The longfigure Package*

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1 Usage

The `longfigure` package uses and relabels components of the well-known `longtable` package, written by David Carlisle, to provide a table-like environment that can display a stream of subfigures as a single figure that can break across pages.

The `longtable` package defines a `longtable` environment, which produces tables that can be broken by TEX's standard page-breaking algorithm. Similarly, the `longfigure` package defines a `longfigure` environment, which produces figures that can be broken by TEX's standard page-breaking algorithm. The internal structure of a long figure is similar to a long table. Rows might contain (for example) tables or graphics. Page breaks can occur only between rows.

The `longfigure` package differs from the `longtable` package in the following ways:

- The `longfigure` package supports two additional key-value options:
  - The `figname=` option specifies the counter for numbering `longfigure` environments. You can specify any string; the default is `figure`. When you specify a `figname=` value for which no counter exists, the `longfigure` package loads the `tocloft` package and creates the counter.
  - The `resetby=` option specifies a counter (for example, `resetby=chapter`) such that output numbering is reset each time the counter value changes. If a counter is specified that does not exist, the `tocloft` package is loaded to create the new counter. For information about how the lists are typeset, see the `tocloft` package documentation.
- The counters and macros that start with `\LT` in the `longtable` package are renamed to start with `\LF` in the `longfigure` pacakge to avoid namespace conflicts when the two packages are used together. The generic macros that are defined in the `longtable` package (`\endfirsthead`, `\endhead`,

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`\endfoot`, `\endlastfoot`) are also renamed with `\LF` as a prefix in the `longfigure` package.

- The `\LF@name` macro is based on the `\fnum@table` macro from the `longtable` package. The `\LF@name` macro returns the capitalized counter name and value. For example, if the counter is `figure` and the macro is processing the second `longfigure`, the `\LF@name` macro would contain the value "Figure 2".

You can use the `longfigure` package defaults to produce a *List of Figures* by inserting the following tag in your document at the point where you want the list to appear.

```
\listoffigures
```

The default counter used to display figures is the `figure` counter, but you can specify a different counter. For example, if you want your figures to be labeled as "Display", specify `figname=display` when you load the `longfigure` package; to display a *List of Displays*, insert the following command in your document at the point where you want the list to appear.

```
\listofdisplay
```

Note: If you specify a counter that does not exist, an auxiliary file with extension `.lft` is created to contain the information needed to create the list.

If you want to use more advanced features of the `tocloft` package, load it before you load the `longfigure` package so that the `longfigure` package sees that the counters specified by the `figname=` and `resetby=` options are already defined and does not attempt to create them.

1.1 Example

The following lines produce a single figure that contains three images and one tabular environment. Each element is a row of the `longfigure` environment. Page breaks can occur between rows.

```
\documentclass{book}
\usepackage{graphicx}
\usepackage{longfigure}

\begin{document}
  \begin{longfigure}{c}
    \caption{My Long Figure}\label{mlfig}\\
    \includegraphics[width=3in]{myfig1}\\
    \includegraphics[width=3in]{myfig2}\\
    \includegraphics[width=3in]{myfig3}\\
    \begin{tabular}{ll}
      one & two \\
      three & four\\
    \end{tabular}
```

```
  \end{longfigure}
\end{document}
```

In this example, the `{c}` argument in the `\begin{longfigure}` command specifies only a single centered column. You can also specify multiple columns and, if needed, use the `\multicolumn` command for more flexibility.

2 Implementation

This section describes the implementation of the `longfigure` package. The comments describe only the changes from the `longtable` package code. For complete details about the logic and usage of the environment, see Carlisle (2004).

```
1 \ProvidesPackage{longfigure}[2014/01/06 longfigure]
```

The following statement loads the `xkeyval` package for declaring and processing package options:

```
2 \RequirePackage{xkeyval}
```

The following statement defines a new command, `\LFcounter`, to contain the string `figure`. Later code tests whether a counter with that name exists:

```
3 \newcommand*{\LFcounter}{figure}
```

The following statement defines a new command, `\LFreset`, to contain the name of the counter within which the `longfigure` number should reset. If no value is specified, the long figures are numbered consecutively through the document.

```
4 \newcommand*{\LFreset}{\@empty}
```

