title : ConTExT User Modules
subtitle : LilyPond Bridge (Music Typesetting)
author : Christopher Creutzig, H. Ramm et al.
date : March 11, 2010
This module serves to include LilyPond music directly in the ConTExt source, just as METAPOST code can be.

It is supposed to work only with LilyPond’s stable version 2.12 and ConTExt MkIV i.e. LuaTeX.

**Complete list of options:**

<table>
<thead>
<tr>
<th>option</th>
<th>default</th>
<th>comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>staffsize</td>
<td>14</td>
<td>in pt</td>
</tr>
<tr>
<td>indent</td>
<td>0pt</td>
<td>first line indent</td>
</tr>
<tr>
<td>time</td>
<td>yes</td>
<td>count time? (i.e. show time signature, set bars, split line)</td>
</tr>
<tr>
<td>clef</td>
<td>yes</td>
<td>show clef?</td>
</tr>
<tr>
<td>linewidth</td>
<td>\localhsize</td>
<td></td>
</tr>
<tr>
<td>between systems space</td>
<td>54pt</td>
<td>space between systems</td>
</tr>
<tr>
<td>height</td>
<td>\textheight</td>
<td></td>
</tr>
<tr>
<td>align</td>
<td>?</td>
<td>default depends on fragment=...</td>
</tr>
<tr>
<td>fragment</td>
<td>no</td>
<td>whole staff line or only snippet?</td>
</tr>
<tr>
<td>barnumbers</td>
<td>no</td>
<td>show numbers of measures?</td>
</tr>
<tr>
<td>showempty</td>
<td>no</td>
<td>drop empty staves?</td>
</tr>
<tr>
<td>seriffont</td>
<td>'TeX Gyre Schola'</td>
<td>font for e.g. lyrics</td>
</tr>
<tr>
<td>sansfont</td>
<td>'LMSans10'</td>
<td>font for e.g. chords</td>
</tr>
<tr>
<td>monofont</td>
<td>'LMTypewriter10'</td>
<td>normally not used</td>
</tr>
<tr>
<td>tmpdir</td>
<td>./lilytemp</td>
<td>directory for temporary files</td>
</tr>
<tr>
<td>imgdir</td>
<td>./lilypdfs</td>
<td>directory for image files (note PDFs)</td>
</tr>
</tbody>
</table>

**Todo list**

- Proper support for multipage results.
- Set LilyPond page size to remaining page space.
- Place instrument names in margin.
- Work with existing PDFs on systems where LilyPond isn’t installed.

**Commented Source**

As usual, we use a prefix for buffers, `\getparameters` etc.:

1. `\writestatus{loading}{LilyPond module}
2. `\startmodule[lilypond]
3. `\unprotect
4. `\definesystemvariable{lily}

Define the text snippets to be placed around fragments. Since LilyPond uses similar syntax to TeX, we must do some catcode fiddling.

5. `\bgroup
6. `\catcode`\=/\@@escape
   `/\catcode`\=/\@@other
   `/\catcode`\/=\@@other
   `/\catcode`\=/\@@begingroup
   `/\catcode`\=/\@@endgroup
   `/\catcode`\{/\@@other
LilyPond Bridge (Music Typesetting)

```
7 /gdef/lily!fragmentprefix
   <string "J
   /string "J
   {/string "J
     % ly snippet contents follows:/string "J
   >

8 /gdef/lily!fragmentsuffix
   /string "J
   % end ly snippet:/string "J
 }/string "J

9 /gdef/lily!prefix
   <string "J
   /string "J
   #((ly:set-option (quote no-point-and-click))/string "J
   #((ly:set-option (quote delete-intermediate-files))/string "J
   /string "J
   \version "2.12.0"/string "J
   #(define version-seen? #t)/string "J
   \layout {/string "J
    /iflily!showempty/else
      % drop empty staves:/string "J
   /context { \RemoveEmptyStaffContext } % MUST come first:/string "J
   /context { \Score \override VerticalAxisGroup \#remove-first = ##t
    )/string "J
   /if
   /string "J
    /unless/iflily!time
      % switch off time signature (i.e. only one line, no bars):/string "J
      ragged-last = ##t/string "J
   /context { \Score timing = ##f /string "J
   /context { \Staff \remove "Time_signature_engraver" /string "J
    /string "J
   /if
   /unless/iflily!barnumbers
     % switch off bar numbers:/string "J
   /context { \Score \remove "Bar_number_engraver" /string "J
   /if
   /string "J
    /unless/iflily!clef
      % switch off clef sign:/string "J
   /context { \Staff \remove "Clef_engraver" /string "J
   /if
   /string "J
    #define fonts
    (make-pango-font-tree
     @lilyseriffont /space
     @lilysansfont /space
     @lilymonofont /space
```
Here, we define our parameters:

\newdimen\lily!linewidth
\newdimen\lily!vsize
\newdimen\lily!indent
\newdimen\lily!betweensystemspace
\newif\iflily!showempty
\newif\iflily!align
\newif\iflily!clef
\newif\iflily!time
\newif\iflily!barnumbers

Again, as usual, there is a \setuplilypond command that accepts the same parameters as \lilypond and \startlilypond do in their optional argument.

