

Audovia Documentation

1 Introduction

Audovia is a database application for making music on your Microsoft Windows or Linux Ubuntu laptop or PC. Songs can have up to 15 instrumental voices and a percussion track. Instruments can be chosen from either the default soundbank of 128 instruments or other soundbanks of your choice.

Songs can be developed, tested and edited very quickly and easily by virtue of the database structure and the **JFugue** MusicString notation. Notes within a MusicString are specified by their name and octave or by their MIDI value and their durations are specified either by character code, or numerically. You can use notes from C0 to G10, corresponding to MIDI values 0 to 127. Middle C is C5. Notes can be entered manually or by picking from graphic Treble, Alto, Tenor and Bass staves within the MusicString editor.

The opening phrase of Joy to the World can be written as:

```
C6h B5q. A5i G5h. F5q E5h D5h C5h.
```

Sequences of MusicStrings can be assembled into Patterns, which can be nested to any level. Songs can be constructed from Patterns either timewise or by voice.

The *File/Template* menu item creates song templates by voice where each voice is a Pattern containing other Patterns and MusicStrings. Bars can be MusicStrings or Patterns. Pattern bars can be used to contain separate MusicStrings and/or Patterns.

All MusicStrings and Patterns within a song are given unique names which makes it easy to keep track of them within a composition. A MusicString can be shared between any of the Patterns in a song and it only needs to be edited once for the changes to be effective wherever that MusicString occurs within the song.

You can collaborate with your colleagues on a song by using a MySQL shared database. You can also share your songs by exporting and importing to and from XML files.

Audovia will play back your music and also export to MIDI, MusicXML and WAV files for music processing and music publishing. The WAV files can be opened in **Audacity**, then exported to MP3.

1.1 Background

Audovia is written in Java with a Swing forms user interface. It uses Apache Derby as the default database with an embedded JDBC driver. The music is generated by **JFugue**, a Java API for music programming.

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2 Installation

Before running **Audovia** on Microsoft Windows you will first need to install the latest version of Java from **Java.com** or, if you are using Linux Ubuntu, you will need to execute the following commands to install Oracle's Java.

```
sudo add-apt-repository ppa:webupd8team/java
sudo apt-get update
sudo apt-get install oracle-java8-installer
```

For best results on Linux Ubuntu, we recommend using the Gnome Desktop Environment.

Then, from **Audovia.com**, follow the appropriate link to download and install the desktop shortcut for running **Audovia**.

2.1 Soundbanks

Audovia uses the Gervill synthesizer to generate sound. Gervill can use the default soundbank or any soundbank with a *.sf2* or *.dls* extension.

Soundbanks can be kept on file or you can use *Soundbanks/Manage Soundbanks* to upload these to the database.

If you play a Pattern and specify the default soundbank, Gervill will search the locations:

- *<Java Runtime location>\lib\audio*.dls and *.sf2*
- *<Windows location>\System32\drivers\gm.dls*

If a soundbank is not found, Gervill will generate one using software.

*You can create your own soundbanks by recording instrument sounds in **Audacity** and importing them into the **Viena** SoundFont editor which is available from the **SynthFont** website.*

2.2 Backing up your Songs

Use *File/XML Export* to export a song to an XML file or *File/XML Import* to import a song from an XML file. The entire song structure is exported or imported with the exception of any soundbank reference.

2.3 Shared Database (optional)

If you are using a Database as a Service provider, then your hostname, port, database, username and password may be set up for you. In this case, use *Database/Database Connections* to create a new connection and enter the Connection Details. Please note that when entering the Connection Details, there should be no leading or trailing spaces in any of the fields as this will cause a communications failure. Then use *File/Create Tables* to create the database tables on the remote host.

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If you are using MySQL as your shared database, we recommend that you create a user in your database called 'guest' with *EXECUTE* as the only privilege. Connecting as 'guest' enables read access to all songs and also the ability to create and log in to individual user accounts for the creation of songs. Full access to these songs can optionally be shared with selected other user accounts.

3 Tutorial

Audovia opens with the **Songs** form for managing your songs. If you are using numeric note durations within a song, use the **/durations** column to specify whether these are expressed as decimal values of a whole note or as pulses, where 32 pulses represents a quarter note.

To ensure that the different voices in a song are synchronized, all note durations should equate to a whole number of pulses.

