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Author: Jan de Kloe

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1 Introduction

MusicXML is a standard for a music encoding language which is being adopted primarily for interchange between computer applications. The interest for SCORE users is that other music software for engravers and sound production accept MusicXML as input.

After the success of SipXML which converts Finale/Dolet MusicXML to Score, the current program does the inverse, ie. it generates MusicXML from a selection of Score files.

The product runs under the Windows operating system.

Users of this program do not need a SCORE license to make conversion of SCORE produced music files.

Not all information which can be generated in a MusicXML file is obtainable automatically from SCORE music files. The converter offers features to conveniently add such information.

Generated output by the converter is in a subset of the MusicXML 2.0 standard.

2 The SIP philosophy

SIP is a collection of utilities for SCORE engravers of which the first tools became available in the early 1990's. New tools have constantly been added to the family, and all share a common approach and user interface.

SIP utilities are characterized by their intuitive approach and though well documented, users hardly ever need to consult user guides having seen them once. Originally intended for private use, it became evident from discussions on the forum and meetings with other engravers that there was a wider interest for at least some of these tools. Currently, SIP is used by SCORE engravers in North America, Europe, and Australia. More than 100 licenses have been sold.

The website www.dekloe.be extensively describes the SIP offering.

The license for SipScoreToXML includes a couple of free utilities such as SipAnlib for analysis of fonts and draw symbols, SipEdit, SipRenum, and SipResize for editing, SipThema for incipit extraction, SipValid for MUS file reconstruction, SipXlyr for lyrics extraction, SipFind for locating SCORE and Finale files, SipPMX for generating PMX output, and the structure validation programs SipClef and SipDur. SipRip is included to move bars across files.

SipStack is available to combine multi-file pages into one file for processing with SipScore2XML. Such pages may be beyond the size limitations of Score but the converter can handle them without practical restrictions.

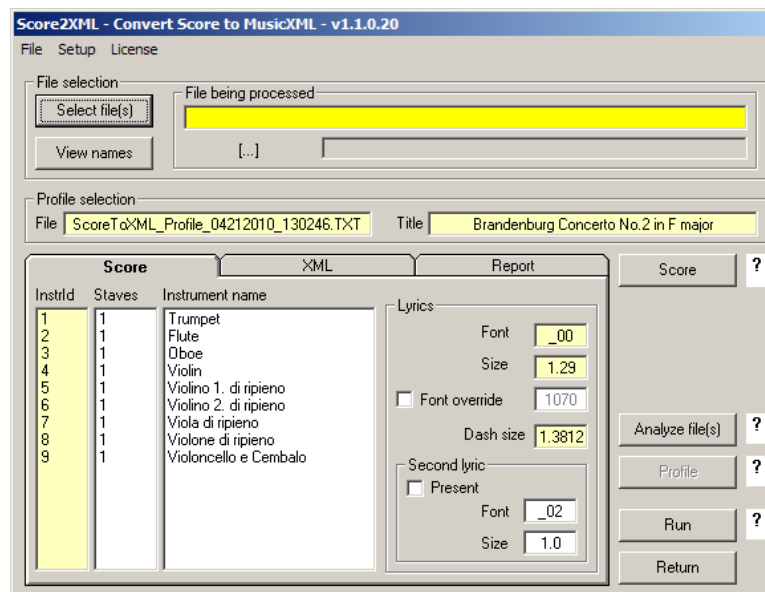
Not included are the licensed programs:

SipSib	conversion of Sibelius EPS files to SCORE
SipSplit	SCORE files part extraction
SipXref	cross reference listing of SCORE files
SipEPS01	post processing to create space around in-staff fingering
SipXML	conversion of Finale/Dolet generated MusicXML to Score
SipText	text editor for SCORE files with Cyrillic and kerning capabilities

Refer to the website for additional information.

3 Starting up SipScoreToXML

The Windows application is called from the main SIP panel. The user interface looks like this:



The input for the file which is being used throughout this description is the Project Gutenberg eBook of Johann Sebastian Bach's Brandenburg Concerto No. 2 in F Major, BWV 1047, which is downloadable from the internet. This file was converted to SCORE using SipXML2Score.¹ Single system SCORE files were generated, 24 in all (named BACH0001.MUS through BACH0024.MUS) and these files were barline aligned with the SCORE LJ command. No other action was taken on this source. The conversion input files and the conversion result are available on the website for qualification and comments.

The main panel shows the following parts:

3.1 Menu selection

File

Allows the user to exit with the **Exit** submenu.

