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 already 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, and \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.

The following lines display another example that specifies a 'continued' heading when the figure breaks over a page. It also displays a double horizontal line at the end of the figure.

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

\begin{document}
  \begin{longfigure}{c}
    \caption{My Long Figure}\label{mlfig2}\\
    \hline\endLFfirsthead
    \caption{continued}\\
    \hline\endLFhead
    \hline\endLFfoot
    \hline\hline\endLFlastfoot
    \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}
```

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 `longtable` 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.

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

2.1 Options

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

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

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

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

The following statements process the options:

```
\def\LFProcessOptions#1{
  \@ifundefined{c@#1}{%
      \RequirePackage{tocloft}
      \def\LFuc##1##2{\MakeUppercase{##1}{##2}}
      \expandafter\def\csname list#1name\endcsname{List of \LFuc#1s}
      \ifx\@empty\LFreset%
        \newlistof{#1}{lft}{\csname list#1name\endcsname}
      \else
        \newlistof[\LFreset]{#1}{lft}{\csname list#1name\endcsname}
      \fi
  }{}%
}
\expandafter\LFProcessOptions\expandafter{\LFcounter}
```

If a counter is specified that does not exist, its name (`\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.

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⟨/longfigure⟩

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