\def\setuplilypond
{\bgroup
  \catcode`\#=\@@other
  \dosingleempty\dosetuplilypond}

\def\dosetuplilypond[#1]\
{\egroup
  \getparameters[??lily][#1]}

We set the following defaults:

\setuplilypond
  \staffsize=20,\n  indent=0pt,\n  betweensystemspace=54pt,
LilyPond Bridge (Music Typesetting)

\begin{verbatim}
time=\yes, 
clef=\yes, 
align=\no,  \%
\quad default depends on fragment=\ldots 
\text{fragment}\no, 
\text{barnumbers}\no, 
\text{showempty}\no, 
\text{seriffont}=\TeX\ Gyre\ Schola", \%
\quad LilyPond\ default\ font 
\text{sansfont}=\LMSans10", 
\text{monofont}=\LMTypewriter10", 
\text{tmpdir}=\{./lilytemp\}, 
\text{imgdir}=\{./lilypdfs\}]
\end{verbatim}

If you want to know which fonts of your system LilyPond can see with which names, try \texttt{lilypond -dshow-available-fonts any}. (The 3rd parameter is necessary, but can be anything.)

There are a lot of restrictions, e.g. no fonts from the \TeX tree (don’t know why), only one face per font file etc.

Check if temporary and image directories exist and create them if not:

\begin{verbatim}
16 \def\tmpdir{\@@lilytmpdir} \% \texttt{for} intermediate files 
\def\imgdir{\@@lilyimgdir} \% \texttt{for} music PDFs

17 \startluacode
   \ifnot \lfs.isdir("\tmpdir") \then
      \logs.report("LilyPond Warn ", "Temporary directory not found, trying 
to make \texttt{\tmpdir}\")
      \lfs.mkdir("\tmpdir")
   \end
   \ifnot \lfs.isdir("\imgdir") \then
      \logs.report("LilyPond Warn ", "Image directory not found, trying to 
make \texttt{\imgdir}\")
      \lfs.mkdir("\imgdir")
   \end
\stopluacode
\end{verbatim}

\texttt{\startlilypond} is a multistage implementation, because end-of-line characters must be treated specially in the \texttt{\startlilypond \ldots \stopleypond} range.

\begin{verbatim}
18 \def\startlilypond
   {\bgroup
      \catcode`\#=\@@other 
      \dosingleempty\dostartlilypond}

19 \def\dostartlilypond[#1]\%
   {\obeylines 
      \dodostartlilypond[#1]}

20 \long\def\dodostartlilypond[#1]#2\stopleypond
   {\egroup 
      \bgroup

The default of the \texttt{linewidth} parameter is the local \texttt{\hsize}.
The default of \texttt{align} depends on whether we typeset a fragment:

We are using a counter to keep the different LilyPond pieces separate. This allows to typeset them only once, during the first run.

\textbf{TODO:} This won’t work any longer once we pass the remaining vertical space to LilyPond.

\textbf{TODO:} Option ‘packed’

In Lua\TeX\ buffers are kept in memory in contrast to older flavours of \TeX\ where they’re written to a file automatically. We have to require writing to a file explicitly with \texttt{savebuffer}.

Generating a PDF directly previously created always a whole page, so we generate EPS first. In recent versions of LilyPond that gets converted to PDF immediately, but we check for that.
It would be nice, if \texttt{-delete-intermediate-files} would delete all useless intermediate files. It would be even better, if \texttt{mtxrun} wouldn’t declare non-existing files as “unchanged”. (Is that fixed now?)