Setup

Provides two submenus: **Midi** to communicate channel information to instruments and sound levels to dynamics and **Preamble** to maintain the XML file header.

License

Shows the current license and version information.

3.2 File selection

Here the user selects his SCORE music files. The area next to the selection button shows the file being processed. The way files are selected is standard through all SIP utilities and results in a 'names' file familiar to SCORE users. Note that filenames should have a structure which guarantees the order.

¹ A fix needed to be made in the violin part, measure 99, which has a stem direction error.

The contents of the names file can be viewed with a separate button. Although manual update of this file is possible, this is discouraged.

Progress of a conversion is shown in text (as shown in this panel by [...]) and by a progress bar.

File selection is easiest when a group of files is dragged from the Explorer and dropped on the 'Select file(s)' button. Note that the module SipOLE must be at least version 1.3 when files contain more than 32 staves.

Multi-file pages are not supported. Such files need to be combined into single files per page with the freeware utility SipStack. Assure that the order is 'bottom to top' and that 'One system' is set. While the resulting file may not be readable by Score because of its size, this does not limit the converter. SipStack minimum version is 1.6 is required.

3.3 Profile selection

Prior to a conversion, the user must create a profile. A profile keeps identification information and the information on instrument identifiers with their names because these are required in the generated MusicXML. While the user has full control over the instrument names, the converter will work without any user input.

To make life easier, the converter has an analysis phase to collect instrument identifiers with their names. All text items from the first page are presented in a list such that the title, composer and librettist can be selected. This information can also be typed.

The profile is kept in a file which can be recalled for a later conversion.

3.4 Option tabs

There are three tab panels for control of the conversion process for Score (input), XML (output), and the Report.

3.4.1 Score tab

This tab shows the instrument id's and the names as they result from an analysis and optionally the user's typed information.

The project settings for lyrics font/size and dash size are visualized as an aid memoire. These field cannot be changed here. Update those with the 'Set project options', tab Lyrics, and for the dash size tab Score to modify PREF.SCR.

As vocal music can have lyrics in different fonts/sizes, a second selection can be set here. The primary font may have an override such as shown above (though not activated).

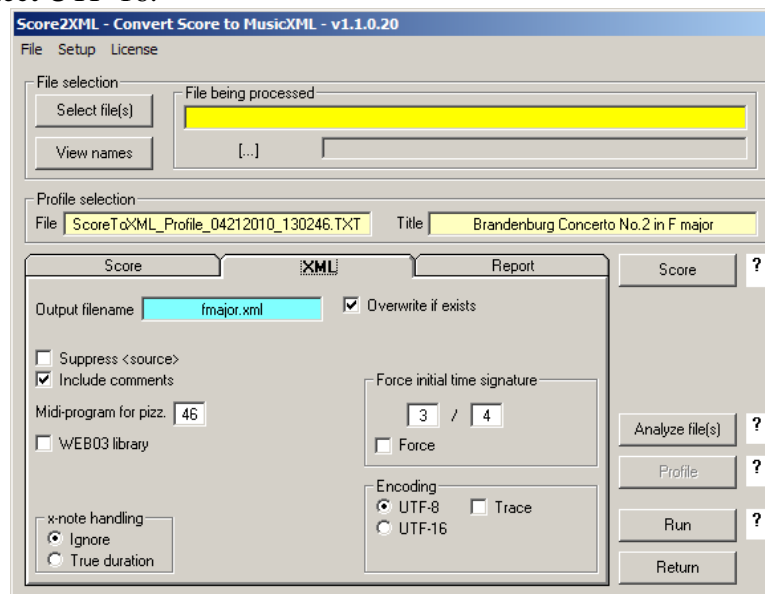
3.4.2 XML tab

By default the name of the output XML file is ScoreToXML.xml. The user can change this name to any valid filename. The path prefix is identical to the one of the selected input.

An option controls if the file may be overwritten. If not set and the file exist, the user is prompted for a yes/no decision.

Another option allows including comments to the output XML. It leaves traces for every note or rest with their item number, staff number, horizontal and vertical position. The item number and staff number are not from the original input as the converter first creates workfiles per instrument.

Other options are self-explanatory. Note that when the music has text with accents, you must select UTF-16.



3.4.3 Report tab

The following option is available:

- Suppress warnings
- Suppress progress reporting
- Suppress sound level errors

3.5 Action control buttons

The action buttons allow a call to SCORE and control the conversion process: Analyze file(s), Profile, Run, and Return. The question mark fields are hotspots which momentarily explain when a button is enabled/disabled when pointed to by the cursor. Tooltips explain which input is currently being selected.

