

The background of the page is a dense, overlapping pattern of stylized document icons. Each icon is a rectangle with a white border and a gray fill, containing several horizontal lines to represent text. The icons are arranged in a way that they appear to be floating or overlapping each other, creating a textured, layered effect.

# ConT<sub>E</sub>Xt

**title** : ConT<sub>E</sub>Xt User Modules  
**subtitle** : Lilypond Connections (Music Typesetting)  
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**date** : September 21, 2005



This module serves to include lilypond music directly in the `CONTEXT` source, just as `METAPOST` code can be. Before starting with the implementation, one or two examples are in order.

The input

```
\startlilypond
% Telemann, TWV 40:11
\version "2.6.3"

\relative c' {
\set Staff.instrument = 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
```


is typeset as



`\startlilypond` accepts options, as in

`\startlilypond[staffsize=24, linewidth=14cm, indent=5cm, time=no]`:



It is also possible to mix text and music:  is a g.

TODO: Complete list of options.

TODO: The `\lower` in the example above should not be necessary.

TODO: Switches to turn off the clef etc.

TODO: Proper support for multipage results.

TODO: lilypond -> `CONTEXT`.

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

```
1 \unprotect
  \def\??lily{lilypond-}
```

Define the text snippets to be placed around fragments. Since lilypond uses similar syntax to T<sub>E</sub>X, we must do some catcode fiddling.

```
2 \bgroup
  \catcode'\@escape
  /catcode'\@other
  /catcode'\#/@other
  /catcode'\<=@begingroup
  /catcode'\>=@endgroup
  /catcode'\{/@other
  /catcode'\}/@other
  /catcode'\%=@other
  /gdef/lily!fragmentprefix<
  /string^^J
  \layout {/string^^J
    /string^^J
  }/string^^J
  /string^^J
  {/string^^J
  >

3 /gdef/lily!fragmentsuffix</string^^J
  }/string^^J
  >

4 /gdef/lily!prefix</string^^J
                                     (ly:parser-print-score/string^^J
                                     p (ly:music-scorify m p))))/string^^J

  /string^^J
  /string^^J
  /iflily!time/else
  \layout {/string^^J
    raggedlast = ##t
  \context {/string^^J
    \Score/string^^J
    timing = ##f/string^^J
  }/string^^J
  \context {/string^^J
    \Staff/string^^J
    \remove Time_signature_engraver/string^^J
  }/string^^J
  }/string^^J
  /fi
  \paper {/string^^J
    #(define dump-extents #t)/string^^J
    /string^^J
    raggedright = /iflily!align ##f/else ##t/fi/string^^J
    indent = /withoutpt/the/lily!indent\pt/string^^J
    linewidth = /withoutpt/the/lily!linewidth\pt/string^^J
```

```

    vsize = /withoutpt/the/lily!vsize\pt/string^^J
    printpagenumber = ##f/string^^J
  }/string^^J
>

```

```

5 /gdef/lily!hash<#>
  /egroup

```

```

6 \newdimen\lily!linewidth
  \newdimen\lily!vsize
  \newdimen\lily!indent
  \newif\iflily!align
  \newif\iflily!time

```

```

7 \newcount\lily!figures

```

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

```

8 \def\setuplilypond{\dosingleempty\dosetuplilypond}
9 \def\dosetuplilypond[#1]{%
  \getparameters[\??lily][#1]%
}

```

We set the following defaults:

```

10 \setuplilypond
    [staffsize=20,
     indent=0pt,
     time=\v!yes,
     align=?,% default depends on fragment=...
     fragment=\v!no,
    ]

```

`\startlilypond` is a multistage implementation, because end-of-line characters must be treated specially in the `\startlilypond... \stoplilypond` range.

```

11 \def\startlilypond{\dosingleempty\dostartlilypond}
12 \def\dostartlilypond[#1]{%
    \bgroup
    \obeylines
    \dodostartlilypond[{#1}]%
}
13 \long\def\dodostartlilypond[#1]#2\stoplilypond{%
    \egroup% from \dostartlilypond
    \bgroup%

```

The default of the `linewidth` parameter is the local `\hspace`.

```

14 \setlocalhspace
    \getparameters[\??lily][linewidth=\the\localhspace,height=\the\textheight,#1]%
    \lily!linewidth\dimexpr\getvalue{\??lily linewidth}\relax
    \lily!vsize\dimexpr\getvalue{\??lily height}\relax
    \lily!indent\dimexpr\getvalue{\??lily indent}\relax

```

The default of `align` depends on whether we typeset a fragment:

```
15 \@EAEAEA\doifelse\getvalue{\??lily align}{\v!yes}%
    \lily!aligntrue\lily!alignfalse
\@EAEAEA\doif\getvalue{\??lily fragment}{\v!no}{%
    \@EAEAEA\doif\getvalue{\??lily align}?
    \lily!aligntrue
}%
\@EAEAEA\doifelse\getvalue{\??lily time}{\v!yes
    \lily!timetrue\lily!timefalse
```

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

TODO: This won't work any longer once we pass the remaining vertical space to lilypond.

```
16 \global\advance\lily!figures\plusone
\startmode[*\v!first]%
\def\obeyedlines{\string^^J}%
\convertargument#2\to\ascii
\expanded{%
\setbuffer[lilypond-\the\lily!figures]%
\lily!prefix
\lily!hash(set-global-staff-size \getvalue{\??lily staffsize})\string^^J%
\ifundefined{\??lily fragment}\else\lily!fragmentprefix\fi
%% TODO: Option "packed"
\ascii%
\ifundefined{\??lily fragment}\else\lily!fragmentsuffix\fi
}%
\endbuffer%
```

Generating a pdf directly always creates a whole page, so we generate eps first. If `\ifeof18` creates an error for you, your pdfetex is too old. just change it to then. (`\ifeof18` checks whether `\write18` is disabled.)

```
17 \ifeof18
    \installprogram{lilypond -b eps --ps \bufferprefix lilypond-
\the\lily!figures.tmp}%
    \doif\jobsuffix{pdf}{%
        \installprogram{texutil --figures --epstopdf \bufferprefix lilypond-
\the\lily!figures.eps}%
    }%
    \else
        \executesystemcommand{lilypond -b eps --ps \bufferprefix lilypond-
\the\lily!figures.tmp}%
        \doif\jobsuffix{pdf}{%
            \executesystemcommand{texutil --figures --epstopdf \bufferprefix lilypond-
\the\lily!figures.eps}%
        }%
    \fi
\stopmode% only first run
\doifelse\jobsuffix{pdf}
{ \edef\lily!img{\bufferprefix lilypond-\the\lily!figures.pdf}}%
{ \edef\lily!img{\bufferprefix lilypond-\the\lily!figures.eps}}%
```

## Lilypond Connections (Music Typesetting)

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.

TODO: Get the relevant dimension directly from lilypond, to place the instrument name into the left margin for short snippets as well.

```
18   \ifvmode
      \getfiguredimensions[\bufferprefix lilypond-\the\lily!figures.pdf] []%
      \leavevmode
      \ifdim\figurewidth>\localhsize
        \!!dimena=\localhsize
        \advance\!!dimena by-\figurewidth
        \noindent\hskip\!!dimena
      \fi
      \fi
      \externalfigure[\lily!img] []%
      \egroup%
}%
```

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

```
19   \def\lilypond{\dosingleempty\dolilypond}
20   \def\dolilypond[#1]#2{\startlilypond[#1]#2\stoplilypond}
21   \protect
End of file
```