Drum_note_performer is not part of any context.
2.2.31 Drum_notes_engraver

Generate drum note heads.

Music types accepted:
Section 1.2.44 [note-event], page 47,
Properties (read)

\texttt{drumStyleTable} (hash table)
The layout style is a hash table, containing the drum-pitches (e.g., the symbol ‘hihat’) as keys, and a list (\texttt{notehead-style script vertical-position}) as values.

This engraver creates the following layout object(s):
Section 3.1.84 [NoteHead], page 480, and Section 3.1.100 [Script], page 497.
\texttt{Drum_notes_engraver} is part of the following context(s): Section 2.1.6 [DrumVoice], page 83.

2.2.32 Duration_line_engraver

Engraver to print a line representing the duration of a rhythmic event like \texttt{NoteHead}, \texttt{NoteColumn} or \texttt{Rest}.

Music types accepted:
Section 1.2.20 [duration-line-event], page 44,
Properties (read)

\texttt{currentCommandColumn} (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\texttt{currentMusicalColumn} (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

\texttt{endAtSkip} (boolean)
End \texttt{DurationLine} grob on \texttt{skip-event}

\texttt{startAtNoteColumn} (boolean)
Start \texttt{DurationLine} grob at entire \texttt{NoteColumn}.

\texttt{startAtSkip} (boolean)
Start \texttt{DurationLine} grob at \texttt{skip-event}.

This engraver creates the following layout object(s):
Section 3.1.39 [DurationLine], page 426.
\texttt{Duration_line_engraver} is not part of any context.

2.2.33 Dynamic_align_engraver

Align hairpins and dynamic texts on a horizontal line.
Properties (read)

\texttt{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):
Section 3.1.40 [DynamicLineSpanner], page 427.

Dynamic_align_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.7 [Dynamics], page 95, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.34 Dynamic_engraver
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 43, and Section 1.2.64 [span-dynamic-event], page 49,

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):
Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, and Section 3.1.54 [Hairpin], page 443.

Dynamic_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.7 [Dynamics], page 95, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.35 Dynamic_performer
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.17 [crescendo-event], page 44, and Section 1.2.18 [decrescendo-event], page 44,

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 not part of any context.

2.2.36 Episema_engraver
Create an Editio Vaticana-style episema line.
   Music types accepted:
   Section 1.2.22 [episema-event], page 44,
   This engraver creates the following layout object(s):
   Section 3.1.43 [Episema], page 432.
   Episema_engraver is part of the following context(s): Section 2.1.13 [GregorianTranscriptionVoice], page 117, and Section 2.1.32 [VaticanaVoice], page 287.

2.2.37 Extender_engraver
Create lyric extenders.
   Music types accepted:
   Section 1.2.16 [completize-extender-event], page 44, and Section 1.2.23 [extender-event], page 44,
   Properties (read)

       extendersOverRests (boolean)
       Whether to continue extenders as they cross a rest.

   This engraver creates the following layout object(s):
   Section 3.1.67 [LyricExtender], page 461.
   Extender_engraver is part of the following context(s): Section 2.1.16 [Lyrics], page 155.

2.2.38 Figured_bass_engraver
Make figured bass numbers.
   Music types accepted:
   Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.55 [rest-event], page 48,
   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):
Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigureAlignment], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, and Section 3.1.19 [BassFigureLine], page 398.

**Figured_bass_engraver** is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.8 [FiguredBass], page 99, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

### 2.2.39 Figured_bass_position_engraver

Position figured bass alignments over notes.

This engraver creates the following layout object(s):
Section 3.1.16 [BassFigureAlignmentPositioning], page 396.

**Figured_bass_position_engraver** is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

### 2.2.40 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):
Section 3.1.45 [FingeringColumn], page 435.

**Fingering_column_engraver** is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

### 2.2.41 Fingering_engraver

Create fingering scripts.

Music types accepted:
Section 1.2.24 [fingering-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.44 [Fingering], page 433.

**Fingering_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.
2.2.42 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): Section 2.1.3 [CueVoice], page 63, Section 2.1.5 [DrumStaff], page 76, Section 2.1.6 [DrumVoice], page 83, Section 2.1.7 [Dynamics], page 95, Section 2.1.9 [FretBoards], page 101, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.14 [KievanStaff], page 130, Section 2.1.15 [KievanVoice], page 141, Section 2.1.16 [Lyrics], page 155, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, Section 2.1.30 [TabVoice], page 263, Section 2.1.31 [VaticanaStaff], page 276, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.43 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):
Section 3.1.47 [FootnoteItem], page 436, and Section 3.1.48 [FootnoteSpanner], page 437.

Footnote_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.44 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): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.16 [Lyrics], page 155, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, Section 2.1.30 [TabVoice], page 263, Section 2.1.31 [VaticanaStaff], page 276, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.45 Fretboard_engraver

Generate fret diagram from one or more events of type NoteEvent.

Music types accepted:
Section 1.2.24 [fingering-event], page 44, Section 1.2.44 [note-event], page 47, and Section 1.2.68 [string-number-event], page 51.

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):
Section 3.1.49 [FretBoard], page 438.

`Fretboard_ engraver` is part of the following context(s): Section 2.1.9 [FretBoards], page 101.

### 2.2.46 Glissando_ engraver

Engrave glissandi.

Music types accepted:
Section 1.2.26 [glissando-event], page 45,

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):
Section 3.1.50 [Glissando], page 440.

**Glissando_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

### 2.2.47 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:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

- **autoBeaming** (boolean)
  If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.20 [Beam], page 399.

**Grace_auto_beam_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

### 2.2.48 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:
Section 1.2.8 [beam-event], page 43,
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 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):
Section 3.1.20 [Beam], page 399.

**Grace_beam_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.
2.2.49 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): Section 2.1.3 [CueVoice], page 63,
Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117,
Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23
[PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice],
page 287, and Section 2.1.33 [Voice], page 300.

2.2.50 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):
Section 3.1.51 [GraceSpacing], page 442.
Grace_spacing_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.51 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):
Section 3.1.52 [GridLine], page 442.
Grid_line_span_engraver is not part of any context.

2.2.52 Grid_point_engraver
Generate grid points.

Properties (read)

  gridInterval (moment)
  Interval for which to generate GridPoints.

This engraver creates the following layout object(s):
Section 3.1.53 [GridPoint], page 443.
Grid_point_engraver is not part of any context.

2.2.53 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)

busyGros (list)

A queue of \texttt{(end-moment . grob)} cons cells. This is for internal (C++)
use only. This property contains the grobs which are still busy (e.g.
ote heads, spanners, etc.).

\texttt{Grob\_pq\_engraver} is part of the following context(s): Section 2.1.3 [CueVoice], page 63,
Section 2.1.5 [DrumStaff], page 76, Section 2.1.6 [DrumVoice], page 83, Section 2.1.12 [Gregor-
ianTranscriptionStaff], page 106, Section 2.1.13 [GregorianTranscriptionVoice], page 117,
Section 2.1.14 [KievanStaff], page 130, Section 2.1.15 [KievanVoice], page 141, Section 2.1.17
[MensuralStaff], page 157, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.20 [NullVoice],
page 184, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.23 [PetrucciVoice], page 199,
Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, Section 2.1.30 [TabVoice],
page 263, Section 2.1.31 [VaticanaStaff], page 276, Section 2.1.32 [VaticanaVoice], page 287, and
Section 2.1.33 [Voice], page 300.

2.2.54 \texttt{Horizontal\_bracket\_engraver}

Create horizontal brackets over notes for musical analysis purposes.

Music types accepted:

Section 1.2.45 [note-grouping-event], page 47,

This engraver creates the following layout object(s):

Section 3.1.55 [HorizontalBracket], page 445, and Section 3.1.56 [HorizontalBracketText],
page 446.

\texttt{Horizontal\_bracket\_engraver} is not part of any context.

2.2.55 \texttt{Hyphen\_engraver}

Create lyric hyphens, vowel transitions and distance constraints between words.

Music types accepted:

Section 1.2.28 [hyphen-event], page 45, and Section 1.2.82 [vowel-transition-event], page 52,

This engraver creates the following layout object(s):

Section 3.1.68 [LyricHyphen], page 462, Section 3.1.69 [LyricSpace], page 463, and
Section 3.1.145 [VowelTransition], page 548.

\texttt{Hyphen\_engraver} is part of the following context(s): Section 2.1.16 [Lyrics], page 155.

2.2.56 \texttt{Instrument\_name\_engraver}

Create a system start text for instrument or vocal names.

Properties (read)

\texttt{currentCommandColumn} (graphical (layout) object)

Grob that is X-parent to all current breakable (clef, key signature, etc.)
items.

\texttt{instrumentName} (markup)

The name to print left of a staff. The \texttt{instrumentName} property labels
the staff in the first system, and the \texttt{shortInstrumentName} property
labels following lines.

\texttt{shortInstrumentName} (markup)

See \texttt{instrumentName}.

\texttt{shortVocalName} (markup)

Name of a vocal line, short version.
vocalName (markup)
Name of a vocal line.

This engraver creates the following layout object(s):
Section 3.1.57 [InstrumentName], page 447.

Instrument_name_engraver is part of the following context(s): Section 2.1.1 [ChoirStaff],
page 59, Section 2.1.5 [DrumStaff], page 76, Section 2.1.9 [FretBoards], page 101, Section 2.1.11
[GrandStaff], page 104, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14
[KievanStaff], page 130, Section 2.1.16 [Lyrics], page 155, Section 2.1.17 [MensuralStaff],
page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.24 [PianoStaff], page 212,
Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.28
[StaffGroup], page 251, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff],
page 276.

2.2.57 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):
Section 3.1.58 [InstrumentSwitch], page 448.

Instrument_switch_engraver is part of the following context(s): Section 2.1.3 [CueVoice],
page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice],
page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169,
Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32
[VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.58 Keep_alive_together_engraver
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.

Keep_alive_together_engraver is part of the following context(s): Section 2.1.24 [PianoS-
taff], page 212.

2.2.59 Key_engraver
Engrave a key signature.

Music types accepted:
Section 1.2.29 [key-change-event], page 45,

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):

Section 3.1.59 [KeyCancellation], page 449, and Section 3.1.60 [KeySignature], page 452.

Key_performer is part of the following context(s): Section 2.1.12 [GregorianTranscription-
Staff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157,
Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, and Section 2.1.31 [Vatic-
icanaStaff], page 276.

2.2.60 Key_performer

Music types accepted:

Section 1.2.29 [key-change-event], page 45,

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 "quotes.

Key_performer is not part of any context.
2.2.61 **Kievan_ligature_engraver**

Handle *Kievan_ligature_events* by gluing Kievan heads together.

- Music types accepted:
  - Section 1.2.33 [ligature-event], page 45,
  - This engraver creates the following layout object(s):
  - Section 3.1.61 [KievanLigature], page 455.
  - *Kievan_ligature_engraver* is part of the following context(s): Section 2.1.15 [KievanVoice], page 141.

2.2.62 **Laissez_vibrer_engraver**

Create laissez vibrer items.

- Music types accepted:
  - Section 1.2.31 [laissez-vibrer-event], page 45,
  - This engraver creates the following layout object(s):
  - Section 3.1.62 [LaissezVibrerTie], page 455, and Section 3.1.63 [LaissezVibrerTieColumn], page 457.
  - *Laissez_vibrer_engraver* is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.63 **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):
  - Section 3.1.64 [LedgerLineSpanner], page 457.
  - *Ledger_line_engraver* is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.64 **Ligature_bracket_engraver**

Handle *Ligature_events* by engraving Ligature brackets.

- Music types accepted:
  - Section 1.2.33 [ligature-event], page 45,
  - This engraver creates the following layout object(s):
  - Section 3.1.66 [LigatureBracket], page 460.
  - *Ligature_bracket_engraver* is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.30 [TabVoice], page 263, and Section 2.1.33 [Voice], page 300.

2.2.65 **Lyric_engraver**

Engrave text for lyrics.

- Music types accepted:
  - Section 1.2.35 [lyric-event], page 46,
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):
Section 3.1.70 [LyricText], page 463.
Lyric_engraver is part of the following context(s): Section 2.1.16 [Lyrics], page 155.

2.2.66 Lyric_performer
Music types accepted:
  Section 1.2.35 [lyric-event], page 46,
Lyric_performer is not part of any context.

2.2.67 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 2.2.116 [Staff_collecting_engraver], page 355, must move along, otherwise all marks end up on the same Y location.

Music types accepted:
  Section 1.2.36 [mark-event], page 46,
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):
Section 3.1.94 [RehearsalMark], page 491.
Mark_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.68 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:
  Section 1.2.37 [measure-counter-event], page 46,
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):
Section 3.1.71 [MeasureCounter], page 465.
Measure_counter_engraver is not part of any context.

2.2.69 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 baseMoments 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):
Section 3.1.72 [MeasureGrouping], page 467.
Measure_grouping_engraver is not part of any context.

2.2.70 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:
   Section 1.2.38 [measure-spanner-event], page 46,

   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):
Section 3.1.73 [MeasureSpanner], page 468.
Measure_spanner_engraver is not part of any context.
2.2.71 Melody_engraver

Create information for context dependent typesetting decisions.

This engraver creates the following layout object(s):

- Section 3.1.74 [MelodyItem], page 469.

**Melody_engraver** is not part of any context.

2.2.72 Mensural_ligature_engraver

Handle Mensural_ligature_events by gluing special ligature heads together.

Music types accepted:

- Section 1.2.33 [ligature-event], page 45,

This engraver creates the following layout object(s):

- Section 3.1.75 [MensuralLigature], page 469.

**Mensural_ligature_engraver** is part of the following context(s): Section 2.1.18 [MensuralVoice], page 169, and Section 2.1.23 [PetrucciVoice], page 199.

2.2.73 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): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.74 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_rests_engraver do not merge rests when this is set to true.

**Merge_rests_engraver** is not part of any context.

2.2.75 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 2.2.116 [Staff_collecting_engraver], page 355.

Music types accepted:

- Section 1.2.71 [tempo-change-event], page 51,

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):
Section 3.1.76 [MetronomeMark], page 470.
Metronome_mark_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.76 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 not part of any context.

2.2.77 Multi_measure_rest_engraver

Engrave multi-measure rests that are produced with ‘R’. It reads measurePosition and internalBarNumber to determine what number to print over the Section 3.1.77 [MultiMeasureRest], page 472.

Music types accepted:
Section 1.2.40 [multi-measure-articulation-event], page 46, Section 1.2.41 [multi-measure-rest-event], page 46, and Section 1.2.42 [multi-measure-text-event], page 46,
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`.

`measurePosition` (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

`restNumberThreshold` (number)
If a multimeasure rest has more measures than this, a number is printed.

`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):

Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, and Section 3.1.80 [MultiMeasureRestText], page 476.

`Multi_measure_rest_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.78 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):

Section 3.1.44 [Fingering], page 433, Section 3.1.100 [Script], page 497, Section 3.1.116 [StringNumber], page 512, and Section 3.1.117 [StrokeFinger], page 514.
New_fingering_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.79 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):
Section 3.1.142 [VoiceFollower], page 544.

Note_head_line_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.80 Note_heads_engraver

Generate note heads.

Music types accepted:
Section 1.2.44 [note-event], page 47,

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):
Section 3.1.84 [NoteHead], page 480.

Note_heads_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.20 [NullVoice], page 184, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.81 Note_name_engraver

Print pitches as words.

Music types accepted:
Section 1.2.44 [note-event], page 47,

Properties (read)

noteNameFunction (procedure)
   Function used to convert pitches into strings and markups.

noteNameSeparator (string)
   String used to separate simultaneous NoteName objects.
\textbf{printAccidentalNames} (boolean or symbol)
Print accidentals in the \texttt{NoteNames} context.

\textbf{printNotesLanguage} (string)
Use a specific language in the \texttt{NoteNames} context.

\textbf{printOctaveNames} (boolean or symbol)
Print octave marks in the \texttt{NoteNames} context.

This engraver creates the following layout object(s):
Section 3.1.85 \texttt{[NoteName]}, page 482.

\texttt{Note\_name\_engraver} is part of the following context(s): Section 2.1.19 \texttt{[NoteNames]}, page 182.

\subsection*{2.2.82 Note\_performer}

Music types accepted:

Section 1.2.6 \texttt{[articulation-event]}, page 43, Section 1.2.14 \texttt{[breathing-event]}, page 43, Section 1.2.44 \texttt{[note-event]}, page 47, and Section 1.2.74 \texttt{[tie-event]}, page 51,

\texttt{Note\_performer} is not part of any context.

\subsection*{2.2.83 Note\_spacing\_engraver}

Generate \texttt{NoteSpacing}, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s):
Section 3.1.86 \texttt{[NoteSpacing]}, page 482.

\texttt{Note\_spacing\_engraver} is part of the following context(s): Section 2.1.3 \texttt{[CueVoice]}, page 63, Section 2.1.6 \texttt{[DrumVoice]}, page 83, Section 2.1.13 \texttt{[GregorianTranscriptionVoice]}, page 117, Section 2.1.15 \texttt{[KievanVoice]}, page 141, Section 2.1.17 \texttt{[MensuralVoice]}, page 169, Section 2.1.23 \texttt{[PetrucciVoice]}, page 199, Section 2.1.30 \texttt{[TabVoice]}, page 263, Section 2.1.32 \texttt{[VaticanaVoice]}, page 287, and Section 2.1.33 \texttt{[Voice]}, page 300.

\subsection*{2.2.84 Ottava\_spanner\_engraver}

Create a text spanner when the ottavation property changes.

Properties (read)

\textbf{currentMusicalColumn} (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

\textbf{middleCOffset} (number)
The offset of middle C from the position given by \texttt{middleCClefPosition}
This is used for ottava brackets.

\textbf{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):
Section 3.1.87 \texttt{[OttavaBracket]}, page 483.

\texttt{Ottava\_spanner\_engraver} is part of the following context(s): Section 2.1.12 \texttt{[GregorianTranscriptionStaff]}, page 106, Section 2.1.14 \texttt{[KievanStaff]}, page 130, Section 2.1.17 \texttt{[MensuralStaff]}, page 157, Section 2.1.22 \texttt{[PetrucciStaff]}, page 188, Section 2.1.27 \texttt{[Staff]}, page 240, and Section 2.1.31 \texttt{[VaticanaStaff]}, page 276.
2.2.85 Output_property_engraver

Apply a procedure to any grob acknowledged.

Music types accepted:
Section 1.2.4 [apply-output-event], page 42,

Output_property_engraver is part of the following context(s): Section 2.1.2 [ChordNames], page 60, Section 2.1.3 [CueVoice], page 63, Section 2.1.5 [DrumStaff], page 76, Section 2.1.6 [DrumVoice], page 83, Section 2.1.7 [Dynamics], page 95, Section 2.1.9 [FretBoards], page 101, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.14 [KievanStaff], page 130, Section 2.1.15 [KievanVoice], page 141, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.26 [Score], page 219, Section 2.1.27 [Staff], page 240, Section 2.1.28 [StaffGroup], page 251, Section 2.1.29 [TabStaff], page 253, Section 2.1.30 [TabVoice], page 263, Section 2.1.31 [VaticanaStaff], page 276, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.86 Page_turn_engraver

Decide where page turns are allowed to go.

Music types accepted:
Section 1.2.12 [break-event], page 43,
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.

2.2.87 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:
Section 1.2.12 [break-event], page 43, and Section 1.2.30 [label-event], page 45,
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 \texttt{#t}, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.81 [NonMusicalPaperColumn], page 478, and Section 3.1.88 [PaperColumn], page 484.

\texttt{Paper\_column\_engraver} is part of the following context(s): Section 2.1.26 [Score], page 219.

\textbf{2.2.88 Parenthesis\_engraver}
Parenthesize objects whose music cause has the \texttt{parenthesize} property.
This engraver creates the following layout object(s):
Section 3.1.89 [ParenthesesItem], page 485.

\texttt{Parenthesis\_engraver} is part of the following context(s): Section 2.1.26 [Score], page 219.

\textbf{2.2.89 Part\_combine\_engraver}
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.48 [part-combine-event], page 48,
Properties (read)

\texttt{aDueText} (markup)
Text to print at a unisono passage.

\texttt{partCombineTextsOnNote} (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.

\texttt{printPartCombineTexts} (boolean)
Set ‘Solo’ and ‘A due’ texts in the part combiner?

\texttt{soloIIText} (markup)
The text for the start of a solo for voice ‘two’ when part-combining.

\texttt{soloText} (markup)
The text for the start of a solo when part-combining.

This engraver creates the following layout object(s):
Section 3.1.30 [CombineTextScript], page 411.

\texttt{Part\_combine\_engraver} is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievianVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

\textbf{2.2.90 Percent\_repeat\_engraver}
Make whole measure repeats.

Music types accepted:
Section 1.2.50 [percent-event], page 48,
Properties (read)

\texttt{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):
   Section 3.1.90 [PercentRepeat], page 486, and Section 3.1.91 [PercentRepeatCounter],
   page 487.

Percent_repeat_engraver is part of the following context(s): Section 2.1.3 [CueVoice],
   page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice],
   page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169,
   Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32
   [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.91 Phrasing_slur_engraver
   Print phrasing slurs. Similar to Section 2.2.108 [Slur_engraver], page 353.
   Music types accepted:
      Section 1.2.44 [note-event], page 47, and Section 1.2.52 [phrasing-slur-event], page 48,
   This engraver creates the following layout object(s):
      Section 3.1.92 [PhrasingSlur], page 488.
   Phrasing_slur_engraver is part of the following context(s): Section 2.1.3 [CueVoice],
      page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice],
      page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169,
      Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32
      [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.92 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):
      Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.119 [SustainPedalLineSpanner],
      page 516, and Section 3.1.138 [UnaCordaPedalLineSpanner], page 540.
   Piano_pedal_align_engraver is part of the following context(s): Section 2.1.5 [DrumStaff],
      page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff],
      page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188,
      Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff],
      page 276.

2.2.93 Piano_pedal_engraver
   Engrave piano pedal symbols and brackets.
   Music types accepted:
Section 1.2.62 [sostenuto-event], page 49, Section 1.2.70 [sustain-event], page 51, and Section 1.2.80 [una-corda-event], page 52.

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):

Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.118 [SustainPedal], page 515, and Section 3.1.137 [UnaCordaPedal], page 539.

Piano_pedal_engraver is part of the following context(s): Section 2.1.7 [Dynamics], page 95, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.94 Piano_pedal_performer

Music types accepted:

Section 1.2.62 [sostenuto-event], page 49, Section 1.2.70 [sustain-event], page 51, and Section 1.2.80 [una-corda-event], page 52.

Piano_pedal_performer is not part of any context.

2.2.95 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): Section 2.1.20 [NullVoice], page 184, and Section 2.1.25 [RhythmicStaff], page 215.
2.2.96 Pitched_trill_engraver

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s):

Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, and Section 3.1.133 [TrillPitchHead], page 534.

Pitched_trill_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.97 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): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.16 [Lyrics], page 155, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.98 Repeat_acknowledge_engraver

Acknowledge repeated music, and convert the contents of repeatCommands into an appropriate setting for whichBar.

Properties (read)

- **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.

- **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.

- **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.

- **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): Section 2.1.26 [Score],
page 219.

2.2.99 Repeat_tie_engraver

Create repeat ties.

Music types accepted:
Section 1.2.54 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.96 [RepeatTie], page 494, and Section 3.1.97 [RepeatTieColumn], page 495.

Repeat_tie_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63,
Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117,
Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23
[PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice],
page 287, and Section 2.1.33 [Voice], page 300.

2.2.100 Rest_collision_engraver

Handle collisions of rests.

Properties (read)

busyGros (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):
Section 3.1.99 [RestCollision], page 496.

Rest_collision_engraver is part of the following context(s): Section 2.1.5 [DrumStaff],
page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff],
page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188,
Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff],
page 276.

2.2.101 Rest_engraver

Engrave rests.

Music types accepted:
Section 1.2.55 [rest-event], page 48,
Properties (read)

middleCPosition (number)
The place of the middle C, measured in half staff-spaces. Usually de-
termined by looking at middleCClefPosition and middleCOffset.

This engraver creates the following layout object(s):
Section 3.1.98 [Rest], page 495.

Rest_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63,
Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117,
generate NoteColumn, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s):
Section 3.1.83 [NoteColumn], page 480.

Rhythmic_column_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.103 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):
Section 3.1.101 [ScriptColumn], page 498.

Script_column_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.104 Script_engraver
Handle note scripted articulations.

Music types accepted:
Section 1.2.6 [articulation-event], page 43,
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):
Section 3.1.100 [Script], page 497.

Script_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.7 [Dynamics], page 95, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.105 Script_row_engraver
Determine order in horizontal side position elements.

This engraver creates the following layout object(s):
Section 3.1.102 [ScriptRow], page 498.

Script_row_engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130,
Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.106 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):
Section 3.1.110 [StaffSpacing], page 506.

