A New Implementation of \LaTeX’s \texttt{verbatim} and \texttt{verbatim*} Environments.

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Abstract

This package reimplements the \LaTeX verbatim and verbatim* environments. In addition it provides a \texttt{comment} environment that skips any commands or text between \texttt{\begin{comment}} and the next \texttt{\end{comment}}. It also defines the command \texttt{verbatiminput} to input a whole file verbatim.

1 Usage notes

\LaTeX’s \texttt{verbatim} and \texttt{verbatim*} environments have a few features that may give rise to problems. These are:

- Due to the method used to detect the closing \texttt{\end{verbatim}} (i.e. macro parameter delimiting) you cannot leave spaces between the \texttt{\end} token and \{verbatim).

- Since \TeX has to read all the text between the \texttt{\begin{verbatim}} and the \texttt{\end{verbatim}} before it can output anything, long verbatim listings may overflow \TeX’s memory.

Whereas the first of these points can be considered only a minor nuisance the other one is a real limitation.
This package file contains a reimplemention of the \verbatim and \verbatim* environments which overcomes these restrictions. There is, however, one incompatibility between the old and the new implementations of these environments: the old version would treat text on the same line as the \endverbatim command as if it were on a line by itself.

This new version will simply ignore it.

(This is the price one has to pay for the removal of the old \verbatim environment’s size limitations.) It will, however, issue a warning message of the form

\LaTeX{} warning: Characters dropped after \verbatim*!

This is not a real problem since this text can easily be put on the next line without affecting the output.

This new implementation also solves the second problem mentioned above: it is possible to leave spaces (but not begin a new line) between the \end and the \verbatim or \verbatim*:

\begin {verbatim*}
  test
  test
\end {verbatim*}

Additionally we introduce a \comment{} environment, with the effect that the text between \begin{comment} and \end{comment} is simply ignored, regardless of what it looks like. At first sight this seems to be quite different from the purpose of \verbatim{} listing, but actually the implementation of these two concepts turns out to be very similar. Both rely on the fact that the text between \begin{...} and \end{...} is read by \TeX{} without interpreting any commands or special characters. The remaining difference between \verbatim{} and \comment{} is only that the text is to be typeset in the first case and to be thrown away in the latter. Note that these environments cannot be nested.

\verbatiminput{} is a command with one argument that inputs a file verbatim, i.e. the command \verbatiminput{xx.yy} has the same effect as

\beginverbatim
<Contents of the file xx.yy>
\endverbatim

This command has also a *-variant that prints spaces as \textbackslash.

## 2 Interfaces for package writers

The \verbatim environment of \LaTeX{} does not offer a good interface to programmers. In contrast, this package provides a simple mechanism to implement similar features, the \comment{} environment implemented here being an example of what can be done and how.

### 2.1 Simple examples

It is now possible to use the \verbatim environment to define environments of your own. E.g.,
Verbatim style option

\newenvironment{myverbatim}{}
  {\endgraf\noindent MYVERBATIM:%
  \endgraf\verbatim}
  {\endverbatim}

can be used afterwards like the \verbatim environment, i.e.
\begin{myverbatim}
  test
  test
\end{myverbatim}

Another way to use it is to write
\let\foo=\comment
\let\endfoo=\endcomment

and from that point on environment \foo is the same as the comment environment, i.e. everything inside its body is ignored.

You may also add special commands after the \verbatim macro is invoked, e.g.
\newenvironment{myverbatim}{}
  {\verbatim\myspecialverbatimsetup}
  {\endverbatim}

though you may want to learn about the hook \everyverbatim at this point. However, there are still a number of restrictions:

1. You must not use the \begin or the \end command inside a definition, e.g. the following two examples will not work:

\newenvironment{myverbatim}{}
  {\endgraf\noindent MYVERBATIM:%
  \endgraf\verbatim}
  {\verbatim}
\newenvironment{fred}{}
  {\verbatim}
  {\verbatim}

If you try these examples, \TeX will report a “runaway argument” error. More generally, it is not possible to use \begin \dots \end or the related environments in the definition of the new environment. Instead, the correct way to define this environment would be

\newenvironment{fred}{}
  {\verbatim}
  {\verbatim}

2. You cannot use the \verbatim environment inside user defined commands; e.g.,

\newcommand{\verbatimfile}{[1]}%
  \verbatimfile{\verbatim}
  \verbatimfile{\verbatim}

\verbatimfile
Verbatim style option

1. Before the first character of an input line is read, it executes the macro \verbatim@startline.

2. After some characters have been read, the macro \verbatim@addtoline is called with these characters as its only argument. This may happen several times per line (when an \end command is present on the line in question).

