StaffKlavar1 User Guide and Reference

[For complete examples of this and other notations, see the Musical Examples page]

Introduction

In my blog posts, I discussed some reasons for using a non-standard notation for beginning music. This document describes how you can create a simple music score in custom notation on a Windows or Mac computer without special score-notation software, but just using a spreadsheet, word processor, and a free custom font I designed called **StaffKlavar1**. Using these techniques, you can design your own music notation and use your own custom font.

The form of staff used for this music in this example is similar to KlavarSkribo. It "exactly" matches the actual piano keyboard.

First of all, the staff lines run up and down the page, with the notes spread across, as on the piano keyboard. [Note: this is the way the staff prints, but if you wish to read it horizontally when playing, simply turn the page sideways.]

Secondly, it has 12 note places for each octave, so black keys have a staff place of their own and don't need to share the same positions as a white key. Even the colors match: the staff has a "black" line for each black key and a "white" space for each white note (almost) in the repeating 12-note pattern: wbwbwwbwbwbw, 7 white and 5 black. I say "almost" because the EF and BC spaces are in total are only 1-1/2 note-widths wide; these notes touch a line on one side with a 1/2 space on the other.

This pattern corresponds to the notes C d D e E F g G a A b B, then starts over with C, etc. (where lower-case letters represent flats--black keys). A chromatic scale of all 12 notes would have notes starting every 1/2 note width, as in the following example, produced directly in this document with a word processor and the StaffKlavar1 font:
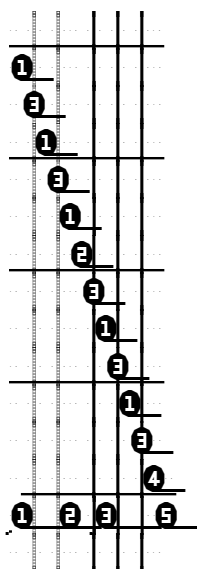
Just as pitch is indicated by position in the horizontal direction, timing is indicated by position in the vertical direction. Timing increments are indicated by bar lines. In version 1, bar lines can be added with the underline feature in the word processor. You can also add variety of line symbols in place of noteheads or staff lines.

Each "row" down the staff corresponds to the duration of the shortest note in the piece (or section).   A note symbol is place at the count for the start of the note. Each note (in a part) sounds until the next note in that part appears, which is the normal case. When the note is supposed to be held while another note starts, I show a quotation mark (") for the held note on the line where the new note starts; when the note stops before the next note starts, I show a percent (%) for a rest, or a dot (.) for staccato.

Left and right hand parts are distinguished on the score by stems: RH right, LH left.

Since you actually play the notes by striking them with a particular finger, I put finger numbers inside the note heads.

Part 1: Creating Scores with StaffKlavar1

The Font
A font is a file containing the bit-map or drawing instructions to make the character you see on the computer screen or printer paper corresponding to the keys you press on the computer keyboard. Normally the letter, digit, and punctuation keys are converted into the symbols we associate with those letters, but different fonts use different styles, as in the following example:

But the font author could substitute any other graphics, called *glyphs*, for the same characters, as in the Mac WEBDINGS font for these same letters:

This is an example of a "symbol" font, in which the keyboard characters do not represent themselves but are assigned to arbitrary symbols for some other purpose. The advantage of symbol fonts is that graphic symbols can be "typed" into an ordinary text document as strings of characters. The limitation is that the symbols must be entered in rows, as text. Vertical alignment of symbols is also possible if the font uses uniform, or at least predictable, character width.
StaffKlavar1 is a symbol font that replaces certain characters with symbols for notes and staff lines, for example:

Y   4   {   ] become ⑤   ❹ |

The font is designed with staff lines one unit wide and noteheads 7 units wide. But a 3-unit space characters is included to allow notes to be aligned at any 4-using boundary, to match the conventional alignment of notes on lines or spaces of the staff.
So combining the characters in the proper order, we can create a staff with notes:

The principal StaffKlavar symbols are given in the following table:

Char	Glyph	Description
6 7 8 9 0	❺ ❹ ❸ ❷ ❶	digits: LH solid (black) notes, left stems
1 2 3 4 5	❶ ❷ ❸ ❹ ❺	digits: RH solid (black) notes, left stems
~ ` p q	● ● ○ ○	noteheads without finger numbers
Y U I O P	⑤ ④ ③ ② ①	capitals (keys below digits) LH hollow (white) notes, left stems
Q W E R T	① ② ③ ④ ⑤	capitals (keys below digits): RH hollow (white) notes, right stems
[ ]	‖	brackets: gray/black solid staff lines (no note on line)
{ }	⠂	braces: gray/black partial staff lines (offset 4 pixels, appears above and below following note "on" the line)
|		vertical bar: 1-pixel space for "no line" between EF and BC
,		comma: 3-pixel half-space
"	"	quote: indicates continuation of current note when new note is added
.	•	period (dot): indicates staccato: immediate release of note after striking
%	⁒	percent: rest; stop sounding note before next note is sounded.
\ /	— __	diagonals: left and right stem extension
-	–	hyphen: dashed line for time division
_	—	underscore: solid line for bar line or time division
=	=	equal: double bar line

Installing the Font
Before you can use the StaffKlavar font, you must install it on your computer. To do this:
1. Go to the website http://fontstruct.fontshop.com/
2. Search for and download the font **StaffKlavar1**
3. Follow the font installation instructions for your computer in the FAQ, Technical Questions at
http://fontstruct.fontshop.com/faq/technical_questions/
how_do_i_install_fonts_made_with_fontstruct

The font installs as a True-Type font, which works on Windows and Mac computers.

Creating "Staff Paper"

To create a Klavar staff for a chromatic octave, type the character sequence shown below; when displayed in StaffKlavar1 font, the brackets will become the staff lines and

the comma becomes a fractional space. Repeat the pattern for as many octaves as you need.

```
NOTES: C d D e E F g G a A b B C
STAFF: |,{,[,{,[,|,},],},],},],|,
FONT :   ┊ ┊   | | |
```

There are four different line characters: { and [draw gray lines, which I use for d and e, and } and] draw black lines, for g a b. The brace characters { and } draw just the top and bottom portions of a line that a note is "on". The bracket characters [and] draw a full line that will not have a note. The bar | represents the "no line" between BC or EF. The comma generates the spaces between the lines. Both full and partial lines characters are present in the default pattern, but when you enter a note, it will erase the one you don't need.

To use proportional space timing, you need to determine the shortest note length in your song. If you're doing beginner music, this will probably be 1/8 note. So in 4/4 time, with any 1/8 notes in the song, you would have 8 lines for *each* measure, even measures that have no 1/8 notes. If only an occasional measure has shorter notes, you might think you're "wasting space" on the measures without those notes, and want to use fewer rows for the measures that don't have really short notes. But my philosophy is, the reason for using a non-standard notation in the first place is to avoid having to expend excessive memory and mental effort to "translate" the notation into what you actually do to play the piece. So the fewer inconsistencies, the better; paper is cheaper than lessons!

Adding the notes

In StaffKlavar, a notehead is 7 pixels wide and a line is one. The comma character represents a 3-pixel space, so the sequence: *comma-bracket-comma* is seven pixels wide, the width of a notehead.

To add a note, you simply replace the "line" symbol at that position, and the surrounding commas, with the symbol for the desired notehead. A digit next to a bracket symbol will place the notehead in the space *beside* the line; a digit right of a brace places the notehead *on* the corresponding line; a digit next to a bar places the notehead next to the corresponding blank half-space; one of those characters must be on each side of the notehead symbol.

I have given the left-hand fingers different numbers from the right-hand so I get different stem directions automatically. LH fingers are numbered, pinky to thumb, 6 7 8 9 0. RH fingers retain their standard numbers, thumb to pinky: 1 2 3 4 5. This matches the order on the computer keyboard number row--if you cross your hands! [It also makes some mathematical sense, if you count down from your right pinky, right to left, modulo 10!]