Numeric durations should be used for triplets. A quarter note divided into three triplets should be given durations of 11, 11 and 10 pulses, or 12, 10 and 10 pulses if you want to give more emphasis to the first triplet.

To edit a cell, either select the cell and type something into it or double-click on the cell. To copy data in a cell, highlight the text to be copied and press Ctrl-C. To paste, press Ctrl-V. This only works if the cell is in edit mode (yellow).

The **Strings** button opens a form for defining the **JFugue** MusicStrings in a selected song and the **Patterns** button opens a form for declaring the Patterns in the song.

The naming of MusicStrings is independant from the naming of Patterns. You may find it helpful to name MusicStrings in lower case and Patterns with an initial capital.

Use *File/Template* to give you a start when creating new songs.

Use *File/Tree View* to display the structure of Patterns and MusicStrings in a selected song (see below).

3.1 Strings

The **Strings** form is used to define the MusicStrings in the selected song. MusicString notation is described in the next section.

MusicStrings can be edited within this form or, if they are more than two lines long, the **Popup Editor** can be used to provide an editing window.

MusicStrings can be imported from other songs by using *File/Import Strings*. Libraries of MusicStrings can be built and used in this way.

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3.2 Patterns

The **Patterns** form is used to declare the Patterns in the selected song. A Pattern is a container for other Patterns and MusicStrings.

The **Components** button opens a form for picking the Patterns and MusicStrings that are to be contained within a selected Pattern.

The **Play** button will play the selected Pattern.

The *File* options are *Export to MIDI*, *Export to MusicXML*, *Export to WAV* and *Clone*. If you want to create a Pattern that is very similar to an existing Pattern, use *Clone* and edit the clone.

3.2.1 Example of Cloning

Suppose you have a song which is 128 bars long and the first 12 bars are repeated with a different 12th bar on the repeat.

Use the template to create a song where the voices have 2 parts with 128 bars per part. Clone each Part 1 and call this the Repeat. Insert the Repeat after Part 1 in the voice patterns. Delete bar 13 from Part 1 and delete bar 12 from the Repeat. Bar 13 in the Repeat becomes the different 12th bar.

You can keep the existing bar numbers and since bar numbers are independant for each part you can start Part 2 at bar 13.

3.3 Components

The **Components** form is used to pick the Patterns and MusicStrings that are to be contained within the selected Pattern and to specify their position in the sequence in which they are to be played. Picking is done via a drop down list which is displayed when you click on a **Component** cell.

The **Insert** and **Renumber** buttons can be used to insert components into an existing sequence.

The **Drill Down** button allows you to drill down to the child components of a selected Pattern. Drilling down on a MusicString will provide a window for editing that MusicString. When selecting a component for **Drill Down** it is advisable to click on the **Position** cell otherwise the component pick list will be displayed.

If you would like to enter an anonymous MusicString into your Pattern, leave the **Component** cell blank and type the MusicString into the **Anonymous String** cell. This column can be made wider by dragging the boundary between the **Component** and **Anonymous String** headers.

3.4 Tree View

The tree view may be used to display the structure of Patterns and MusicStrings in a selected song.

Clicking on a MusicString will open a popup window for editing that MusicString. Use the **Refresh** button to propagate any changes made here throughout the tree.

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Clicking on a Pattern will enable the **Play** button and also the *File* options: *Export to MIDI*, *Export to MusicXML*, *Export to WAV* and *Clone*.

3.5 MusicXML

If you export a Pattern to a MusicXML file, suitable for input to a music publishing system such as **MuseScore**, then for best results:

- Tempo should be the first token in the Pattern and each different Voice token should appear only once in the Pattern and be followed by one each of Instrument and Key tokens.
- Combined harmony and melody should be represented by separate voices. Notes connected to chords using the _ character will not be exported to the MusicXML file.
- Bar lines should be used.
- If numeric note durations are used they should match exactly to durations within the range whole note going down by halves to 128th note (dotted or undotted, but not a dotted 128th note).