3. When the end of the line is reached, the macro \verbatim@processline is called to process the characters that \verbatim@addtoline has accumulated.

4. Finally, there is the macro \verbatim@finish that is called just before the environment is ended by a call to the \end macro.

To make this clear let us consider the standard verbatim environment. In this case the three macros above are defined as follows:

1. \verbatim@startline clears the character buffer (a token register).

2. \verbatim@addtoline adds its argument to the character buffer.

3. \verbatim@processline typesets the characters accumulated in the buffer.
With this it is very simple to implement the \texttt{comment} environment: in this case \texttt{verbatim@startline} and \texttt{verbatim@processline} are defined to be no-ops whereas \texttt{verbatim@addtoline} discards its argument.

Let's use this to define a variant of the \texttt{verbatim} environment that prints line numbers in the left margin. Assume that this would be done by a counter called \texttt{VerbatimLineNo}. Assuming that this counter was initialized properly by the environment, \texttt{verbatim@processline} would be defined in this case as

\begin{verbatim}
def verbatim@processline{\addtocounter{VerbatimLineNo}{1}leavevmode\llap{theVerbatimLineNo}\hspace{\@totalleftmargin}theverbatim@line\par}
\end{verbatim}

A further possibility is to define a variant of the \texttt{verbatim} environment that boxes and centers the whole verbatim text. Note that the boxed text should be less than a page otherwise you have to change this example.

\begin{verbatim}
def verbatimboxed#1{\begingroup\def verbatim@processline{\setbox0=hbox{theverbatim@line}\hsize=\wd0\theverbatim@line\par}\setbox0=vbox{\parskip=0pt\topsep=0pt\partopsep=0ptverbatiminput{#1}}\begin{center}\fbox{\box0}\end{center}\endgroup}
\end{verbatim}

As a final nontrivial example we describe the definition of an environment called \texttt{verbatimwrite}. It writes all text in its body to a file whose name is given as an argument. We assume that a stream number called \texttt{verbatim@out} has already been reserved by means of the \texttt{newwrite} macro.

Let's begin with the definition of the macro \texttt{verbatimwrite}.

\begin{verbatim}
def verbatimwrite#1{% First we call \@bsphack so that this environment does not influence the spacing. Then we open the file and set the category codes of all special characters: \@bsphack\immediate\openoutverbatim@out #1 \let\do@makeother\dospecials \catcode`\^^M\active The default definitions of the macros \verbatim@startline \verbatim@addtoline \verbatim@finish

are also used in this environment. Only the macro \texttt{verbatim@processline} has to be changed before \texttt{verbatim@start} is called:

\begin{verbatim}
def verbatim@processline{% \immediate\write1verbatim@out{theverbatim@line}verbatim@start}
\end{verbatim}
\end{verbatim}
The definition of `\endverbatimwrite` is very simple: we close the stream and call `\@esphack` to get the spacing right.

\def\endverbatimwrite{\immediate\closeout\verbatim@out\@esphack}

# 3 The implementation

The very first thing we do is to ensure that this file is not read in twice. To this end we check whether the macro `verbatim@@@` is defined. If so, we just stop reading this file. The ‘package’ guard here allows most of the code to be excluded when extracting the driver file for testing this package.

1 (*package*)
2 `\NeedsTeXFormat{LaTeX2e}`
3 `\ProvidesPackage{verbatim}`
4  [2003/08/22 v1.5q LaTeX2e package for verbatim enhancements]
5 `\@ifundefined{verbatim@@@}{}{\endinput}`

We use a mechanism similar to the one implemented for the `\comment...\endcomment` macro in `AMSTeX`: We input one line at a time and check if it contains the `\end{...}` tokens. Then we can decide whether we have reached the end of the verbatim text, or must continue.

## 3.1 Preliminaries

`\everyverbatim` The hook (i.e. token register) `\everyverbatim` is initialized to \textit{(empty)}.