3.5.1 Score

The first of the selected SCORE files is immediately visualized by this button. There is no path-length restriction as in DOS.

Subsequent SCORE files can only be viewed by the NX command when the path is 24 characters or shorter.

3.5.2 Analyze file(s)

This establishes the instrument identifiers used in the selected files, the names of these instruments when they are provided left of the staff belonging to them.

Note that all staves must have instrument id's. As SCORE is not capable of visualizing these, a quick and simple way to assign id's is with SipEdit (Staff) or with the SipRenum (Bar) utility. Both freeware utilities are integrated in SIP.

A table of text items is created from the first page to allow work number, title and creator(s) selection.

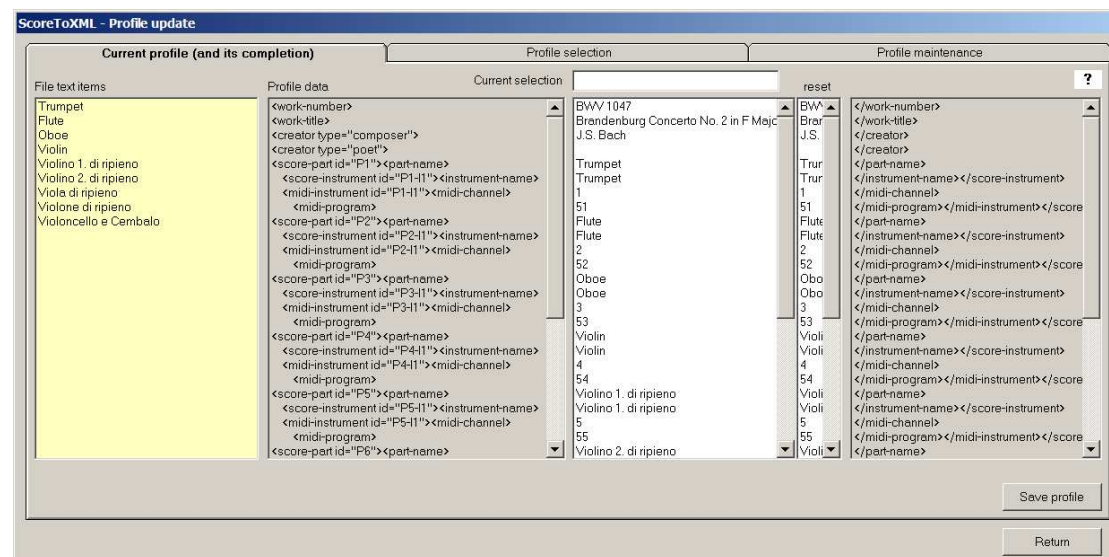
At the end of this analysis a summary report shows the selected instrument information per page and system, which allows a visual check for discrepancies in identifier to staff assignment.

3.5.3 Profile

Once the analysis has been done, a profile can be created or a previous profile can be selected.

A profile contains those MusicXML commands which are copied to the resulting output. While no specific knowledge of XML is required by the user, notions of some attributes will help to understand the details.

The panel which controls the profile also has a maintenance feature. The primary information is shown here:



3.5.3.1 Current profile (and its completion)

The yellow area shows the text items found on the first page. Only items with a positive Code16Par04 are included as to omit lyrics. Normally one would find here a work title, a composer name and a librettist name. These can be assigned to the white area as indicated by the MusicXML attributes in grey.

Update by hand is possible by selecting any white line. Selection in the wide white list assigns the selected text. Modify or delete a text by selection in the parallel narrow white list.

A profile is saved by a button. Saved profiles have a date and time stamp in the filename.

3.5.3.2 Profile selection

This tab panel shows all profiles previously saved in order, the most recent on top. Select a previous profile from this list.

3.5.3.3 Profile maintenance

Via this tab panel, profiles can be inspected, modified, and deleted. For inspection, detailed knowledge of MusicXML is a requirement. Modification is discouraged and provided primarily for the developer. Deletion is provided to eliminate profiles which are no longer useful.

3.5.4 Run

Execute a conversion with this button.

The conversion of the 24 sample files takes 17 seconds on modern equipment. Besides the generated MusicXML file, the utility provides a run report at completion. The report has identification information, progress information (if not suppressed by user option), and diagnostic messages. Messages can be of three categories:

- informational
- warnings
- errors

Errors indicate those situations where the converter found a non-convertible situation ie. a Code05 item with a Par3>Par6 or a Code01 with an invisible ledger line.