4 MusicStrings

4.1 Notes

A C Major scale of quarter notes, starting at middle C, can be written as:

```
C5q D5q E5q F5q G5q A5q B5q C6q
```

or as:

```
C5/0.25 D5/0.25 E5/0.25 F5/0.25 G5/0.25 A5/0.25 B5/0.25 C6/0.25
```

or, if you have **/durations** set to pulses, as:

```
C5/32 D5/32 E5/32 F5/32 G5/32 A5/32 B5/32 C6/32
```

In addition to the note letters, A to G, you can use R for a rest. Sharps, flats and naturals can be added by placing the character #, b or n immediately after the note letter so B-flat above middle C is written as Bb5.

Please note that, if you are transcribing music, accidentals in **Audovia** apply only to the immediately following note and not to the end of the bar as in conventional music notation.

MusicStrings can optionally be split into bars (or measures) by using the vertical bar character (|):

```
C5q D5q E5q F5q | G5q A5q B5q C6q |
```

As an alternative to note letters, MIDI values, enclosed in square brackets, may be used:

```
[60]q [62]q [64]q [65]q | [67]q [69]q [71]q [72]q |
```

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4.1.1 Durations

The duration characters are:

w	whole note
h	half note
q	quarter note
i	eighth note
s	sixteenth note
t	thirty-second note
x	sixty-fourth note
o	one-twenty-eighth note

Dotted duration can be achieved by putting the period character (.) immediately after the duration character.

4.1.2 Chords

Chords are formed by adding the constituent notes together. A C Major chord can be written as:

C5q+E5q+G5q

4.1.3 Ties

Two or more notes of the same pitch can be tied together by using the hyphen character (-). Place the hyphen immediately after the duration of the note at the start of the tie and immediately before the duration of the note at the end of the tie. Notes in the middle of the tie have hyphens placed immediately before and after the note duration:

C5q D5q E5q F5q- | F5-w- | F5-q G5q A5q B5q |

4.2 Tempo

A tempo of 120 beats per minute can be expressed as:

T120

or as:

T[allegro]

Note the use of a pre-defined numeric constant within the square brackets. More tempo constants are available from *Insert/Tempo*.

4.3 Constants

Constants are defined using the \$ character followed by the constant name.

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4.3.1 Numeric Constants

Numeric constants can be used anywhere that a number would appear in a MusicString. In addition to the pre-defined constants available from the *Insert* menu, you can define your own constants. For example, a scale with non-standard MIDI values could be defined as:

```
$A1=70
$G=68
$F=67
$E=65
$D=63
$C=62
$B=60
$A=58
```

and played as:

```
[A]q [B]q [C]q [D]q [E]q [F]q [G]q [A1]q
```

4.3.2 String Constants

Suppose you wanted to use the following arpeggio several times in your music:

```
F3i A3i C4i F4i C4i A3i
```

You could define a string constant as:

```
$arpeggioFoctave3=F3i~A3i~C4i~F4i~C4i~A3i
```

Then, in your music, you could refer to it as:

```
{arpeggioFoctave3}
```

Note the use of curly brackets for string constants.

4.4 Voices

Voices are specified by the V character followed by a number from 0 to 15. Note that V9 is the percussion voice and has its own set of instruments.

4.5 Key Signatures

Key signatures are specified by the K character followed by a note letter (or a note letter followed by # or b) followed by maj or min to indicate a major or minor scale so the key of G Major is written as KGmaj.

4.6 Instruments

Instruments are specified by the I character followed by a number from 0 to 127. You can use *Insert/Instrument* to pick one of the pre-defined values.

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4.7 MIDI Controller

MIDI controller events can be specified by the X character followed by the controller number followed by the equals sign (=) followed by a value. You can use *Insert/Controller* to pick one of the pre-defined controllers.

4.8 Pitch Wheel

A change of pitch can be specified by the & character followed by a number from 0 to 16383. This affects all following notes:

&0	lowers the pitch by a full tone;
&8192	returns the pitch to no change;
&16383	raises the pitch by a full tone.

5 Linux Ubuntu

On Linux Ubuntu, the desktop shortcut will be installed in */usr/share/applications*.

Audovia uses Liberation Fonts. If these are not already installed, search for fonts-liberation in the Ubuntu Software Center.

Since there is no default soundbank in Ubuntu, Gervill will generate one automatically. You may wish to search the Internet for SoundFont files to get better quality. You can also follow the SoundFont links on the **SynthFont** website.