6 \newtoks\everyverbatim
7 \everyverbatim={}

`\@makeother` `\@makeother` takes as argument a character and changes its category code to 12 (other).
8 \def\@makeother#1{\catcode`#112\relax}

`\@vobeyspaces` The macro `\@vobeyspaces` causes spaces in the input to be printed as spaces in the output.
9 \begingroup
10 \catcode`\ =\active%
11 \def\x{\def\@vobeyspaces{\catcode`\ active\let \@xobeysp}}
12 \expandafter\endgroup\x

`\@xobeysp` The macro `\@xobeysp` produces exactly one space in the output, protected against breaking just before it. (\texttt{@M} is an abbreviation for the number 10000.)
13 \def\@xobeysp{\leavevmode\penalty\@M \ }

`\verbatim@line` We use a newly defined token register called `\verbatim@line` that will be used as the character buffer.
14 \newtoks\verbatim@line

The following four macros are defined globally in a way suitable for the `verbatim` and `verbatim*` environments.

`\verbatim@startline` `\verbatim@startline` initializes processing of a line by emptying the character buffer (`\verbatim@line`).
15 \def\verbatim@startline{\verbatim@line{}}
Verbatim style option

\verbatim@addtoline adds the tokens in its argument to our buffer register \verbatim@line without expanding them.
16 \def\verbatim@addtoline#1{% 17 \verbatim@line\expandafter{\the\verbatim@line#1}}

Processing a line inside a \verbatim or \verbatim* environment means printing it. Ending the line means that we have to begin a new paragraph. We use \par for this purpose. Note that \par is redefined in \verbatim to force \TeX into horizontal mode and to insert an empty box so that empty lines in the input do appear in the output.
18 \def\verbatim@processline{\the\verbatim@line\par}

\verbatim@finish As a default, \verbatim@finish processes the remaining characters. When this macro is called we are facing the following problem: when the \end{verbatim} command is encountered \verbatim@processline is called to process the characters preceding the command on the same line. If there are none, an empty line would be output if we did not check for this case.

If the line is empty \the\verbatim@line expands to nothing. To test this we use a trick similar to that on p. 376 of the \TeXbook, but with $...$ instead of the ! tokens. These $ tokens can never have the same category code as a $ token that might possibly appear in the token register \verbatim@line, as such a token will always have been read with category code 12 (other). Note that \ifcat expands the following tokens so that \the\verbatim@line is replaced by the accumulated characters
19 \def\verbatim@finish{\ifcat$\the\verbatim@line$\else
20 \verbatim@processline\fi}

3.2 The \verbatim and \verbatim* environments

\verbatim@font We start by defining the macro \verbatim@font that is to select the font and to set font-dependent parameters. Then we expand \@noligs (defined in the \LaTeX2e kernel). Among possibly other things, it will go through \verbatim@nolig@list to avoid certain ligatures. \verbatim@nolig@list is a macro defined in the \LaTeX2e kernel to expand to
\do\do\do\do\do\do\do\do\do\do
All the characters in this list can be part of a ligature in some font or other.
21 \def\verbatim@font{\normalfont\ttfamily
22 \hyphenchar\font\m@ne
23 \@noligs}

\verbatim The macro \verbatim sets up things properly. First of all, the tokens of the \every@verbatim hook are inserted. Then a trivlist environment is started and its first \item command inserted. Each line of the \verbatim or \verbatim* environment will be treated as a separate paragraph.
24 \def\verbatim{\the\every@verbatim
25 \trivlist \item \relax
The following extra vertical space is for compatibility with the \LaTeXX kernel: otherwise, using the \verbatim package changes the vertical spacing of a \verbatim environment nested within a quote environment.
26 \if@minipage\else\vskip\parskip\fi
The paragraph parameters are set appropriately: the penalty at the beginning of the environment, left and right margins, paragraph indentation, the glue to fill the last line, and the vertical space between paragraphs. The latter space has to be zero since we do not want to add extra space between lines.

\begin{verbatim}
\begin
\end{verbatim}

There’s one point to make here: the list environment uses \TeX{}’s \texttt{\parshape} primitive to get a special indentation for the first line of the list. If the list begins with a \texttt{verbatim} environment this \texttt{\parshape} is still in effect. Therefore we have to reset this internal parameter explicitly. We could do this by assigning 0 to \texttt{\parshape}. However, there is a simpler way to achieve this: we simply tell \TeX{} to start a new paragraph. As is explained on p. 103 of the \TeX{}book, this resets \texttt{\parshape} to zero.