2.1 Options

The `\LFcounter` and `\LFreset` commands support the package options `figname=` and `resetby=` as follows:

```
5 \DeclareOptionX{figname}[figure]{\renewcommand*{\LFcounter}{#1}}
6 \DeclareOptionX{resetby}{\renewcommand*{\LFreset}{#1}}
```

The following statements further define the options that the `longtable` package defines:

```
7 \DeclareOptionX{set}{}
8 \DeclareOptionX{final}{}
9 \DeclareOptionX{errorshow}{\def\LF@warn{\PackageInfo{longfigure}}}
10 \DeclareOptionX{pausing}{\def\LF@warn#1{\LF@err{#1}{This is not really an error}}}
11 \ProcessOptionsX
```

The following statements process the options.

```
12 \def\LFProcessOptions#1{
13   \@ifundefined{c@#1}{%
14       \RequirePackage{tocloft}
15       \expandafter\def\csname list#1name\endcsname{List of #1s}
16       \ifx\@empty\LFreset%
17         \newlistof{#1}{lft}{\csname list#1name\endcsname}
```

```
      \else
        \newlistof[\LFreset]{#1}{lft}{\csname list#1name\endcsname}
      \fi
    \fi
  }{}%
}
\expandafter\LFProcessOptions\expandafter{\LFcounter}
```

If a counter is specified that does not exist, `\c@`*countername* is undefined and the `longfigure` package loads the `tocloft` package in order to use its commands to create the new counters and list.

Thus, the `tocloft` package is required only when a new counter is specified, and this automatic loading takes place only if the counter that is specified in the package options is not defined.

You can load the `tocloft` package before loading the `longfigure` package and retain all of the flexibility that the `tocloft` package offers. However, you must define the new counters yourself by using the `\newlistof` command in the `tocloft` package, and you must define the new list to use an auxiliary `lft` file where its auxiliary information is written.

2.2 Utilities

`\strcfstr` The following macro, `\strcfstr`, checks whether two strings, which are provided as arguments, are equal (Wilson, 2001). A new boolean `\ifLF@same` contains the result of the test.

```
\newif\ifLF@same
\newcommand{\strcfstr}[2]{%
  \LF@samefalse
  \begingroup\def\2{#2}
    \ifx\2#1\endgroup\LF@sametrue
    \else\endgroup
    \fi
}
```

`\LFupcase` The following macro, `\LFupcase`, uppercases the first letter of a string (Lazarides, 2010):

```
\def\LFupcase#1{%
  \def\x##1##2{%
    \MakeUppercase{##1}{##2}}\x#1%
}
```

The following macro, `\LF@name`, creates a string to provide a label and number for an output. Analogous to the `\fnum@table` macro in the `longtable` package, it contains the capitalized version of the counter name and the counter number (for example, `Figure~3`).

```
\def\LF@name{\expandafter\LFupcase%
             \expandafter{\LFcounter}~%
             \expandafter\csname the\LFcounter\endcsname}%
```