Warnings are given when there is a situation which could be handled by the converter taking certain assumptions.

The total duration and number of generated XML lines and messages are displayed at the end of the run report. An example of a report is given further down.

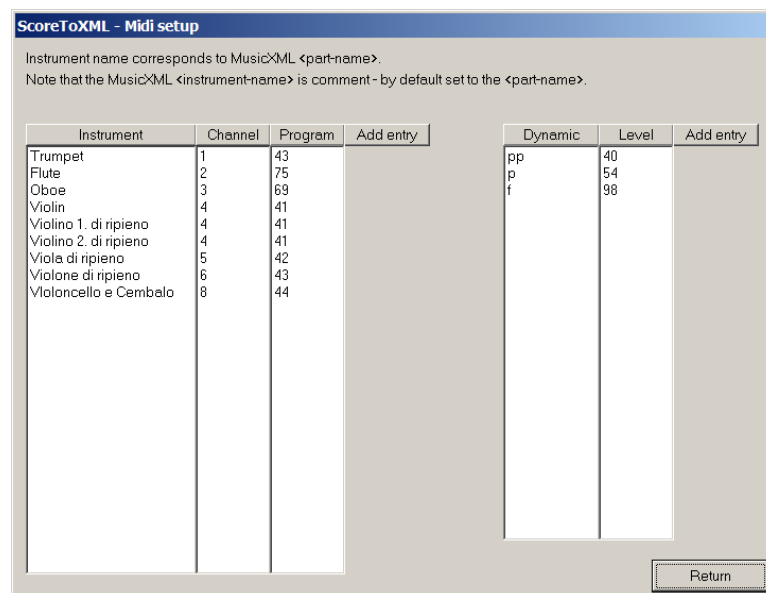
3.5.5 Return

This button brings you back to the main SIP panel.

4 Midi setup

SCORE music files do not contain the Midi information we would like to convey to the MusicXML file. This utility has an easy way to communicate this to MusicXML. As information on channels and sound levels is likely to be reused, this information is kept between sessions and in a standard working method in an engraving shop this only needs to be defined once.

The panel to setup Midi information looks like this:



Information can be added, updated, deleted, and sorted. The sort order for sound levels is always low to high.

The converter always assigns a Midi channel (starting from 1) and a Midi program (starting from 51) when one is not defined for an instrument.

5 Preamble setup

Every MusicXML file has header information which provides information on the level of the language and a few other details. These are of no concern to the user but it is necessary that they can be maintained and therefore are separately defined. This is the default delivered with the system:

```
<?xml version="1.0" standalone="no"?>
<!DOCTYPE score-partwise PUBLIC "-//Recordare//DTD MusicXML 0.6a Partwise//EN"
"//D:/Program Files/MusicXML/partwise.dtd">
```

Updates are downloadable, as will be the updated versions of the program itself.

6 Environment information

The main SIP module has the capability to define certain SCORE properties. These are necessary for the converter to recognize page numbers, bar numbers, lyrics, and fingering as such.

To recognize a lyrics dash as such, the converter consults the PREF.SCR file for its length. When that file is not accessible, or the dash size is not defined, it will assume a dash size.

7 Sample report

The following report is generated by the conversion of the sample batch. First is a run without the optional output:

```
ScoreToXML - v1.1.0.20 - 04-21-2010 - 13:26:28

Work number . . . . . BWV 1047
Work title . . . . . Brandenburg Concerto No. 2 in F Major
Composer . . . . . J.S. Bach
Number of XML lines . . . . . 115274
Duration in seconds . . . . . 16.48
Number of messages . . . . . 0
```