Although it may be a tad tedious, it is possible to enter a score directly in a word processor. First, create the staff pattern in normal font. Then, find the required note positions and replace the corresponding comma-bracket-comma sequence with the desired notehead character. After entering all the notes, change the font for the entire score, and viola!, you have a printable score. Add bar lines with the underscore feature of your Word Processor.

You can also add bar lines and sub-bar timing divisions with the "bar" characters - _ =; these will be converted to "bars" the appropriate style and position by the font. Note that bar lines entered this way consume a whole vertical note position, so you must be careful to maintain the timing proportionality.

Finally, you can also change font size and add column and page breaks to align the music on the page the way you wish.

Creating a score with a spreadsheet

I wanted to be able to create the score in a spreadsheet, similar to using Piano Roll notation.

To create the staff paper with a spreadsheet:,
1. First, shade the columns in the pattern of the keys. (Note: the shading is just for your convenience; it will not appear in the final music. You may also want to add a row at the top with note names, which you can remove later.)

2. Next, fill in the staff characters in each row in the following pattern. Note that you do not need to type the commas; they will be added when you save the sheet in .csv format.   Once you do one octave, you can use copy and paste to make enough columns and rows for the whole song.

C	d	D	e	E	F	g	G	a	A	b	B	C
{	[	{	[	|	}	]	}	]	}	]	|	
{	[	{	[	|	}	]	}	]	}	]	|	
{	[	{	[	|	}	]	}	]	}	]	|	
{	[	{	[	|	}	]	}	]	}	]	|	
{	[	{	[	|	}	]	}	]	}	]	|	
{	[	{	[	|	}	]	}	]	}	]	|	
{	[	{	[	|	}	]	}	]	}	]	|	
{	[	{	[	|	}	]	}	]	}	]	|	
{	[	{	[	|	}	]	}	]	}	]	|	

Enter the notes by replacing the bracket character in the corresponding column and row with the notehead symbol.

Recall that the note symbol must also replace the commas surrounding it, which represent the space between the lines. This must be done with a word processor after the sheet is saved. To facilitate removing the commas with a global find-and-replace command, you may insert an otherwise unused character, such as semicolon (;) around the note characters.

For example, the first few notes of Twinkle Twinkle Little Star, C C G G A A G, might look like this:

C	d	D	e	E	F	g	G	a	A	b	B	C
{	[	{	[	|	}	]		]	}	]	|	
;1;	[	{	[	|	}	]	}	]	}	]	|	
;1;	[	{	[	|	}	]	}	]	}	]	|	
{	[	{	[	|	}	]	;4;	]	}	]	|	
{	[	{	[	|	}	]	;4;	]	}	]	|	
{	[	{	[	|	}	]	}	]	;5;	]	|	
{	[	{	[	|	}	]	}	]	;5;	]	|	
{	[	{	[	|	}	]	;4;	]	}	]	|	
{	[	{	[	|	}	]		]	}	]	|	

3. After entering all the notes, save the sheet in comma-separated-value format. The Twinkle example would look like this:

```
,,C,d,D,e,E,F,g,G,a,A,b,B,C
,|,{,[,{,[,|,},],},],},],|
,|,,;1;,,[,{,[,|,},],},],},],|
,|,,;1;,,[,{,[,|,},],},],},],|
,|,{,[,{,[,|,},],,;4;,,],},],|
,|,{,[,{,[,|,},],,;4;,,],},],|
,|,{,[,{,[,|,},],},],,;5;,,],|
,|,{,[,{,[,|,},],},],,;5;,,],|
,|,{,[,{,[,|,},],,;4;,,],},],|
,|,{,[,{,[,|,},],},],},],|,{
```

4. Now, you must remove extraneous lines and the extra commas:
• Open .csv file in a text editor or word processor
• Use a monospace character font such as Courier New;