A quick way to get a SoundFont is to first run *sudo apt-get install timidity lame* from the command prompt, then from the Ubuntu Software Center, find timidity and select the *Fluid (R3) General MIDI SoundFont (GM)* Add-on. This will put a SoundFont in */usr/share/sounds/sf2*. To use this, select Soundbank from Filewhen playing a Pattern.

To convert your songs to MP3, you can either *Export to WAV* then open the WAV files in **Audacity**, then export to MP3, or you can create a *<config.cfg>* file with the following entry:

```
soundfont <soundfontfile.sf2>
```

Then *Export to MIDI* and, from the command prompt, run:

```
timidity <song.mid> -c <config.cfg> -Ow -o - | lame - <song.mp3>
```

Please note that timidity will remove any silence from the beginning of the song. If you want to restore some silence, use the following commands:

```
timidity <song.mid> -c <config.cfg> -Ow -o <song.wav>
sox <song.wav> <song_padded.wav> pad <seconds>
lame <song_padded.wav> <song.mp3>
```

To apply reverb, open the .wav file in **Audacity** and use the *Reverb* effect, then *File/Export* to MP3.

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6 Predefined Constants

6.1 Instrument Names

PIANO	0	CELLO	42
ACOUSTIC_GRAND	0	CONTRABASS	43
BRIGHT_ACOUSTIC	1	TREMOLO_STRINGS	44
ELECTRIC_GRAND	2	PIZZICATO_STRINGS	45
HONKEY_TONK	3	ORCHESTRAL_STRINGS	46
ELECTRIC_PIANO	4	TIMPANI	47
ELECTRIC_PIANO_1	4	STRING_ENSEMBLE_1	48
ELECTRIC_PIANO_2	5	STRING_ENSEMBLE_2	49
HARPISCHORD	6	SYNTH_STRINGS_1	50
HARPSICHORD	6	SYNTH_STRINGS_2	51
CLAVINET	7	CHOIR_AAHS	52
CELESTA	8	VOICE_OOHS	53
GLOCKENSPIEL	9	SYNTH_VOICE	54
MUSIC_BOX	10	ORCHESTRA_HIT	55
VIBRAPHONE	11	TRUMPET	56
MARIMBA	12	TROMBONE	57
XYLOPHONE	13	TUBA	58
TUBULAR_BELLS	14	MUTED_TRUMPET	59
DULCIMER	15	FRENCH_HORN	60
DRAWBAR_ORGAN	16	BRASS_SECTION	61
PERCUSSIVE_ORGAN	17	SYNTHBRASS_1	62
ROCK_ORGAN	18	SYNTH_BRASS_1	62
CHURCH_ORGAN	19	SYNTHBRASS_2	63
REED_ORGAN	20	SYNTH_BRASS_2	63
ACCORDIAN	21	SOPRANO_SAX	64
HARMONICA	22	ALTO_SAX	65
TANGO_ACCORDIAN	23	TENOR_SAX	66
GUITAR	24	BARITONE_SAX	67
NYLON_STRING_GUITAR	24	OBOE	68
STEEL_STRING_GUITAR	25	ENGLISH_HORN	69
ELECTRIC_JAZZ_GUITAR	26	BASSOON	70
ELECTRIC_CLEAN_GUITAR	27	CLARINET	71
ELECTRIC_MUTED_GUITAR	28	PICCOLO	72
OVERDRIVEN_GUITAR	29	FLUTE	73
DISTORTION_GUITAR	30	RECORDER	74
GUITAR_HARMONICS	31	PAN_FLUTE	75
ACOUSTIC_BASS	32	BLOWN_BOTTLE	76
ELECTRIC_BASS_FINGER	33	SKAKUHACHI	77
ELECTRIC_BASS_PICK	34	WHISTLE	78
FRETLESS_BASS	35	OCARINA	79
SLAP_BASS_1	36	LEAD_SQUARE	80
SLAP_BASS_2	37	SQUARE	80
SYNTH_BASS_1	38	LEAD_SAWTOOTH	81
SYNTH_BASS_2	39	SAWTOOTH	81
VIOLIN	40	LEAD_CALLIOPE	82
VIOLA	41	CALLIOPE	82