\texttt{\@par}

We now ensure that \texttt{\par} has the correct definition, namely to force \TeX{} into horizontal mode and to include an empty box. This is to ensure that empty lines do appear in the output. Afterwards, we insert the \texttt{\interlinepenalty} since \TeX{} does not add a penalty between paragraphs (here: lines) by its own initiative. Otherwise a \texttt{verbatim} environment could be broken across pages even if a \texttt{\samepage} declaration were present.

However, in a top-aligned minipage, this will result in an extra empty line added at the top. Therefore, a slightly more complicated construct is necessary. One of the important things here is the inclusion of \texttt{\leavevmode} as the first macro in the first line, for example, a blank verbatim line is the first thing in a list item.

\texttt{\def\par{\if@tempswa
\leavevmode\null\@@par\penalty\interlinepenalty
\else
\@tempswatrue
\ifhmode\@@par\penalty\interlinepenalty\fi
\fi}}%

But to avoid an error message when the environment doesn’t contain any text, we redefine \texttt{\@noitemerr} which will in this case be called by \texttt{\endtrivlist}.

\texttt{\def\@noitemerr{\@warning{No verbatim text}}%}

Now we call \texttt{\obeylines} to make the end of line character active,

\texttt{\obeylines}

change the category code of all special characters, to 12 (other).

\texttt{\let\do\@makeother \dospecials}

and switch to the font to be used.

\texttt{\verbatim@font}

To avoid a breakpoint after the labels box, we remove the penalty put there by the list macros: another use of \texttt{\unpenalty}!

\texttt{\everypar \expandafter{\the\everypar \unpenalty}}

\texttt{\verbatim}

Now we define the toplevel macros. \texttt{\verbatim} is slightly changed: after setting up things properly it calls \texttt{\verbatim@start}. This is done inside a group, so that \texttt{\verbatim} can be used directly, without \texttt{\begin}.
\def\verbatim\begingroup@verbatim \frenchspacing@vobeyspaces
\verbatim is defined accordingly.
\namedef{verbatim*}{\begingroup@verbatim@start}

To end the \verbatim and \verbatim* environments it is only necessary to finish the trivlist environment started in \verbatim and close the corresponding group.
\def\endverbatim{\endtrivlist\endgroup@doendpe}
\expandafter\let\csname endverbatim*\endcsname =\endverbatim

3.3 The comment environment

The \comment macro is similar to \verbatim*. However, we do not need to switch fonts or set special formatting parameters such as \parindent or \parskip. We need only set the category code of all special characters to 12 (other) and that of ^M (the end of line character) to 13 (active). The latter is needed for macro parameter delimiter matching in the internal macros defined below. In contrast to the default definitions used by the \verbatim and \verbatim* macros, we define \verbatim@addtoline to throw away its argument and \verbatim@processline, \verbatim@startline, and \verbatim@finish to act as no-ops. Then we call \verbatim@. But the first thing we do is to call \@bsphack so that this environment has no influence whatsoever upon the spacing.
\def\comment{\@bsphack
\let\do\@makeother\dospecials\catcode\^M\active
\let\verbatim@startline\relax
\let\verbatim@addtoline\@gobble
\let\verbatim@processline\relax
\let\verbatim@finish\relax
\verbatim@}
\endcomment is very simple: it only calls \@esphack to take care of the spacing. The \end macro closes the group and therefore takes care of restoring everything we changed.
\let\endcomment=\@esphack

3.4 The main loop

Here comes the tricky part: During the definition of the macros we need to use the special characters \, {}, and \} not only with their normal category codes, but also with category code 12 (other). We achieve this by the following trick: first we tell \TeX that \, {}, and \} are the lowercase versions of !, [, and ]. Then we replace every occurrence of \, {}, and \} that should be read with category code 12 by !, [, and ], respectively, and give the whole list of tokens to \lowercase, knowing that category codes are not altered by this primitive!

But first we have ensure that !, [, and ] themselves have the correct category code! To allow special settings of these codes we hide their setting in the macro \vrb@catcodes. If it is already defined our new definition is skipped.
\@ifundefined{vrb@catcodes}{}
\def\vrb@catcodes{
\catcode\!12\catcode\[12\catcode\]}
This trick allows us to use this code for applications where other category codes are in effect.

We start a group to keep the category code changes local.

\begingroup
\verb@catcodes
\lccode`\!=`\ 
\lccode`\[=`\{ 
\lccode`\]=`\}

We also need the end-of-line character `\^\^M`, as an active character. If we were to simply write `\catcode`\^\^M=\active` then we would get an unwanted active end of line character at the end of every line of the following macro definitions. Therefore we use the same trick as above: we write a tilde `~` instead of `\^\^M` and pretend that the latter is the lowercase variant of the former. Thus we have to ensure now that the tilde character has category code 13 (active).