Separating_line_group_engraver is part of the following context(s): Section 2.1.2 [Chord-Names], page 60, Section 2.1.5 [DrumStaff], page 76, Section 2.1.8 [FiguredBass], page 99, Section 2.1.9 [FretBoards], page 101, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.19 [NoteNames], page 182, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.107 Slash_repeat_engraver
Make beat repeats.

Music types accepted:
Section 1.2.53 [repeat-slash-event], page 48.

This engraver creates the following layout object(s):
Section 3.1.38 [DoubleRepeatSlash], page 425, and Section 3.1.95 [RepeatSlash], page 493.

Slash_repeat_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.108 Slur_engraver
Build slur grobs from slur events.

Music types accepted:
Section 1.2.44 [note-event], page 47, and Section 1.2.59 [slur-event], page 49.

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):
Section 3.1.103 [Slur], page 498.

Slur_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.20 [NullVoice], page 184, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, and Section 2.1.33 [Voice], page 300.

2.2.109 Slur_performer
Music types accepted:
Section 1.2.59 [slur-event], page 49,
Slur_performer is not part of any context.

2.2.110 Spacing_engraver
Make a SpacingSpanner and do bookkeeping of shortest starting and playing notes.
Music types accepted:
Section 1.2.63 [spacing-section-event], page 49,
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):
Section 3.1.106 [SpacingSpanner], page 503.
Spacing_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.111 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):
Section 3.1.9 [Arpeggio], page 387.
Span_arpeggio_engraver is part of the following context(s): Section 2.1.11 [GrandStaff], page 104, Section 2.1.24 [PianoStaff], page 212, and Section 2.1.28 [StaffGroup], page 251.

2.2.112 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):
Section 3.1.107 [SpanBar], page 504.
**Span_bar_engraver** is part of the following context(s): Section 2.1.11 [GrandStaff], page 104, Section 2.1.24 [PianoStaff], page 212, and Section 2.1.28 [StaffGroup], page 251.

### 2.2.113 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):
  - Section 3.1.108 [SpanBarStub], page 505.

**Span_bar_stub_engraver** is part of the following context(s): Section 2.1.11 [GrandStaff], page 104, Section 2.1.24 [PianoStaff], page 212, and Section 2.1.28 [StaffGroup], page 251.

### 2.2.114 Span_stem_engraver

Connect cross-staff stems to the stems above in the system.

- This engraver creates the following layout object(s):
  - Section 3.1.113 [Stem], page 508.

**Span_stem_engraver** is not part of any context.

### 2.2.115 Spanner_break_forbid_engraver

Forbid breaks in certain spanners.

**Spanner_break_forbid_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

### 2.2.116 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): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.26 [Score], page 219, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

### 2.2.117 Staff_performer

**Staff_performer** is not part of any context.

### 2.2.118 Staff_symbol_engraver

Create the constellation of five (default) staff lines.

- Music types accepted:
  - Section 1.2.66 [staff-span-event], page 50,

- This engraver creates the following layout object(s):
  - Section 3.1.111 [StaffSymbol], page 507.
**Staff_symbol_engraver** is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

### 2.2.119 Stanza_number_align_engraver

This engraver ensures that stanza numbers are neatly aligned.

**Stanza_number_align_engraver** is part of the following context(s): Section 2.1.26 [Score], page 219.

### 2.2.120 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):

- Section 3.1.112 [StanzaNumber], page 507.

**Stanza_number_engraver** is part of the following context(s): Section 2.1.16 [Lyrics], page 155.

### 2.2.121 Stem_engraver

Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

**Music types accepted:**

- Section 1.2.76 [tremolo-event], page 51, and Section 1.2.79 [tuplet-span-event], page 52,

**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):

- Section 3.1.46 [Flag], page 435, Section 3.1.113 [Stem], page 508, Section 3.1.114 [StemStub], page 510, and Section 3.1.115 [StemTremolo], page 511.

**Stem_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, and Section 2.1.33 [Voice], page 300.
2.2.122 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):

- Section 3.1.121 [SystemStartBar], page 518, Section 3.1.122 [SystemStartBrace], page 519, Section 3.1.123 [SystemStartBracket], page 520, and Section 3.1.124 [SystemStartSquare], page 521.

System_start_delimiter_engraver is part of the following context(s): Section 2.1.1 [ChoirStaff], page 59, Section 2.1.11 [GrandStaff], page 104, Section 2.1.24 [PianoStaff], page 212, Section 2.1.26 [Score], page 219, and Section 2.1.28 [StaffGroup], page 251.

2.2.123 Tab_note_heads_engraver

Generate one or more tablature note heads from event of type NoteEvent.

Music types accepted:

- Section 1.2.24 [fingering-event], page 44, Section 1.2.44 [note-event], page 47, and Section 1.2.68 [string-number-event], page 51.

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 argu-
ments: 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):
Section 3.1.125 [TabNoteHead], page 522.
Tab_note_heads_engraver is part of the following context(s): Section 2.1.30 [TabVoice],
page 263.

2.2.124 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):
Section 3.1.111 [StaffSymbol], page 507.
Tab_staff_symbol_engraver is part of the following context(s): Section 2.1.29 [TabStaff],
page 253.

2.2.125 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): Section 2.1.30 [TabVoice],
page 263.

2.2.126 Tempo_performer
Properties (read)

tempoWholesPerMinute (moment)
The tempo in whole notes per minute.

Tempo_performer is not part of any context.

2.2.127 Text_engraver
Create text scripts.
Music types accepted:
Section 1.2.72 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.126 [TextScript], page 524.
2.2.128 **Text_spanner_engraver**
Create text spanner from an event.

Music types accepted:
Section 1.2.73 [text-span-event], page 51,

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):
Section 3.1.127 [TextSpanner], page 526.

**Text_spanner_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.7 [Dynamics], page 95, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.129 **Tie_engraver**
Generate ties between note heads of equal pitch.

Music types accepted:
Section 1.2.74 [tie-event], page 51,

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):
Section 3.1.128 [Tie], page 527, and Section 3.1.129 [TieColumn], page 529.

**Tie_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.19 [NoteNames], page 182, Section 2.1.20 [NullVoice], page 184, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.
2.2.130 Tie_performer

Generate ties between note heads of equal pitch.

Music types accepted:
Section 1.2.74 [tie-event], page 51,
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 not part of any context.

2.2.131 Time_signature_engraver

Create a Section 3.1.130 [TimeSignature], page 529, whenever timeSignatureFraction changes.
Music types accepted:
Section 1.2.75 [time-signature-event], page 51,
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):
Section 3.1.130 [TimeSignature], page 529.

Time_signature_engraver is part of the following context(s): Section 2.1.5 [DrumStaff],
page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.17 [MensuralStaff],
page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215,
Section 2.1.27 [Staff], page 240, and Section 2.1.29 [TabStaff], page 253.

2.2.132 Time_signature_performer

Time_signature_performer is not part of any context.

2.2.133 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.

Properties (read)

baseMoment (moment)
	Smallest unit of time that will stand on its own as a subdivided section.

currentBarNumber (integer)
	Contains the current bar number. 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)

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.

Timing_translator is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.134 Trill_spanner_engraver
Create trill spanner from an event.
Music types accepted:
Section 1.2.78 [trill-span-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.).

This engraver creates the following layout object(s):
Section 3.1.134 [TrillSpanner], page 535.

Trill_spanner_engraver is part of the following context(s): Section 2.1.3 [CueVoice],
page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice],
Chapter 2: Translation

2.2.135 Tuplet_ engraver
Catch tuplet events and generate appropriate bracket.

Music types accepted:
Section 1.2.79 [tuplet-span-event], page 52,
Properties (read)

\texttt{tupletFullLength} (boolean)
If set, the tuplet is printed up to the start of the next note.

\texttt{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):
Section 3.1.135 [TupletBracket], page 536, and Section 3.1.136 [TupletNumber], page 538.

\texttt{Tuplet_ engraver} is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievianVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 300.

2.2.136 Tweak_ engraver
Read the \texttt{tweaks} property from the originating event, and set properties.

\texttt{Tweak_ engraver} is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.137 Vaticana_ligature_ engraver
Handle ligatures by glueing special ligature heads together.

Music types accepted:
Section 1.2.33 [ligature-event], page 45, and Section 1.2.51 [pes-or-flexa-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.34 [DotColumn], page 420, and Section 3.1.139 [VaticanaLigature], page 541.

\texttt{Vaticana_ligature_ engraver} is part of the following context(s): Section 2.1.32 [VaticanaVoice], page 287.

2.2.138 Vertical_align_ engraver
Catch groups (staves, lyrics lines, etc.) and stack them vertically.

Properties (read)

\texttt{alignAboveContext} (string)
Where to insert newly created context in vertical alignment.

\texttt{alignBelowContext} (string)
Where to insert newly created context in vertical alignment.

\texttt{hasAxisGroup} (boolean)
True if the current context is contained in an axis group.
This engraver creates the following layout object(s):
Section 3.1.140 [VerticalAlignment], page 542.

Vertical_align_engraver is part of the following context(s): Section 2.1.1 [ChoirStaff], page 59, Section 2.1.11 [GrandStaff], page 104, Section 2.1.24 [PianoStaff], page 212, Section 2.1.26 [Score], page 219, and Section 2.1.28 [StaffGroup], page 251.

2.2.139 Volta_engraver

Make volta brackets.

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):
Section 3.1.143 [VoltaBracket], page 545, and Section 3.1.144 [VoltaBracketSpanner], page 546.

Volta_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

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 separate 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.

-alternativeNumberingStyle (symbol)
The style of an alternative’s bar numbers. Can be numbers for going back to the same number or numbers-with-letters for going back to the same number with letter suffixes. No setting will not go back in measure-number time.

-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 baseMoments 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\times3, 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:
‘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 val-
ues.

**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.

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 GridPoints.

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 \quotes.
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.

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, unisomo, 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 propor-
tional 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 cor-
responding percent repeat number should be printed when countPercentRepeats
is set.

restCompletionBusy (boolean)
Signal whether a completion-rest is active.

restNumberThreshold (number)
If a multimeasure rest has more measures than this, a number is printed.

restrainOpenStrings (boolean)
Exclude open strings from the automatic fret calculator.

searchForVoice (boolean)
Signal whether a search should be made of all contexts in the context hierarchy for
a voice to provide rhythms for the lyrics.

segnoType (string)
Set the default bar line for a requested segno. Default is ‘S’.

shapeNoteStyles (vector)
Vector of symbols, listing style for each note head relative to the tonic (qv.) of the
scale.

shortInstrumentName (markup)
See instrumentName.

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

skipBars (boolean)
If set to true, then skip the empty bars that are produced by multimeasure notes
and rests. These bars will not appear on the printed output. If not set (the default),
multimeasure notes and rests expand into their full length, printing the appropriate
number of empty bars so that synchronization with other voices is preserved.

{ 
  r1 r1*3 R1*3 
  \set Score.skipBars= ##t
  r1*3 R1*3
}
skipTypesetting (boolean)
If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

slashChordSeparator (markup)
The markup object used to separate a chord name from its root note in case of inversions or slash chords.

soloIIText (markup)
The text for the start of a solo for voice ‘two’ when part-combining.

soloText (markup)
The text for the start of a solo when part-combining.

squashedPosition (integer)
Vertical position of squashing for Section “Pitch_squash_engraver” in Internals Reference.

staffLineLayoutFunction (procedure)
Layout of staff lines, traditional, or semitone.

stanza (markup)
Stanza ‘number’ to print before the start of a verse. Use in Lyrics context.

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}{7}.'

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 \}
\}

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.

tieMelismaBusy (boolean)
Signal whether a tie is present.
3 Backend

3.1 All layout objects

3.1.1 Accidental

Accidental objects are created by: Section 2.2.1 [Accidental engraver], page 313.

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.

eextra-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): Section 3.2.1 [accidental-interface], page 549,
Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.51
[inline-accidental-interface], page 581, and Section 3.2.53 [item-interface], page 583.

3.1.2 AccidentalCautionary

AccidentalCautionary objects are created by: Section 2.2.1 [Accidental engraver], page 313.

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): Section 3.2.1 [accidental-interface], page 549,
Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.51
[inline-accidental-interface], page 581, and Section 3.2.53 [item-interface], page 583.

3.1.3 AccidentalPlacement

AccidentalPlacement objects are created by: Section 2.2.1 [Accidental_engraver], page 313, and
Section 2.2.2 [Ambitus_engraver], page 314.

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): Section 3.2.2 [accidental-placement-interface], page 550, Section 3.2.46 [grob-interface], page 575, and Section 3.2.53 [item-interface], page 583.

3.1.4 AccidentalSuggestion
AccidentalSuggestion objects are created by: Section 2.2.1 [Accidental engraver], page 313.

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 cen-
  tered, 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): Section 3.2.1 [accidental-interface], page 549,
Section 3.2.3 [accidental-suggestion-interface], page 550, Section 3.2.37 [font-interface], page 569,
Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87
[outside-staff-interface], page 600, Section 3.2.102 [script-interface], page 606, Section 3.2.103
[self-alignment-interface], page 607, and Section 3.2.107 [side-position-interface], page 610.
Ambitus objects are created by: Section 2.2.2 [Ambitus engraver], page 314.

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):
- `<primitive-procedure 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):
- `<primitive-procedure ly:axis-group-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): Section 3.2.5 [ambitus-interface], page 551, Section 3.2.7 [axis-group-interface], page 553, Section 3.2.15 [break-aligned-interface], page 560, Section 3.2.46 [grob-interface], page 575, and Section 3.2.53 [item-interface], page 583.

### 3.1.6 AmbitusAccidental

AmbitusAccidental objects are created by: Section 2.2.2 [Ambitus engraver], page 314.

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.doublesharpest")
 (-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): Section 3.2.1 [accidental-interface], page 549, Section 3.2.15 [break-aligned-interface], page 560, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.107 [side-position-interface], page 610.

### 3.1.7 AmbitusLine

AmbitusLine objects are created by: Section 2.2.2 [Ambitus_engraver], page 314.

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.

class (stencil):
  ambitus::print
  The symbol to print.

class (stencil):
  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):
  0
  The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): Section 3.2.5 [ambitus-interface], page 551, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, and Section 3.2.53 [item-interface], page 583.

3.1.8 AmbitusNoteHead

AmbitusNoteHead objects are created by: Section 2.2.2 [Ambitus_engraver], page 314.

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.

class (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): Section 3.2.5 [ambitus-interface], page 551, 
Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 
[item-interface], page 583, Section 3.2.58 [ledgered-interface], page 587, Section 3.2.80 [note-head-
interface], page 597, Section 3.2.100 [rhythmic-head-interface], page 606, and Section 3.2.118 
[staff-symbol-referencer-interface], page 620.

3.1.9 Arpeggio
Arpeggio objects are created by: Section 2.2.3 [Arpeggio_engraver], page 315, and Section 2.2.111 
[Span_arpeggio_engraver], page 354.

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 end-
points. 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): Section 3.2.6 [arpeggio-interface], page 552, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.107 [side-position-interface], page 610, and Section 3.2.118 [staff-symbol-referencer-interface], page 620.
3.1.10 BalloonTextItem

BalloonTextItem objects are created by: Section 2.2.6 [Balloon engraver], page 317.

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.

eextra-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): Section 3.2.8 [balloon-interface], page 555, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.128 [text-interface], page 626.

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):

\((+\text{inf.0} . -\text{inf.0})\)

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 \((+\text{inf.0} . -\text{inf.0})\).

stencil (stencil):

\(\text{ly:balloon-interface::print-spanner}\)

The symbol to print.

text (markup):

\(#<\text{procedure \#f (grob)}>\)

Text markup. See Section “Formatting text” in Notation Reference.

X-offset (number):

\(#<\text{procedure \#f (grob)}>\)

The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):

\(#<\text{unpure-pure-container \#<\text{primitive-procedure ly:grob::stencil-height}> \#<\text{primitive-procedure ly:balloon-interface::pure-height}> >\)

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):

\(#<\text{procedure \#f (grob)}>\)

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.8 [balloon-interface], page 555, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.128 [text-interface], page 626.

3.1.12 BarLine

BarLine objects are created by: Section 2.2.7 [Bar engraver], page 317.

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):

\(\text{ly:bar-line::calc-bar-extent}\)

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):

\(\text{ly:bar-line::calc-anchor}\)

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):

\('\text{staff-bar}\)
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, \(\{\text{end-of-line unbroken begin-of-line}\} \). \#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 \((-\text{inf.0} . +\text{inf.0})\).

**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): Section 3.2.9 [bar-line-interface], page 555, Section 3.2.15 [break-aligned-interface], page 560, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.96 [pure-from-neighbor-interface], page 604.

### 3.1.13 BarNumber

BarNumber objects are created by: Section 2.2.8 [Bar_number_engraver], page 317.

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):
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.

dside-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): Section 3.2.14 [break-alignable-interface], page 560, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface], page 607, Section 3.2.107 [side-position-interface], page 610, and Section 3.2.128 [text-interface], page 626.

3.1.14 BassFigure

BassFigure objects are created by: Section 2.2.38 [Figured_bass_engraver], page 329.

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): Section 3.2.11 [bass-figure-interface], page 556, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.99 [rhythmic-grob-interface], page 606, and Section 3.2.128 [text-interface], page 626.
3.1.15 BassFigureAlignment

BassFigureAlignment objects are created by: Section 2.2.38 [Figured_bass_engraver], page 329.

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): Section 3.2.4 [align-interface], page 551, Section 3.2.7 [axis-group-interface], page 553, Section 3.2.10 [bass-figure-alignment-interface], page 556, Section 3.2.46 [grob-interface], page 575, and Section 3.2.114 [spanner-interface], page 617.

3.1.16 BassFigureAlignmentPositioning

BassFigureAlignmentPositioning objects are created by: Section 2.2.39 [Figured_bass_position_engraver], page 330.

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 \texttt{side-axis} is 0 (or X), then this property determines whether the object is placed \texttt{LEFT}, \texttt{CENTER} or \texttt{RIGHT} with respect to the other object. Otherwise, it determines whether the object is placed \texttt{UP}, \texttt{CENTER} or \texttt{DOWN}. Numerical values may also be used: \texttt{UP}=1, \texttt{DOWN}=-1, \texttt{LEFT}=-1, \texttt{RIGHT}=1, \texttt{CENTER}=0.

\texttt{padding} (dimension, in staff space):
\begin{verbatim}
  0.5
\end{verbatim}
Add this much extra space between objects that are next to each other.

\texttt{side-axis} (number):
\begin{verbatim}
  1
\end{verbatim}
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.

\texttt{staff-padding} (dimension, in staff space):
\begin{verbatim}
  1.0
\end{verbatim}
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.

\texttt{X-extent} (pair of numbers):
\begin{verbatim}
  ly:axis-group-interface::width
\end{verbatim}
Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

\texttt{Y-extent} (pair of numbers):
\begin{verbatim}
  ly:axis-group-interface::height
\end{verbatim}
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

\texttt{Y-offset} (number):
\begin{verbatim}
  ly:side-position-interface::y-aligned-side
\end{verbatim}
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 553, Section 3.2.46 [grob-interface], page 575, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.107 [side-position-interface], page 610, and Section 3.2.114 [spanner-interface], page 617.

### 3.1.17 BassFigureBracket

BassFigureBracket objects are created by: Section 2.2.38 [Figured bass engraver], page 329.

Standard settings:

\texttt{edge-height} (pair):
\begin{verbatim}
  '(.2 . .2)
\end{verbatim}
A pair of numbers specifying the heights of the vertical edges: \texttt{(left-height . right-height)}.

\texttt{stencil} (stencil):
\begin{verbatim}
  ly:enclosing-bracket::print
\end{verbatim}
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): Section 3.2.31 [enclosing-bracket-interface], page 567, Section 3.2.46 [grob-interface], page 575, and Section 3.2.53 [item-interface], page 583.

3.1.18 BassFigureContinuation

BassFigureContinuation objects are created by: Section 2.2.38 [Figured_bass_engraver], page 329.

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): Section 3.2.33 [figured-bass-continuation-interface], page 567, Section 3.2.46 [grob-interface], page 575, and Section 3.2.114 [spanner-interface], page 617.

3.1.19 BassFigureLine

BassFigureLine objects are created by: Section 2.2.38 [Figured_bass_engraver], page 329.

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): Section 3.2.7 [axis-group-interface], page 553, Section 3.2.46 [grob-interface], page 575, Section 3.2.86 [outside-staff-axis-group-interface], page 599, and Section 3.2.114 [spanner-interface], page 617.
3.1.20 Beam

Beam objects are created by: Section 2.2.4 [Auto Beam engraver], page 315, Section 2.2.10 [Beam engraver], page 319, Section 2.2.16 [Chord Tremolo engraver], page 321, Section 2.2.47 [Grace Auto Beam engraver], page 333, and Section 2.2.48 [Grace Beam engraver], page 333.

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)
A list 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-
Two skylines, one above and one below this grob.

X-positions (pair of numbers):

Pair of X staff coordinates of a spanner in the form \((\text{left}, \text{right})\), where both \text{left} and \text{right} are in \text{staff-space} units of the current staff.

This object supports the following interface(s): Section 3.2.12 [beam-interface], page 557, Section 3.2.46 [grob-interface], page 575, Section 3.2.114 [spanner-interface], page 617, Section 3.2.118 [staff-symbol-referencer-interface], page 620, and Section 3.2.137 [unbreakable-spanner-interface], page 634.

### 3.1.21 BendAfter

BendAfter objects are created by: Section 2.2.12 [Bend engraver], page 319.

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 \text{springs-and-rods} property. If added to a \text{Tie}, this sets the minimum distance between noteheads.

- **stencil** (stencil):
  
  \text{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 \text{Staff.StaffSymbol.thickness}).

This object supports the following interface(s): Section 3.2.13 [bend-after-interface], page 559, Section 3.2.46 [grob-interface], page 575, and Section 3.2.114 [spanner-interface], page 617.

### 3.1.22 BreakAlignGroup

BreakAlignGroup objects are created by: Section 2.2.13 [Break align engraver], page 320.

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):
  
  \text{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): Section 3.2.7 [axis-group-interface], page 553, Section 3.2.15 [break-aligned-interface], page 560, Section 3.2.46 [grob-interface], page 575, and Section 3.2.53 [item-interface], page 583.

3.1.23 BreakAlignment

BreakAlignment objects are created by: Section 2.2.13 [Break_align_engraver], page 320.

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): Section 3.2.7 [axis-group-interface], page 553,
Section 3.2.16 [break-alignment-interface], page 562, Section 3.2.46 [grob-interface], page 575,
and Section 3.2.53 [item-interface], page 583.

3.1.24 BreathingSign

BreathingSign objects are created by: Section 2.2.14 [Breathing_sign engraver], page 320.

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, #(<em>end-of-line unbroken begin-of-line</em>). #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): Section 3.2.15 [break-aligned-interface], page 560, Section 3.2.17 [breathing-sign-interface], page 563, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87 [outside-staff-interface], page 600, and Section 3.2.128 [text-interface], page 626.

3.1.25 ChordName
ChordName objects are created by: Section 2.2.15 [Chord_name_engraver], page 320.

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 \((-\text{inf}.0 \ . \ +\text{inf}.0\)).

**extra-spacing-width** (pair of numbers):
\[\text{'(}-0.5 . \ 0.5\text{')}\]
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 \((+\text{inf}.0 \ . \ -\text{inf}.0\)).

**font-family** (symbol):
\[\text{'sans}\]
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 font-size is set, its value is added to this before the glyph is printed. Fractional values are allowed.

**stencil** (stencil):
\[\text{ly:text-interface::print}\]
The symbol to print.

**word-space** (dimension, in staff space):
\[0.0\]
Space to insert between words in texts.

**Y-extent** (pair of numbers):
\[
\#<\text{unpure-pure-container} \ #<\text{primitive-procedure} \\
\text{ly:grob::stencil-height}> > \\
\text{ly:grob::stencil-height}> > \\
\]
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.18 [chord-name-interface], page 563, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.99 [rhythmic-grob-interface], page 606, and Section 3.2.128 [text-interface], page 626.

### 3.1.26 Clef

Clef objects are created by: Section 2.2.17 [Clef_engraver], page 321.

Standard settings:

**avoid-slur** (symbol):
\[\text{'inside}\]
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
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): Section 3.2.15 [break-aligned-interface], page 560, Section 3.2.19 [clef-interface], page 563, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.96 [pure-from-neighbor-interface], page 604, and Section 3.2.118 [staff-symbol-referencer-interface], page 620.

3.1.27 ClefModifier

ClefModifier objects are created by: Section 2.2.17 [Clef engraver], page 321, and Section 2.2.24 [Cue_clef_engraver], page 324.

