The footnote* package

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1 User guide

This package provides some commands for handling footnotes slightly better
than \TeX usually does; there are several commands and environments (notably
\texttt{\parbox}, \texttt{minipage} and \texttt{tabular}) which ‘trap’ footnotes so that they can’t escape
and appear at the bottom of the page.

\texttt{savenotes}  

The \texttt{savenotes} environment saves up any footnotes encountered within it, and
performs them all at the end.

\texttt{savenotes} \texttt{\spewnotes}

If you’re defining a command or environment, you can use the \texttt{savenotes}
command to start saving up footnotes, and the \texttt{spewnotes} command to execute
them all at the end. Note that \texttt{savenotes} and \texttt{spewnotes} enclose a group, so
watch out. You can safely nest the commands and environments – they work out
if they’re already working and behave appropriately.

\texttt{minipage*}

To help things along a bit, the package provides a *-version of the \texttt{minipage}
environment, which doesn’t trap footnotes for itself (and in fact sends any footnotes
it contains to the bottom of the page, where they belong).

\texttt{\makessavenoteenv}

The new \texttt{minipage*} environment was created with a magic command called
\texttt{\makessavenoteenv}. It has a fairly simple syntax:

\footnote{The \texttt{footnote} package is currently at version 1.13, dated 28 January 1997.}
\footnote{The \texttt{mdwtab} package, provided in this distribution, handles footnotes correctly anyway; it
uses an internal version of this package to do so.}
\maketitle

\section*{Footnotes}

Footnotes provide a convenient way to reference material that is too long or too technical to include in the main text. With footnotes, you can break up long lists of references into several shorter lists. It also allows you to make footnotes for long equations, so you can make the main text shorter and more readable. It can be useful to define a footnote environment so that you can use \footnotesize and \footnotesizeformat for these footnotes. It also allows you to use \footnotesizeformat in the main text.

\section*{Footnote package}

The package also redefines the \footnote package so that it works properly with footnotes. The other problem which people tend to experience with footnotes is that you can't put verbatim text (with the \verb command or the verbatim environment) into the \footnote command's argument. This package provides a \footnote environment, which does allow verbatim things. You use the environment just like you do the command. It's really easy. It even has an optional argument, which works the same way.

\section*{Implementation}

Most implementations of footnote-saving (in particular, that used in the \texttt{tabularx} and \texttt{longtable} packages) use a token list register to store the footnote text, and then expand it when whatever was preventing footnotes (usually a \texttt{vbox}) stops. This is no good at all if the footnotes contain things which might not be there by the time the expansion occurs. For example, references to things in temporary boxes won't work.

This implementation therefore stores the footnotes up in a box register. This must be just as valid as using tokens, because all I'm going to do at the end is unbox the box.

1 \begin{verbatim}
\newdimen\fn@width
\newbox\fn@notes
\setlength\linewidth{\columnwidth}
\parbox{.4\textwidth}{
I'll need a length to tell me how wide the footnotes should be at the moment.
\end{verbatim}

2 The solution to this problem is to send mail to David Carlisle persuading him to use this package to handle footnotes, rather than doing it his way.
And now a switch to remember if we’re already handling footnotes,
7 \newif\if@savingnotes

2.1 Building footnote text
I need to emulate \TeX’s footnote handling when I’m putting the notes into my box; this is also useful in the verbatim-in-footnotes stuff.
\begin{verbatim}
\startnote Here’s how a footnote gets started. Most of the code here is stolen from \footnotetext.
8 \edef\startnote{%
9 \hspace{\colwidth}%
10 \interfootnotelinepenalty\interfootnotelinepenalty%
11 \reset@font\footnotesize%
12 \floatingpenalty\NR% Is this right???
13 \parboxrestore%
14 \protected@edef@currentlabel{\csname p\@mpfn\endcsname\@thefnmark}%
15 \color{begingroup}%
16 }
\end{verbatim}

Footnotes are finished off by this macro. This is the easy bit.
17 \let\@footnotetext\color@endgroup

2.2 Footnote saving
\begin{verbatim}
\fn@fntext Now to define how to actually do footnotes. I’ll just add the notes to the bottom of the footnote box I’m building.
3 There’s some hacking added here to handle the case that a footnote is in an \intertext command within a broken amsmath alignment environment – otherwise the footnotes get duplicated due to the way that package measures equations.\footnote{The correct solution of course is to implement aligning environments in a sensible way, by building the table and leaving penalties describing the intended format, and then pick that apart in a postprocessing phase. If I get the time, I’ll start working on this again. I have a design worked out and the beginnings of an implementation, but it’s going to be a long time coming.}.
4 \edef\fntext@i{%
5 \ifx\ifmeasuring\@undefined%
6 \expandafter\%secondoftwo\else\expandafter\@iden%
7 \fi%
8 \ifmeasuring\expandafter\gobble\else\expandafter\@iden\fi%
9 \%
10 \global\setbox\fnt@notes\vbox{%
11 \unvbox\fnt@notes%
12 \fnt@startnote%
13 \fnt@fntext%
14 \fnt@endnote%
15 \%
16 \rule\footnotepsep%
17 \ignorespaces%
18 \%}
19 \fnt@finalstrut\strutbox%
20 }%}
\end{verbatim}
The \texttt{\savenotes} declaration starts saving footnotes, to be spewed at a later date. We’ll also remember which counter we’re meant to use, and redefine the footnotes used by \texttt{minipage}.