The remainder of this package follows the `longtable` package almost identically, except that macros, skips, counters, and so on use an `\LF` prefix instead of the `\LT` prefix that the `longtable` package uses.

```
\def\LF@err{\PackageError{longfigure}}
\def\LF@warn{\PackageWarning{longfigure}}
\def\LF@final@warn{%
  \AtEndDocument{%
    \LF@warn{\LFcounter \@width s have changed. Rerun \LaTeX\.\@gobbletwo}}%
  \global\let\LF@final@warn\relax}
%
\newskip\LFleft       \LFleft=\fill
\newskip\LFright      \LFright=\fill
\newskip\LFpre        \LFpre=\bigskipamount
\newskip\LFpost       \LFpost=\bigskipamount
\newcount\LFchunksize \LFchunksize=20
\let\c@LFchunksize\LFchunksize
\newdimen\LFcapwidth  \LFcapwidth=4in
\newbox\LF@head
\newbox\LF@firsthead
\newbox\LF@foot
\newbox\LF@lastfoot
\newcount\LF@cols
\newcount\LF@rows
\newcounter{LF@tables}
\newcounter{LF@chunks}[LF@tables]
%
\newtoks\LF@p@ftn
\mathchardef\LF@end@pen=30000
\def\longfigure{%
  \par
  \ifx\multicols\@undefined
  \else
     \ifnum\col@number>\@ne
       \@twocolumntrue
     \fi
  \fi
  \if@twocolumn
    \LF@err{longfigure not in 1-column mode}\@ehc
  \fi
  \begingroup
  \@ifnextchar[\LF@array{\LF@array[x]}}
\def\LF@array[#1]#2{%
  \refstepcounter{\LFcounter}\stepcounter{LF@tables}%
  \if l#1%
    \LFleft\z@ \LFright\fill
  \else\if r#1%
    \LFleft\fill \LFright\z@
  \else\if c#1%
    \LFleft\fill \LFright\fill
```

```
  \fi\fi\fi
  \let\LF@mcol\multicolumn
  \let\LF@@tabarray\@tabarray
  \let\LF@@hl\hline
  \def\@tabarray{%
    \let\hline\LF@@hl
    \LF@@tabarray}%
  \let\\\LF@tabularcr\let\tabularnewline\\%
  \def\newpage{\noalign{\break}}%
  \def\pagebreak{\noalign{\ifnum`}=0\fi\@testopt{\LF@no@pgbk-}4}%
  \def\nopagebreak{\noalign{\ifnum`}=0\fi\@testopt\LF@no@pgbk4}%
  \let\hline\LF@hline \let\kill\LF@kill\let\caption\LF@caption
  \@tempdima\ht\strutbox
  \let\@endpbox\LF@endpbox
  \ifx\extrarowheight\@undefined
    \let\@acol\@tabacol
    \let\@classz\@tabclassz \let\@classiv\@tabclassiv
    \def\@startpbox{\vtop\LF@startpbox}%
    \let\@@startpbox\@startpbox
    \let\@@endpbox\@endpbox
    \let\LF@LL@FM@cr\@tabularcr
  \else
    \advance\@tempdima\extrarowheight
    \col@sep\tabcolsep
    \let\@startpbox\LF@startpbox\let\LF@LL@FM@cr\@arraycr
  \fi
  \setbox\@arstrutbox\hbox{\vrule
    \@height \arraystretch \@tempdima
    \@depth \arraystretch \dp \strutbox
    \@width \z@}%
  \let\@sharp##\let\protect\relax
   \begingroup
    \@mkpream{#2}%
    \xdef\LF@bchunk{%
       \global\advance\c@LF@chunks\@ne
       \global\LF@rows\z@\setbox\z@\vbox\bgroup
       \LF@setprevdepth
       \tabskip\LFleft \noexpand\halign to\hsize\bgroup
      \tabskip\z@ \@arstrut \@preamble \tabskip\LFright \cr}%
  \endgroup
  \expandafter\LF@nofcols\LF@bchunk&\LF@nofcols
  \LF@make@row
  \m@th\let\par\@empty
  \everycr{}\lineskip\z@\baselineskip\z@
  \LF@bchunk}
\def\LF@no@pgbk#1[#2]{\penalty #1\@getpen{#2}\ifnum`{=0\fi}}
\def\LF@start{%
  \let\LF@start\endgraf
  \endgraf\penalty\z@\vskip\LFpre
  \dimen@\pagetotal
```

```
  \advance\dimen@ \ht\ifvoid\LF@firsthead\LF@head\else\LF@firsthead\fi
  \advance\dimen@ \dp\ifvoid\LF@firsthead\LF@head\else\LF@firsthead\fi
  \advance\dimen@ \ht\LF@foot
  \dimen@ii\vfuzz
  \vfuzz\maxdimen
    \setbox\tw@\copy\z@
    \setbox\tw@\vsplit\tw@ to \ht\@arstrutbox
    \setbox\tw@\vbox{\unvbox\tw@}%
  \vfuzz\dimen@ii
  \advance\dimen@ \ht
        \ifdim\ht\@arstrutbox>\ht\tw@\@arstrutbox\else\tw@\fi
  \advance\dimen@\dp
        \ifdim\dp\@arstrutbox>\dp\tw@\@arstrutbox\else\tw@\fi
  \advance\dimen@ -\pagegoal
  \ifdim \dimen@>\z@\vfil\break\fi
      \global\@colroom\@colht
  \ifvoid\LF@foot\else
    \advance\vsize-\ht\LF@foot
    \global\advance\@colroom-\ht\LF@foot
    \dimen@\pagegoal\advance\dimen@-\ht\LF@foot\pagegoal\dimen@
    \maxdepth\z@
  \fi
  \ifvoid\LF@firsthead\copy\LF@head\else\box\LF@firsthead\fi\nobreak
  \output{\LF@output}}
\def\endlongfigure{%
  \crcr
  \noalign{%
    \let\LF@entry\LF@entry@chop
    \xdef\LF@save@row{\LF@save@row}}%
  \LF@echunk
  \LF@start
  \unvbox\z@
  \LF@get@widths
  \if@filesw