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): Section 3.2.20 [clef-modifier-interface], page 563, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface], page 607, Section 3.2.107 [side-position-interface], page 610, and Section 3.2.128 [text-interface], page 626.
3.1.28 ClusterSpanner

ClusterSpanner objects are created by: Section 2.2.18 [Cluster_spanner_engraver], page 322.

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): Section 3.2.22 [cluster-interface], page 564, Section 3.2.46 [grob-interface], page 575, and Section 3.2.114 [spanner-interface], page 617.

3.1.29 ClusterSpannerBeacon

ClusterSpannerBeacon objects are created by: Section 2.2.18 [Cluster_spanner_engraver], page 322.

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): Section 3.2.21 [cluster-beacon-interface], page 564, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.99 [rhythmic-grob-interface], page 606.

3.1.30 CombineTextScript

CombineTextScript objects are created by: Section 2.2.89 [Part_combine_engraver], page 347.

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. \texttt{around} moves the grob vertically to the outside of the slur only if there is a collision. \texttt{ignore} does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), \texttt{outside} and \texttt{around} behave like \texttt{ignore}.

\texttt{baseline-skip} (dimension, in staff space):

\begin{itemize}
\item 2
\end{itemize}

Distance between base lines of multiple lines of text.

\texttt{direction} (direction):

\begin{itemize}
\item 1
\end{itemize}

If \texttt{side-axis} is 0 (or \texttt{X}), then this property determines whether the object is placed \texttt{LEFT}, \texttt{CENTER} or \texttt{RIGHT} with respect to the other object. Otherwise, it determines whether the object is placed \texttt{UP}, \texttt{CENTER} or \texttt{DOWN}. Numerical values may also be used: \texttt{UP=1}, \texttt{DOWN=-1}, \texttt{LEFT=-1}, \texttt{RIGHT=1}, \texttt{CENTER=0}.

\texttt{extra-spacing-width} (pair of numbers):

\begin{itemize}
\item (+inf.0 . -inf.0)
\end{itemize}

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).

\texttt{font-series} (symbol):

\begin{itemize}
\item 'bold
\end{itemize}

Select the series of a font. Choices include \texttt{medium}, \texttt{bold}, \texttt{bold-narrow}, etc.

\texttt{outside-staff-priority} (number):

\begin{itemize}
\item 450
\end{itemize}

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 \texttt{outside-staff-priority} is closer to the staff.

\texttt{padding} (dimension, in staff space):

\begin{itemize}
\item 0.5
\end{itemize}

Add this much extra space between objects that are next to each other.

\texttt{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 \texttt{self-alignment-X} property will be used.

\texttt{script-priority} (number):

\begin{itemize}
\item 200
\end{itemize}

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.

\texttt{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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface], page 607, Section 3.2.107 [side-position-interface], page 610, Section 3.2.128 [text-interface], page 626, and Section 3.2.129 [text-script-interface], page 627.

3.1.31 CueClef

CueClef objects are created by: Section 2.2.24 [Cue_clef_engraver], page 324.

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))
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:groб::vertical-skylines-from-stencil>
    Two skylines, one above and one below this grob.

Y-extent (pair of numbers):
    #<unpure-pure-container #<primitive-procedure
    ly:groб::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): Section 3.2.15 [break-aligned-interface],
page 560, Section 3.2.19 [clef-interface], page 563, Section 3.2.37 [font-interface], page 569,
Section 3.2.46 [groб-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.96
[pure-from-neighbor-interface], page 604, and Section 3.2.118 [staff-symbol-referencer-interface],
page 620.

3.1.32 CueEndClef

CueEndClef objects are created by: Section 2.2.24 [Cue_clef_ engraver], page 324.

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
groб inside the slur. outside moves the groб vertically to the outside
of the slur. around moves the groб 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 \((-\text{inf}.0 . +\text{inf}.0)\).

**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

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): Section 3.2.15 [break-aligned-interface],
page 560, Section 3.2.19 [clef-interface], page 563, Section 3.2.37 [font-interface], page 569,
### 3.1.33 Custos

Custos objects are created by: Section 2.2.25 [Custos engraver], page 324.

#### 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): Section 3.2.15 [break-aligned-interface], page 560, Section 3.2.23 [custos-interface], page 564, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.118 [staff-symbol-referencer-interface], page 620.

3.1.34 DotColumn
DotColumn objects are created by: Section 2.2.27 [Dot_column_engraver], page 325, and Section 2.2.137 [Vaticana_ligature_engraver], page 362.

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): Section 3.2.7 [axis-group-interface], page 553, Section 3.2.24 [dot-column-interface], page 565, Section 3.2.46 [grob-interface], page 575, and Section 3.2.53 [item-interface], page 583.

### 3.1.35 Dots

Dots objects are created by: Section 2.2.28 [Dots engraver], page 326.

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 \((+\infty , -\infty )\).

**staff-position** (number):
- \(\text{dot::calc-staff-position}\)
  
  Vertical position, measured in half staff spaces, counted from the middle line.

**stencil** (stencil):
- \(\text{ly:dot::print}\)
  
  The symbol to print.

**Y-extent** (pair of numbers):
- \(\text{#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >}\)
  
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.25 [dots-interface], page 565, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.118 [staff-symbol-referencer-interface], page 620.

### 3.1.36 DoublePercentRepeat

DoublePercentRepeat objects are created by: Section 2.2.29 [Double_percent_repeat_engraver], page 326.

Standard settings:

**break-align-symbol** (symbol):
- \('\text{staff-bar}'\)
  
  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, \(\text{(end-of-line unbroken begin-of-line)}\). \#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):
- \('\text{fetaMusic}'\)
  
  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 \text{fetaMusic} (Emmentaler), \text{fetaBraces}, \text{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): Section 3.2.15 [break-aligned-interface], page 560, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.90 [percent-repeat-interface], page 602, and Section 3.2.91 [percent-repeat-item-interface], page 603.

### 3.1.37 DoublePercentRepeatCounter

DoublePercentRepeatCounter objects are created by: Section 2.2.29 [Double_percent_repeat_counter], page 326.

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
\texttt{fontSize} is set, its value is added to this before the glyph is printed.
Fractional values are allowed.

\texttt{padding} (dimension, in staff space):

\begin{verbatim}
0.2
\end{verbatim}

Add this much extra space between objects that are next to each other.

\texttt{parent-alignment-\textit{X}} (number):

\begin{verbatim}
0
\end{verbatim}

Specify on which point of the parent the object is aligned. The value
\texttt{-1} means aligned on parent’s left edge, \texttt{0} on center, and \texttt{1} right edge, in \textit{X} direction. Other numerical values may also be specified - the unit
is half the parent’s width. If unset, the value from \texttt{self-alignment-\textit{X}}
property will be used.

\texttt{self-alignment-\textit{X}} (number):

\begin{verbatim}
0
\end{verbatim}

Specify alignment of an object. The value \texttt{-1} means left aligned, \texttt{0} cen-
tered, and \texttt{1} right-aligned in \textit{X} direction. Other numerical values may
also be specified - the unit is half the object width.

\texttt{side-axis} (number):

\begin{verbatim}
1
\end{verbatim}

If the value is \texttt{X} (or equivalently \texttt{0}), the object is placed horizontally
next to the other object. If the value is \texttt{Y} or \texttt{1}, it is placed vertically.

\texttt{staff-padding} (dimension, in staff space):

\begin{verbatim}
0.25
\end{verbatim}

Maintain this much space between reference points and the staff. Its
effect is to align objects of differing sizes (like the dynamics \texttt{p} and \texttt{f}) on
their baselines.

\texttt{stencil} (stencil):

\begin{verbatim}
ly: text-interface::print
\end{verbatim}

The symbol to print.

\texttt{X-offset} (number):

\begin{verbatim}
ly: self-alignment-interface::aligned-on-x-parent
\end{verbatim}

The horizontal amount that this object is moved relative to its \texttt{X}-parent.

\texttt{Y-extent} (pair of numbers):

\begin{verbatim}
#<unpure-pure-container #<primitive-procedure
ly: grob::stencil-height> >
\end{verbatim}

Extent (size) in the \texttt{Y} direction, measured in staff-space units, relative
to object’s reference point.

\texttt{Y-offset} (number):

\begin{verbatim}
#<unpure-pure-container #<primitive-procedure ly: side-
position-interface::y-aligned-side> #<primitive-procedure
ly: side-position-interface::pure-y-aligned-side> >
\end{verbatim}

The vertical amount that this object is moved relative to its \texttt{Y}-parent.

This object supports the following interface(s): Section 3.2.37 [font-interface], page 569,
Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87
3.1.38 DoubleRepeatSlash

DoubleRepeatSlash objects are created by: Section 2.2.107 [Slash_repeat_ engraver], page 353.

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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.90 [percent-repeat-interface], page 602, Section 3.2.91 [percent-repeat-item-interface], page 603, and Section 3.2.99 [rhythmic-grob-interface], page 606.
3.1.39 \textbf{DurationLine}

DurationLine objects are created by: Section 2.2.32 [Duration\_line\_engraver], page 327.

Standard settings:

\begin{itemize}
\item \textbf{after-line-breaking} (boolean):
  \begin{verbatim}
  ly:spanner::kill-zero-spanned-time
  \end{verbatim}
  Dummy property, used to trigger callback for \texttt{after-line-breaking}.

\item \textbf{arrow-length} (number):
  \begin{verbatim}
  2
  \end{verbatim}
  Arrow length.

\item \textbf{arrow-width} (number):
  \begin{verbatim}
  1.5
  \end{verbatim}
  Arrow width.

\item \textbf{bound-details} (list):
  \begin{verbatim}
  '((right (end-on-acidental . #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)))
  \end{verbatim}
  An alist of properties for determining attachments of spanners to edges.

\item \textbf{breakable} (boolean):
  \begin{verbatim}
  #t
  \end{verbatim}
  Allow breaks here.

\item \textbf{details} (list):
  \begin{verbatim}
  '(hook-height . 0.34)
  (hook-thickness . #f)
  (hook-direction . 1))
  \end{verbatim}
  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 \texttt{details}
  property.

\item \textbf{minimum-length} (dimension, in staff space):
  \begin{verbatim}
  2
  \end{verbatim}
  Try to make a spanner at least this long, normally in the horizontal
  direction. This requires an appropriate callback for the \texttt{springs-and-rod}s
  property. If added to a \texttt{Tie}, this sets the minimum distance be-
  tween noteheads.

\item \textbf{minimum-length-after-break} (dimension, in staff space):
  \begin{verbatim}
  6
  \end{verbatim}
  If set, try to make a broken spanner starting a line this long. This
  requires an appropriate callback for the \texttt{springs-and-rod}s property.
  If added to a \texttt{Tie}, this sets the minimum distance to the notehead.

\item \textbf{springs-and-rods} (boolean):
  \begin{verbatim}
  ly:spanner::set-spacing-rods
  \end{verbatim}
  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):
   ly:grob::vertical-skylines-from-stencil
   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): Section 3.2.26 [duration-line-interface], page 566, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.62 [line-interface], page 587, Section 3.2.63 [line-spanner-interface], page 588, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.137 [unbreakable-spanner-interface], page 634.

3.1.40 DynamicLineSpanner

DynamicLineSpanner objects are created by: Section 2.2.33 [Dynamic_align_engraver], page 327.

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):

Y-offset is a measure of the vertical distance that an object is moved relative to its Y-parent. It is used to specify the position of objects relative to each other along the Y-axis.

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 553, Section 3.2.27 [dynamic-interface], page 566, Section 3.2.28 [dynamic-line-spanner-interface], page 566, Section 3.2.46 [grob-interface], page 575, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.107 [side-position-interface], page 610, and Section 3.2.114 [spanner-interface], page 617.

### 3.1.41 DynamicText

DynamicText objects are created by: Section 2.2.34 [Dynamic engraver], page 328.

#### 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):

```plaintext
0.5
```

Space to insert on the right side of an object (e.g., between note and its accidentals).

**self-alignment-X** (number):

```plaintext
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):

```plaintext
ly:text-interface::print
```

The symbol to print.

**vertical-skylines** (pair of skylines):

```plaintext
#<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):

```plaintext
#t
```

If true, this grob will ignore suspended noteheads when aligning itself on NoteColumn.

**X-offset** (number):

```plaintext
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):

```plaintext
#<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):

```plaintext
#<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): Section 3.2.27 [dynamic-interface], page 566, Section 3.2.29 [dynamic-text-interface], page 566, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.102 [script-interface], page 606, Section 3.2.103 [self-alignment-interface], page 607, and Section 3.2.128 [text-interface], page 626.

### 3.1.42 DynamicTextSpanner

DynamicTextSpanner objects are created by: Section 2.2.34 [Dynamic engraver], page 328.

**Standard settings:**

**before-line-breaking** (boolean):

```plaintext
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):

'ditalic

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): Section 3.2.27 [dynamic-interface], page 566, Section 3.2.30 [dynamic-text-spanner-interface], page 566, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.62 [line-interface], page 587, Section 3.2.63 [line-spanner-interface], page 588, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.128 [text-interface], page 626.

3.1.43 Episema

Episema objects are created by: Section 2.2.36 [Episema_engraver], page 329.

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): Section 3.2.32 [episema-interface], page 567,
Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.62
[line-interface], page 587, Section 3.2.63 [line-spanner-interface], page 588, Section 3.2.107 [side-
position-interface], page 610, and Section 3.2.114 [spanner-interface], page 617.

3.1.44 Fingering

Fingering objects are created by: Section 2.2.41 [Fingering_engraver], page 330, and
Section 2.2.78 [New_fingering_engraver], page 343.

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): Section 3.2.34 [fingering-interface], page 568, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface], page 607, Section 3.2.107 [side-position-interface], page 610, Section 3.2.128 [text-interface], page 626, and Section 3.2.129 [text-script-interface], page 627.

### 3.1.45 FingeringColumn

FingeringColumn objects are created by: Section 2.2.40 [Fingering_column_engraver], page 330.

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): Section 3.2.35 [fingering-column-interface], page 568, Section 3.2.46 [grob-interface], page 575, and Section 3.2.53 [item-interface], page 583.

### 3.1.46 Flag

Flag objects are created by: Section 2.2.121 [Stem_engraver], page 356.

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): Section 3.2.36 [flag-interface], page 568,
Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, and
Section 3.2.53 [item-interface], page 583.

3.1.47 FootnoteItem
FootnoteItem objects are created by: Section 2.2.43 [Footnote engraver], page 331.

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): Section 3.2.8 [balloon-interface], page 555,
Section 3.2.37 [font-interface], page 569, Section 3.2.38 [footnote-interface], page 570,
Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and
Section 3.2.128 [text-interface], page 626.

3.1.48 FootnoteSpanner
FootnoteSpanner objects are created by: Section 2.2.43 [Footnote engraver], page 331.
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): Section 3.2.8 [balloon-interface], page 555, Section 3.2.37 [font-interface], page 569, Section 3.2.38 [footnote-interface], page 570, Section 3.2.39 [footnote-spanner-interface], page 571, Section 3.2.46 [grob-interface], page 575, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.128 [text-interface], page 626.

3.1.49 FretBoard

FretBoard objects are created by: Section 2.2.45 [Fretboard_engraver], page 331.

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):
    '(.2 . -.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):
    '(-.5 . .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 \texttt{fret-diagram-details} include the following:

- \texttt{barre-type} – Type of barre indication used. Choices include \texttt{curved}, \texttt{straight}, and \texttt{none}. Default \texttt{curved}.
- \texttt{capo-thickness} – Thickness of capo indicator, in multiples of fret-space. Default value 0.5.
- \texttt{dot-color} – Color of dots. Options include \texttt{black} and \texttt{white}. Default \texttt{black}.
- \texttt{dot-label-font-mag} – Magnification for font used to label fret dots. Default value 1.
- \texttt{dot-position} – Location of dot in fret space. Default 0.6 for dots without labels, 0.95-\texttt{dot-radius} for dots with labels.
- \texttt{dot-radius} – Radius of dots, in terms of fret spaces. Default value 0.425 for labeled dots, 0.25 for unlabeled dots.
- \texttt{finger-code} – Code for the type of fingering indication used. Options include \texttt{none}, \texttt{in-dot}, and \texttt{below-string}. Default \texttt{none} for markup fret diagrams, \texttt{below-string} for \texttt{FretBoards} fret diagrams.
- \texttt{fret-count} – The number of frets. Default 4.
- \texttt{fret-distance} – Multiplier to adjust the distance between frets. Default 1.0.
- \texttt{fret-label-custom-format} – The format string to be used label the lowest fret number, when \texttt{number-type} equals to \texttt{custom}. Default \texttt{"~a"}.
- \texttt{fret-label-font-mag} – The magnification of the font used to label the lowest fret number. Default 0.5.
- \texttt{fret-label-vertical-offset} – The offset of the fret label from the center of the fret in direction parallel to strings. Default 0.
- \texttt{fret-label-horizontal-offset} – The offset of the fret label from the center of the fret in direction orthogonal to strings. Default 0.
- \texttt{handedness} – Print the fret-diagram left- or right-handed. -1, LEFT for left; 1, RIGHT for right. Default \texttt{RIGHT}.
- \texttt{paren-padding} – The padding for the parenthesis. Default 0.05.
- \texttt{label-dir} – Side to which the fret label is attached. -1, LEFT, or \texttt{DOWN} for left or down; 1, RIGHT, or \texttt{UP} for right or up. Default \texttt{RIGHT}.
- \texttt{mute-string} – Character string to be used to indicate muted string. Default \texttt{"x"}.
- \texttt{number-type} – Type of numbers to use in fret label. Choices include \texttt{roman-lower}, \texttt{roman-upper}, \texttt{arabic} and \texttt{custom}. In the later case, the format string is supplied by the \texttt{fret-label-custom-format} property. Default \texttt{roman-lower}.
- \texttt{open-string} – Character string to be used to indicate open string. Default \texttt{"o"}.
- \texttt{orientation} – Orientation of fret-diagram. Options include \texttt{normal}, \texttt{landscape}, and \texttt{opposing-landscape}. Default \texttt{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 \( \text{thickness} \times (1 + \text{string-thickness-factor})^{(k-1)} \). 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): Section 3.2.18 [chord-name-interface], page 563, Section 3.2.37 [font-interface], page 569, Section 3.2.40 [fret-diagram-interface], page 571, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87 [outside-staff-interface], page 600, and Section 3.2.99 [rhythmic-grob-interface], page 606.

### 3.1.50 Glissando

Glissando objects are created by: Section 2.2.46 [Glissando engraver], page 332.

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): Section 3.2.41 [glissando-interface], page 573, Section 3.2.46 [grob-interface], page 575, Section 3.2.62 [line-interface], page 587, Section 3.2.63 [line-spanner-interface], page 588, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.137 [unbreakable-spanner-interface], page 634.
3.1.51 GraceSpacing
GraceSpacing objects are created by: Section 2.2.50 [Grace_spacing_engraver], page 334.

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): Section 3.2.42 [grace-spacing-interface], page 573, Section 3.2.46 [grob-interface], page 575, Section 3.2.111 [spacing-options-interface], page 615, and Section 3.2.114 [spanner-interface], page 617.

3.1.52 GridLine
GridLine objects are created by: Section 2.2.51 [Grid_line_span_engraver], page 334.

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):
  \texttt{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):
  \texttt{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): Section 3.2.44 [grid-line-interface], page 574, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.103 [self-alignment-interface], page 607.

3.1.53 GridPoint

GridPoint objects are created by: Section 2.2.52 [Grid_point_engraver], page 334.

Standard settings:

X-extent (pair of numbers):
  \texttt{'(0 . 0)}
  Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

Y-extent (pair of numbers):
  \texttt{'(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): Section 3.2.45 [grid-point-interface], page 574, Section 3.2.46 [grob-interface], page 575, and Section 3.2.53 [item-interface], page 583.

3.1.54 Hairpin

Hairpin objects are created by: Section 2.2.34 [Dynamic_engraver], page 328.

Standard settings:

after-line-breaking (boolean):
  \texttt{ly:spanner::kill-zero-spanned-time}
  Dummy property, used to trigger callback for \texttt{after-line-breaking}.

bound-padding (number):
  \texttt{1.0}
  The amount of padding to insert around spanner bounds.

broken-bound-padding (number):
  \texttt{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).

grow-direction (direction):
  \texttt{ly: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): Section 3.2.27 [dynamic-interface], page 566, Section 3.2.46 [grob-interface], page 575, Section 3.2.47 [hairpin-interface], page 579, Section 3.2.62 [line-interface], page 587, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface], page 607, and Section 3.2.114 [spanner-interface], page 617.

3.1.55 HorizontalBracket

HorizontalBracket objects are created by: Section 2.2.54 [Horizontal_bracket_engraver], page 335.

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
\texttt{Staff.StaffSymbol.thickness}).

\textbf{Y-offset (number):}
\begin{verbatim}
  #<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side>
  #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >
\end{verbatim}

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.46 [grob-interface], page 575,
Section 3.2.49 [horizontal-bracket-interface], page 580, Section 3.2.62 [line-interface], page 587,
Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.107 [side-position-interface],
page 610, and Section 3.2.114 [spanner-interface], page 617.

\textbf{3.1.56 HorizontalBracketText}

HorizontalBracketText objects are created by: Section 2.2.54 [Horizontal_bracket_engraver],
page 335.

Standard settings:

\textbf{direction (direction):}
\begin{verbatim}
  ly:horizontal-bracket-text::calc-direction
\end{verbatim}

If \texttt{side-axis} is 0 (or X), then this property determines whether the
object is placed \texttt{LEFT}, \texttt{CENTER} or \texttt{RIGHT} with respect to the other object.
Otherwise, it determines whether the object is placed \texttt{UP}, \texttt{CENTER} or
\texttt{DOWN}. Numerical values may also be used: \texttt{UP\textasciitilde1}, \texttt{DOWN\textasciitilde1}, \texttt{LEFT\textasciitilde1},
\texttt{RIGHT\textasciitilde1}, \texttt{CENTER\textasciitilde0}.

\textbf{font-size (number):}
\texttt{-1}

The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal
size, \texttt{-1} is smaller, \texttt{+1} is bigger. Each step of \texttt{1} is approximately 12\%
larger; 6 steps are exactly a factor 2 larger. If the context property
\texttt{fontSize} is set, its value is added to this before the glyph is printed.
Fractional values are allowed.

\textbf{padding (dimension, in staff space):}
\texttt{0.5}

Add this much extra space between objects that are next to each other.

\textbf{parent-alignment-X (number):}
\texttt{0}

Specify on which point of the parent the object is aligned. The value
\texttt{-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 \texttt{self-alignment-X}
property will be used.

\textbf{self-alignment-X (number):}
\texttt{0}

Specify alignment of an object. The value \texttt{-1} means left aligned, 0 cen-
tered, 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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.50 [horizontal-bracket-text-interface], page 581, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface], page 607, Section 3.2.107 [side-position-interface], page 610, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.128 [text-interface], page 626.

3.1.57 InstrumentName

InstrumentName objects are created by: Section 2.2.56 [Instrument_name_engraver], page 335.

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):

\texttt{system-start-text::calc-x-offset}

The horizontal amount that this object is moved relative to its X-parent.

Y-offset (number):

\texttt{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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.103 [self-alignment-interface], page 607, Section 3.2.107 [side-position-interface], page 610, Section 3.2.114 [spanner-interface], page 617, Section 3.2.126 [system-start-text-interface], page 625, and Section 3.2.128 [text-interface], page 626.

3.1.58 InstrumentSwitch

InstrumentSwitch objects are created by: Section 2.2.57 [Instrument_switch_engraver], page 336.

Standard settings:

direction (direction):

1

If \texttt{side-axis} is 0 (or X), then this property determines whether the object is placed \texttt{LEFT}, \texttt{CENTER} or \texttt{RIGHT} with respect to the other object. Otherwise, it determines whether the object is placed \texttt{UP}, \texttt{CENTER} or \texttt{DOWN}. Numerical values may also be used: \texttt{UP}=1, \texttt{DOWN}=-1, \texttt{LEFT}=-1, \texttt{RIGHT}=1, \texttt{CENTER}=0.

extra-spacing-width (pair of numbers):

\texttt{(+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 \texttt{(+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 \texttt{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 \texttt{-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 \texttt{self-alignment-X} property will be used.

self-alignment-X (number):

\texttt{-1}

Specify alignment of an object. The value \texttt{-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): Section 3.2.37 [font-interface], page 569,
Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87
[outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface], page 607,
Section 3.2.107 [side-position-interface], page 610, and Section 3.2.128 [text-interface], page 626.

3.1.59 KeyCancellation

KeyCancellation objects are created by: Section 2.2.59 [Key_engraver], page 336.

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 \((-\infty . +\infty)\).

**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 \((+\infty . -\infty)\).

**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):

\[
\text{Ext} \langle \text{unpure-pure-container} \ \text{#<primitive-procedure} \ 
\text{ly:grob::stencil-height} > \rangle
\]

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 560, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.54 [key-cancellation-interface], page 585, Section 3.2.55 [key-signature-interface], page 585, Section 3.2.96 [pure-from-neighbor-interface], page 604, and Section 3.2.118 [staff-symbol-referencer-interface], page 620.