The idea here is that we’ll gather up footnotes within the environment, and output them in whatever format they were being typeset outside the environment.

I’ll take this a bit at a time. The start is easy: we need a group in which to keep our local definitions.

Now, if I’m already saving footnotes away, I won’t bother doing anything here. Otherwise I need to start hacking, and set the switch.

I redefine the \texttt{\footnotetext} command, which is responsible for adding a footnote to the appropriate insert. I’ll redefine both the current version, and \texttt{minipage}’s specific version, in case there’s a nested minipage.

I’d better make sure my box is empty before I start, and I must set up the column width so that later changes (e.g., in \texttt{minipage}) don’t upset things too much.

Now for some yuckiness. I want to ensure that \texttt{minipage} doesn’t change how footnotes are handled once I’ve taken charge. I’ll store the current values of \texttt{\thempfn} (which typesets a footnote marker) and \texttt{\mpfn} (which contains the name of the current footnote counter).

The \texttt{minipage} environment provides a hook, called \texttt{\@minipagerestore}. Initially it’s set to \texttt{\relax}, which is unfortunately unexpandable, so if I want to add code to it, I must check this possibility. I’ll make it \texttt{\empty} (which expands to nothing) if it’s still \texttt{\relax}. Then I’ll add my code to the hook, to override \texttt{\thempfn} and \texttt{\mpfn} set up by \texttt{minipage}.

Note that I can’t just force the \texttt{mpfootnote} counter to be equal to the \texttt{footnote} one, because \texttt{minipage} clears \texttt{\@mpfootnote} to zero when it starts. This method will ensure that even so, the current counter works OK.
\spnewnotes Now I can spew out the notes we saved. This is a bit messy, actually. Since the standard \@footnotetext implementation tries to insert funny struts and things, I must be a bit careful. I’ll disable all this bits which start paragraphs prematurely.

\begin{verbatim}
def\spnewnotes{%
  \endgroup%
  \if@savingnotes\else\ifvoid\fn@notes\else\begingroup%
  \let\@makefntext\empty%
  \let\@finalstrut\@gobble%
  \let\rule\@gobbletwo%
  \@footnotetext{\unvbox\fn@notes}%
  \endgroup\fi\fi%
}

Now make an environment, for users.

\let\endsavenotes\spnewnotes

That’s all that needs to be in the shared code section.

\end{verbatim}

2.3 The footnote environment

Since \footnote is a command with an argument, things like \verbatim are unwelcome in it. Every so often someone on \texttt{comp.text.tex} moans about it and I post a nasty hack to make it work. However, as a more permanent and ‘official’ solution, here’s an environment which does the job rather better. Lots of this is based on code from my latest attempt on the newsgroup.

I’ll work on this in a funny order, although I think it’s easier to understand. First, I’ll do some macros for reading the optional argument of footnote-related commands.

\begin{verbatim}
\fn@gemark Saying \\fn@gemark{\texttt{(default-code)}\texttt{(cont-code)} will read an optional argument giving a value for the footnote counter; if the argument isn’t there, the \texttt{(default-code)} is executed, and it’s expected to set up the appropriate counter to the current value. The footnote marker text is stored in the macro \@thefnmark, as is conventional for \LaTeX’s footnote handling macros. Once this is done properly, the \texttt{(cont-code)} is called to continue handling things.

Since the handling of the optional argument plays with the footnote counter locally, I’ll start a group right now to save some code. Then I’ll decide what to do based on the presence of the argument.

\def\fn@gemark#1#2{%
  \begingroup%
  \ifnextchar[%
    {\fn@gemark#1#1}%
    {#1\fn@gemark#1#2}%
  }%
}

There’s an optional argument, so I need to read it and assign it to the footnote counter.

\def\fn@gemark@i#1[#2]{%
  \xspace}%
\end{verbatim}

5
Finally, set up the macro properly, and end the group.

\def\fn@getmark@ii\%\unrestored@protected@xdef@\thefnmark{\themp@f}\%\endgroup\%#1\%}

From argument reading, I’ll move on to footnote typesetting.

The \fn@startfntext macro sets everything up for building the footnote in a box register, ready for unboxing into the footnotes insert. The \fn@prefntext macro is a style hook I’ll set up later.

\def\fn@startfntext\{%\setbox\z@\vbox\bgroup\fn@startnote\%\fn@prefntext\%\rule\z@\footnotesep\%\ignorespaces\%}

Now I’ll end the vbox, and add it to the footnote insertion. Again, I must be careful to prevent \@footnotetext from adding horizontal mode things in bad places.