Remember: More possible options in \texttt{lily.scm}.

```latex
\begin{verbatim}
\texttt{os.execute('mtxrun --ifchanged="\lily!tmpfilename" --exec bin:lilypond
 -backend=eps --no-gs load-fonts -dinclude eps-fonts
 -o"\tmpdir/\lily!filename "\lily!tmpfilename")}
if not lfs.isfile(\tmpdir/\lily!filename.pdf) then
  \texttt{os.execute('mtxrun --ifchanged="\tmpdir/\lily!filename.\eps"
  --exec bin:pstopdf "\tmpdir/\lily!filename.\eps"')}
end
\end{verbatim}
```

At least on Windows, Lua’s \texttt{os.rename} won’t overwrite existing files, so we need to remove them before.

```latex
\begin{verbatim}
\texttt{if lfs.isfile('\lily!img') and lfs.isfile(\tmpdir/\lily!filename.pdf) then}
  \texttt{os.remove('\lily!img')}
end
\texttt{os.rename(\tmpdir/\lily!filename.pdf, 'lily!img')}
\end{verbatim}
```

\texttt{STOPLUACODE}

\texttt{TODO: Get the relevant dimension directly from LilyPond, to place the instrument name into the left margin for short snippets as well. (Is that possible at all?)}

If we are not in the middle of some text, we have to check whether LilyPond created an image that is wider than requested: It places the instrument names in the left margin.

```latex
\begin{verbatim}
\ifvmode
  \getfiguredimensions[\lily!img]%
  \leavevmode
  \!!dimenb\figurewidth
  \ifdim\!!dimenb>\localhsize
    \!!dimena=\localhsize
    \advance\!!dimena-\!!dimenb
    \noindent\hskip\!!dimena
  \fi
  \fi
  \externalfigure[\lily!img]%
\endgroup
\fi
\end{verbatim}
```

For short snippets, we define an inline alternative to our start/stop pair:

```latex
\begin{verbatim}
\def\lilypond{"\dosingleempty\dolilypond}
\def\dolilypond[#1][#2{"\startlilypond[#1][#2]\stoplilypond}
\end{verbatim}
```

\texttt{STOPMODULE}

\texttt{PROTECT \doifnotmode{demo}{\endinput}}

End of file.

Here follows a sample. (\texttt{context t-lilypond --mode=demo})
\starttext
\startbuffer[sample]
\subject{Telemann, TWV 40:11}
\startlilypond
\relative c' {
  \set Staff.instrumentName = flute
  \key fis \minor
  \time 3/4
  \partial 4
  r8 fis 8 \ fis4. cis8 a cis \ fis, a cis fis a fis | b, d fis b d b | eis,, gis cis eis gis b, | a fis' gis, fis' cis eis | fis,4 r8
  a' gis fis | e gis, a e' fis cis |
  d fis, gis b e d | cis4 \trill r8
  cis b a | b dis e gis cis, b | a e' dis fis b, a | gis4 \trill r8
}
\stoplilypond
\stopbuffer

The input \typebuffer[sample] is typeset as \getbuffer[sample]

\type{\startlilypond} accepts options, as in \crlf
\type{\startlilypond[staffsize=18, linewidth=14cm, indent=5cm, time=no, clef=no]}:
\nobreak\startlilypond[staffsize=18,linewidth=14cm,indent=5cm,time=no,clef=no]
\relative c' {
  \key fis \minor
  \time 3/4
  \partial 4
  r8 fis 8 \ fis4. cis8 a cis \ fis, a cis fis a fis | b, d fis b d b | eis,, gis cis eis gis b, | a fis' gis, fis' cis eis | fis,4 r8
  a' gis fis | e gis, a e' fis cis |
  d fis, gis b e d | cis4 \trill r8
  cis b a | b dis e gis cis, b | a e' dis fis b, a | gis4 \trill r8
}
\stoplilypond

It is also possible to mix text and music:
\lower 8.2pt\hbox{\lilypond[fragment=true,staffsize=16,time=no,clef=no]{g'}} is a g.

\texttt{TODO}: The \type{\lower} in the example above should not be necessary.

\subject{Starlight (round)}

Here is a sample with lyrics:
\startlilypond
<<
\context Staff = onlyone <<
\clef treble
\key a \major
\time 6/8
\context Voice = one {
\relative c'4 {
  a4. \markup{1.} e' |
  e8( d cis) b4. |
  e4. \markup{2.} d4 d8 |
  cis( b) a b4 e,8 |
  cis4 cis8 b( cis d) |
  cis( d) e e4 e,8 |
  fis4 fis8 gis4. 
  \bar "::" |
}
}
>>
\lyricsto one \new Lyrics {
\lyricmode {
  Star -- light, star -- bright, 
  first star I see to -- night; 
  I wish I may, I wish I might 
  have the wish I wish to -- night. 
}
}
>>
\stoplilypond
\stoptext