3.1.60 KeySignature

KeySignature objects are created by: Section 2.2.59 [Key_engraver], page 336.

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):

\[
\text{ly:break-aligned-interface::calc-extent-aligned-anchor}
\]

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 \text{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):

\[
\text{#(#f #f #t)}
\]

A vector of 3 booleans, \text{(end-of-line unbroken begin-of-line)}. #t means visible, #f means killed.

extra-spacing-height (pair of numbers):

\[
\text{pure-from-neighbor-interface::extra-spacing-height-including-staff}
\]
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 $(-\infty.0 . +\infty.0)$.

**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 $(+\infty.0 . -\infty.0)$.

**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)
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):**

\[ ly:\text{key-signature-interface}\mathbin{::print} \]

The symbol to print.

**Vertical Skylines (pair of skylines):**

\[ \langle \text{unpure-pure-container} \langle \text{primitive-procedure} \]

\[ ly:\text{grob}\mathbin{::vertical-skylines-from-stencil} > \]

Two skylines, one above and one below this grob.

**Y-extent (pair of numbers):**

\[ \langle \text{unpure-pure-container} \langle \text{primitive-procedure} \]

\[ ly:\text{grob}\mathbin{::stencil-height} > \]

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

**Y-offset (number):**

\[ \langle \text{unpure-pure-container} \langle \text{primitive-procedure} ly:\text{staff-symbol-referencer}\mathbin{::callback} > \]

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 560, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.55 [key-signature-interface], page 585, Section 3.2.96 [pure-from-neighbor-interface], page 604, and Section 3.2.118 [staff-symbol-referencer-interface], page 620.

### 3.1.61 KievanLigature

KievanLigature objects are created by: Section 2.2.61 [Kievan_ligature_engraver], page 338.

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):**

\[ ly:\text{spanner}\mathbin{::set-spacing-rods} \]

Dummy variable for triggering spacing routines.

**Stencil (stencil):**

\[ ly:\text{kievan-ligature}\mathbin{::print} \]

The symbol to print.

This object supports the following interface(s): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.56 [kievan-ligature-interface], page 586, and Section 3.2.114 [spanner-interface], page 617.

### 3.1.62 LaissezVibrerTie

LaissezVibrerTie objects are created by: Section 2.2.62 [Laissez_vibrer_engraver], page 338.

Standard settings:

**Control-Points (list of number pairs):**

\[ ly:\text{semi-tie}\mathbin{::calc-control-points} \]
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))
A list 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): Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.105 [semi-tie-interface], page 609, and Section 3.2.131 [tie-interface], page 628.
3.1.63 LaissezVibrerTieColumn

LaissezVibrerTieColumn objects are created by: Section 2.2.62 [Laissez_vibrer_ engraver], page 338.

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): Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.104 [semi-tie-column-interface], page 608.

3.1.64 LedgerLineSpanner

LedgerLineSpanner objects are created by: Section 2.2.63 [Ledger_line_engraver], page 338.

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): Section 3.2.46 [grob-interface], page 575, Section 3.2.57 [ledger-line-spanner-interface], page 586, and Section 3.2.114 [spanner-interface], page 617.

### 3.1.65 LeftEdge

LeftEdge objects are created by: Section 2.2.13 [Break_align_engraver], page 320.

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):
  - `(#t #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): Section 3.2.15 [break-aligned-interface], page 560, Section 3.2.46 [grob-interface], page 575, and Section 3.2.53 [item-interface], page 583.

3.1.66 LigatureBracket

LigatureBracket objects are created by: Section 2.2.64 [Ligature bracket engraver], page 338.

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): Section 3.2.46 [grob-interface], page 575, Section 3.2.62 [line-interface], page 587, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.135 [tuplet-bracket-interface], page 631.

### 3.1.67 LyricExtender

LyricExtender objects are created by: Section 2.2.37 [Extender engraver], page 329.

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): Section 3.2.46 [grob-interface], page 575, Section 3.2.64 [lyric-extender-interface], page 590, Section 3.2.66 [lyric-interface], page 591, and Section 3.2.114 [spanner-interface], page 617.

3.1.68 **LyricHyphen**

LyricHyphen objects are created by: Section 2.2.55 [Hyphen-engraver], page 335.

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
\textit{\texttt{Staff.StaffSymbol.thickness}}).

\texttt{vertical-skylines} (pair of skylines):
\begin{verbatim}
/rem:<unpure-pure-container
/primitive-procedure
ly:grob::vertical-skylines-from-stencil
/rem:
/primitive-procedure
ly:grob::pure-simple-vertical-skylines-from-extents

Two skylines, one above and one below this grob.
\end{verbatim}

\textit{Y-extent} (pair of numbers):
\begin{verbatim}
'(0.0)
\end{verbatim}
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

This object supports the following interface(s): Section 3.2.37 \textit{[font-interface]}, page 569,
Section 3.2.46 \textit{[grob-interface]}, page 575, Section 3.2.65 \textit{[lyric-hyphen-interface]}, page 590,
Section 3.2.66 \textit{[lyric-interface]}, page 591, and Section 3.2.114 \textit{[spanner-interface]}, page 617.

3.1.69 \textbf{LyricSpace}

LyricSpace objects are created by: Section 2.2.55 \textit{[Hyphen.engraver]}, page 335.

Standard settings:

\textbf{minimum-distance} (dimension, in staff space):
\begin{verbatim}
0.45
\end{verbatim}
Minimum distance between rest and notes or beam.

\textbf{padding} (dimension, in staff space):
\begin{verbatim}
0.0
\end{verbatim}
Add this much extra space between objects that are next to each other.

\textbf{springs-and-rods} (boolean):
\begin{verbatim}
ly:lyric-hyphen::set-spacing-rods
\end{verbatim}
Dummy variable for triggering spacing routines.

\textbf{X-extent} (pair of numbers)
Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

\textbf{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): Section 3.2.46 \textit{[grob-interface]}, page 575,
Section 3.2.65 \textit{[lyric-hyphen-interface]}, page 590, and Section 3.2.114 \textit{[spanner-interface]}, page 617.

3.1.70 \textbf{LyricText}

LyricText objects are created by: Section 2.2.65 \textit{[Lyric.engraver]}, page 338.

Standard settings:

\textbf{extra-spacing-height} (pair of numbers):
\begin{verbatim}
'(0.2 . -0.2)
\end{verbatim}
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):
   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):
   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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.67 [lyric-syllable-interface], page 591, Section 3.2.99 [rhythmic-grob-interface], page 606, Section 3.2.103 [self-alignment-interface], page 607, and Section 3.2.128 [text-interface], page 626.

3.1.71 MeasureCounter
MeasureCounter objects are created by: Section 2.2.68 [Measure_counter_engraver], page 339.

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 it is 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 BreakAlignments.
  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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.69 [measure-counter-interface], page 591, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface], page 607, Section 3.2.107 [side-position-interface], page 610, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.128 [text-interface], page 626.

3.1.72 MeasureGrouping

MeasureGrouping objects are created by: Section 2.2.69 [Measure_grouping_ engraver], page 340.

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> >
Chapter 3: Backend

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.46 [grob-interface], page 575, Section 3.2.70 [measure-grouping-interface], page 592, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.107 [side-position-interface], page 610, and Section 3.2.114 [spanner-interface], page 617.

3.1.73 MeasureSpanner

MeasureSpanner objects are created by: Section 2.2.70 [Measure_spanner_engraver], page 340.

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 BreakAlignments.

  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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.62 [line-interface], page 587, Section 3.2.71 [measure-spanner-interface], page 592, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface], page 607, Section 3.2.107 [side-position-interface], page 610, Section 3.2.114 [melody-spanner-interface], page 617, and Section 3.2.128 [text-interface], page 626.

3.1.74 MelodyItem
MelodyItem objects are created by: Section 2.2.71 [Melody_engraver], page 341.
Standard settings:

neutral-direction (direction):
-1
Which direction to take in the center of the staff.

This object supports the following interface(s): Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.72 [melody-spanner-interface], page 593.

3.1.75 MensuralLigature
MensuralLigature objects are created by: Section 2.2.72 [Mensural_ligature_engraver], page 341.
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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.73 [mensural-ligature-interface], page 593, and Section 3.2.114 [spanner-interface], page 617.

3.1.76 MetronomeMark

MetronomeMark objects are created by: Section 2.2.75 [MetronomeMark engraver], page 341.

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): Section 3.2.14 [break-alignable-interface], page 560, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.74 [metronome-mark-interface], page 594, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface], page 607, Section 3.2.107 [side-position-interface], page 610, and Section 3.2.128 [text-interface], page 626.
3.1.77 MultiMeasureRest

MultiMeasureRest objects are created by: Section 2.2.77 [Multi_measure_rest_engraver], page 342.

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 BreakAlignments.
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-logs 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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.75 [multi-measure-interface], page 594, Section 3.2.76 [multi-measure-rest-interface], page 594, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.98 [rest-interface], page 605, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.118 [staff-symbol-referencer-interface], page 620.

3.1.78 MultiMeasureRestNumber

MultiMeasureRestNumber objects are created by: Section 2.2.77 [Multi_measure_rest_engraver], page 342.

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.
Chapter 3: Backend

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 cen-
  tered, 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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.75 [multi-measure-interface], page 594, Section 3.2.77 [multi-measure-rest-number-interface], page 596, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface], page 607, Section 3.2.107 [side-position-interface], page 610, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.128 [text-interface], page 626.

3.1.79 MultiMeasureRestScript

MultiMeasureRestScript objects are created by: Section 2.2.77 [Multi_measure_rest_engraver], page 342.

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):

```lily
```

Two skylines, one above and one below this grob.

**X-offset** (number):

```lily
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):

```lily
<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):

```lily
<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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.75 [multi-measure-interface], page 594, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.102 [script-interface], page 606, Section 3.2.103 [self-alignment-interface], page 607, Section 3.2.107 [side-position-interface], page 610, and Section 3.2.114 [spanner-interface], page 617.

### 3.1.80 MultiMeasureRestText

MultiMeasureRestText objects are created by: Section 2.2.77 [Multi_measure_rest_engraver], page 342.

**Standard settings:**

**direction** (direction):

```lily
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):

```lily
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):

```lily
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.

d self-alignment-X (number):
0
Specify alignment of an object. The value -1 means left aligned, 0 cen-
tered, 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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.75 [multi-measure-interface], page 594, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface], page 607, Section 3.2.107 [side-position-interface], page 610, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.128 [text-interface], page 626.

3.1.81 NonMusicalPaperColumn

NonMusicalPaperColumn objects are created by: Section 2.2.87 [Paper_column_engraver], page 346.

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 col-
  umn. 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): Section 3.2.7 [axis-group-interface], page 553,
Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53
[item-interface], page 583, Section 3.2.88 [paper-column-interface], page 601, Section 3.2.106
[separation-item-interface], page 610, and Section 3.2.109 [spaceable-grob-interface], page 614.

3.1.82 NoteCollision

NoteCollision objects are created by: Section 2.2.19 [Collision_engraver], page 322.

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):

```latex
#<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): Section 3.2.7 [axis-group-interface], page 553, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.78 [note-collision-interface], page 596.

### 3.1.83 NoteColumn

NoteColumn objects are created by: Section 2.2.102 [Rhythmic_column_engraver], page 352.

Standard settings:

- **axes** (list):
  
  ```latex
  '(0 1)
  ```

  List of axis numbers. In the case of alignment grobs, this should contain only one number.

- **horizontal-skylines** (pair of skylines):
  
  ```latex
  ly:separation-item::calc-skylines
  ```

  Two skylines, one to the left and one to the right of this grob.

- **skyline-vertical-padding** (number):
  
  ```latex
  0.15
  ```

  The amount by which the left and right skylines of a column are padded vertically, beyond the Y-extents and extra-spacing-heights of the constituent grobs in the column. Increase this to prevent interleaving of grobs from adjacent columns.

- **vertical-skylines** (pair of skylines):
  
  ```latex
  ly:axis-group-interface::calc-skylines
  ```

  Two skylines, one above and one below this grob.

- **X-extent** (pair of numbers):
  
  ```latex
  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):
  
  ```latex
  #<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): Section 3.2.7 [axis-group-interface], page 553, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.79 [note-column-interface], page 596, and Section 3.2.106 [separation-item-interface], page 610.

### 3.1.84 NoteHead

NoteHead objects are created by: Section 2.2.20 [Completion_heads_engraver], page 322, Section 2.2.31 [Drum_notes_engraver], page 327, and Section 2.2.80 [Note_heads_engraver], page 344.
Standard settings:

**duration-log** (integer):

\[\text{note-head::calc-duration-log}\]

The 2-log of the note head duration, i.e., 0 = whole note, 1 = half note, etc.

**extra-spacing-height** (pair of numbers):

\[\text{ly:note-head::include-ledger-line-height}\]

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 \((-\infty, 0 . +\infty, 0)\).

**glyph-name** (string):

\[\text{note-head::calc-glyph-name}\]

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):

\[\text{'(accidental-grob dot)}\]

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):

\[\text{ly:note-head::calc-stem-attachment}\]

An \((x, y)\) pair where the stem attaches to the notehead.

**stencil** (stencil):

\[\text{ly:note-head::print}\]

The symbol to print.

**X-offset** (number):

\[\text{ly:note-head::stem-x-shift}\]

The horizontal amount that this object is moved relative to its X-parent.

**Y-extent** (pair of numbers):

\[\text{#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >}\]

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

**Y-offset** (number):

\[\text{#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >}\]

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.37 [font-interface], page 569, Section 3.2.43 [gregorian-ligature-interface], page 573, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.58 [ledgered-interface], page 587, Section 3.2.60 [ligature-head-interface], page 587, Section 3.2.73 [mensural-ligature-interface],
3.1.85 NoteName

NoteName objects are created by: Section 2.2.81 [Note_name_engraver], page 344.

Standard settings:

\begin{verbatim}
  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.
\end{verbatim}

This object supports the following interface(s): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.81 [note-name-interface], page 598, and Section 3.2.128 [text-interface], page 626.

3.1.86 NoteSpacing

NoteSpacing objects are created by: Section 2.2.83 [Note_spacing_engraver], page 345.

Standard settings:

\begin{verbatim}
  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 configu-
    rations. 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 configu-
    rations. For opposite directions, this amount is the correction for two
    normal sized stems that overlap completely.
\end{verbatim}

This object supports the following interface(s): Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.82 [note-spacing-interface], page 598, and Section 3.2.110 [spacing-interface], page 615.
3.1.87 OttavaBracket

OttavaBracket objects are created by: Section 2.2.84 [Ottava_spanner_engraver], page 345.

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): Section 3.2.37 [font-interface], page 569,
Section 3.2.46 [grob-interface], page 575, Section 3.2.49 [horizontal-bracket-interface], page 580,
Section 3.2.62 [line-interface], page 587, Section 3.2.85 [ottava-bracket-interface], page 599,
Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.107 [side-position-interface],
page 610, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.128 [text-interface],
page 626.

3.1.88 PaperColumn

PaperColumn objects are created by: Section 2.2.87 [Paper_column_engraver], page 346.

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 \textit{Y-extents} and \textit{extra-spacing-heights} 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): Section 3.2.7 [axis-group-interface], page 553, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.88 [paper-column-interface], page 601, Section 3.2.106 [separation-item-interface], page 610, and Section 3.2.109 [spaceable-grob-interface], page 614.

### 3.1.89 ParenthesesItem

ParenthesesItem objects are created by: Section 2.2.88 [Parenthesis engraver], page 347.

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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.89 [parentheses-interface], page 602.

3.1.90 PercentRepeat

PercentRepeat objects are created by: Section 2.2.90 [Percent_repeat_engraver], page 347.

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 BreakAlignments.
  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): Section 3.2.37 [font-interface], page 569,
Section 3.2.46 [grob-interface], page 575, Section 3.2.76 [multi-measure-rest-interface], page 594,
Section 3.2.90 [percent-repeat-interface], page 602, and Section 3.2.114 [spanner-interface],
page 617.

3.1.91 PercentRepeatCounter

PercentRepeatCounter objects are created by: Section 2.2.90 [Percent_repeat_engraver],
page 347.

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. Cur-
  rently, only Lilypond’s system fonts (Emmentaler) are using this prop-
  erty. 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 \texttt{self-alignment-X} property will be used.

\texttt{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.

\texttt{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 \texttt{p} and \texttt{f}) on their baselines.

\texttt{stencil (stencil)}:
\texttt{ly:text-interface::print}
The symbol to print.

\texttt{X-offset (number)}:
\texttt{ly:self-alignment-interface::aligned-on-x-parent}
The horizontal amount that this object is moved relative to its X-parent.

\texttt{Y-extent (pair of numbers)}:
\texttt{#<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.

\texttt{Y-offset (number)}:
\texttt{#<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): \texttt{Section 3.2.37 [font-interface]}, page 569, \texttt{Section 3.2.46 [grob-interface]}, page 575, \texttt{Section 3.2.87 [outside-staff-interface]}, page 600, \texttt{Section 3.2.90 [percent-repeat-interface]}, page 602, \texttt{Section 3.2.103 [self-alignment-interface]}, page 607, \texttt{Section 3.2.107 [side-position-interface]}, page 610, \texttt{Section 3.2.114 [spanner-interface]}, page 617, and \texttt{Section 3.2.128 [text-interface]}, page 626.

\textbf{3.1.92 PhrasingSlur}

PhrasingSlur objects are created by: \texttt{Section 2.2.91 [Phrasing_slur_engraver]}, page 348.

Standard settings:

\texttt{control-points (list of number pairs)}:
\texttt{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.

\texttt{details (list)}:
'((region-size . 4)
 (head-encompass-penalty . 1000.0)
A list 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):**

\[\text{ly:slur::print}\]

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 \(\text{Staff.StaffSymbol.thickness}\)).

**vertical-skylines (pair of skylines):**

\[\text{#<unpure-pure-container #<primitive-procedure ly:slur::vertical-skylines> #<primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents>} >\]

Two skylines, one above and one below this grob.

**Y-extent (pair of numbers):**

\[\text{#<unpure-pure-container #<primitive-procedure ly:slur::height> #<primitive-procedure ly:slur::pure-height>} >\]

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.46 [grob-interface], page 575, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.108 [slur-interface], page 612, and Section 3.2.114 [spanner-interface], page 617.

### 3.1.93 PianoPedalBracket

PianoPedalBracket objects are created by: Section 2.2.93 [Piano_pedal_ engraver], page 348.

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: \(\text{UP}=1\), \(\text{DOWN}=-1\), \(\text{LEFT}=-1\), \(\text{RIGHT}=1\), \(\text{CENTER}=0\).

**edge-height (pair):**

\'(1.0 . 1.0)\]

A pair of numbers specifying the heights of the vertical edges: \(\text{left-height . right-height}\).
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.Symbol.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): Section 3.2.46 [grob-interface], page 575, Section 3.2.62 [line-interface], page 587, Section 3.2.92 [piano-pedal-bracket-interface], page 603, Section 3.2.93 [piano-pedal-interface], page 604, and Section 3.2.114 [spanner-interface], page 617.

3.1.94 RehearsalMark
RehearsalMark objects are created by: Section 2.2.67 [Mark engraver], page 339.

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): Section 3.2.14 [break-alignable-interface],
page 560, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575,
Section 3.2.53 [item-interface], page 583, Section 3.2.68 [mark-interface], page 591,
Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface],
page 607, Section 3.2.107 [side-position-interface], page 610, and Section 3.2.128 [text-interface],
page 626.

3.1.95 RepeatSlash

RepeatSlash objects are created by: Section 2.2.107 [Slash_repeat_engraver], page 353.

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): Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.90 [percent-repeat-interface], page 602, Section 3.2.91 [percent-repeat-item-interface], page 603, and Section 3.2.99 [rhythmic-grob-interface], page 606.

3.1.96 RepeatTie

RepeatTie objects are created by: Section 2.2.99 [Repeat_tie_engraver], page 351.

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))
   A list 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.
**thick**ness (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-sky**lines** (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): Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.105 [semi-tie-interface], page 609, and Section 3.2.131 [tie-interface], page 628.

### 3.1.97 RepeatTieColumn

RepeatTieColumn objects are created by: Section 2.2.99 [Repeat_tie_engraver], page 351.

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): Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.104 [semi-tie-column-interface], page 608.

### 3.1.98 Rest

Rest objects are created by: Section 2.2.21 [Completion_rest_engraver], page 323, and Section 2.2.101 [Rest_engraver], page 351.

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): Section 3.2.37 [font-interface], page 569,
Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.98
[rest-interface], page 605, Section 3.2.99 [rhythmic-grob-interface], page 606, Section 3.2.100
[rhythmic-head-interface], page 606, and Section 3.2.118 [staff-symbol-referencer-interface],
page 620.

3.1.99 RestCollision

RestCollision objects are created by: Section 2.2.100 [Rest_collision_ engraver], page 351.
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): Section 3.2.46 [grobi-face], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.97 [rest-collision-interface], page 605.

### 3.1.100 Script

Script objects are created by: Section 2.2.31 [Drum notes engraver], page 327, Section 2.2.78 [New_fingering_ engraver], page 343, and Section 2.2.104 [Script engraver], page 352.

#### 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):

Two skylines, one above and one below this grob.

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.

This object supports the following interface(s): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.102 [script-interface], page 606, Section 3.2.103 [self-alignment-interface], page 607, and Section 3.2.107 [side-position-interface], page 610.

3.1.101 ScriptColumn

ScriptColumn objects are created by: Section 2.2.103 [Script_column_engraver], page 352.

Standard settings:

before-line-breaking (boolean):

Dummy property, used to trigger a callback function.

This object supports the following interface(s): Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.101 [script-column-interface], page 606.

3.1.102 ScriptRow

ScriptRow objects are created by: Section 2.2.105 [Script_row_engraver], page 352.

Standard settings:

before-line-breaking (boolean):

Dummy property, used to trigger a callback function.

This object supports the following interface(s): Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.101 [script-column-interface], page 606.

3.1.103 Slur

Slur objects are created by: Section 2.2.108 [Slur_engraver], page 353.

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):

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):

A list 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.

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): Section 3.2.46 [grob-interface], page 575, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.108 [slur-interface], page 612, and Section 3.2.114 [spanner-interface], page 617.
3.1.104 SostenutoPedal

SostenutoPedal objects are created by: Section 2.2.93 [Piano_pedal_engraver], page 348.

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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.94 [piano-pedal-script-interface], page 604, Section 3.2.103 [self-alignment-interface], page 607, and Section 3.2.128 [text-interface], page 626.

3.1.105 SostenutoPedalLineSpanner

SostenutoPedalLineSpanner objects are created by: Section 2.2.92 [Piano pedal align engraver], page 348.

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>
Chapter 3: Backend

3.1.106 SpacingSpanner

SpacingSpanner objects are created by: Section 2.2.110 [Spacing_engraver], page 354.

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): Section 3.2.46 [grob-interface], page 575, Section 3.2.111 [spacing-options-interface], page 615, Section 3.2.112 [spacing-spanner-interface], page 615, and Section 3.2.114 [spanner-interface], page 617.

3.1.107 SpanBar
SpanBar objects are created by: Section 2.2.112 [Span_bar_engraver], page 354.
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): Section 3.2.9 [bar-line-interface], page 555,
Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53
[item-interface], page 583, and Section 3.2.113 [span-bar-interface], page 616.

3.1.108 SpanBarStub
SpanBarStub objects are created by: Section 2.2.113 [Span_bar_stub_engraver], page 355.

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): Section 3.2.46 [grob-interface], page 575,
Section 3.2.53 [item-interface], page 583, and Section 3.2.96 [pure-from-neighbor-interface],
page 604.

3.1.109 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 dis-
tance 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): Section 3.2.46 [grob-interface], page 575, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.115 [staff-grouper-interface], page 618.

### 3.1.110 StaffSpacing

StaffSpacing objects are created by: Section 2.2.106 [Separating_line_group_engraver], page 353.

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): Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.110 [spacing-interface], page 615, and Section 3.2.116 [staff-spacing-interface], page 619.
3.1.111 StaffSymbol

StaffSymbol objects are created by: Section 2.2.118 [Staff_symbol_engraver], page 355, and Section 2.2.124 [Tab_staff_symbol_engraver], page 358.

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): Section 3.2.46 [grob-interface], page 575, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.117 [staff-symbol-interface], page 619.

3.1.112 StanzaNumber

StanzaNumber objects are created by: Section 2.2.120 [Stanza_number_engraver], page 356.

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
Numerical values may also be used: \texttt{UP}=1, \texttt{DOWN}=-1, \texttt{LEFT}=-1, \texttt{RIGHT}=1, \texttt{CENTER}=0.

\textbf{font-series (symbol):}

\texttt{bold}

Select the series of a font. Choices include \texttt{medium}, \texttt{bold}, \texttt{bold-narrow}, etc.

\textbf{padding (dimension, in staff space):}

1.0

Add this much extra space between objects that are next to each other.

\textbf{side-axis (number):}

0

If the value is \texttt{X} (or equivalently \texttt{0}), the object is placed horizontally next to the other object. If the value is \texttt{Y} or \texttt{1}, it is placed vertically.

\textbf{stencil (stencil):}

\texttt{ly:text-interface::print}

The symbol to print.

\textbf{X-offset (number):}

\texttt{ly:side-position-interface::x-aligned-side}

The horizontal amount that this object is moved relative to its \texttt{X}-parent.

\textbf{Y-extent (pair of numbers):}

\texttt{ly:grob::stencil-height} >

Extent (size) in the \texttt{Y} direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.107 [side-position-interface], page 610, Section 3.2.119 [stanza-number-interface], page 620, and Section 3.2.128 [text-interface], page 626.

\section*{3.1.113 Stem}

Stem objects are created by: Section 2.2.114 [Span stem- engraver], page 355, and Section 2.2.121 [Stem- engraver], page 356.

Standard settings:

\textbf{beamlet-default-length (pair):}

\texttt{’(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 \texttt{beamlet-max-length-proportion}, whichever is smaller.

\textbf{beamlet-max-length-proportion (pair):}

\texttt{’(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))
  A list 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 them-
  selves, 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 repre-
  sents 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):**

\[
\text{ly:stem::print}
\]

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 \textit{Staff.StaffSymbol.thickness}).

**X-extent (pair of numbers):**

\[
\text{ly:stem::width}
\]

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

**X-offset (number):**

\[
\text{ly:stem::offset-callback}
\]

The horizontal amount that this object is moved relative to its X-parent.

**Y-extent (pair of numbers):**

\[
\text{<unpure-pure-container <primitive-procedure ly:stem::height> <primitive-procedure ly:stem::pure-height> >}
\]

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

**Y-offset (number):**

\[
\text{<unpure-pure-container <primitive-procedure ly:staff-symbol-referencer::callback> >}
\]

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, and Section 3.2.120 [stem-interface], page 620.

### 3.1.114 StemStub

StemStub objects are created by: Section 2.2.121 [Stem_engraver], page 356.

Standard settings:

**Extra-spacing-height (pair of numbers):**

\[
\text{stem-stub::extra-spacing-height}
\]

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 \((-\text{inf.0 . +inf.0})\).

**X-extent (pair of numbers):**

\[
\text{stem-stub::width}
\]

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.
Y-extent (pair of numbers):

Extant (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.46 [grob-interface], page 575, and Section 3.2.53 [item-interface], page 583.

3.1.115 StemTremolo

StemTremolo objects are created by: Section 2.2.121 [Stem engraver], page 356.

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): Section 3.2.46 [grob-interface], page 575, 
Section 3.2.53 [item-interface], page 583, Section 3.2.103 [self-alignment-interface], page 607, 
and Section 3.2.121 [stem-tremolo-interface], page 623.

3.1.116 StringNumber

StringNumber objects are created by: Section 2.2.78 [New_fingering_engraver], page 343.

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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.83
3.1.117 StrokeFinger

StrokeFinger objects are created by: Section 2.2.78 [New_fingering_engraver], page 343.

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.
\textbf{staff-padding} (dimension, in staff space):
\begin{verbatim}
0.5
\end{verbatim}
Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics \texttt{p} and \texttt{f}) on their baselines.

\textbf{stencil} (stencil):
\begin{verbatim}
stencil
\end{verbatim}
\texttt{ly:text-interface::print}
The symbol to print.

\textbf{text} (markup):
\begin{verbatim}
stroke-finger::calc-text
\end{verbatim}
Text markup. See Section “Formatting text” in Notation Reference.

\textbf{Y-extent} (pair of numbers):
\begin{verbatim}
#<unpure-pure-container #<primitive-procedure
ly:grob::stencil-height>
\end{verbatim}
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.103 [self-alignment-interface], page 607, Section 3.2.107 [side-position-interface], page 610, Section 3.2.123 [stroke-finger-interface], page 624, Section 3.2.128 [text-interface], page 626, and Section 3.2.129 [text-script-interface], page 627.

3.1.118 SustainPedal
SustainPedal objects are created by: Section 2.2.93 [Piano_pedal_engraver], page 348.

Standard settings:

\textbf{extra-spacing-width} (pair of numbers):
\begin{verbatim}
'(\texttt{+inf.0 . -inf.0})
\end{verbatim}
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 \texttt{(+inf.0 . -inf.0)}.

\textbf{padding} (dimension, in staff space):
\begin{verbatim}
0.0
\end{verbatim}
Add this much extra space between objects that are next to each other.

\textbf{parent-alignment-X} (number)
Specify on which point of the parent the object is aligned. The value \texttt{-1} means aligned on parent’s left edge, \texttt{0} on center, and \texttt{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 \textbf{self-alignment-X} property will be used.

\textbf{self-alignment-X} (number):
\begin{verbatim}
0
\end{verbatim}
Specify alignment of an object. The value \texttt{-1} means left aligned, \texttt{0} centered, and \texttt{1} right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.
The symbol to print.

Two skylines, one above and one below this grob.

The horizontal amount that this object is moved relative to its X-parent.

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.93 [piano-pedal-interface], page 604, Section 3.2.94 [piano-pedal-script-interface], page 604, Section 3.2.103 [self-alignment-interface], page 607, and Section 3.2.128 [text-interface], page 626.

3.1.119 SustainPedalLineSpanner

SustainPedalLineSpanner objects are created by: Section 2.2.92 [Piano_pedal_align_engraver], page 348.

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): Section 3.2.7 [axis-group-interface], page 553, Section 3.2.46 [grob-interface], page 575, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.93 [piano-pedal-interface], page 604, Section 3.2.107 [side-position-interface], page 610, and Section 3.2.114 [spanner-interface], page 617.

3.1.120 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): Section 3.2.7 [axis-group-interface], page 553,
Section 3.2.46 [grob-interface], page 575, Section 3.2.86 [outside-staff-axis-group-interface],
page 599, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.124 [system-interface],
page 624.

### 3.1.121 SystemStartBar

SystemStartBar objects are created by: Section 2.2.122 [System_start_delimiter_engraver],
page 357.

Standard settings:

**collapse-height** (dimension, in staff space):
5.0
Minimum height of system start delimiter. If equal or smaller, the
brace/bracket/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): Section 3.2.46 [grob-interface], page 575, Section 3.2.107 [side-position-interface], page 610, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.125 [system-start-delimiter-interface], page 625.

### 3.1.122 SystemStartBrace

SystemStartBrace objects are created by: Section 2.2.122 [System_start_delimiter_engraver], page 357.

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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.107 [side-position-interface], page 610, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.125 [system-start-delimiter-interface], page 625.

3.1.123 SystemStartBracket
SystemStartBracket objects are created by: Section 2.2.122 [System_start_delimiter_engraver], page 357.

  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 \( \text{Staff.StaffSymbol.thickness} \)).

**X-offset (number):**