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LEAD_CHIFF	83	ATMOSPHERE	99
CHIFF	83	FX_BRIGHTNESS	100
LEAD_CHARANG	84	BRIGHTNESS	100
CHARANG	84	FX_GOBLINS	101
LEAD_VOICE	85	GOBLINS	101
VOICE	85	FX_ECHOES	102
LEAD_FIFTHS	86	ECHOES	102
FIFTHS	86	FX_SCI-FI	103
LEAD_BASSLEAD	87	SCI-FI	103
BASSLEAD	87	SITAR	104
PAD_NEW_AGE	88	BANJO	105
NEW_AGE	88	SHAMISEN	106
PAD_WARM	89	KOTO	107
WARM	89	KALIMBA	108
PAD_POLYSYNTH	90	BAGPIPE	109
POLYSYNTH	90	FIDDLE	110
PAD_CHOIR	91	SHANAI	111
CHOIR	91	TINKLE_BELL	112
PAD_BOWED	92	AGOGO	113
BOWED	92	STEEL_DRUMS	114
PAD_METALLIC	93	WOODBLOCK	115
METALLIC	93	TAIKO_DRUM	116
PAD_HALO	94	MELODIC_TOM	117
HALO	94	SYNTH_DRUM	118
PAD_SWEEP	95	REVERSE_CYMBAL	119
SWEEP	95	GUITAR_FRET_NOISE	120
FX_RAIN	96	BREATH_NOISE	121
RAIN	96	SEASHORE	122
FX_SOUNDTRACK	97	BIRD_TWEET	123
SOUNDTRACK	97	TELEPHONE_RING	124
FX_CRYSTAL	98	HELICOPTER	125
CRYSTAL	98	APPLAUSE	126
FX_ATMOSPHERE	99	GUNSHOT	127

6.2 Percussion Names

ACOUSTIC_BASS_DRUM	35	CRASH_CYMBAL_1	49
BASS_DRUM	36	HIGH_TOM	50
SIDE_STICK	37	RIDE_CYMBAL_1	51
ACOUSTIC_SNARE	38	CHINESE_CYMBAL	52
HAND_CLAP	39	RIDE_BELL	53
ELECTRIC_SNARE	40	TAMBOURINE	54
LOW_FLOOR_TOM	41	SPLASH_CYMBAL	55
CLOSED_HI_HAT	42	COWBELL	56
HIGH_FLOOR_TOM	43	CRASH_CYMBAL_2	57
PEDAL_HI_HAT	44	VIBRASLAP	58
LOW_TOM	45	RIDE_CYMBAL_2	59
OPEN_HI_HAT	46	HI_BONGO	60
LOW_MID_TOM	47	LOW_BONGO	61
HI_MID_TOM	48	MUTE_HI_CONGA	62

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OPEN_HI_CONGA	63	SHORT_GUIRO	73
LOW_CONGA	64	LONG_GUIRO	74
HIGH_TIMBALE	65	CLAVES	75
LOW_TIMBALE	66	HI_WOOD_BLOCK	76
HIGH_AGOGO	67	LOW_WOOD_BLOCK	77
LOW_AGOGO	68	MUTE_CUICA	78
CABASA	69	OPEN_CUICA	79
MARACAS	70	MUTE_TRIANGLE	80
SHORT_WHISTLE	71	OPEN_TRIANGLE	81
LONG_WHISTLE	72		