    {\let\LF@entry\LF@entry@write\immediate\write\@auxout{%
      \gdef\expandafter\noexpand
        \csname LF@\romannumeral\c@LF@tables\endcsname
          {\LF@save@row}}}%
  \fi
  \ifx\LF@save@row\LF@@save@row
  \else
    \LF@warn{Column \@width s have changed\MessageBreak
             in table \thetable}%
    \LF@final@warn
  \fi
  \endgraf\penalty -\LF@end@pen
  \endgroup
  \global\@mparbottom\z@
  \pagegoal\vsize
  \endgraf\penalty\z@\addvspace\LFpost
```

```
  \ifvoid\footins\else\insert\footins{}\fi}
\def\LF@nofcols#1&{%
  \futurelet\@let@token\LF@n@fcols}
\def\LF@n@fcols{%
  \advance\LF@cols\@ne
  \ifx\@let@token\LF@nofcols
    \expandafter\@gobble
  \else
    \expandafter\LF@nofcols
  \fi}
\def\LF@tabularcr{%
  \relax\iffalse{\fi\ifnum0=`}\fi
  \@ifstar
    {\def\crcr{\LF@crcr\noalign{\nobreak}}\let\cr\crcr
     \LF@t@bularcr}%
    {\LF@t@bularcr}}
\let\LF@crcr\crcr
\let\LF@setprevdepth\relax
\def\LF@t@bularcr{%
  \global\advance\LF@rows\@ne
  \ifnum\LF@rows=\LFchunksize
    \gdef\LF@setprevdepth{%
      \prevdepth\z@\global
      \global\let\LF@setprevdepth\relax}%
    \expandafter\LF@xtabularcr
  \else
    \ifnum0=`{}\fi
    \expandafter\LF@LL@FM@cr
  \fi}
\def\LF@xtabularcr{%
  \@ifnextchar[\LF@argtabularcr\LF@ntabularcr}
\def\LF@ntabularcr{%
  \ifnum0=`{}\fi
  \LF@echunk
  \LF@start
  \unvbox\z@
  \LF@get@widths
  \LF@bchunk}
\def\LF@argtabularcr[#1]{%
  \ifnum0=`{}\fi
  \ifdim #1>\z@
    \unskip\@xargarraycr{#1}%
  \else
    \@yargarraycr{#1}%
  \fi
  \LF@echunk
  \LF@start
  \unvbox\z@
  \LF@get@widths
  \LF@bchunk}
```

```
\def\LF@echunk{%
  \crcr\LF@save@row\cr\egroup
  \global\setbox\@ne\lastbox
    \unskip
  \egroup}
\def\LF@entry#1#2{%
  \ifhmode\@firstofone{&}\fi\omit
  \ifnum#1=\c@LF@chunks
  \else
    \kern#2\relax
  \fi}
\def\LF@entry@chop#1#2{%
  \noexpand\LF@entry
    {\ifnum#1>\c@LF@chunks
       1}{0pt%
     \else
       #1}{#2%
     \fi}}
\def\LF@entry@write{%
  \noexpand\LF@entry^^J%
  \@spaces}
\def\LF@kill{%
  \LF@echunk
  \LF@get@widths
  \expandafter\LF@rebox\LF@bchunk}
\def\LF@rebox#1\bgroup{%
  #1\bgroup
  \unvbox\z@
  \unskip
  \setbox\z@\lastbox}
\def\LF@blank@row{%
  \xdef\LF@save@row{\expandafter\LF@build@blank
    \romannumeral\number\LF@cols 001 }}
\def\LF@build@blank#1{%
  \if#1m%
    \noexpand\LF@entry{1}{0pt}%
    \expandafter\LF@build@blank
  \fi}
\def\LF@make@row{%
  \global\expandafter\let\expandafter\LF@save@row
    \csname LF@\romannumeral\c@LF@tables\endcsname
  \ifx\LF@save@row\relax
    \LF@blank@row
  \else
    {\let\LF@entry\or
     \if!%
         \ifcase\expandafter\expandafter\expandafter\LF@cols
         \expandafter\@gobble\LF@save@row
         \or
         \else
```

```
            \relax
          \fi
        !%
      \else
        \aftergroup\LF@blank@row
      \fi}%
  \fi}
\let\setlongfigures\relax
\def\LF@get@widths{%
  \setbox\tw@\hbox{%
    \unhbox\@ne
    \let\LF@old@row\LF@save@row
    \global\let\LF@save@row\@empty
    \count@\LF@cols
    \loop
      \unskip
      \setbox\tw@\lastbox
    \ifhbox\tw@
      \LF@def@row
      \advance\count@\m@ne
    \repeat}%
  \ifx\LF@@save@row\@undefined
    \let\LF@@save@row\LF@save@row
  \fi}
\def\LF@def@row{%
  \let\LF@entry\or
  \edef\@tempa{%
    \ifcase\expandafter\count@\LF@old@row
    \else
      {1}{0pt}%
    \fi}%
  \let\LF@entry\relax
  \xdef\LF@save@row{%
    \LF@entry
    \expandafter\LF@max@sel\@tempa
    \LF@save@row}}
\def\LF@max@sel#1#2{%
  {\ifdim#2=\wd\tw@
     #1%
   \else
     \number\c@LF@chunks
   \fi}%
  {\the\wd\tw@}}
\def\LF@hline{%
  \noalign{\ifnum0=`}\fi
    \penalty\@M
    \futurelet\@let@token\LF@@hline}
\def\LF@@hline{%
  \ifx\@let@token\hline
    \global\let\@gtempa\@gobble
```

```
    \gdef\LF@sep{\penalty-\@medpenalty\vskip\doublerulesep}%
  \else
    \global\let\@gtempa\@empty
    \gdef\LF@sep{\penalty-\@lowpenalty\vskip-\arrayrulewidth}%
  \fi
  \ifnum0=`{\fi}%
  \multispan\LF@cols
     \unskip\leaders\hrule\@height\arrayrulewidth\hfill\cr
  \noalign{\LF@sep}%
  \multispan\LF@cols
     \unskip\leaders\hrule\@height\arrayrulewidth\hfill\cr
  \noalign{\penalty\@M}%
  \@gtempa}
```