```latex
\text{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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.107 [side-position-interface], page 610, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.125 [system-start-delimiter-interface], page 625.

### 3.1.124 SystemStartSquare

SystemStartSquare objects are created by: Section 2.2.122 [System_start_delimiter_engraver], page 357.

**Standard settings:**

- **collapse-height (dimension, in staff space):**
  
  ```latex
  5.0
  ```

  Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.

- **direction (direction):**
  
  ```latex
  -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):**
  
  ```latex
  \text{ly:system-start-delimiter::print}
  ```

  The symbol to print.

- **style (symbol):**
  
  ```latex
  'line-bracket
  ```

  This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

- **thickness (number):**
  
  ```latex
  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 \( \text{Staff.StaffSymbol.thickness} \)).

- **X-offset (number):**
  
  ```latex
  \text{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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.107 [side-position-interface], page 610, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.125 [system-start-delimiter-interface], page 625.

### 3.1.125 TabNoteHead

TabNoteHead objects are created by: Section 2.2.123 [Tab_note_heads_engraver], page 357.

#### Standard settings:

- **details** (list):
  - '(cautionary-properties
    (angularity . 0.4)
    (half-thickness . 0.075)
    (padding . 0)
    (procedure
      #<procedure parenthesize-stencil (stencil half-thickness width angularity)
        (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 angularity)
          (width . 0.25))
    (repeat-tied-properties
      (note-head-visible . #t)
      (parenthesize . #t))
    (tied-properties (parenthesize . #t)))

  A list 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 font-size 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):

'(0.0 . 1.35)

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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.80 [note-head-interface], page 597, Section 3.2.99 [rhythmic-grob-interface], page 606, Section 3.2.100 [rhythmic-head-interface], page 606, Section 3.2.118 [staff-symbol-referencer-interface], page 620, Section 3.2.127 [tab-note-head-interface], page 626, and Section 3.2.128 [text-interface], page 626.
3.1.126 TextScript

TextScript objects are created by: Section 2.2.127 [Text_engraver], page 358.

Standard settings:

avoid-slur (symbol):
'around
Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside moves 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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.52 [instrument-specific-markup-interface],
3.1.127 TextSpanner

TextSpanner objects are created by: Section 2.2.128 [Text_spnner_engraver], page 359.

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): Section 3.2.37 [font-interface], page 569,
Section 3.2.46 [grob-interface], page 575, Section 3.2.62 [line-interface], page 587, Section 3.2.63
[line-spanner-interface], page 588, Section 3.2.87 [outside-staff-interface], page 600,
Section 3.2.107 [side-position-interface], page 610, and Section 3.2.114 [spanner-interface],
page 617.

3.1.128 Tie
Tie objects are created by: Section 2.2.20 [Completion_heads engraver], page 322, and
Section 2.2.129 [Tie engraver], page 359.

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)
A list 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...
vertical-skylines (pair of skylines):

Two skylines, one above and one below this grob.

This object supports the following interface(s): Section 3.2.46 [grob-interface], page 575, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.131 [tie-interface], page 628.

3.1.129 TieColumn

TieColumn objects are created by: Section 2.2.20 [Completion_heads_engraver], page 322, and Section 2.2.129 [Tie_engraver], page 359.

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): Section 3.2.46 [grob-interface], page 575, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.130 [tie-column-interface], page 627.

3.1.130 TimeSignature

TimeSignature objects are created by: Section 2.2.131 [Time_signature_engraver], page 360.

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): Section 3.2.15 [break-aligned-interface], page 560, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.96 [pure-from-neighbor-interface], page 604, and Section 3.2.132 [time-signature-interface], page 631.

### 3.1.131 TrillPitchAccidental

TrillPitchAccidental objects are created by: Section 2.2.96 [Pitched_trill_engraver], page 350.

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.flatsharp")
   (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): Section 3.2.1 [accidental-interface], page 549, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.51 [inline-accidental-interface], page 581, Section 3.2.53 [item-interface], page 583, Section 3.2.107 [side-position-interface], page 610, and Section 3.2.133 [trill-pitch-accidental-interface], page 631.

3.1.132 TrillPitchGroup

TrillPitchGroup objects are created by: Section 2.2.96 [Pitched_trill_engraver], page 350.

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): Section 3.2.7 [axis-group-interface], page 553, Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.80 [note-head-interface], page 597, Section 3.2.89 [parentheses-interface], page 602, and Section 3.2.107 [side-position-interface], page 610.

### 3.1.133 TrillPitchHead

TrillPitchHead objects are created by: Section 2.2.96 [Pitched_trill_engraver], page 350.

**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.
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.58 [ledgered-interface], page 587, Section 3.2.95 [pitched-trill-interface], page 604, Section 3.2.100 [rhythmic-head-interface], page 606, and Section 3.2.118 [staff-symbol-referencer-interface], page 620.

### 3.1.134 TrillSpanner

TrillSpanner objects are created by: Section 2.2.134 [Trill_spanner_engraver], page 361.

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):

'\text{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): Section 3.2.37 [font-interface], page 569,
Section 3.2.46 [grob-interface], page 575, Section 3.2.62 [line-interface], page 587, Section 3.2.63
[line-spanner-interface], page 588, Section 3.2.87 [outside-staff-interface], page 600,
Section 3.2.107 [side-position-interface], page 610, Section 3.2.114 [spanner-interface], page 617,
and Section 3.2.134 [trill-spanner-interface], page 631.

### 3.1.135 TupletBracket

TupletBracket objects are created by: Section 2.2.135 [Tuplet
engraver], page 362.

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 \text{side-axis} is 0 (or $X$), then this property determines whether the
object is placed \text{LEFT}, \text{CENTER} or \text{RIGHT} with respect to the other object.
Otherwise, it determines whether the object is placed \text{UP}, \text{CENTER} or
\text{DOWN}. Numerical values may also be used: \text{UP}=1, \text{DOWN}=-1, \text{LEFT}=-1,
\text{RIGHT}=1, \text{CENTER}=0.

**edge-height** (pair):

'$(0.7 \; . \; 0.7)$

A pair of numbers specifying the heights of the vertical edges: $(\text{left-
height} \; . \; \text{right-height})$. 
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): Section 3.2.46 [grob-interface], page 575, Section 3.2.62 [line-interface], page 587, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.135 [tuplet-bracket-interface], page 631.

### 3.1.136 TupletNumber

TupletNumber objects are created by: Section 2.2.135 [Tuplet engraver], page 362.

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):

\texttt{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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.114 [spanner-interface], page 617, Section 3.2.128 [text-interface], page 626, and Section 3.2.136 [tuplet-number-interface], page 633.

### 3.1.137 UnaCordaPedal

UnaCordaPedal objects are created by: Section 2.2.93 [Piano_pedal_engraver], page 348.

Standard settings:

direction (direction):

\begin{verbatim}
1
\end{verbatim}

If \texttt{side-axis} is 0 (or X), then this property determines whether the object is placed \texttt{LEFT}, \texttt{CENTER} or \texttt{RIGHT} with respect to the other object. Otherwise, it determines whether the object is placed \texttt{UP}, \texttt{CENTER} or \texttt{DOWN}. Numerical values may also be used: \texttt{UP=-1}, \texttt{DOWN=-1}, \texttt{LEFT=-1}, \texttt{RIGHT=1}, \texttt{CENTER=0}.

extra-spacing-width (pair of numbers):

\begin{verbatim}
(+inf.0 . -inf.0)
\end{verbatim}

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 \texttt{(+inf.0 . -inf.0)}.

font-shape (symbol):

\begin{verbatim}
'italic
\end{verbatim}

Select the shape of a font. Choices include \texttt{upright}, \texttt{italic}, \texttt{caps}.

padding (dimension, in staff space):

\begin{verbatim}
0.0
\end{verbatim}

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 \texttt{-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 \texttt{self-alignment-X} property will be used.

self-alignment-X (number):

\begin{verbatim}
0
\end{verbatim}

Specify alignment of an object. The value \texttt{-1} means left aligned, 0 centered, and \texttt{1} right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

stencil (stencil):

\begin{verbatim}
ly:print
\end{verbatim}

The symbol to print.

vertical-skylines (pair of skylines):

\begin{verbatim}
#<unpure-pure-container #<primitive-procedure
ly:grob::vertical-skylines-from-stencil>
\end{verbatim}
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): Section 3.2.37 [font-interface], page 569,
Section 3.2.46 [grob-interface], page 575, Section 3.2.53 [item-interface], page 583, Section 3.2.94
[piano-pedal-script-interface], page 604, Section 3.2.103 [self-alignment-interface], page 607, and
Section 3.2.128 [text-interface], page 626.

3.1.138 UnaCordaPedalLineSpanner
UnaCordaPedalLineSpanner objects are created by: Section 2.2.92 [Piano
pedal_align_engraver], page 348.

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):

Two skylines, one above and one below this grob.

**X-extent** (pair of numbers):

\[\text{ly:axis-group-interface::width}\]

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

**Y-extent** (pair of numbers):

\[\text{ly:axis-group-interface::height} \quad \text{ly:axis-group-interface::pure-height}\]

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

**Y-offset** (number):

\[\text{ly:side-position-interface::y-aligned-side} \quad \text{ly:side-position-interface::pure-y-aligned-side}\]

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 553, Section 3.2.46 [grob-interface], page 575, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.93 [piano-pedal-interface], page 604, Section 3.2.107 [side-position-interface], page 610, and Section 3.2.114 [spanner-interface], page 617.

### 3.1.139 VaticanaLigature

VaticanaLigature objects are created by: Section 2.2.137 [Vaticana_ligature_engraver], page 362.

**Standard settings:**

**stencil** (stencil):

\[\text{ly:vaticana-ligature::print}\]

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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.138 [vaticana-ligature-interface], page 634.
3.1.140 VerticalAlignment

VerticalAlignment objects are created by: Section 2.2.138 [Vertical_align_engraver], page 362.

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):
  
  ly:axis-group-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): Section 3.2.4 [align-interface], page 551, Section 3.2.7 [axis-group-interface], page 553, Section 3.2.46 [grob-interface], page 575, and Section 3.2.114 [spanner-interface], page 617.

3.1.141 VerticalAxisGroup

VerticalAxisGroup objects are created by: Section 2.2.5 [Axis_group_engraver], page 316.

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):
     ly:hara-kiri-group-spanner::y-extent
     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): Section 3.2.7 [axis-group-interface], page 553,
Section 3.2.46 [grob-interface], page 575, Section 3.2.48 [hara-kiri-group-spanner-interface],
page 580, Section 3.2.86 [outside-staff-axis-group-interface], page 599, and Section 3.2.114
[spanner-interface], page 617.

3.1.142 VoiceFollower

VoiceFollower objects are created by: Section 2.2.79 [Note_head_line_engraver], page 344.

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): Section 3.2.46 [grob-interface], page 575,
Section 3.2.62 [line-interface], page 587, Section 3.2.63 [line-spanner-interface], page 588, and
Section 3.2.114 [spanner-interface], page 617.

3.1.143 VoltaBracket
VoltaBracket objects are created by: Section 2.2.139 [Volta_engraver], page 363.

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.

direction (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. Cur-
   rentsly, only LilyPond’s system fonts (Emmentaler) are using this prop-
   erty. 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): Section 3.2.37 [font-interface], page 569, Section 3.2.46 [grob-interface], page 575, Section 3.2.49 [horizontal-bracket-interface], page 580, Section 3.2.62 [line-interface], page 587, Section 3.2.107 [side-position-interface], page 610, Section 3.2.114 [spanner-interface], page 617, Section 3.2.128 [text-interface], page 626, Section 3.2.139 [volta-bracket-interface], page 635, and Section 3.2.140 [volta-interface], page 635.

3.1.144 VoltaBracketSpanner

VoltaBracketSpanner objects are created by: Section 2.2.139 [Volta_ engraver], page 363.

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):

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 553, Section 3.2.46 [grob-interface], page 575, Section 3.2.87 [outside-staff-interface], page 600, Section 3.2.107 [side-position-interface], page 610, Section 3.2.114 [spanner-interface], page 617, and Section 3.2.140 [volta-interface], page 635.

3.1.145 VowelTransition

VowelTransition objects are created by: Section 2.2.55 [Hyphen-engraver], page 335.

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): Section 3.2.46 [grob-interface], page 575, Section 3.2.62 [line-interface], page 587, Section 3.2.63 [line-spanner-interface], page 588, Section 3.2.66 [lyric-interface], page 591, and Section 3.2.114 [spanner-interface], page 617.

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): Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379, Section 3.1.4 [AccidentalSuggestion], page 381, Section 3.1.6 [AmbitusAccidental], page 384, and Section 3.1.131 [TrillPitchAccidental], page 532.

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): Section 3.1.3 [AccidentalPlacement], page 380.

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): Section 3.1.4 [AccidentalSuggestion], page 381.
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 “NonMusicalPaper-Column” 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): Section 3.1.15 [BassFigure-Alignment], page 396, and Section 3.1.140 [VerticalAlignment], page 542.

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:

```plaintext
note-heads (array of grobs)
An array of note head grobs.
```

This grob interface is used in the following graphical object(s): Section 3.1.5 [Ambitus], page 383, Section 3.1.7 [AmbitusLine], page 385, and Section 3.1.8 [AmbitusNoteHead], page 386.

3.2.6 arpeggio-interface

Functions and settings for drawing an arpeggio symbol.

User settable properties:

```plaintext
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:

```plaintext
stems (array of grobs)
An array of stem objects.
```

This grob interface is used in the following graphical object(s): Section 3.1.9 [Arpeggio], page 387.
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-extents 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): Section 3.1.5 [Ambitus], page 383, Section 3.1.15 [BassFigureAlignment], page 396, Section 3.1.16 [BassFigureAlignment-Positioning], page 396, Section 3.1.19 [BassFigureLine], page 398, Section 3.1.22 [BreakAlign-Group], page 401, Section 3.1.23 [BreakAlignment], page 402, Section 3.1.34 [DotColumn],
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): Section 3.1.10 [BalloonTextItem], page 389, Section 3.1.11 [FootnoteItem], page 436, and Section 3.1.144 [VoltaBracketSpanner], page 546.

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): Section 3.1.12 [BarLine], page 390, and Section 3.1.107 [SpanBar], page 504.

3.2.10 bass-figure-alignment-interface
Align a bass figure.

This grob interface is used in the following graphical object(s): Section 3.1.15 [BassFigure-Alignment], page 396.

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): Section 3.1.14 [BassFigure], page 395.

### 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 \( \leq \text{round-to-zero-slope} \).

- **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 collision 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)
A list 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 \((\text{start} . \text{end})\), where \(\text{start}\) and \(\text{end}\) are vertical positions in \(\text{staff-space}\) 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 \((\text{left} . \text{right})\), where both \(\text{left}\) and \(\text{right}\) are in \(\text{staff-space}\) 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): Section 3.1.20 [Beam], page 399.

**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 \(\text{Staff.StaffSymbol.thickness}\)).
Internal properties:

\[ \text{delta-position (number)} \]

The vertical position difference.

This grob interface is used in the following graphical object(s): Section 3.1.21 [BendAfter], page 401.

3.2.14 break-alignable-interface

Object that is aligned on a break alignment.

User settable properties:

\[ \text{break-align-symbols (list)} \]

A list of \text{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 \text{break-visibility}, we will align to the next grob (and so on). Choices are listed in Section “break-alignment-interface” in \text{Internals Reference}.

\[ \text{non-break-align-symbols (list)} \]

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): Section 3.1.13 [BarNumber], page 393, Section 3.1.76 [MetronomeMark], page 470, and Section 3.1.94 [RehearsalMark], page 491.

3.2.15 break-aligned-interface

Breakable items.

User settable properties:

\[ \text{break-align-anchor (number)} \]

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.

\[ \text{break-align-anchor-alignment (number)} \]

Read by \text{ly:break-aligned-interface::calc-extent-aligned-anchor} for aligning an anchor to a grob’s extent.

\[ \text{break-align-symbol (symbol)} \]

This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in \text{Internals Reference}.

\[ \text{space-alist (list)} \]

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 \text{break-align-symbol} are listed in Section “break-alignment-interface” in \text{Internals Reference}. Additionally, three special break-align symbols available to \text{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): Section 3.1.5 [Ambitus], page 383, Section 3.1.6 [AmbitusAccidental], page 384, Section 3.1.12 [BarLine], page 390, Section 3.1.22 [BreakAlignGroup], page 401, Section 3.1.24 [BreathingSign], page 403, Section 3.1.26 [Clef], page 406, Section 3.1.31 [CueClef], page 413, Section 3.1.32 [CueEndClef], page 416, Section 3.1.33 [Custos], page 419, Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.59 [KeyCancellation], page 449, Section 3.1.60 [KeySignature], page 452, Section 3.1.65 [LeftEdge], page 458, and Section 3.1.130 [TimeSignature], page 529.
3.2.16 break-alignment-interface

The object that performs break alignment.

Three interfaces deal specifically with break alignment:
1. break-alignment-interface (this one),
2. Section 3.2.14 [break-alignable-interface], page 560, and
3. Section 3.2.15 [break-aligned-interface], page 560.

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): Section 3.1.23 [BreakAlignment], page 402.
3.2.17 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): Section 3.1.24 [BreathingSign], page 403.

3.2.18 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): Section 3.1.25 [ChordName], page 405, and Section 3.1.49 [FretBoard], page 438.

3.2.19 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): Section 3.1.26 [Clef], page 406, Section 3.1.31 [CueClef], page 413, and Section 3.1.32 [CueEndClef], page 416.

3.2.20 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): Section 3.1.27 [ClefModifier], page 409.

### 3.2.21 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): Section 3.1.29 [ClusterSpannerBeacon], page 411.

### 3.2.22 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): Section 3.1.28 [ClusterSpanner], page 411.

### 3.2.23 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): Section 3.1.33 [Custos],
page 419.

3.2.24 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): Section 3.1.34 [DotColumn],
page 420.