- remove extraneous lines, that is, anything that isn't music
- Use the find-replace feature to replace the combinations comma-semicolon (,:) and semicolon comma (:,) with null. All note characters (digits, etc) should now have staff characters (brace, bracket, or bar) on both sides, as in the following example:

```
,|,{,[,{,[,|,},],},],},],|
,|1[,{,[,|,},],},],},],|
,|1[,{,[,|,},],},],},],|
,|,{,[,{,[,|,},]4],},],|
,|,{,[,{,[,|,},]4],},],|
,|,{,[,{,[,|,},],},]5],|
,|,{,[,{,[,|,},],},]5],|
,|,{,[,{,[,|,},]4],},],|
,|,{,[,{,[,|,},],},],},],|
```

5. Finally, change the font to StaffKalvar1, and the music appears.
6. You can now add bar lines using the underline function of your word processor.
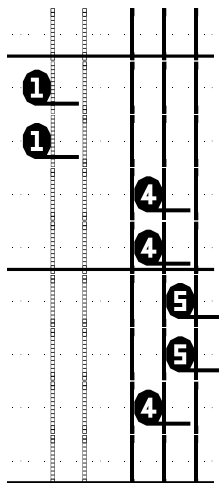
7. The score is now ready to print. You can use your word processor to scale the score to fit the paper, break the score into multiple columns or pages, etc.

8. You can also convert the file to .pdf format to email or post to the internet. If your word processor does not save files in .pdf format, you can download a free program, such PDFCreator [http://sourceforge.net/projects/pdfcreator/] to do this.

Part 2: Creating the StaffKlavar1 Glyphs with FontStruct

To create the actual note and staff line symbols, I used a free on-line font development system called FontStruct, at http://fontstruct.fontshop.com. This system generates True-Type fonts that you can allow to be downloaded by anyone for use on Windows or Mac computers.

The figure above is the working screen for FontStruct. It illustrates the glyph I've drawn for the character "E", which represents a hollow notehead with right-extending stem and finger number 3.

In FontStruct, glyphs are constructed on a grid by dragging tiles from the palette on the left to the squares in the drawing area. The tiles consist of squares with various geometric shapes shaded within. By using the appropriate combination of shapes, you can approximate smooth curves and other patterns as shown in the examples. FontStruct then processes these tile patterns and turns them into True-Type fonts.

The blue and green character boundaries in the example determine that the character is 7 squares wide. But the stem actually extends farther to the right, into the adjacent character position; it is also possible to extend to the left, or below the print line, depending on the glyph desired.

The grayed-out characters to the left and right of this note are the "previous" and "next" character in the alphabet. Here, the "D" symbol is a hollow notehead with "gray" line segments extending from the top and bottom of the note. The "F" symbol is a notehead

filled with a dot pattern intended to represent a "gray" note. [Some of the characters in the actual font were experimental attempts that I no longer use in my scores.]