The same input/output but with the reporting options set:

```
ScoreToXML - v1.1.0.20 - 04-21-2010 - 13:26:28

Path to input file(s) . . . . C:\BWV1047\
Reading input file . . . . . BACH0001.MUS, created 7/2/2005 16:48:50
Reading input file . . . . . BACH0002.MUS, created 7/1/2005 13:03:31
Reading input file . . . . . BACH0003.MUS, created 7/1/2005 13:03:31
Reading input file . . . . . BACH0004.MUS, created 7/1/2005 13:03:31
Reading input file . . . . . BACH0005.MUS, created 7/1/2005 13:03:31
Reading input file . . . . . BACH0006.MUS, created 7/1/2005 13:03:31
Reading input file . . . . . BACH0007.MUS, created 7/1/2005 13:03:32
Reading input file . . . . . BACH0008.MUS, created 7/1/2005 13:03:32
Reading input file . . . . . BACH0009.MUS, created 7/1/2005 13:03:32
Reading input file . . . . . BACH0010.MUS, created 7/1/2005 13:03:32
Reading input file . . . . . BACH0011.MUS, created 7/1/2005 13:03:32
Reading input file . . . . . BACH0012.MUS, created 7/1/2005 13:03:32
Reading input file . . . . . BACH0013.MUS, created 7/1/2005 13:03:32
Reading input file . . . . . BACH0014.MUS, created 7/1/2005 13:03:32
Reading input file . . . . . BACH0015.MUS, created 7/1/2005 13:03:32
Reading input file . . . . . BACH0016.MUS, created 7/1/2005 13:03:32
Reading input file . . . . . BACH0017.MUS, created 7/1/2005 13:03:33
Reading input file . . . . . BACH0018.MUS, created 7/1/2005 13:03:33
Reading input file . . . . . BACH0019.MUS, created 7/1/2005 13:03:33
Reading input file . . . . . BACH0020.MUS, created 7/1/2005 13:03:33
Reading input file . . . . . BACH0021.MUS, created 7/1/2005 13:03:33
Reading input file . . . . . BACH0022.MUS, created 7/1/2005 13:03:33
Reading input file . . . . . BACH0023.MUS, created 7/1/2005 13:03:33
Reading input file . . . . . BACH0024.MUS, created 7/1/2005 13:03:33
Work number . . . . . BWV 1047
```

```

Work title . . . . . Brandenburg Concerto No. 2 in F Major
Composer . . . . . J.S. Bach
Workfile 1 created . . . . . SCORETOXML0001-0000.MUS, 1437 items - Trumpet
Workfile 2 created . . . . . SCORETOXML0002-0000.MUS, 2019 items - Flute
Workfile 3 created . . . . . SCORETOXML0003-0000.MUS, 1863 items - Oboe
Workfile 4 created . . . . . SCORETOXML0004-0000.MUS, 2140 items - Violin
Workfile 5 created . . . . . SCORETOXML0005-0000.MUS, 1399 items - Violino 1. di >>
Workfile 6 created . . . . . SCORETOXML0006-0000.MUS, 1204 items - Violino 2. di >>
Workfile 7 created . . . . . SCORETOXML0007-0000.MUS, 1266 items - Viola di ripieno
Workfile 8 created . . . . . SCORETOXML0008-0000.MUS, 1449 items - Violone di ripieno
Workfile 9 created . . . . . SCORETOXML0009-0000.MUS, 1720 items - Violoncello e >>
Processing workfile 1 . . . . . SCORETOXML0001-0000.MUS
Processing workfile 2 . . . . . SCORETOXML0002-0000.MUS
Processing workfile 3 . . . . . SCORETOXML0003-0000.MUS
Processing workfile 4 . . . . . SCORETOXML0004-0000.MUS
Processing workfile 5 . . . . . SCORETOXML0005-0000.MUS
Processing workfile 6 . . . . . SCORETOXML0006-0000.MUS
Processing workfile 7 . . . . . SCORETOXML0007-0000.MUS
Processing workfile 8 . . . . . SCORETOXML0008-0000.MUS
Processing workfile 9 . . . . . SCORETOXML0009-0000.MUS

```

Level	Instrument id	measure	Diagnostic
WARNING	2	0	No equal notes at tie ends. Assumed slur.
WARNING	4	0	No equal notes at tie ends. Assumed slur.
WARNING	4	0	No equal notes at tie ends. Assumed slur.
WARNING	4	0	No equal notes at tie ends. Assumed slur.
WARNING	4	0	No equal notes at tie ends. Assumed slur.
WARNING	5	0	No equal notes at tie ends. Assumed slur.
WARNING	5	0	No equal notes at tie ends. Assumed slur.
WARNING	5	0	No equal notes at tie ends. Assumed slur.
Number of XML lines			115274
Duration in seconds			16.75
Number of messages			8

(Lines ending with >> have been shortened for this user guide. The report also has a license information line which has been suppressed here).

As can be seen from this example, messages identify the location by instrument identifier and bar number. The bar number is the one computed by the converter which may not necessarily be the bar number in the SCORE engraving.

8 Conversion details

There are a few aspects of which the SCORE engraver needs to be aware when using this program:

- the converter assumes valid and aligned input;
- only standard symbols will be recognized;
- SCORE does not have a voice notion required for MusicXML and voices are assigned per bar based on an internal analysis;
- some SCORE item types or attributes cannot be converted.