3.2.25 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 `style` callback reading this property.

This grob interface is used in the following graphical object(s): Section 3.1.35 [Dots], page 421.

### 3.2.26 duration-line-interface

A line lasting for the duration of a rhythmic event.

**User settable properties:**

- **details** (list)

  A list 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): Section 3.1.39 [DurationLine], page 426.

### 3.2.27 dynamic-interface

Any kind of loudness sign.

This grob interface is used in the following graphical object(s): Section 3.1.40 [DynamicLineSpanner], page 427, Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, and Section 3.1.54 [Hairpin], page 443.

### 3.2.28 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): Section 3.1.40 [DynamicLineSpanner], page 427.

### 3.2.29 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): Section 3.1.41 [DynamicText], page 429.

### 3.2.30 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): Section 3.1.42 [DynamicTextSpanner], page 430.

3.2.31 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: \((\text{left-height} \cdot \text{right-height})\).

- 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 \texttt{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): Section 3.1.17 [BassFigureBracket], page 397.

3.2.32 episema-interface

An episema line.

This grob interface is used in the following graphical object(s): Section 3.1.43 [Episema], page 432.

3.2.33 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 \texttt{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): Section 3.1.18 [BassFigure-Continuation], page 398.

3.2.34 finger-interface

A fingering instruction.

This grob interface is used in the following graphical object(s): Section 3.1.44 [Fingering], page 433.

3.2.35 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): Section 3.1.45 [FingeringColumn], page 435.

3.2.36 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 \texttt{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, \textit{glyph-name} represents a processed form of \textit{glyph}, where decisions about line breaking etc. are already taken.

\textbf{stroke-style} (string)
Set to "grace" to turn stroke through flag on.

\textbf{style} (symbol)
This setting determines in what style a grob is typeset. Valid choices depend on the \texttt{stencil} callback reading this property.

This grob interface is used in the following graphical object(s): Section 3.1.46 [Flag], page 435.

\textbf{3.2.37 font-interface}
Any symbol that is typeset through fixed sets of glyphs, (i.e., fonts).

\textbf{User settable properties:}

\textbf{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 \texttt{fetaMusic} (Emmentaler), \texttt{fetaBraces}, \texttt{fetaText} (Emmentaler).

\textbf{font-family} (symbol)
The font family is the broadest category for selecting text fonts. Options include: \texttt{sans}, \texttt{roman}.

\textbf{font-features} (list)
OpenType features.

\textbf{font-name} (string)
Specifies a file name (without extension) of the font to load. This setting overrides selection using \texttt{font-family}, \texttt{font-series} and \texttt{font-shape}.

\textbf{font-series} (symbol)
Select the series of a font. Choices include \texttt{medium}, \texttt{bold}, \texttt{bold-narrow}, etc.

\textbf{font-shape} (symbol)
Select the shape of a font. Choices include \texttt{upright}, \texttt{italic}, \texttt{caps}.

\textbf{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 \texttt{fontSize} is set, its value is added to this before the glyph is printed. Fractional values are allowed.

\textbf{Internal properties:}

\textbf{font} (font metric)
A cached font metric object.

This grob interface is used in the following graphical object(s): Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379, Section 3.1.4 [AccidentalSuggestion], page 381, Section 3.1.6 [AmbitusAccidental], page 384, Section 3.1.7 [AmbitusLine], page 385, Section 3.1.8 [AmbitusNoteHead], page 386, Section 3.1.9 [Arpeggio], page 387, Section 3.1.10 [BalloonTextItem], page 389, Section 3.1.11 [BalloonTextSpanner], page 389, Section 3.1.12
3.2.38 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): Section 3.1.47 [FootnoteItem], page 436, and Section 3.1.48 [FootnoteSpanner], page 437.

3.2.39 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): Section 3.1.48 [FootnoteSpanner], page 437.

3.2.40 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.

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
  \[
  \text{thickness} \times (1 + \text{string-thickness-factor})^k 
  \]
  (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): Section 3.1.49 [FretBoard], page 438.

### 3.2.41 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): Section 3.1.50 [Glissando], page 440.

### 3.2.42 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): Section 3.1.51 [GraceSpacing], page 442.

### 3.2.43 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 diminished?

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): Section 3.1.84 [NoteHead], page 480.

3.2.44 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): Section 3.1.52 [GridLine], page 442.

3.2.45 grid-point-interface
A spanning point for grid lines.

This grob interface is used in the following graphical object(s): Section 3.1.53 [GridPoint], page 443.
3.2.46 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 3.1.82 \[NoteCollision\], page 479, 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 \overrride 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")) will produce <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 will have 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 excep-
tion: 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 gener-
ally, 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): Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379, Section 3.1.3 [AccidentalPlacement], page 380, Section 3.1.4 [AccidentalSuggestion], page 381, Section 3.1.5 [Ambitus], page 383, Section 3.1.6 [AmbitusAccidental], page 384, Section 3.1.7 [AmbitusLine], page 385, Section 3.1.8 [AmbitusNoteHead], page 386, Section 3.1.9 [Arpeggio], page 387, Section 3.1.10 [BalloonTextItem], page 389, Section 3.1.11 [BalloonTextSpanner], page 389, Section 3.1.12 [BarLine], page 390, Section 3.1.13 [BarNumber], page 393, Section 3.1.14 [BassFigure], page 395, Section 3.1.15 [BassFigureAlignment], page 396, Section 3.1.16 [BassFigureAlignmentPositioning], page 396, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.18 [BassFigureContinuation], page 398, Section 3.1.19 [BassFigureLine], page 398, Section 3.1.20 [Beam], page 399, Section 3.1.21 [BendAfter], page 401, Section 3.1.22 [BendAlignGroup], page 401, Section 3.1.23 [BendAlignment], page 402, Section 3.1.24 [BreathingSign], page 403, Section 3.1.25 [ChordName], page 405, Section 3.1.26 [Clef], page 406, Section 3.1.27 [ClefModifier], page 409, Section 3.1.28 [ClusterSpanner], page 411, Section 3.1.29 [ClusterSpannerBeacon], page 411, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.31 [CueClef], page 413, Section 3.1.32 [CueEndClef], page 416, Section 3.1.33 [Custos], page 419, Section 3.1.34 [DotColumn], page 420, Section 3.1.35 [Dots], page 421, Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.39 [DurationLine], page 426, Section 3.1.40 [DynamicLineSpanner], page 427, Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, Section 3.1.43 [Episema], page 432, Section 3.1.44 [Fingering], page 433, Section 3.1.45 [FingeringColumn], page 435, Section 3.1.46 [Flag], page 435, Section 3.1.47 [FootnoteItem], page 436, Section 3.1.48 [FootnoteSpanner], page 437, Section 3.1.49 [FretBoard], page 438, Section 3.1.50 [Glissando], page 440, Section 3.1.51 [GraceSpacing], page 442, Section 3.1.52 [GridLine], page 442, Section 3.1.53 [GridPoint], page 443, Section 3.1.54 [Hairpin], page 443, Section 3.1.55 [HorizontalBracket], page 445, Section 3.1.56 [HorizontalBracketText], page 446, Section 3.1.57 [InstrumentName], page 447, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.59 [KeyCancellation], page 449, Section 3.1.60 [KeySignature], page 452, Section 3.1.61 [KievianLigature], page 455, Section 3.1.62 [LaissezVibrerTie], page 455, Section 3.1.63 [LaissezVibrerTieColumn], page 457, Section 3.1.64 [LedgerLineSpanner], page 457, Section 3.1.65 [LeftEdge], page 458, Section 3.1.66 [LigatureBracket], page 460, Section 3.1.67 [LyricExtender], page 461, Section 3.1.68 [LyricHyphen], page 462, Section 3.1.69 [LyricSpace], page 463, Section 3.1.70 [LyricText], page 463, Section 3.1.71 [MeasureCounter], page 465, Section 3.1.72 [MeasureGrouping], page 467, Section 3.1.73 [MeasureSpanner], page 468, Section 3.1.74 [MelodyItem], page 469, Section 3.1.75 [MensuralLigature], page 469, Section 3.1.76 [MetronomeMark], page 470, Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, Section 3.1.80 [MultiMeasureRestText], page 476, Section 3.1.81 [NonMusicalPaperColumn], page 478, Section 3.1.82 [NoteCollision], page 479, Section 3.1.83 [NoteColumn], page 480, Section 3.1.84 [NoteHead], page 480, Section 3.1.85 [NoteName], page 482, Section 3.1.86 [NoteSpacing], page 482, Section 3.1.87 [OttavaBracket], page 483, Section 3.1.88 [PaperColumn], page 484, Section 3.1.89 [ParenthesesItem], page 485, Section 3.1.90 [PercentRepeat], page 486, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.92 [PhrasingSlur], page 488, Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.94 [RehearsalMark], page 491, Section 3.1.95 [RepeatSlash], page 493, Section 3.1.96 [RepeatTie], page 494, Section 3.1.97 [RepeatTieColumn], page 495, Section 3.1.98 [Rest], page 495, Section 3.1.99 [RestCollision], page 496, Section 3.1.100 [Script], page 497, Section 3.1.101 [ScriptColumn], page 498, Section 3.1.102 [ScriptRow], page 498, Section 3.1.103 [Slur], page 498, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.106 [SpacingSpanner], page 503, Section 3.1.107 [SpanBar], page 504, Section 3.1.108 [SpanBarStub], page 505, Section 3.1.109 [StaffGrouper],
3.2.47 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).

- **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): Section 3.1.54 [Hairpin], page 443.
3.2.48 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: '#an' 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 VerticalAxisGroups. If any of them are alive, then we will stay alive.

- **make-dead-when** (array of grobs)
  - An array of other VerticalAxisGroups. If any of them are alive, then we will turn dead.

This grob interface is used in the following graphical object(s): Section 3.1.141 [VerticalAxisGroup], page 542.

3.2.49 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: \( \text{left-height} . \text{right-height} \).

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): Section 3.1.55 [HorizontalBracket], page 445, Section 3.1.87 [OttavaBracket], page 483, and Section 3.1.143 [VoltaBracket], page 545.

3.2.50 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): Section 3.1.56 [HorizontalBracketText], page 446.

3.2.51 inline-accidental-interface
An inlined accidental (i.e. normal accidentals, cautionary accidentals).

This grob interface is used in the following graphical object(s): Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379, and Section 3.1.131 [TrillPitchAccidental], page 532.

3.2.52 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 \( \text{property} . \text{value} \) pair. The properties which can be included in \text{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 "~n".

• **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. De-
fault 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 $\text{thickness} \times (1+\text{string-thickness-factor})^{(k-1)}$. 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): Section 3.1.126 [TextScript], page 524.

### 3.2.53 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 \texttt{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 \texttt{break-visibility} are predefined:

\begin{tabular}{llll}
& before & no & after \\
grob will show: & break & break & 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 \\
\end{tabular}

\textbf{User settable properties:}

\begin{description}
\item[break-visibility (vector)] A vector of 3 booleans. #\texttt{(end-of-line unbroken begin-of-line)}. #t means visible, #f means killed.
\item[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).
\item[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).
\item[non-musical (boolean)] True if the grob belongs to a \texttt{NonMusicalPaperColumn}.
\end{description}

This grob interface is used in the following graphical object(s): Section 3.1.1 [Accidental], page 378, Section 3.1.2 [AccidentalCautionary], page 379, Section 3.1.3 [AccidentalPlacement], page 380, Section 3.1.4 [AccidentalSuggestion], page 381, Section 3.1.5 [Ambitus], page 383, Section 3.1.6 [AmbitusAccidental], page 384, Section 3.1.7 [AmbitusLine], page 385, Section 3.1.8 [AmbitusNoteHead], page 386, Section 3.1.9 [Arpeggio], page 387, Section 3.1.10 [BalloonTextItem], page 389, Section 3.1.12 [BarLine], page 390, Section 3.1.13 [BarNumber], page 393, Section 3.1.14 [BassFigure], page 395, Section 3.1.17 [BassFigureBracket], page 397, Section 3.1.22 [BreakAlignGroup], page 401, Section 3.1.23 [BreakAlignment], page 402, Section 3.1.24 [BreathingSign], page 403, Section 3.1.25 [ChordName], page 405, Section 3.1.26 [Clef], page 406, Section 3.1.27 [ClefModifier], page 409, Section 3.1.29 [ClusterSpannerBeacon], page 411, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.31 [CueClef], page 413, Section 3.1.32 [CueEndClef], page 416, Section 3.1.33 [Custos], page 419,
Section 3.1.34 [DotColumn], page 420, Section 3.1.35 [Dots], page 421, Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.41 [DynamicText], page 429, Section 3.1.44 [Fingering], page 433, Section 3.1.45 [FingeringColumn], page 435, Section 3.1.46 [Flag], page 435, Section 3.1.47 [FootnoteItem], page 436, Section 3.1.49 [FretBoard], page 438, Section 3.1.52 [GridLine], page 442, Section 3.1.53 [GridPoint], page 443, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.59 [KeyCancellation], page 449, Section 3.1.60 [KeySignature], page 452, Section 3.1.62 [LaissezVibrerTie], page 455, Section 3.1.63 [LaissezVibrerTieColumn], page 457, Section 3.1.65 [LeftEdge], page 458, Section 3.1.70 [LyricText], page 463, Section 3.1.74 [MusicalPaperColumn], page 469, Section 3.1.76 [MetronomeMark], page 470, Section 3.1.81 [NonMusicalPaperColumn], page 478, Section 3.1.82 [NoteCollision], page 479, Section 3.1.83 [NoteColumn], page 480, Section 3.1.84 [NoteHead], page 480, Section 3.1.85 [NoteName], page 482, Section 3.1.86 [NoteSpacing], page 482, Section 3.1.88 [PaperColumn], page 484, Section 3.1.89 [ParenthesesItem], page 485, Section 3.1.94 [RehearsalMark], page 491, Section 3.1.95 [RepeatSlash], page 493, Section 3.1.96 [RepeatTie], page 494, Section 3.1.97 [RepeatTieColumn], page 495, Section 3.1.98 [Rest], page 495, Section 3.1.99 [RestCollision], page 496, Section 3.1.100 [Script], page 497, Section 3.1.101 [ScriptColumn], page 498, Section 3.1.102 [ScriptRow], page 498, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.107 [SpanBar], page 504, Section 3.1.108 [SpanBarStub], page 505, Section 3.1.110 [StaffSpacing], page 506, Section 3.1.112 [StanzaNumber], page 507, Section 3.1.113 [Stem], page 508, Section 3.1.114 [StemStub], page 510, Section 3.1.115 [StemTremolo], page 511, Section 3.1.116 [StringNumber], page 512, Section 3.1.117 [StrokeFinger], page 514, Section 3.1.118 [SustainPedal], page 515, Section 3.1.125 [TabNoteHead], page 522, Section 3.1.126 [TextScript], page 524, Section 3.1.130 [TimeSignature], page 529, Section 3.1.131 [TrillPitchAccidental], page 532, Section 3.1.132 [TrillPitchGroup], page 533, Section 3.1.133 [TrillPitchHead], page 534, and Section 3.1.137 [UnaCordaPedal], page 539.

3.2.54 key-cancellation-interface
A key cancellation.

This grob interface is used in the following graphical object(s): Section 3.1.59 [KeyCancellation], page 449.

3.2.55 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:

co-position (integer)
An integer indicating the position of middle C.

This grob interface is used in the following graphical object(s): Section 3.1.59 [KeyCancellation], page 449, and Section 3.1.60 [KeySignature], page 452.

3.2.56 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): Section 3.1.61 [KievanLigature], page 455.

3.2.57 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 3.1.111 [StaffSymbol], page 507, 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): Section 3.1.64 [LedgerLineSpanner], page 457.

**3.2.58 ledgered-interface**

Objects that need ledger lines, typically note heads. See also Section 3.2.57 [ledger-line-spanner-interface], page 586.

**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): Section 3.1.8 [AmbitusNoteHead], page 386, Section 3.1.84 [NoteHead], page 480, and Section 3.1.133 [TrillPitchHead], page 534.

**3.2.59 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.

**3.2.60 ligature-head-interface**

A note head that can become part of a ligature.

  This grob interface is used in the following graphical object(s): Section 3.1.84 [NoteHead], page 480.

**3.2.61 ligature-interface**

A ligature.

  This grob interface is not used in any graphical object.

**3.2.62 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): Section 3.1.39 [DurationLine], page 426, Section 3.1.42 [DynamicTextSpanner], page 430, Section 3.1.43 [Episema], page 432, Section 3.1.50 [Glissando], page 440, Section 3.1.54 [Hairpin], page 443, Section 3.1.55 [HorizontalBracket], page 445, Section 3.1.66 [LigatureBracket], page 460, Section 3.1.73 [MeasureSpanner], page 468, Section 3.1.87 [OttavaBracket], page 483, Section 3.1.93 [PianoPedalBracket], page 490, Section 3.1.127 [TextSpanner], page 526, Section 3.1.134 [TrillSpanner], page 535, Section 3.1.135 [TupletBracket], page 536, Section 3.1.142 [VoiceFollower], page 544, Section 3.1.143 [VoltaBracket], page 545, and Section 3.1.145 [VowelTransition], page 548.

3.2.63 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
Determine 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:

\begin{itemize}
  \item \texttt{note-columns} (array of grobs)
    \begin{itemize}
      \item An array of \texttt{NoteColumn} grobs.
    \end{itemize}
  \end{itemize}

This grob interface is used in the following graphical object(s): Section 3.1.39 [DurationLine], page 426, Section 3.1.42 [DynamicTextSpanner], page 430, Section 3.1.43 [Episema], page 432, Section 3.1.50 [Glissando], page 440, Section 3.1.127 [TextSpanner], page 526, Section 3.1.134 [TrillSpanner], page 535, Section 3.1.142 [VoiceFollower], page 544, and Section 3.1.145 [Vowel-Transition], page 548.

\subsection*{3.2.64 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:

\begin{itemize}
  \item \texttt{left-padding} (dimension, in staff space)
    \begin{itemize}
      \item The amount of space that is put left to an object (e.g., a lyric extender).
    \end{itemize}
  \item \texttt{next} (graphical (layout) object)
    \begin{itemize}
      \item Object that is next relation (e.g., the lyric syllable following an extender).
    \end{itemize}
  \item \texttt{right-padding} (dimension, in staff space)
    \begin{itemize}
      \item Space to insert on the right side of an object (e.g., between note and its accidentals).
    \end{itemize}
  \item \texttt{thickness} (number)
    \begin{itemize}
      \item 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 \texttt{Staff.StaffSymbol.thickness}).
    \end{itemize}
\end{itemize}

Internal properties:

\begin{itemize}
  \item \texttt{heads} (array of grobs)
    \begin{itemize}
      \item An array of note heads.
    \end{itemize}
\end{itemize}

This grob interface is used in the following graphical object(s): Section 3.1.67 [LyricExtender], page 461.

\subsection*{3.2.65 lyric-hyphen-interface}

A centered hyphen is simply a line between lyrics used to divide syllables.

User settable properties:

\begin{itemize}
  \item \texttt{dash-period} (number)
    \begin{itemize}
      \item The length of one dash together with whitespace. If negative, no line is drawn at all.
    \end{itemize}
  \item \texttt{height} (dimension, in staff space)
    \begin{itemize}
      \item Height of an object in \texttt{staff-space} units.
    \end{itemize}
  \item \texttt{length} (dimension, in staff space)
    \begin{itemize}
      \item User override for the stem length of unbeamed stems (each unit represents half a \texttt{staff-space}).
    \end{itemize}
\end{itemize}
**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): Section 3.1.68 [LyricHyphen], page 462, and Section 3.1.69 [LyricSpace], page 463.

### 3.2.66 lyric-interface
Any object that is related to lyrics.

This grob interface is used in the following graphical object(s): Section 3.1.67 [LyricExtender], page 461, Section 3.1.68 [LyricHyphen], page 462, and Section 3.1.145 [VowelTransition], page 548.

### 3.2.67 lyric-syllable-interface
A single piece of lyrics.

This grob interface is used in the following graphical object(s): Section 3.1.70 [LyricText], page 463.

### 3.2.68 mark-interface
A rehearsal mark.

This grob interface is used in the following graphical object(s): Section 3.1.94 [RehearsalMark], page 491.