6.3 Controller Names

BANK_SELECT_COARSE	0	HOLD_2_PEDAL	69
MOD_WHEEL_COARSE	1	HOLD_2	69
BREATH_COARSE	2	SOUND_VARIATION	70
FOOT_PEDAL_COARSE	4	VARIATION	70
PORTAMENTO_TIME_COARSE	5	SOUND_TIMBRE	71
DATA_ENTRY_COARSE	6	TIMBRE	71
VOLUME_COARSE	7	SOUND_RELEASE_TIME	72
BALANCE_COARSE	8	RELEASE_TIME	72
PAN_POSITION_COARSE	10	SOUND_ATTACK_TIME	73
EXPRESSION_COARSE	11	ATTACK_TIME	73
EFFECT_CONTROL_1_COARSE	12	SOUND_BRIGHTNESS	74
EFFECT_CONTROL_2_COARSE	13	BRIGHTNESS	74
SLIDER_1	16	SOUND_CONTROL_6	75
SLIDER_2	17	CONTROL_6	75
SLIDER_3	18	SOUND_CONTROL_7	76
SLIDER_4	19	CONTROL_7	76
BANK_SELECT_FINE	32	SOUND_CONTROL_8	77
MOD_WHEEL_FINE	33	CONTROL_8	77
BREATH_FINE	34	SOUND_CONTROL_9	78
FOOT_PEDAL_FINE	36	CONTROL_9	78
PORTAMENTO_TIME_FINE	37	SOUND_CONTROL_10	79
DATA_ENTRY_FINE	38	CONTROL_10	79
VOLUME_FINE	39	GENERAL_PURPOSE_BUTTON_1	80
BALANCE_FINE	40	GENERAL_BUTTON_1	80
PAN_POSITION_FINE	42	BUTTON_1	80
EXPRESSION_FINE	43	GENERAL_PURPOSE_BUTTON_2	81
EFFECT_CONTROL_1_FINE	44	GENERAL_BUTTON_2	81
EFFECT_CONTROL_2_FINE	45	BUTTON_2	81
HOLD_PEDAL	64	GENERAL_PURPOSE_BUTTON_3	82
HOLD	64	GENERAL_BUTTON_3	82
PORTAMENTO	65	BUTTON_3	82
SUSTENUTO_PEDAL	66	GENERAL_PURPOSE_BUTTON_4	83
SUSTENUTO	66	GENERAL_BUTTON_4	83
SOFT_PEDAL	67	BUTTON_4	83
SOFT	67	EFFECTS_LEVEL	91
LEGATO_PEDAL	68	EFFECTS	91
LEGATO	68	TREMULO_LEVEL	92

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TREMULO	92	REGISTERED_COARSE	100
CHORUS_LEVEL	93	REGISTERED_FINE	101
CHORUS	93	ALL_SOUND_OFF	120
CELESTE_LEVEL	94	ALL_CONTROLLERS_OFF	121
CELESTE	94	LOCAL_KEYBOARD	122
PHASER_LEVEL	95	ALL_NOTES_OFF	123
PHASER	95	OMNI_MODE_OFF	124
DATA_BUTTON_INCREMENT	96	OMNI_OFF	124
DATA_BUTTON_INC	96	OMNI_MODE_ON	125
BUTTON_INC	96	OMNI_ON	125
DATA_BUTTON_DECREMENT	97	MONO_OPERATION	126
DATA_BUTTON_DEC	97	MONO	126
BUTTON_DEC	97	POLY_OPERATION	127
NON_REGISTERED_COARSE	98	POLY	127
NON_REGISTERED_FINE	99		

6.4 Combined Controller Names

(index = coarse_controller_index * 128 + fine_controller_index)

BANK_SELECT	16383	BALANCE	1064
MOD_WHEEL	161	PAN_POSITION	1322
BREATH	290	EXPRESSION	1451
FOOT_PEDAL	548	EFFECT_CONTROL_1	1580
PORTAMENTO_TIME	677	EFFECT_CONTROL_2	1709
DATA_ENTRY	806	NON_REGISTERED	12770
VOLUME	935	REGISTERED	13028

6.5 Values for some controllers

ON	127
OFF	0
DEFAULT	64

6.6 Tempo Values

GRAVE	40	ANDANTINO	80
LARGO	45	MODERATO	95
LARGHETTO	50	ALLEGRETTO	110
LENTO	55	ALLEGRO	120
ADAGIO	60	VIVACE	145
ADAGIETTO	65	PRESTO	180
ANDANTE	70	PRETISSIMO	220

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7 XML Specification

Here is the XML specification of the *.sbxml* files used in *File/XML Export* and *File/XML Import*.

```
<?xml version="1.0"?>

<songs>

  <song>

    <song_name>Song Name</song_name>
    <numeric_duration_type>decimal or pulses</numeric_duration_type>

    <components>

      <component>

        <component_type>pattern or string</component_type>
        <component_name>Pattern or String Name</component_name>
        <string_value>a JFugue MusicString</string_value>

      </component>

    </components>

    <pattern_components>

      <pattern_component>

        <pattern_name>Pattern Name</pattern_name>
        <component_position>an integer value</component_position>
        <component_type>pattern or string</component_type>
        <component_name>Pattern or String Name</component_name>
        <anonymous_string>a JFugue MusicString</anonymous_string>

      </pattern_component>

    </pattern_components>

  </song>

</songs>
```