\catcode`~=\active \lccode`~=`\^\^M

The use of the `\lowercase` primitive leads to one problem: the uppercase character `\^C` needs to be used in the code below and its case must be preserved. So we add the command:

\lccode`\^C=`\^C

Now we start the token list passed to `\lowercase`. We use the following little trick (proposed by Bernd Raichle): The very first token in the token list we give to `\lowercase` is the `\endgroup` primitive. This means that it is processed by TeX immediately after `\lowercase` has finished its operation, thus ending the group started by `\begingroup` above. This avoids the global definition of all macros.

The purpose of `\verbatim@start` is to check whether there are any characters on the same line as the `\begin{verbatim}` and to pretend that they were on a line by themselves. On the other hand, if there are no characters remaining on the current line we shall just find an end of line character. `\verbatim@start` performs its task by first grabbing the following character (its argument). This argument is then compared to an active `\^\^M`, the end of line character.

\def\verbatim@start#1{%
    \verbatim@startline
    \if\noexpand#1\noexpand~%
        \verbatim@test
    \else \def\next{\verbatim@#1}\fi
}

If this is true we transfer control to `\verbatim@` to process the next line. We use `\next` as the macro which will continue the work.

\let\next\verbatim@

Otherwise, we define `\next` to expand to a call to `\verbatim@` followed by the character just read so that it is reinserted into the text. This means that those characters remaining on this line are handled as if they formed a line by themselves.

\def\next{\verbatim@#1}\fi

Finally we call `\next`.

The three macros `\verbatim@`, `\verbatim@@`, and `\verbatim@@@` form the “main loop” of the `verbatim` environment. The purpose of `\verbatim@` is to read exactly one line of input. `\verbatim@@` and `\verbatim@@@` work together to find out whether the four characters `\end` (all with category code 12 (other)) occur in that line. If so, `\verbatim@@@` will call `\verbatim@test` to check whether this `\end`
is part of \end{verbatim} and will terminate the environment if this is the case. Otherwise we continue as if nothing had happened. So let’s have a look at the definition of \verbatim@:

71 \def\verbatim@#1\end\@nil%

Note that the ! character will have been replaced by a \ with category code 12 (other) by the \lowercase primitive governing this code before the definition of this macro actually takes place. That means that it takes the line, puts \end (four character tokens) and \@nil (one control sequence token) as a delimiter behind it, and then calls \verbatim@@.

\verbatim@@ takes everything up to the next occurrence of the four characters \end as its argument.

72 \def\verbatim@@#1\end{%

That means: if they do not occur in the original line, then argument #1 is the whole input line, and \@nil is the next token to be processed. However, if the four characters \end are part of the original line, then #1 consists of the characters in front of \end, and the next token is the following character (always remember that the line was lengthened by five tokens). Whatever #1 may be, it is verbatim text, so #1 is added to the line currently built.

73 \verbatim@addtoline{#1}%

The next token in the input stream is of special interest to us. Therefore \futurelet defines \next to be equal to it before calling \verbatim@@@.

74 \futurelet\next\verbatim@@@%

\verbatim@@@ will now read the rest of the tokens on the current line, up to the final \@nil token.

75 \def\verbatim@@@#1\@nil{%

If the first of the above two cases occurred, i.e. no \end characters were on that line, #1 is empty and \next is equal to \@nil. This is easily checked.

76 \ifx\next\@nil

If so, this was a simple line. We finish it by processing the line we accumulated so far. Then we prepare to read the next line.

77 \verbatim@processline 78 \verbatim@startline 79 \let\next\verbatim@

Otherwise we have to check what follows these \end tokens.

80 \else

Before we continue, it’s a good idea to stop for a moment and remember where we are: We have just read the four character tokens \end and must now check whether the name of the environment (surrounded by braces) follows. To this end we define a macro called \@tempa that reads exactly one character and decides what to do next. This macro should do the following: skip spaces until it encounters either a left brace or the end of the line. But it is important to remember which characters are skipped. The \end{optional spaces}\ characters may be part of the verbatim text, i.e. these characters must be printed.