2.3 Captioning

You can easily change how a long figure is captioned by redefining the `\LF@makecaption` macro after loading the `longfigure` package. The following statements show the default definition of the `\LF@makecaption`:

```
\def\LF@caption{%
  \noalign\bgroup
    \@ifnextchar[{\egroup\LF@c@ption\@firstofone}\LF@capti@n}
```

The `\LF@caption` command begins the process. If it includes an optional argument, it calls `\LF@c@ption`; otherwise it calls `\LF@capti@n`, which then calls `\LF@c@ption`.

```
\def\LF@c@ption#1[#2]#3{%
  \LF@makecaption#1\LF@name{#3}%
  \def\@tempa{#2}%
  \ifx\@tempa\@empty\else
```

If a list of long figures is requested, the following code uses the previously defined `\strcfstr` macro and `\ifLF@same` boolean to determine the name of the counter and set the output file to contain the `longfigure` information.

The code writes to one of the following files.

- If the counter is `figure`, write to the `lof` file.
- If the counter is `table`, write to the `lot` file.
- Otherwise, write to `lft`, a file created here for this purpose.

```
    {\let\\\space
    \strcfstr{\LFcounter}{figure}
      \ifLF@same\def\LFoutfile{lof}\else
        \strcfstr{\LFcounter}{table}
          \ifLF@same\def\LFoutfile{lot}\else
            \def\LFoutfile{lft}\fi\fi
    \addcontentsline{\LFoutfile}{\LFcounter}
    {\expandafter\protect\expandafter\numberline\expandafter%
```

```
  {\expandafter\csname the\LFcounter\endcsname}{#2}}}%
  \fi
}
```