### 3.2.69 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 `BreakAlignments`.

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 =
```
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): Section 3.1.71 [Measure-Counter], page 465.

### 3.2.70 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): Section 3.1.72 [Measure-Grouping], page 467.

### 3.2.71 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 BreakAlignments.
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): Section 3.1.73 [MeasureSpanner], page 468.

3.2.72 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): Section 3.1.74 [MelodyItem], page 469.

3.2.73 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): Section 3.1.75 [MensuralLigature], page 469, and Section 3.1.84 [NoteHead], page 480.

### 3.2.74 metronome-mark-interface

A metronome mark.

This grob interface is used in the following graphical object(s): Section 3.1.76 [MetronomeMark], page 470.

### 3.2.75 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): Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, and Section 3.1.80 [MultiMeasureRestText], page 476.

### 3.2.76 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 be-
tween 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 BreakAlignments.
For example, a MultiMeasureRest will ignore prefatory items at its
bounds (i.e., clefs, key signatures and time signatures) using the follow-
ing 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-logs 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.
3.2.77 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): Section 3.1.78 [MultiMeasur-eRestNumber], page 473.

3.2.78 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 3.2.79 [note-column-interface], page 596: 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): Section 3.1.82 [NoteCollision], page 479.

3.2.79 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 NoteColumns 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): Section 3.1.83 [NoteColumn], page 480.

3.2.80 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 \texttt{stencil} callback reading this property.

\textbf{Internal properties:}

\begin{itemize}
  \item accidental-grob (graphical (layout) object)
    The accidental for this note.
\end{itemize}

This grob interface is used in the following graphical object(s): Section 3.1.8 [AmbitusNoteHead], page 386, Section 3.1.84 [NoteHead], page 480, Section 3.1.125 [TabNoteHead], page 522, and Section 3.1.132 [TrillPitchGroup], page 533.

\textbf{3.2.81 note-name-interface}
Note names.

This grob interface is used in the following graphical object(s): Section 3.1.85 [NoteName], page 482.

\textbf{3.2.82 note-spacing-interface}
This object calculates spacing wishes for individual voices.

\textbf{User settable properties:}

\begin{itemize}
  \item knee-spacing-correction (number)
    Factor for the optical correction amount for kneed beams. Set between 0 for no correction and 1 for full correction.
  \item 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.
  \item 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.
  \item 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.
\end{itemize}

\textbf{Internal properties:}

\begin{itemize}
  \item left-items (array of grobs)
    Grobs organized on the left by a spacing object.
  \item right-items (array of grobs)
    Grobs organized on the right by a spacing object.
\end{itemize}

This grob interface is used in the following graphical object(s): Section 3.1.86 [NoteSpacing], page 482.
3.2.83 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): Section 3.1.116 [StringNumber], page 512.

3.2.84 only-prebreak-interface

Kill this grob after the line breaking process.

This grob interface is not used in any graphical object.

3.2.85 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 \texttt{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): Section 3.1.87 [OttavaBracket], page 483.

3.2.86 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.

    - \texttt{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): Section 3.1.19 [BassFigure-Line], page 398, Section 3.1.120 [System], page 517, and Section 3.1.141 [VerticalAxisGroup], page 542.

### 3.2.87 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 it is 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): Section 3.1.4 [Accidental-Suggestion], page 381, Section 3.1.13 [BarNumber], page 393, Section 3.1.16 [BassFigureAlignmentPositioning], page 396, Section 3.1.24 [BreathingSign], page 403, Section 3.1.25 [ChordName], page 405, Section 3.1.27 [ClefModifier], page 409, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.40 [DynamicLineSpanner], page 427, Section 3.1.41 [DynamicText], page 429, Section 3.1.44 [Fingering], page 433, Section 3.1.49 [FretBoard], page 438, Section 3.1.54 [Hairpin], page 443, Section 3.1.55 [HorizontalBracket], page 445, Section 3.1.56 [HorizontalBracketText], page 446, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.71 [MeasureCounter], page 465, Section 3.1.72 [MeasureGrouping], page 467, Section 3.1.73 [MeasureSpanner], page 468, Section 3.1.76 [MetronomeMark], page 470, Section 3.1.77 [MultiMeasureRest], page 472, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, Section 3.1.80 [MultiMeasureRestText], page 476, Section 3.1.87 [OttavaBracket], page 483, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.92 [PhrasingSlur], page 488, Section 3.1.94 [RehearsalMark], page 491, Section 3.1.100 [Script], page 497, Section 3.1.103 [Slur], page 498, Section 3.1.105 [SostenutoPedalLineSpanner],
3.2.88 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): Section 3.1.81 [NonMusical-PaperColumn], page 478, and Section 3.1.88 [PaperColumn], page 484.

3.2.89 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): Section 3.1.89 [ParenthesesItem], page 485, and Section 3.1.132 [TrillPitchGroup], page 533.

3.2.90 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.
slop (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 currentstaff-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): Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.90 [PercentRepeat], page 486, Section 3.1.91 [PercentRepeatCounter], page 487, and Section 3.1.95 [RepeatSlash], page 493.

3.2.91 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 currentstaff-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): Section 3.1.36 [DoublePercentRepeat], page 422, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.38 [DoubleRepeatSlash], page 425, and Section 3.1.95 [RepeatSlash], page 493.

3.2.92 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): Section 3.1.93 [PianoPedal-Bracket], page 490.

**3.2.93 piano-pedal-interface**
A piano pedal sign.

This grob interface is used in the following graphical object(s): Section 3.1.93 [PianoPedal-Bracket], page 490, Section 3.1.105 [SostenutoPedalLineSpanner], page 502, Section 3.1.118 [SustainPedal], page 515, Section 3.1.119 [SustainPedalLineSpanner], page 516, and Section 3.1.138 [UnaCordaPedalLineSpanner], page 540.

**3.2.94 piano-pedal-script-interface**
A piano pedal sign, fixed size.

This grob interface is used in the following graphical object(s): Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.118 [SustainPedal], page 515, and Section 3.1.137 [UnaCordaPedal], page 539.

**3.2.95 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): Section 3.1.133 [TrillPitch-Head], page 534.

**3.2.96 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): Section 3.1.12 [BarLine], page 390, Section 3.1.26 [Clef], page 406, Section 3.1.31 [CueClef], page 413, Section 3.1.32 [CueEndClef], page 416, Section 3.1.59 [KeyCancellation], page 449, Section 3.1.60 [KeySignature], page 452, Section 3.1.108 [SpanBarStub], page 505, and Section 3.1.130 [TimeSignature], page 529.

3.2.97 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): Section 3.1.99 [RestCollision], page 496.

3.2.98 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): Section 3.1.77 [MultiMeasureRest], page 472, and Section 3.1.98 [Rest], page 495.
3.2.99 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): Section 3.1.14 [BassFigure], page 395, Section 3.1.25 [ChordName], page 405, Section 3.1.29 [ClusterSpannerBeacon], page 411, Section 3.1.38 [DoubleRepeatSlash], page 425, Section 3.1.49 [FretBoard], page 438, Section 3.1.70 [LyricText], page 463, Section 3.1.84 [NoteHead], page 480, Section 3.1.95 [Repeat-Slash], page 493, Section 3.1.98 [Rest], page 495, and Section 3.1.125 [TabNoteHead], page 522.

3.2.100 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): Section 3.1.8 [Ambitus-NoteHead], page 386, Section 3.1.84 [NoteHead], page 480, Section 3.1.98 [Rest], page 495, Section 3.1.125 [TabNoteHead], page 522, and Section 3.1.133 [TrillPitchHead], page 534.

3.2.101 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): Section 3.1.101 [ScriptColumn], page 498, and Section 3.1.102 [ScriptRow], page 498.

3.2.102 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): Section 3.1.4 [Accidental-Suggestion], page 381, Section 3.1.41 [DynamicText], page 429, Section 3.1.79 [MultiMeasureRestScript], page 475, and Section 3.1.100 [Script], page 497.

### 3.2.103 self-alignment-interface

Position this object on itself and/or on its parent. To this end, the following functions are provided:

**Self_alignment_interface::[xyl]_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 cen-
  tered, 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): Section 3.1.4
[AccidentalSuggestion], page 381, Section 3.1.13 [BarNumber], page 393, Section 3.1.27
[ClefModifier], page 409, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.37 [Double
PercentRepeatCounter], page 423, Section 3.1.41 [DynamicText], page 429, Section 3.1.44
[Finger], page 433, Section 3.1.52 [GridLine], page 442, Section 3.1.54 [Hairpin],
page 443, Section 3.1.56 [HorizontalBracketText], page 446, Section 3.1.57 [InstrumentName],
page 447, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.70 [LyricText], page 463,
Section 3.1.71 [MeasureCounter], page 465, Section 3.1.73 [MeasureSpanner], page 468,
Section 3.1.76 [MetronomeMark], page 470, Section 3.1.78 [MultiMeasureRestNumber],
page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, Section 3.1.80 [MultiMea-
sureRestText], page 476, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.94
[RehearsalMark], page 491, Section 3.1.100 [Script], page 497, Section 3.1.104 [SostenutoPedal],
page 501, Section 3.1.115 [StemTremolo], page 511, Section 3.1.116 [StringNumber],
page 512, Section 3.1.117 [StrokeFinger], page 514, Section 3.1.118 [SustainPedal], page 515,
Section 3.1.126 [TextScript], page 524, and Section 3.1.137 [UnaCordaPedal], page 539.

3.2.104 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): Section 3.1.63 [LaissezViberTieColumn], page 457, and Section 3.1.97 [RepeatTieColumn], page 495.

**3.2.105 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)
  A list 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): Section 3.1.62 [LaissezVibrerTie], page 455, and Section 3.1.96 [RepeatTie], page 494.

### 3.2.106 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-extents and extra-spacing-heights 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): Section 3.1.81 [NonMusical-PaperColumn], page 478, Section 3.1.83 [NoteColumn], page 480, and Section 3.1.88 [PaperColumn], page 484.

### 3.2.107 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): Section 3.1.4 [AccidentalSuggestion], page 381, Section 3.1.6 [AmbitusAccidental], page 384, Section 3.1.9 [Arpeggio], page 387, Section 3.1.13 [BarNumber], page 393, Section 3.1.16 [BassFigureAlignmentPositioning], page 396, Section 3.1.27 [ClefModifier], page 409, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.40 [DynamicLineSpanner], page 427, Section 3.1.43 [Episema], page 432, Section 3.1.44 [Fingering], page 433, Section 3.1.55 [HorizontalBracket], page 445, Section 3.1.56 [HorizontalBracketText], page 446, Section 3.1.57 [InstrumentName], page 447, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.71 [MeasureCounter], page 465, Section 3.1.72 [MeasureGrouping], page 467, Section 3.1.73 [MeasureSpanner], page 468, Section 3.1.76 [MetronomeMark], page 470, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.79 [MultiMeasureRestScript], page 475, Section 3.1.80 [MultiMeasureRestText], page 476, Section 3.1.87 [OttavaBracket], page 483, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.94 [RehearsalMark], page 491, Section 3.1.100 [Script], page 497, Section 3.1.105 [SostenutoPedalLineSpanner],
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.

distance
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)
A list 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 \texttt{Staff.StaffSymbol.thickness}).

positions (pair of numbers)
Pair of staff coordinates \texttt{(start, end)}, where \texttt{start} and \texttt{end} are vertical positions in \texttt{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 \texttt{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 \texttt{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 \texttt{NoteColumn} grobs.

This grob interface is used in the following graphical object(s): Section 3.1.92 [PhrasingSlur], page 488, and Section 3.1.103 [Slur], page 498.

3.2.109 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)
  
  \[(obj \cdot (dist \cdot strength))\] 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 \((obj \cdot dist)\).

- `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): Section 3.1.81 [NonMusical-PaperColumn], page 478, and Section 3.1.88 [PaperColumn], page 484.

### 3.2.110 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): Section 3.1.86 [NoteSpacing], page 482, and Section 3.1.110 [StaffSpacing], page 506.

### 3.2.111 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): Section 3.1.51 [GraceSpacing], page 442, and Section 3.1.106 [SpacingSpanner], page 503.

### 3.2.112 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 proportionally 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): Section 3.1.106 [SpacingSpanner], page 503.

### 3.2.113 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): Section 3.1.107 [SpanBar], page 504.

3.2.114 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 be-
tween 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): Section 3.1.11 [Balloon-
TextSpanner], page 389, Section 3.1.15 [BassFigureAlignment], page 396, Section 3.1.16 [Bass-
FigureAlignmentPositioning], page 396, Section 3.1.18 [BassFigureContinuation], page 398,
Section 3.1.19 [BassFigureLine], page 398, Section 3.1.20 [Beam], page 399, Section 3.1.21
[BendAfter], page 401, Section 3.1.28 [ClusterSpanner], page 411, Section 3.1.39 [DurationLine],
3.2.115 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): Section 3.1.109 [StaffGrouper], page 505.

### 3.2.116 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): Section 3.1.110 [StaffSpacing], page 506.

### 3.2.117 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): Section 3.1.111 [StaffSymbol], page 507.

3.2.118 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): Section 3.1.8 [Ambitus-NoteHead], page 386, Section 3.1.9 [Arpeggio], page 387, Section 3.1.20 [Beam], page 399, Section 3.1.26 [Clef], page 406, Section 3.1.31 [CueClef], page 413, Section 3.1.32 [CueEnd-Clef], page 416, Section 3.1.33 [Custos], page 419, Section 3.1.35 [Dots], page 421, Section 3.1.59 [KeyCancellation], page 449, Section 3.1.60 [KeySignature], page 452, Section 3.1.77 [Multi-MeasureRest], page 472, Section 3.1.84 [NoteHead], page 480, Section 3.1.98 [Rest], page 495, Section 3.1.125 [TabNoteHead], page 522, and Section 3.1.133 [TrillPitchHead], page 534.

3.2.119 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): Section 3.1.112 [StanzaNumber], page 507.

3.2.120 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.
Chapter 3: Backend

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)
A list 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 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): Section 3.1.113 [Stem],
page 508.

3.2.121 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): Section 3.1.115 [StemTremolo],
page 511.
3.2.122 string-number-interface
A string number instruction.

This grob interface is used in the following graphical object(s): Section 3.1.116 [StringNumber], page 512.

3.2.123 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): Section 3.1.117 [StrokeFinger], page 514.

3.2.124 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): Section 3.1.120 [System], page 517.

3.2.125 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): Section 3.1.121 [SystemStart-Bar], page 518, Section 3.1.122 [SystemStartBrace], page 519, Section 3.1.123 [SystemStartBracket], page 520, and Section 3.1.124 [SystemStartSquare], page 521.

3.2.126 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): Section 3.1.57 [Instrument-Name], page 447.

3.2.127 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): Section 3.1.125 [TabNote-Head], page 522.

3.2.128 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): Section 3.1.10 [BalloonTextItem], page 389, Section 3.1.11 [BalloonTextSpanner], page 389, Section 3.1.13 [BarNumber], page 393, Section 3.1.14 [BassFigure], page 395, Section 3.1.24 [BreathingSign], page 403, Section 3.1.25 [ChordName], page 405, Section 3.1.27 [ClefModifier], page 409, Section 3.1.30 [CombineTextScript], page 411, Section 3.1.37 [DoublePercentRepeatCounter], page 423, Section 3.1.41 [DynamicText], page 429, Section 3.1.42 [DynamicTextSpanner], page 430, Section 3.1.44 [Fingering], page 433, Section 3.1.47 [FootnoteItem], page 436, Section 3.1.48 [FootnoteSpanner], page 437, Section 3.1.56 [HorizontalBracketText], page 446, Section 3.1.57 [InstrumentName], page 447, Section 3.1.58 [InstrumentSwitch], page 448, Section 3.1.70 [LyricText], page 463, Section 3.1.71 [MeasureCounter], page 465, Section 3.1.73 [MeasureSpanner], page 468, Section 3.1.76 [MetronomeMark], page 470, Section 3.1.78 [MultiMeasureRestNumber], page 473, Section 3.1.80 [MultiMeasureRestText], page 476, Section 3.1.85 [NoteName], page 482, Section 3.1.87 [OttavaBracket], page 483, Section 3.1.91 [PercentRepeatCounter], page 487, Section 3.1.94 [RehearsalMark], page 491, Section 3.1.104 [SostenutoPedal], page 501, Section 3.1.112 [StanzaNumber], page 507, Section 3.1.116 [StringNumber], page 512, Section 3.1.117 [StrokeFinger], page 514, Section 3.1.118 [SustainPedal], page 515, Section 3.1.125 [TabNoteHead], page 522, Section 3.1.126 [TextScript], page 524, Section 3.1.136 [TupletNumber], page 538, Section 3.1.137 [UnaCordaPedal], page 539, and Section 3.1.143 [VoltaBracket], page 545.

3.2.129 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): Section 3.1.30 [CombineTextScript], page 411, Section 3.1.44 [Fingering], page 433, Section 3.1.116 [StringNumber], page 512, Section 3.1.117 [StrokeFinger], page 514, and Section 3.1.126 [TextScript], page 524.

3.2.130 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): Section 3.1.129 [TieColumn], page 529.

### 3.2.131 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)
  A list 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): Section 3.1.62 [LaissezVibrerTie], page 455, Section 3.1.96 [RepeatTie], page 494, and Section 3.1.128 [Tie], page 527.

3.2.132 time-signature-interface
A time signature, in different styles. The following values for style 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): Section 3.1.130 [TimeSignature], page 529.

3.2.133 trill-pitch-accidental-interface
An accidental for trill pitch.

This grob interface is used in the following graphical object(s): Section 3.1.131 [TrillPitchAccidental], page 532.

3.2.134 trill-spanner-interface
A trill spanner.

This grob interface is used in the following graphical object(s): Section 3.1.134 [TrillSpanner], page 535.

3.2.135 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): Section 3.1.66 [Ligature-
Bracket], page 460, and Section 3.1.135 [TupletBracket], page 536.

3.2.136 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): Section 3.1.136 [TupletNumber], page 538.

3.2.137 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): Section 3.1.20 [Beam], page 399, Section 3.1.39 [DurationLine], page 426, and Section 3.1.50 [Glissando], page 440.

3.2.138 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): Section 3.1.84 [NoteHead], page 480, and Section 3.1.139 [VaticanaLigature], page 541.

3.2.139 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): Section 3.1.143 [VoltaBracket], page 545.

3.2.140 volta-interface
A volta repeat.

This grob interface is used in the following graphical object(s): Section 3.1.143 [VoltaBracket], page 545, and Section 3.1.144 [VoltaBracketSpanner], page 546.

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 encomp- 
  passes.
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.
Chapter 3: Backend

**base-shortest-duration (moment)**
Spacing is based on the shortest notes in a piece. Normally, pieces are spaced as if notes at least as short as this are present.

**baseline-skip (dimension, in staff space)**
Distance between base lines of multiple lines of text.

**beam-thickness (dimension, in staff space)**
Beam thickness, measured in staff-space units.

**beam-width (dimension, in staff space)**
Width of the tremolo sign.

**beamed-stem-shorten (list)**
How much to shorten beamed stems, when their direction is forced. It is a list, since the value is different depending on the number of flags and beams.

**beaming (pair)**
Pair of number lists. Each number list specifies which beams to make. 0 is the central beam, 1 is the next beam toward the note, etc. This information is used to determine how to connect the beaming patterns from stem to stem inside a beam.

**beamlet-default-length (pair)**
A pair of numbers. The first number specifies the default length of a beamlet that sticks out of the left hand side of this stem; the second number specifies the default length of the beamlet to the right. The actual length of a beamlet is determined by taking either the default length or the length specified by beamlet-max-length-proportion, whichever is smaller.

**beamlet-max-length-proportion (pair)**
The maximum length of a beamlet, as a proportion of the distance between two adjacent stems.

**before-line-breaking (boolean)**
Dummy property, used to trigger a callback function.

**between-cols (pair)**
Where to attach a loose column to.

**bound-details (list)**
An alist of properties for determining attachments of spanners to edges.

**bound-padding (number)**
The amount of padding to insert around spanner bounds.

**bracket-flare (pair of numbers)**
A pair of numbers specifying how much edges of brackets should slant outward. Value 0.0 means straight edges.

**bracket-visibility (boolean or symbol)**
This controls the visibility of the tuplet bracket. Setting it to false prevents printing of the bracket. Setting the property to if-no-beam makes it print only if there is no beam associated with this tuplet bracket.

**break-align-anchor (number)**
Grobs aligned to this 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 collision 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)
A list 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).

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 $\text{thickness} \times (1 + \text{string-thickness-factor}) \times (k-1)$. 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 NoteColumns 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-quant (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")) will produce <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 will
have 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-extents and extra-spacing-heights 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 BreakAlignments.
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-logs 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-extents 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 diminished?
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.

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 VerticalAxisGroups. 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 VerticalAxisGroups. 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:beam-score-count
   [Function]
   count number of beam scores.

ly:book? x
   [Function]
   Is x a Book object?

   [Function]

ly:book-add-score! book-smob score
   [Function]
   Add score to book-smob score list.

   [Function]
Chapter 4: Scheme functions

- **ly:book-header** *book*
  Return header in *book*.

- **ly:book-paper** *book*
  Return paper in *book*.

- **ly:book-process** *book-smob default-paper default-layout output*
  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).

  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*
  Return scores in *book*.

- **ly:book-set-header!** *book module*
  Set the book header.

- **ly:box?** *x*
  Is *x* a Box object?

- **ly:bp** *num*
  *num* bigpoints (1/72th inch).

- **ly:bracket** *a iv t p*
  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*
  Send the stream event *ev* to the dispatcher *disp*.

- **ly:camel-case->lisp-identifier** *name-sym*
  Convert *FooBar_Bla* to *foo-bar-bla* style symbol.

- **ly:chain-assoc-get** *key achain default-value strict-checking*
  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**
  Check whether all expected warnings have really been triggered.

- **ly:cm** *num*
  *num* cm.

- **ly:command-line-code**
  The Scheme code specified on command-line with -e.

- **ly:command-line-options**
  The Scheme options specified on command-line with -d.

- **ly:connect-dispatchers** *to from*
  Make the dispatcher *to* listen to events from *from*. 
ly:context? x
Is x a Context object?

ly:context-current-moment context
Return the current moment of context.

ly:context-def? x
Is x a Context_def object?

ly:context-def-lookup def sym val
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
Return the result of applying the context-mod mod to the context definition def. Does not change def.

ly:context-event-source context
Return event-source of context context.

ly:context-events-below context
Return a stream-distributor that distributes all events from context and all its subcontexts.

ly:context-find context name
Find a parent of context that has name or alias name. Return #f if not found.

ly:context-grob-definition context name
Return the definition of name (a symbol) within context as an alist.

ly:context-id context
Return the ID string of context, i.e., for \context Voice = "one" ... return the string one.

ly:context-matched-pop-property context grob cell
This undoes a particular \override, \once \override or \once \revert when given the specific alist pair to undo.

ly:context-mod? x
Is x a Context_mod object?

ly:context-mod-apply! context mod
Apply the context modification mod to context.

ly:context-name context
Return the name of context, i.e., for \context Voice = "one" ... return the symbol Voice.

ly:context-now context
Return now-moment of context context.

ly:context-parent context
Return the parent of context, #f if none.

ly:context-property context sym def
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
Return the context above context where name is defined.

ly:context-pushpop-property context grob eltprop val
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
Set value of property name in context context to val.

ly:context-unset-property context name
Unset value of property name in context context.

ly:debug str rest
A Scheme callable function to issue a debug message str. The message is formatted with format and rest.

ly:default-scale
Get the global default scale.

ly:dimension? d
Is d a dimension? Used to distinguish length variables from normal numbers.

ly:dir? s
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
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
Stop the dispatcher to listening to events from from.

ly:dispatcher? x
Is x a Dispatcher object?

ly:duration? x
Is x a Duration object?

ly:duration<? p1 p2
Is p1 shorter than p2?

ly:duration->string dur
Convert dur to a string.

ly:duration-dot-count dur
Extract the dot count from dur.

ly:duration-factor dur
Extract the compression factor from dur. Return it as a pair.

ly:duration-length dur
The length of the duration as a moment.

ly:duration-log dur
Extract the duration log from dur.
ly:duration-scale dur
    Extract the compression factor from dur. Return it as a rational.

ly:effective-prefix
    Return effective prefix.

ly:encode-string-for-pdf str
    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
    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
    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
    A Scheme callable function to issue the error str. The error is formatted with format and rest.

ly:event? obj
    Is obj a proper (non-rhythmic) event object?

ly:event-deep-copy m
    Copy m and all sub expressions of m.

ly:event-property sev sym val
    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
    Set property sym in event ev to val.

ly:expand-environment str
    Expand $VAR and ${VAR} in str.

ly:expect-warning str rest
    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
    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
    Return the absolute file name of name, or #f if not found.

ly:font-config-add-directory dir
    Add directory dir to FontConfig.

ly:font-config-add-font font
    Add font font to FontConfig.
ly:font-config-display-fonts

Dump a list of all fonts visible to FontConfig.

ly:font-config-get-font-file name

Get the file for font name.

ly:font-design-size font

Given the font metric font, return the design size, relative to the current output-scale.

ly:font-file-name font

Given the font metric font, return the corresponding file name.

ly:font-get-glyph font name

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

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

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

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

Given the font metric font, return the magnification, relative to the current output-scale.

ly:font-metric? x

Is x a Font_metric object?

ly:font-name font

Given the font metric font, return the corresponding name.

ly:font-sub-fonts font

Given the font metric font of an OpenType font, return the names of the subfonts within font.

ly:format str rest

LilyPond specific format, supporting ~a and ~[0-9]f. Basic support for ~s is also provided.

ly:format-output context

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
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
Get a hash table with all LilyPond Scheme extension functions.

ly:get-all-translators