Assume for example that the current line contains

\begin{verbatim}A{VeryLongEnvironmentName}\end{verbatim}
As we shall soon see, the scanning mechanism implemented here will not find out that this is text to be printed until it has read the right brace. Therefore we need a way to accumulate the characters read so that we can reinsert them if necessary. The token register \@temptokena is used for this purpose.

Before we do this we have to get rid of the superfluous \end tokens at the end of the line. To this end we define a temporary macro whose argument is delimited by \end\@nil (four character tokens and one control sequence token) to be used below on the rest of the line, after appending a \@nil token to it. (Note that this token can never appear in #1.) We use the following definition of \@tempa to get the rest of the line (after the first \end).

\verbatim@addtoline\verbatim@test\verbatim@startline

\def\@tempa##1!end\@nil{##1}%

We mentioned already that we use token register \@temptokena to remember the characters we skip, in case we need them again. We initialize this with the \end we have thrown away in the call to \@tempa.

\verbatim@test

We shall now call \verbatim@test to process the characters remaining on the current line. But wait a moment: we cannot simply call this macro since we have already read the whole line. Therefore we have to first expand the macro \@tempa to insert them again after the \verbatim@test token. A \^^M character is appended to denote the end of the line. (Remember that this character comes disguised as a tilde.)

\verbatim@test

That’s almost all, but we still have to now call \verbatim@test to do the work.
2. A space character follows. This is allowed, so we add it to \@temptokena and continue.

3. An open brace follows. This is the most interesting case. We must now collect characters until we read the closing brace and check whether they form the environment name. This will be done by \verbatim@testend, so here we let \next equal this macro. Again we will process the rest of the line, character by character. The characters forming the name of the environment will be accumulated in \@tempc. We initialize this macro to expand to nothing.

4. Any other character means that the $\texttt{end}$ was part of the verbatim text. Add the characters to the current line and prepare to call \verbatim@ to process the rest of the line.

Note that the [ character will be a { when this macro is defined.

The last thing this macro does is to call \next to continue processing.
2. \}: Call \verbatim@@testend to check if this is the right environment name.

\verbatim@@testend

3. \: This character must not occur in the name of an environment. Thus we stop collecting characters. In principle, the same argument would apply to other characters as well, e.g., {. However, \ is a special case, since it may be the first character of \end. This means that we have to look again for \end{environment name}. Note that we prefixed the ! by a \noexpand primitive, to protect ourselves against it being an active character.

\verbatim@@testend

4. Any other character: collect it and continue. We cannot use \edef to define \@tempc since its replacement text might contain active character tokens.

\verbatim@@testend

Unlike the previous macros \verbatim@@testend is simple: it has only to check if the \end{...} matches the corresponding \begin{...}.

\verbatim@@testend

We use \next again to define the things that are to be done. Remember that the name of the current environment is held in \@currenvir, the characters accumulated by \verbatim@testend are in \@tempc. So we simply compare these and prepare to execute \end{(current environment)} macro if they match. Before we do this we call \verbatim@finish to process the last line. We define \next via \edef so that \@currenvir is replaced by its expansion. Therefore we need \noexpand to inhibit the expansion of \end at this point.

\verbatim@finish

Without this trick the \end command would not be able to correctly check whether its argument matches the name of the current environment and you’d get an interesting \TeX{} error message such as:

! \begin{verbatim*} ended by \end{verbatim*}.

But what do we do with the rest of the characters, those that remain on that line? We call \verbatim@rescan to take care of that. Its first argument is the name of the environment just ended, in case we need it again. \verbatim@rescan takes the list of characters to be reprocessed as its second argument. (This token list was inserted after the current macro by \verbatim@@@.) Since we are still in an \edef we protect it by means of \noexpand.

\verbatim@rescan\noexpand\verbatim@rescan{\@currenvir}
If the names do not match, we reinsert everything read up to now and prepare to call `\verbatim@` to process the rest of the line.

```latex
\verbatim@rescan  \let\next\verbatim@
```