The `\LF@c@ption` macro ends the process when it calls the `\LF@makecaption` macro, which typesets the caption.

```
\def\LF@capti@n{%
  \@ifstar
    {\egroup\LF@c@ption\@gobble[]}%
    {\egroup\@xdblarg{\LF@c@ption\@firstofone}}}
```

If you want to redefine how the `longfigure` is captioned, you need to override the following macro. The first argument is the name of the counter (for example, `Figure`), the second argument is the number of the counter, and the third argument is the caption itself.

```
\def\LF@makecaption#1#2#3{%
  \LF@mcol\LF@cols c{\hbox to\z@{\hss\parbox[t]\LFcapwidth{%
    \sbox\@tempboxa{#1{#2: }#3}%
    \ifdim\wd\@tempboxa>\hsize
      #1{#2: }#3%
    \else
      \hbox to\hsize{\hfil\box\@tempboxa\hfil}%
    \fi
    \endgraf\vskip\baselineskip}%
  \hss}}}
\def\LF@output{%
  \ifnum\outputpenalty <-\@Mi
    \ifnum\outputpenalty > -\LF@end@pen
      \LF@err{floats and marginpars not allowed in a longfigure}\@ehc
    \else
      \setbox\z@\vbox{\unvbox\@cclv}%
      \ifdim \ht\LF@lastfoot>\ht\LF@foot
        \dimen@\pagegoal
        \advance\dimen@-\ht\LF@lastfoot
        \ifdim\dimen@<\ht\z@
          \setbox\@cclv\vbox{\unvbox\z@\copy\LF@foot\vss}%
          \@makecol
          \@outputpage
          \setbox\z@\vbox{\box\LF@head}%
        \fi
      \fi
      \global\@colroom\@colht
      \global\vsize\@colht
      \vbox
        {\unvbox\z@\box\ifvoid\LF@lastfoot\LF@foot\else
         \LF@lastfoot\fi}%
    \fi
  \else
    \setbox\@cclv\vbox{\unvbox\@cclv\copy\LF@foot\vss}%
    \@makecol
```

```
    \@outputpage
      \global\vsize\@colroom
    \copy\LF@head\nobreak
  \fi}
\def\LF@end@hd@ft#1{%
  \LF@echunk
  \ifx\LF@start\endgraf
    \LF@err
     {Longfigure head or foot not at start of table}%
     {Increase LFchunksize}%
  \fi
  \setbox#1\box\z@
  \LF@get@widths
  \LF@bchunk}
```

The following four macros do not have an `\LT` prefix in the `longtable` package, but they must be redefined to have an `\LF` prefix in order to avoid a namespace clash;

```
\def\endLFfirsthead{\LF@end@hd@ft\LF@firsthead}
\def\endLFhead{\LF@end@hd@ft\LF@head}
\def\endLFfoot{\LF@end@hd@ft\LF@foot}
\def\endLFlastfoot{\LF@end@hd@ft\LF@lastfoot}
 %
\def\LF@startpbox#1{%
  \bgroup
    \let\@footnotetext\LF@p@ftntext
    \setlength\hsize{#1}%
    \@arrayparboxrestore
    \vrule \@height \ht\@arstrutbox \@width \z@}
\def\LF@endpbox{%
  \@finalstrut\@arstrutbox
  \egroup
  \the\LF@p@ftn
  \global\LF@p@ftn{}%
  \hfil}
\def\LF@p@ftntext#1{%
  \edef\@tempa{\the\LF@p@ftn\noexpand\footnotetext[\the\c@footnote]}%
  \global\LF@p@ftn\expandafter{\@tempa{#1}}}%
```

2.4 References

Carlisle, D. 2004. *The longtable Package*. Included in the "Comprehensive TEX Archive Network." http://ctan.org.

Lazarides, Y. 2010. TEXstackexchange, online forum. http://tex.stackexchange.com/questions/7992.

Schöpf, R., B. Raichle, and C. Rowley. 2001. *A New Implementation of LATEX's* `verbatim` *and* `verbatim*` *Environments*. Originally appeared in TUGboat 1990, 11(2), 284–296.

Thanh, H., S. Rahtz, H. Hagen, and H. Henkel. 2009. "The pdfTEX User's Manual" Revision 655, corresponding to pdfTEX 1.40.11. www.tug.org/applications/pdftex

Wilson, Peter. 2001. *Glisterings* in TUGboat 22(4), 339–340.

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