The "Advanced" > "View" pulldown windows indicate options that must be selected to see all the guides and neighboring characters. For notehead fonts, the explicit width guide is essential because I frequently need to extend the character outside the boundaries.
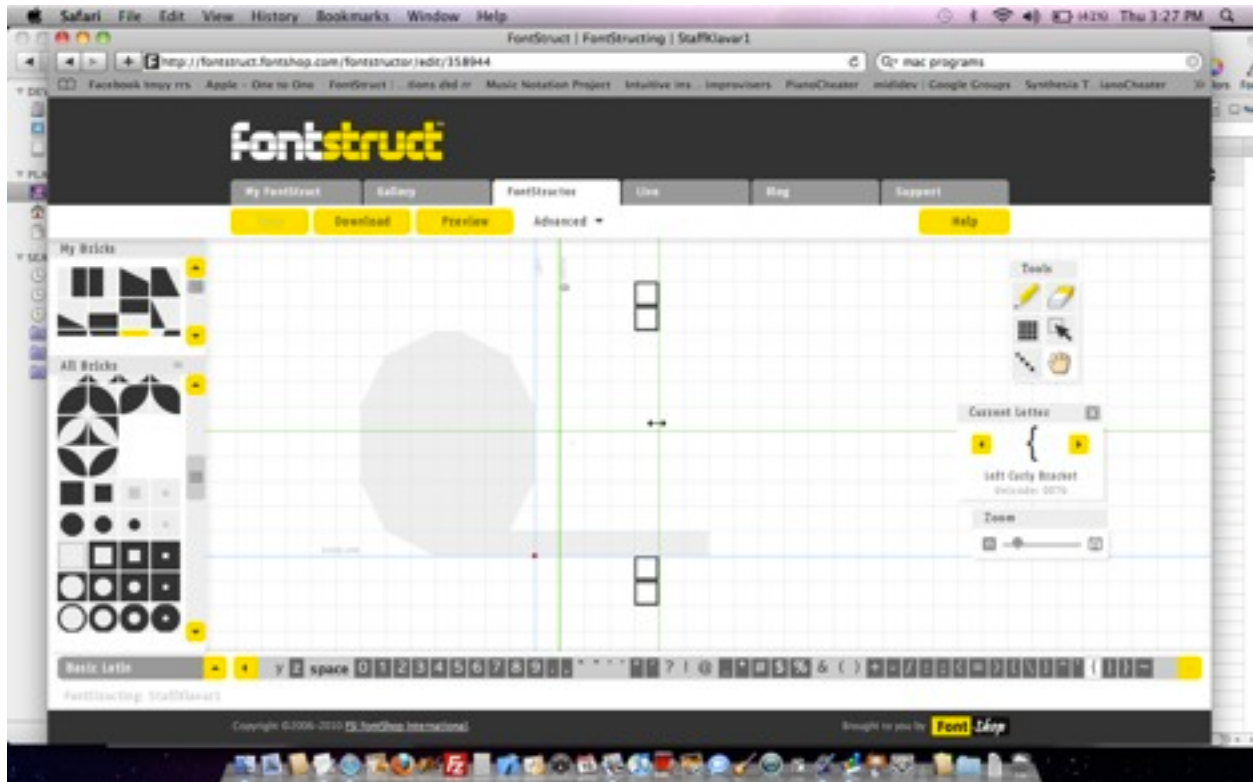
The next example is the glyph for the left brace character " { ". This represents the uncovered parts of a staff line that a note will be placed "on". The next character in the text is expected to be a notehead character. [It would be similar to the previous character, GraveAccent (`), displayed in gray in the workspace.] Note that the width of the { character is one square, but the "inked" tiles appear 4 squares to the right of the right edge of the character, well into the position of the next character. The next character would be a notehead, 7 squares wide, starting flush with the right side of the brace character, so the line segments would appear above and below the center of the notehead.

This staff line is intended to be "gray". [As in Klavar, I use "gray" lined fore Db and Eb and "black" lines for Gb Ab Bb to make the two groups visually distinct. (In practice, it's difficult for the eye to distinguish the group of two from the group of three because there is only a 1/2 note width difference in spacing between the two groups.) To get the "gray" effect, I used a tile which has "ink" only around the outline of the tile. (In the tile palette, you can also see some of the tiles with curved boundaries available in FontStruct; these can be used to smooth corners of symbols.)

Designing a new font with FontStruct is as easy as designing a bit-map font, but the final quality is much superior because of the resolution of tile shapes. The FontStruct system will convert the tile representation to the True-Type representation, which can be scaled to any font size without distortion or pixelation.

Part 3 Further Development

This effort is a work in progress. It is part of an ongoing effort to make music easier to learn, play, and sing. And to make improved music notation accessible to people without the patience to wait for commercial offerings that support alternative notations or the skills to create their own software.

 I offer this early version, not with the expectation that others will use it as-is [there are more complete KlavarSkribo editors already available] , but to illustrate some techniques that may be useful to others developing their own notations. I'd appreciate comments, suggestions, and leads to other work toward the same ultimate goal.

In the meantime, I expect to be making improvements to the font.   My immediate priority is to simplify the music entry and editing process. For example, Converting from PianoRoll to StaffKlavar is a bit tedious, but I've got some ideas for changing the font to make it simpler.

Long term, my focus on alternative notations for elementary music that would be encountered by beginning-intermediate piano students.
I'm especially interested on exposing musical structure: form, rhythm, melody, and harmony, and relating that structure to the structure of the instrument, in this case, the piano.

I'm not really interested at this point in creating scores of complex music for performance by professional musicians--there are already some fine programs for that.

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