The \texttt{hhline} package*

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\begin{abstract}
\texttt{hhline} produces a line like \texttt{\hline}, or a double line like \texttt{\hline\hline}, except for its interaction with vertical lines.
\end{abstract}

\section{Introduction}

The argument to \texttt{hhline} is similar to the preamble of an \texttt{array} or \texttt{tabular}. It consists of a list of tokens with the following meanings:

\begin{itemize}
  \item \texttt{=} A double hline the width of a column.
  \item \texttt{-} A single hline the width of a column.
  \item \texttt{~} A column with no hline.
  \item \texttt{|} A vline which ‘cuts’ through a double (or single) hline.
  \item \texttt{:} A vline which is broken by a double hline.
  \item \texttt{#} A double hline segment between two vlines.
  \item \texttt{t} The top half of a double hline segment.
  \item \texttt{b} The bottom half of a double hline segment.
  \item \texttt{*} \texttt{*\{3\}{==#}} expands to \texttt{==####==#}, as in the \texttt{*}-form for the preamble.
\end{itemize}

If a double vline is specified (\texttt{||} or \	exttt{::}) then the hlines produced by \texttt{hhline} are broken. To obtain the effect of an hline ‘cutting through’ the double vline, use a \texttt{#} or omit the vline specifiers, depending on whether or not you wish the double vline to break.

The tokens \texttt{t} and \texttt{b} must be used between two vertical rules. \texttt{|tb|} produces the same lines as \texttt{#}, but is much less efficient. The main use for these is to make constructions like \texttt{|t:} (top left corner) and \texttt{:b|} (bottom right corner).

If \texttt{hhline} is used to make a single hline, then the argument should only contain the tokens \texttt{-}, \texttt{~} and \texttt{|} (and \texttt{*}-expressions).

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An example using most of these features is:

```
\begin{tabular}{||cc||c|c||}
\hline
| a & b | c & d |
|\hline
| 1 & 2 | 3 & 4 |
|\hline
| i & j | k & l |
|\hline
| w & x | y & z |
|\hline
\end{tabular}
```

The lines produced by \LaTeX{}'s `\hline` consist of a single (\LaTeX{} primitive) \hrule. The lines produced by `\hhline` are made up of lots of small line segments. \LaTeX{} will place these very accurately in the .dvi file, but the program that you use to print the .dvi file may not line up these segments exactly. (A similar problem can occur with diagonal lines in the \texttt{picture} environment.)

If this effect causes a problem, you could try a different driver program, or if this is not possible, increasing `\arrayrulewidth` may help to reduce the effect.

## 2 The Macros

1 (*package*)

\texttt{\HH@box} Makes a box containing a double hline segment. The most common case, both rules of length `\arrayrulewidth` will be stored in `\box1`, this is not initialised until `\hhline` is called as the user may change the parameters `\doublerulesep` and `\arrayrulewidth`. The two arguments to `\HH@box` are the widths (ie lengths) of the top and bottom rules.

2 \def\HH@box#1#2{\vbox{\hrule \@height \arrayrulewidth \@width #1 \vskip \doublerulesep \hrule \@height \arrayrulewidth \@width #2}}

\texttt{\HH@add} Build up the preamble in the register `\toks0`.

3 \def\HH@add#1\@toks0\expandafter{\the\toks0#1}

\texttt{\HH@xexpast} We ‘borrow’ the version of `\@xexpast` from Mittelbach’s `array.sty`, as this allows # to appear in the argument list.

4 \def\HH@xexpast#1*#2#3#4\@@{\@tempcnta #2 \toks@={#1}\@temptokena={#3}\let\the@toksz\relax \let\the@toks\relax \def\@tempa{\the@toksz}\ifnum\@tempcnta >0 \@whilenum\@tempcnta >0\do\edef\@tempa{\@tempa\the@toks}\advance\@tempcnta \m@ne\fi}

### Macros

```latex
\HH@box
\HH@add
\HH@xexpast
```

# to appear in the argument list.

2 \def\HH@xexpast#1*#2#3#4\@@{\@tempcnta #2 \toks@={#1}\@temptokena={#3}\let\the@toksz\relax \let\the@toks\relax \def\@tempa{\the@toksz}\ifnum\@tempcnta >0 \@whilenum\@tempcnta >0\do\edef\@tempa{\@tempa\the@toks}\advance\@tempcnta \m@ne\fi}

3 \let \@tempb \HH@xexpast
```

```
The \texttt{@mkpream} is oversimplified. It assumes that the vertical rules are at the end of the column. If you were to specify \texttt{c|@{xx}|} in the array argument, then \texttt{\hhline} would not be able to access the first vertical rule. (It ought to have an \texttt{@} option, and add \texttt{leaders} up to the width of a box containing the \texttt{@}-expression. We use a loop made with \texttt{\futurelet} rather than \texttt{\@tfor} so that we can use \texttt{#} to denote the crossing of a double hline with a double vline. \texttt{\if@firstamp} is true in the first column and false otherwise. 

\texttt{\if@tempswa} is true if the previous entry was a vline (\texttt{;}, \texttt{|} or \texttt{#}).  

\texttt{\def\hhline#1{\omit\@firstamptrue\@tempswafalse \@@}}
\texttt{\global\setbox\@ne\HH@box\doublerulesep\doublerulesep}

If Mittelbach's \texttt{array.sty} is loaded, we do not need the negative \texttt{\hskip}'s around vertical rules.

\texttt{\expandafter\HH@xexpast\relax#1*0x\@@\toks@{}}

\texttt{\HH@let\Discard\the@toks\the@toksz\%}

\texttt{\edef\@tempa{\@tempa}}

\texttt{\expandafter\@tempb\@tempa #4\@@}
-, add a single hline across the column.
\ifx\@tempb-\@tempswafalse
\if@firstamp\@firstampfalse\else\HH@add{&\omit}\fi
\HH@add{\leaders\hrule\@height\arrayrulewidth\hfil}\else
=, add a double hline across the column.
\ifx\@tempb=\@tempswafalse
\if@firstamp\@firstampfalse\else\HH@add{&\omit}\fi
Put in as many copies of \box1 as possible with \leaders, this may leave gaps at
the ends, so put an extra box at each end, overlapping the \leaders.
\HH@add
\ifx\@tempb t\HH@add{\rlap{\HH@box\doublerulesep\z@}}\else
t, add the top half of a double hline segment, in a \rlap so that it may be used
with b.
\ifx\@tempb b\HH@add{\rlap{\HH@box\z@\doublerulesep}}\else
b, add the bottom half of a double hline segment in a \rlap so that it may be
used with t.
\ifx\@tempb\space ignored in \noexpand\hhline argument%
\PackageWarning{hhline}{\meaning\@tempb ignored in \noexpand\hhline argument%}
\MessageBreak
\fi\fi\fi\fi\fi\fi\fi\fi\fi
Go around the loop again.
\next
}(/package)