Return a list of all translator objects that may be instantiated.

ly:get-cff-offset font-file-name idx
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
Returns the list of context modifications stored in contextmod.

ly:get-font-format font-file-name idx
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
Get a global option setting.

ly:get-spacing-spec from-scm to-scm
Return the spacing spec going between the two given grobs, from_scm and to_scm.

ly:get-undead undead
Get back object from undead.

ly:gettext original
A Scheme wrapper function for gettext.

ly:grob? x
Is x a Grob object?

ly:grob-alist-chain grob global
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
Is x a Grob_array object?

ly:grob-array->list grob-arr
Return the elements of grob-arr as a Scheme list.

ly:grob-array-length grob-arr
Return the length of grob-arr.

ly:grob-array-ref grob-arr index
Retrieve the indexth element of grob-arr.

ly:grob-basic-properties grob
Get the immutable properties of grob.
ly:grob-chain-callback  
\textit{grob proc sym} \hspace{1cm} \text{[Function]}
Find the callback that is stored as property \textit{sym} of \textit{grob} \text{\textit{grob}} and chain \textit{proc} to the head of this, meaning that it is called using \textit{grob} and the previous callback’s result.

ly:grob-common-refpoint  
\textit{grob other axis} \hspace{1cm} \text{[Function]}
Find the common refpoint of \textit{grob} and \textit{other} for \textit{axis}.

ly:grob-common-refpoint-of-array  
\textit{grob others axis} \hspace{1cm} \text{[Function]}
Find the common refpoint of \textit{grob} and \textit{others} (a grob-array) for \textit{axis}.

ly:grob-default-font  
\textit{grob} \hspace{1cm} \text{[Function]}
Return the default font for \textit{grob}.

ly:grob-extent  
\textit{grob refp axis} \hspace{1cm} \text{[Function]}
Get the extent in \textit{axis} direction of \textit{grob} relative to the \textit{grob} \textit{refp}.

ly:grob-get-vertical-axis-group-index  
\textit{grob} \hspace{1cm} \text{[Function]}
Get the index of the vertical axis group the \textit{grob} \text{\textit{grob}} belongs to; return -1 if none is found.

ly:grob-interfaces  
\textit{grob} \hspace{1cm} \text{[Function]}
Return the interfaces list of \textit{grob} \textit{grob}.

ly:grob-layout  
\textit{grob} \hspace{1cm} \text{[Function]}
Get \textit{layout} definition from \textit{grob} \textit{grob}.

ly:grob-object  
\textit{grob sym} \hspace{1cm} \text{[Function]}
Return the value of a pointer in \textit{grob} \textit{grob} of property \textit{sym}. It returns ’() (end-of-list) if \textit{sym} is undefined in \textit{grob}.

ly:grob-original  
\textit{grob} \hspace{1cm} \text{[Function]}
Return the unbroken original \textit{grob} of \textit{grob}.

ly:grob-parent  
\textit{grob axis} \hspace{1cm} \text{[Function]}
Get the parent of \textit{grob}. \textit{axis} is 0 for the X-axis, 1 for the Y-axis.

ly:grob-pq<?  
\textit{a b} \hspace{1cm} \text{[Function]}
Compare two grob priority queue entries. This is an internal function.

ly:grob-properties?  
\textit{x} \hspace{1cm} \text{[Function]}
Is \textit{x} a \textit{Grob\_properties} object?

ly:grob-property  
\textit{grob sym val} \hspace{1cm} \text{[Function]}
Return the value for property \textit{sym} of \textit{grob}. If no value is found, return \textit{val} or ’() if \textit{val} is not specified.

ly:grob-property-data  
\textit{grob sym} \hspace{1cm} \text{[Function]}
Return the value for property \textit{sym} of \textit{grob}, but do not process callbacks.

ly:grob-pure-height  
\textit{grob refp beg end val} \hspace{1cm} \text{[Function]}
Return the pure height of \textit{grob} given \textit{refpoint} \textit{refp}. If no value is found, return \textit{val} or ’() if \textit{val} is not specified.

ly:grob-pure-property  
\textit{grob sym beg end val} \hspace{1cm} \text{[Function]}
Return the pure value for property \textit{sym} of \textit{grob}. If no value is found, return \textit{val} or ’() if \textit{val} is not specified.

ly:grob-relative-coordinate  
\textit{grob refp axis} \hspace{1cm} \text{[Function]}
Get the coordinate in \textit{axis} direction of \textit{grob} relative to the \textit{grob} \textit{refp}.
ly:grob-robust-relative-extent  grob  refp  axis
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
Compare two grobs by script priority. For internal use.

ly:grob-set-nested-property!  grob  symlist  val
Set nested property symlist in grob grob to value val.

ly:grob-set-object!  grob  sym  val
Set sym in grob grob to value val.

ly:grob-set-parent!  grob  axis  parent-grob
Set parent-grob the parent of grob grob in axis axis.

ly:grob-set-property!  grob  sym  val
Set sym in grob grob to value val.

ly:grob-spanned-rank-interval  grob
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
Return the Y-position of sg relative to the staff.

ly:grob-suicide!  grob
Kill grob.

ly:grob-system  grob
Return the system grob of grob.

ly:grob-translate-axis!  grob  d  a
Translate grob on axis a over distance d.

ly:grob-vertical<?>  a  b
Does a lie above b on the page?

ly:gulp-file  name  size
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:has-glyph-names?  font-file-name  idx
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
Return a list of keys in tab.

ly:inch  num
num inches.

ly:input-both-locations  sip
Return input location in sip as (file-name first-line first-column last-line last-column).

ly:input-file-line-char-column  sip
Return input location in sip as (file-name line char column).
ly:input-location? x
Is x a Input object?

ly:input-message sip msg rest
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
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
Interpret the music expression mus in the global context ctx. The context is returned in its final state.

ly:intlog2 d
The 2-logarithm of 1/d.

ly:item? g
Is g an Item object?

ly:item-break-dir it
The break status direction of item it. -1 means end of line, 0 unbroken, and 1 beginning of line.

ly:item-get-column it
Return the PaperColumn or NonMusicalPaperColumn associated with this Item.

ly:iterator? x
Is x a Music_iterator object?

ly:length x y
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
Is x a Lily_lexer object?

ly:lily-parser? x
Is x a Lily_parser object?

ly:line-interface::line grob startx starty endx endy
Make a line using layout information from grob grob.

ly:listened-event-class? disp cl
Does disp listen to any event type in the list cl?

ly:listened-event-types disp
Return a list of all event types that disp listens to.

ly:listener? x
Is x a Listener object?

ly:make-book paper header scores
Make a \book of paper and header (which may be #f as well) containing \scores.

ly:make-book-part scores
Make a \bookpart containing \scores.
ly:make-context-mod mod-list  
Creates a context modification, optionally initialized via the list of modifications mod-list.

ly:make-dispatcher  
Return a newly created dispatcher.

ly:make-duration length dotcount num den  
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  
Set up a global interpretation context, using the output block output-def. The context is returned.

ly:make-global-translator global  
Create a translator group and connect it to the global context global. The translator group is returned.

ly:make-grob-properties alist  
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  
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  
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  
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  
Make music relative to pitch, return final pitch.

ly:make-output-def  
Make an output definition.

ly:make-page-label-marker label  
Return page marker with label label.
ly:make-page-permission-marker symbol permission
Return page marker with page breaking and turning permissions.

ly:make-pango-description-string chain size
Make a PangoFontDescription string for the property alist chain at size size.

ly:make-paper-outputter port alist default-callback
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
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
Create a Prob object.

ly:make-rotation angle center
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
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
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
Return score with music encapsulated in it.

ly:make-spring ideal min-dist
Make a spring. ideal is the ideal distance of the spring, and min-dist is the minimum distance.

ly:make-stencil expr xext yext
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
Create a stream event of class cl with the given mutable property list.

ly:make-transform xx yy xy yy x0 y0
Create a transform. Without options, it is an identity transform. Given four arguments xx, yy, 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 (concatenating 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** \( x \ y \)  
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-undead** \( \text{object} \)  
This packages \( \text{object} \) in a manner that keeps it from triggering "Parsed object should be dead" messages.

**ly:make-unpure-pure-container** \( \text{unpure} \ \text{pure} \)  
Make an unpure-pure container. \( \text{unpure} \) should be an unpure expression, and \( \text{pure} \) should be a pure expression. If \( \text{pure} \) is omitted, the value of \( \text{unpure} \) will be used twice, except that a callback is given two extra arguments that are ignored for the sake of pure calculations.

**ly:message** \( \text{str} \ \text{rest} \)  
A Scheme callable function to issue the message \( \text{str} \). The message is formatted with \text{format} and \text{rest}.

**ly:minimal-breaking** \( \text{pb} \)  
Break (pages and lines) the Paper_book object \( \text{pb} \) without looking for optimal spacing: stack as many lines on a page before moving to the next one.

**ly:mm** \( \text{num} \)  
\( \text{num} \) mm.

**ly:module->alist** \( \text{mod} \)  
Dump the contents of module \( \text{mod} \) as an alist.

**ly:module-copy** \( \text{dest} \ \text{src} \)  
Copy all bindings from module \( \text{src} \) into \( \text{dest} \).

**ly:modules-lookup** \( \text{modules} \ \text{sym} \ \text{def} \)  
Look up \( \text{sym} \) in the list \( \text{modules} \), returning the first occurrence. If not found, return \( \text{def} \) or \( \#f \) if \( \text{def} \) isn’t specified.

**ly:moment?** \( x \)  
Is \( x \) a Moment object?

**ly:moment<?, a b**  
Compare two moments.

**ly:moment-add** \( a \ \text{b} \)  
Add two moments.

**ly:moment-div** \( a \ \text{b} \)  
Divide two moments.

**ly:moment-grace** \( \text{mom} \)  
Extract grace timing as a rational number from \( \text{mom} \).

**ly:moment-grace-denominator** \( \text{mom} \)  
Extract denominator from grace timing.

**ly:moment-grace-numerator** \( \text{mom} \)  
Extract numerator from grace timing.

**ly:moment-main** \( \text{mom} \)  
Extract main timing as a rational number from \( \text{mom} \).
ly:moment-main-denominator \( \text{mom} \)
Extract denominator from main timing.

ly:moment-main-numerator \( \text{mom} \)
Extract numerator from main timing.

ly:moment-mod \( a \ b \)
Modulo of two moments.

ly:moment-mul \( a \ b \)
Multiply two moments.

ly:moment-sub \( a \ b \)
Subtract two moments.

ly:music? \( \text{obj} \)
Is \( \text{obj} \) a music object?

ly:music-compress \( m \ \text{factor} \)
Compress music object \( m \) by scale \( \text{factor} \).

ly:music-deep-copy \( m \ \text{origin} \)
Copy \( m \) and all sub expressions of \( m \). \( m \) may be an arbitrary type; cons cells and music are copied recursively. If \( \text{origin} \) is given, it is used as the origin for one level of music by calling \( \text{ly:set-origin!} \) on the copy.

ly:music-duration-compress \( m \ \text{fact} \)
Compress \( m \) by factor \( \text{fact} \), which is a Moment.

ly:music-duration-length \( m \)
Extract the duration field from \( m \) and return the length.

ly:music-function? \( x \)
Is \( x \) a Music_function object?

ly:music-function-extract \( x \)
Return the Scheme function inside \( x \).

ly:music-function-signature \( x \)
Return the function signature inside \( x \).

ly:music-length \( m \)
Get the length of music expression \( m \) and return it as a Moment object.

ly:music-list? \( \text{lst} \)
Is \( \text{lst} \) a list of music objects?

ly:music-mutable-properties \( m \)
Return an alist containing the mutable properties of \( m \). The immutable properties are not available, since they are constant and initialized by the \( \text{make-music} \) function.

ly:music-output? \( x \)
Is \( x \) a Music_output object?

ly:music-property \( m \ \text{sym} \ \text{val} \)
Return the value for property \( \text{sym} \) of music expression \( m \). If no value is found, return \( \text{val} \) or '() if \( \text{val} \) is not specified.
ly:.music-set-property! mus sym val
Set property sym in music expression mus to val.

ly:music-transpose m p
Transpose m such that central C is mapped to p. Return m.

ly:note-column-accidentals note-column
Return the AccidentalPlacement grob from note-column if any, or SCM_EOL otherwise.

ly:note-column-dot-column note-column
Return the DotColumn grob from note-column if any, or SCM_EOL otherwise.

ly:note-head::stem-attachment font-metric glyph-name
Get attachment in font-metric for attaching a stem to notehead glyph-name.

ly:number->string s
Convert s to a string without generating many decimals.

ly:one-line-auto-height-breaking pb
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
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
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
Optimally break (pages and lines) the Paper_book object pb to minimize badness in both vertical and horizontal spacing.

ly:option-usage port
Print ly:set-option usage. Optional port argument for the destination defaults to current output port.

ly:otf->cff otf-file-name idx
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
Is font an OpenType font?

ly:otf-font-glyph-info font glyph
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
Extract a table tag from font. Return empty string for non-existent tag.

ly:otf-glyph-count font
Return the number of glyphs in font.
ly:otf-glyph-list font
Return a list of glyph names for font.

ly:output-def? x
Is x a Output_def object?

ly:output-def-clone def
Clone output definition def.

ly:output-def-lookup def sym val
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
Return the parent output definition of def.

ly:output-def-scope def
Return the variable scope inside def.

ly:output-def-set-variable! def sym val
Set an output definition def variable sym to val.

ly:output-description output-def
Return the description of translators in output-def.

ly:output-find-context-def output-def context-name
Return an alist of all context defs (matching context-name if given) in output-def.

ly:output-formats
Formats passed to --format as a list of strings, used for the output.

ly:outputter-close outputter
Close port of outputter.

ly:outputter-dump-stencil outputter stencil
Dump stencil expr onto outputter.

ly:outputter-dump-string outputter str
Dump str onto outputter.

ly:outputter-output-scheme outputter expr
Output expr to the paper outputter.

ly:outputter-port outputter
Return output port for outputter.

ly:page-marker? x
Is x a Page_marker object?

ly:page-turn-breaking pb
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
Is f a pango font?

ly:pango-font-physical-fonts f
Return alist of (ps-name file-name font-index) lists for Pango font f.
ly:paper-book? x
  Is x a Paper_book object?

ly:paper-book-header pb
  Return the header definition (\header) in Paper_book object pb.

ly:paper-book-pages pb

ly:paper-book-paper pb
  Return the paper output definition (\paper) in Paper_book object pb.

ly:paper-book-performances pb

ly:paper-book-scopes pb

ly:paper-book-systems pb

ly:paper-column::break-align-width col align-syms
  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
  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
  Return a list containing the fonts from output definition def (e.g., \paper).

ly:paper-get-font def chain
  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
  Return the value of variable sym in output definition def as a double.

ly:paper-outputscale def
  Return the output-scale for output definition def.

ly:paper-score-paper-systems paper-score
  Return vector of paper_system objects from paper-score.

ly:paper-system? obj
  Is obj a C++ Prob object of type paper-system?

ly:paper-system-minimum-distance sys1 sys2
  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
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-lexer parser
   [Function]
   Return the lexer for parser, defaulting to current parser

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 \( pp \)  
Extract the alteration from pitch \( pp \).

ly:pitch-diff \( pitch \ root \)  
Return pitch \( delta \) such that \( root \) transposed by \( delta \) equals \( pitch \).

ly:pitch-negate \( p \)  
Negate \( p \).

ly:pitch-notename \( pp \)  
Extract the note name from pitch \( pp \).

ly:pitch-octave \( pp \)  
Extract the octave from pitch \( pp \).

ly:pitch-quartertones \( pp \)  
Calculate the number of quarter tones of \( pp \) from middle C.

ly:pitch-semitones \( pp \)  
Calculate the number of semitones of \( pp \) from middle C.

ly:pitch-steps \( p \)  
Number of steps counted from middle C of the pitch \( p \).

ly:pitch-tones \( pp \)  
Calculate the number of tones of \( pp \) from middle C as a rational number.

ly:pitch-transpose \( p \ delta \)  
Transpose \( p \) by the amount \( delta \), where \( delta \) is relative to middle C.

ly:pointer-group-interface::add-grob \( grob \ sym \ grob-element \)  
Add \( grob-element \) to \( grob \)'s \( sym \) grob array.

ly:position-on-line? \( sg \ spos \)  
Return whether \( spos \) is on a line of the staff associated with the grob \( sg \) (even on an extender line).

ly:prob? \( x \)  
Is \( x \) a Prob object?

ly:prob-immutable-properties \( prob \)  
Retrieve an alist of immutable properties.

ly:prob-mutable-properties \( prob \)  
Retrieve an alist of mutable properties.

ly:prob-property \( prob \ sym \ val \)  
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? \( obj \ sym \)  
Is boolean prop \( sym \) of \( sym \) set?

ly:prob-set-property! \( obj \ sym \ value \)  
Set property \( sym \) of \( obj \) to \( value \).

ly:prob-type? \( obj \ type \)  
Is \( obj \) the specified prob-type?
ly:programming-error str rest
A Scheme callable function to issue the internal warning str. The message is formatted with format and rest.

ly:progress str rest
A Scheme callable function to print progress str. The message is formatted with format and rest.

ly:property-lookup-stats sym
Return hash table with a property access corresponding to sym. Choices are prob, grob, and context.

ly:protects
Return hash of protected objects.

ly:pt num
num printer points.

ly:pure-call data grob start end rest
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
Randomize C random generator.

ly:register-stencil-expression symbol
Add symbol as head of a stencil expression.

ly:register-translator creator name description
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
Determine the extent of elements relative to common in the axis direction.

ly:rename-file oldname newname
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
Forget all about previously loaded fonts.

ly:round-filled-box xext yext blot
Make a Stencil object that prints a black box of dimensions xext, yext and roundness blot.

ly:round-filled-polygon points blot extroversion
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 the default of -1.0 keeping the outer boundary of the outline just inside of the polygon.

ly:run-translator mus output-def
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
  Is x a Score object?  [Function]

ly:score-add-output-def! score def
  Add an output definition def to score.  [Function]

ly:score-embedded-format score layout
  Run score through layout (an output definition) scaled to correct output-scale already, returning a list of layout-lines.  [Function]

ly:score-error? score
  Was there an error in the score?  [Function]

ly:score-header score
  Return score header.  [Function]

ly:score-music score
  Return score music.  [Function]

ly:score-output-defs score
  All output definitions in a score.  [Function]

ly:score-set-header! score module
  Set the score header.  [Function]

ly:separation-item::print
  Optional stencil for PaperColumn or NonMusicalPaperColumn. Draws the 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.  [Function]

ly:set-default-scale scale
  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.  [Function]

ly:set-grob-modification-callback cb
  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.  [Function]

ly:set-middle-C! context
  Set the middleCPosition variable in context based on the variables middleCClefPosition and middleCOffset.  [Function]

ly:set-option var val
  Set a program option.  [Function]

ly:set-origin! m origin
  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 (#f or '() in which case no action is performed. The return value is m itself.  [Function]
**ly:set-property-cache-callback cb**  
Specify a procedure that will be called whenever LilyPond calculates a callback function and caches the result. The callback will receive as arguments the grob whose property it is, the name of the property, the name of the callback that calculated the property, and the new (cached) value of the property.

**ly:skyline? x**  
Is x a Skyline object?

**ly:skyline-empty? sky**  
Return whether sky is empty.

**ly:skyline-pair? x**  
Is x a Skyline_pair object?

**ly:slur-score-count**  
count number of slur scores.

**ly:smob-protects**  
Return LilyPond’s internal smob protection list.

**ly:solve-spring-rod-problem springs rods length ragged**  
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**  
Is x a Source_file object?

**ly:source-files parser-smob**  
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**  
Is g a spanner object?

**ly:spanner-bound spanner dir**  
Get one of the bounds of spanner. dir is -1 for left, and 1 for right.

**ly:spanner-broken-into spanner**  
Return broken-into list for spanner.

**ly:spanner-set-bound! spanner dir item**  
Set grob item as bound in direction dir for spanner.

**ly:spawn command rest**  
Simple interface to g_spawn_sync str. The error is formatted with format and rest.

**ly:spring? x**  
Is x a Spring object?
ly:spring-set-inverse-compress-strength! spring strength
Set the inverse compress strength of spring.

ly:spring-set-inverse-stretch-strength! spring strength
Set the inverse stretch strength of spring.

ly:staff-symbol-line-thickness grob
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
Returns the radius of the staff associated with grob.

ly:staff-symbol-staff-space grob
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:start-environment
Return the environment (a list of strings) that was in effect at program start.

ly:stderr-redirect file-name mode
Redirect stderr to file-name, opened with mode.

ly:stencil? x
Is x a Stencil object?

ly:stencil-add args
Combine stencils. Takes any number of arguments.

ly:stencil-aligned-to stil axis dir
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
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 #t or #f.

ly:stencil-empty? stil axis
Return whether stil is empty. If an optional axis is supplied, the emptiness check is restricted to that axis.

ly:stencil-expr stil
Return the expression of stil.

ly:stencil-extent stil axis
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
Put stc in a different color. Accepts either three values for r, g, b and an optional value for a, or a single CSS-like string.

ly:stencil-outline stil outline
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
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
Return a stencil stil rotated angle degrees around point (x, y), given in absolute coordinates.

ly:stencil-scale stil x y
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
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
Return a stil, but translated by offset (a pair of numbers).

ly:stencil-translate-axis stil amount axis
Return a copy of stil but translated by amount in axis direction.

ly:stream-event? obj
Is obj a Stream_event object?

ly:string-percent-encode str
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
Replace string a by string b in string s.

ly:system-font-load name
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
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
Is x a Transform object?
ly:transform->list  [Function]
Convert a transform matrix to a list of six values. Values are xx, yx, xy, yy, x0, y0.

ly:translate-cpp-warning-scheme  [Function]
Translates a string in C++ printf format and modifies it to use it for scheme formatting.

ly:translator?  [Function]
Is x a Translator object?

ly:translator-context  [Function]
Return the context of the translator object trans.

ly:translator-description  [Function]
Return an alist of properties of translator definition creator.

ly:translator-group?  [Function]
Is x a Translator_group object?

ly:translator-name  [Function]
Return the type name of the translator definition creator. The name is a symbol.

ly:transpose-key-alist  [Function]
Make a new key alist of l transposed by pitch pit.

ly:truncate-list!  [Function]
Take at most the first i of list lst.

ly:ttf->pfa  [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  [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  [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:undead?  [Function]
Is x a Undead object?

ly:unit  [Function]
Return the unit used for lengths as a string.

ly:unpure-call  [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?  [Function]
Is x a Unpure_pure_container object?

ly:unpure-pure-container-pure-part  [Function]
Return the pure part of pc.
ly:unpure-pure-container-unpure-part pc
Return the unpure part of pc.

ly:usage
Print usage message.

ly:verbose-output?
Was verbose output requested, i.e. loglevel at least DEBUG?

ly:version
Return the current lilypond version as a list, e.g., (1 3 127 uu1).

ly:warning str rest
A Scheme callable function to issue the warning str. The message is formatted with format and rest.

ly:warning-located location str rest
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
Encode the Unicode codepoint wc, an integer, as UTF-8.
Appendix A Indices

A.1 Concept index

(Index is nonexistent)

A.2 Function index

ly:context-mod .......................... 664
ly:context-reset ......................... 664
ly:context-unset-property ............... 667
ly:context-set-property .................. 667
ly:context-set-property! .................. 667
ly:context-unset-property! ................ 667
ly:context-property ...................... 666
ly:context-set-property .................. 666
ly:debug ................................ 667
ly:context-descriptor .......................... 667
ly:context-property ...................... 666
ly:context-set-property .................. 666
ly:context-unset-property ................ 667
ly:context-unset-property! ............... 667
ly:context-set-property! ................. 667
ly:context-unset-property! ............... 667
ly:context-set-property! .................. 667
ly:context-unset-property! ............... 667
ly:context-set-property! .................. 667
ly:context-unset-property! ............... 667
ly:context-set-property! .................. 667
ly:context-unset-property! ............... 667
ly:context-set-property! .................. 667
ly:context-unset-property! ............... 667
ly:context-set-property! .................. 667
ly:context-unset-property! ............... 667
ly:context-set-property! .................. 667
ly:context-unset-property! ............... 667
ly:context-set-property! .................. 667
ly:context-unset-property! ............... 667
ly:context-set-property! .................. 667
<table>
<thead>
<tr>
<th>Function</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ly:staff-symbol-line-thickness</td>
<td>686</td>
</tr>
<tr>
<td>ly:staff-symbol-staff-radius</td>
<td>686</td>
</tr>
<tr>
<td>ly:staff-symbol-staff-space</td>
<td>686</td>
</tr>
<tr>
<td>ly:start-environment</td>
<td>686</td>
</tr>
<tr>
<td>ly:stderr-redirect</td>
<td>686</td>
</tr>
<tr>
<td>ly:stencil-add</td>
<td>686</td>
</tr>
<tr>
<td>ly:stencil-aligned-to</td>
<td>686</td>
</tr>
<tr>
<td>ly:stencil-combine-at-edge</td>
<td>686</td>
</tr>
<tr>
<td>ly:stencil-empty?</td>
<td>686</td>
</tr>
<tr>
<td>ly:stencil-expr</td>
<td>686</td>
</tr>
<tr>
<td>ly:stencil-extent</td>
<td>686</td>
</tr>
<tr>
<td>ly:stencil-in-color</td>
<td>686</td>
</tr>
<tr>
<td>ly:stencil-outline</td>
<td>686</td>
</tr>
<tr>
<td>ly:stencil-rotate</td>
<td>687</td>
</tr>
<tr>
<td>ly:stencil-rotate-absolute</td>
<td>687</td>
</tr>
<tr>
<td>ly:stencil-stack</td>
<td>687</td>
</tr>
<tr>
<td>ly:stencil-translate-axis</td>
<td>687</td>
</tr>
<tr>
<td>ly:stencil?</td>
<td>686</td>
</tr>
<tr>
<td>ly:stream-event?</td>
<td>687</td>
</tr>
<tr>
<td>ly:string-percent-encode</td>
<td>687</td>
</tr>
<tr>
<td>ly:string-substitute</td>
<td>687</td>
</tr>
<tr>
<td>ly:system-font-load</td>
<td>687</td>
</tr>
<tr>
<td>ly:text-interface::interpret-markup</td>
<td>687</td>
</tr>
<tr>
<td>ly:transform-&gt;list</td>
<td>688</td>
</tr>
<tr>
<td>ly:transform?</td>
<td>687</td>
</tr>
<tr>
<td>ly:translate-cpp-warning-scheme</td>
<td>688</td>
</tr>
<tr>
<td>ly:translator-context</td>
<td>688</td>
</tr>
<tr>
<td>ly:translator-description</td>
<td>688</td>
</tr>
<tr>
<td>ly:translator-group?</td>
<td>688</td>
</tr>
<tr>
<td>ly:translator-name</td>
<td>688</td>
</tr>
<tr>
<td>ly:translator?</td>
<td>688</td>
</tr>
<tr>
<td>ly:transpose-key-alist</td>
<td>688</td>
</tr>
<tr>
<td>ly:truncat-list!</td>
<td>688</td>
</tr>
<tr>
<td>ly:ttf-&gt;pfa</td>
<td>688</td>
</tr>
<tr>
<td>ly:ttf-ps-name</td>
<td>688</td>
</tr>
<tr>
<td>ly:type1-&gt;pfa</td>
<td>688</td>
</tr>
<tr>
<td>ly:undead?</td>
<td>688</td>
</tr>
<tr>
<td>ly:unit</td>
<td>688</td>
</tr>
<tr>
<td>ly:unpure-call</td>
<td>688</td>
</tr>
<tr>
<td>ly:unpure-pure-container-pure-part</td>
<td>688</td>
</tr>
<tr>
<td>ly:unpure-pure-container-unpure-part</td>
<td>689</td>
</tr>
<tr>
<td>ly:unpure-pure-container?</td>
<td>688</td>
</tr>
<tr>
<td>ly:usage</td>
<td>689</td>
</tr>
<tr>
<td>ly:verbose-output?</td>
<td>689</td>
</tr>
<tr>
<td>ly:version</td>
<td>689</td>
</tr>
<tr>
<td>ly:warning</td>
<td>689</td>
</tr>
<tr>
<td>ly:warning-located</td>
<td>689</td>
</tr>
<tr>
<td>ly:wide-char-&gt;utf-8</td>
<td>689</td>
</tr>
</tbody>
</table>