\def\fn@endfntext\{%\@finalstrut\strutbox\%\fn@postfntext\%\egroup\%\begingroup\%\let\@makefntext@empty\%\let\@iffinalstrut@gobble\%\let\@rule@gobbletwo\%\@footnotetext{\unvbox\z@}\%\endgroup\%

I can now start on the environment proper. First I’ll look for an optional argument.

\def\footnotetext\%\ifx\currenvir\fn@note\% Oh. I’ve already come up against the first problem: that name’s already used. I’d better save the original version.
\let\fn@latex@footnote\footnote\let\fn@latex@footnote\footnote

The best way I can think of for seeing if I’m in an environment is to look at \currenvir. I’ll need something to compare with, then.

\def\fn@note{footnote}\% Now to start properly. :-)
\def\footnotetext\%
\ifx\currenvir\fn@note\footnote\%
\begin{verbatim}
105 \expandafter@firstoftwo%
106 \else%
107 \expandafter@secondoftwo%
108 \fi%
109 \{\fngetmark{\stepcounter{mpfn}}%
110 \leavevmode\unskip\footnotemark\fn@startfntext}\%
111 \{\fn@latex@footnotemark\}
112 }
113 \let\endfootnotetext\endfntext

footnotetext I'll do the same magic as before for \footnotetext.
114 \def\fn@footnotetext{footnotetext}
115 \let\fn@latex@footnotetext\footnotetext
116 \def\footnotetext{%
117 \ifx\current@fn@footnotetext\%
118 \expandafter@firstoftwo%
119 \else%
120 \expandafter@secondoftwo%
121 \fi%
122 \{\fngetmark{\fn@startfntext}\%
123 \{\fn@latex@footnotemark\}
124 }
125 \let\endfootnotetext\endfntext

\fn@prefntext Now for one final problem. The style hook for footnotes is the command\@makefntext, which takes the footnote text as its argument. Clearly this is utterly unsuitable, so I need to split it into two bits, where the argument is. This is very tricky, and doesn't deserve to work, although it appears to be a good deal more effective than it has any right to be.
126 \long\def\@tempa@\@tempb@\@tempc@\@tempd@\@tempfntext[#1]\def\fn@prefntext[#1]\def\fn@postfntext[#2]}
127 \expandafter@\@tempa\@tempb\@tempc\@tempd\@@tempfntext\@tempfntext\@tempfntext\@tempfntext

2.4 Hacking existing environments

Some existing \LaTeX environments ought to have footnote handling but don't. Now's our chance.

\makeatletter The \makeatletter command makes an environment save footnotes around itself.

It would also be nice to make \parbox work with footnotes. I'll do this later.
128 \def\makeatletter\@ifnextchar\[\fn@msne@ii\\fn@msne@i]

We're meant to redefine the environment. We'll copy it (using \let) to a magic name, and then pass it on to stage 2.
129 \def\fn@msne@i[#1]{%
130 \expandafter\let\csname msne$\#1$\expandafter\endcsname%
131 \csname #1\endcsname%
132 \expandafter\let\csname endmsne$\#1$\expandafter\endcsname%
133 \csname end#1\endcsname%
134 \fn@msne@ii[#1]{msne$\#1$}%
Now we'll define the new environment. The start is really easy, since we just need to insert a \savemotes. The end is more complex, since we need to preserve the \if@endpe flag so that \end can pick it up. I reckon that proper hooks should be added to \begin and \end so that environments can define things to be done outside the main group as well as within it; still, we can't all have what we want, can we?

\begin{minipage}{\textwidth}
\begin{verbatim}
def\fn@same@i[1][2]{
\expandafter\edef\csname#1\endcsname{}
\noexpand\savemotes\
\expandafter\noexpand\csname#2\endcsname%
}
\end{verbatim}
\end{minipage}

\parbox

Now to alter \parbox slightly, so that it handles footnotes properly. I'm going to do this fairly inefficiently, because I'm going to try and change it as little as possible.

First, I'll save the old \parbox command. If I don’t find a ‘*’, I'll just call this command.

\begin{verbatim}
\let\fn@parbox=\parbox
\end{verbatim}

This is the clever bit: I don’t know how many optional arguments Mr Mittelbach and his chums will add to \parbox, so I'll handle any number. I'll store them all up in my first argument and call myself every time I find a new one. If I run out of optional arguments, I'll call the original \parbox command, surrounding it with \savemotes and \savemotes.

\begin{verbatim}
def\parbox{\@ifnextchar[\mynp@parbox@i{}{\mynp@parbox@i{}}
def\mynp@parbox@i[#1][#2]{}
\@ifnextchar[\mynp@parbox@ii[#1][#2]]{}{\mynp@parbox@ii[#1][#2]}%}
\longdef\mynp@parbox@ii[#1][#2][#3]\savemotes\mynp@parbox@i[#1][#2][#3]\savemotes
\end{verbatim}

Done!
\end{minipage}

Mark Wooding, 28 January 1997

Appendix

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Ty Coon, President of Vice

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