In practice this means that certain assumptions must be made and that messages will result in situations that need special attention.

8.1 Valid and aligned input

The converter uses the Code01Par07 duration codes of notes and rests. These must therefore be correct. Parts in a system must be vertically aligned but since the LJ creates imperfect alignment, a narrow margin is applied by the converter. The reason for this alignment is that SCORE does not have barlines in parts other than the bottom staff of a system and the converter requires creating dummy barlines at the correct horizontal position in the upper parts.

For systems to be recognized as such, a system barline is significant. Absence of a system barline indicates a single staff instrument.

There is no restriction on the number of parts and parts may come in at any time. Best results are obtained when the first file of a selection has all parts with the instrument name in the left margin.

To distinguish between a tie and a slur, the converter will assume a tie when the Code05 item is between adjacent notes and has identical height for its ends and tied notes have the same pitch. If not, a slur is assumed.

8.2 Standard symbols

While SCORE offers great flexibility in the definition and use of symbols, customization of library members makes conversion unreliable. The converter therefore uses only part of the total set of symbols (0 through 259) and assumes the installation defaults.

The converter does not access the SCORE library itself.

8.3 The voice attribute

Modern engraving software products have a voice notion and so does MusicXML. However, in SCORE this does not exist and the voice number will by default be set to 1. When the converter encounters input which clearly has more than one voice in a measure, it will assign additional voices after an analysis of the whole bar. The following will create incorrect XML as the lower voice is incomplete (unless there is an invisible rest on the second beat below the chord):



8.4 Non-convertible items and attributes

8.4.1 Non-convertible items

SCORE Code11 (user library symbols) and Code15 (imported Postscript files) are items that cannot be converted.

8.4.2 Non-convertible attributes

SCORE has a multitude of attributes for which there is no equivalent in MusicXML. Significant situations will be signaled while those of a purely graphical nature such as accidental displacement, barline extensions, shortened stems, or invisible ledger lines are tacitly bypassed.

It should be noted that MusicXML does not have the notion of invisible rest. When encountered, these are converted as if they were visible. A message is given in this case.

Note that bar numbers are not significant and ignored. The converter assigns bar numbers to the generated result starting from 1.

Page numbers are ignored likewise as there is no corresponding MusicXML entity.

8.4.3 Item alignment

Since most MusicXML attributes are connected to notes or rests, the converter will attempt to assign dynamics, hairpins, text, and lyrics to them based on horizontal proximity.

8.4.4 Text items

MusicXML 1.0 is particularly weak on text attributes. There is no way to provide a font name attribute to text. The converter only assigns a font-style of normal or italic while the font-weight can be normal or bold based on the basic 35 fonts. Font-family and font-size are not set.

For fonts other than the basic 35, the converter ignores font attributes. Font 99 is ignored.

Code09 items consisting of letters are converted to text items, ie. 'a tempo'.

SCORE font files (.PSC) are not accessed by the converter.

MusicXML 2.0 has the attributes for exact placement of text attributes but these are not generated by SipScore2XML.

9 Product plan

Initially, the converter will process traditional notation on 5-line staff notation while single line percussion is supported. A future version will support tablature conversion. The character set of MusicXML as generated by this program is currently restricted to UTF-8. Characters which cannot be expressed in this standard will be replaced by '+' and receive a warning message. UTF-16 is supported for Latin script. Other scripts such as Cyrillic and Hebrew are not yet supported.

The current version does not support guitar grids, harp pedal settings and harmonica buttons. Requirements for these influence the product plan.

An equivalence file is planned for non-standard symbols. This file will be user maintainable in the same way as the Midi setup.

Also planned is layout information (end-of-page) which is currently not generated.

The first measure in a staff gets the <print new-system="yes"/>.

Text items of which a Code09Par05 of 3nnn exist will be supported in a future version in which case the SCORE file CODE9.DAT must reside on the system.

10 License plan

One license may be installed on a single system. There is a one time license fee.

Initial delivery is on CD and it contains a unique license number. Upgrades of the converter can be downloaded without charge. Downloads will only work for users who have installed the initial delivery.

Licensed users may present feature enhancement suggestions and problem reports via email. All reasonable requests will be honored and all problems will be fixed on a best effort basis.

11 Update history

Version	Date	Remark
1.00	July 14, 2005	Experimental version
2.00	January 31, 2006	First distribution version
3.00	April 21, 2010	Major update, new illustrations reflecting build 20