Finally we call `\next`.

```
\verbatim@rescan
In principle `\verbatim@rescan` could be used to analyse the characters remaining after the `\end{...}` command and pretend that these were read “properly”, assuming “standard” category codes are in force.\footnote{Remember that they were all read with category codes 11 (letter) and 12 (other) so that control sequences are not recognized as such.} But this is not always possible (when there are unmatched curly braces in the rest of the line). Besides, we think that this is not worth the effort: After a `verbatim` or `verbatim*` environment a new line in the output is begun anyway, and an `\end{comment}` can easily be put on a line by itself. So there is no reason why there should be any text here. For the benefit of the user who did put something there (a comment, perhaps) we simply issue a warning and drop them. The method of testing is explained in Appendix D, p. 376 of the \TeXbook. We use `\^\M` instead of the `!` character used there since this is a character that cannot appear in `#1`. The two `\noexpand` primitives are necessary to avoid expansion of active characters and macros.

One extra subtlety should be noted here: remember that the token list we are currently building will first be processed by the `\lowercase` primitive before \TeX carries out the definitions. This means that the ‘C’ character in the argument to the `\@warning` macro must be protected against being changed to ‘c’. That’s the reason why we added the `\lccode` assignment above. We can now finish the argument to `\lowercase` as well as the group in which the category codes were changed.

```
\def\verbatim@rescan#1#2~\{\if\noexpand~\noexpand#2~\else
\@warning{Characters dropped after `\string\end{#1}`}\fi\}
```

### 3.5 The `\verbatiminput` command

```
\verbatiminput
```

We begin by allocating an input stream (out of the 16 available input streams).

```
\verbatim@input
```

The macro `\verbatim@readfile` encloses the main loop by calls to the macros `\verbatim@startline` and `\verbatim@finish`, respectively. This makes sure that the user can initialize and finish the command when the file is empty or doesn’t exist. The `verbatim` environment has a similar behaviour when called with an empty text.

```
\def\verbatim@readfile#1{\%\verbatim@startline
\verbatim@in@stream
\verbatim@readfile
```

The macro `\verbatim@readfile` encloses the main loop by calls to the macros `\verbatim@startline` and `\verbatim@finish`, respectively. This makes sure that the user can initialize and finish the command when the file is empty or doesn’t exist. The `verbatim` environment has a similar behaviour when called with an empty text.

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```

We begin by allocating an input stream (out of the 16 available input streams).

```
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```

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```
\verbatim@readfile
```

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```
\verbatim@readfile
```

We begin by allocating an input stream (out of the 16 available input streams).

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The macro `\verbatim@readfile` encloses the main loop by calls to the macros `\verbatim@startline` and `\verbatim@finish`, respectively. This makes sure that the user can initialize and finish the command when the file is empty or doesn’t exist. The `verbatim` environment has a similar behaviour when called with an empty text.

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\verbatim@in@stream
```

The macro `\verbatim@readfile` encloses the main loop by calls to the macros `\verbatim@startline` and `\verbatim@finish`, respectively. This makes sure that the user can initialize and finish the command when the file is empty or doesn’t exist. The `verbatim` environment has a similar behaviour when called with an empty text.

```
\verbatim@readfile
```
When the file is not found we issue a warning.

\verbatiminput{file1}

At this point we pass the name of the file to \verbatim@addtolist so that its appearance appears in the output of a \verbatim\listfiles command. In addition, we use \verbatim\ProvidesFile to make a log entry in the transcript file and to distinguish files read in via \verbatiminput from others.

\verbatim\addtolist{file1}
\verbatim\ProvidesFile{file1}[\verbatim]

While reading from the file it is useful to switch off the recognition of the end-of-line character. This saves us stripping off spaces from the contents of the line.

\verbatim\addtolist{file1}
\verbatim\ProvidesFile{file1}[\verbatim]

All the work is done in \verbatim\readfile. It reads the input file line by line and recursively calls itself until the end of the file.

\verbatim\readfile
\verbatim\addtolist{next}
\verbatim\ProvidesFile{next}[\verbatim]

For each line we call \verbatim\addtolist with the contents of the line. \verbatim\processline is called next.

\verbatim\addtolist{next}
\verbatim\processline

After processing the line we call \verbatim\startline to initialize all before we read the next line.

\verbatim\startline

Without \verbatim\addtolist each call of \verbatim\readfile uses space in \TeX’s input stack.²

\verbatim\addtolist
\verbatim\finish

\verbatiminput \verbatiminput first starts a group to keep font and category changes local. Then it calls the macro \verbatim\input with additional arguments, depending on whether an asterisk follows.

\verbatim\input{begingroup
\verbatim\ifstar{\verbatim\input[\verbatim\frenchspacing\verbatim\vobeyspaces]}

²A standard \TeX would report an overflow error if you try to read a file with more than ca. 200 lines. The same error occurs if the first line of code in §390 of “\TeX: The Program” is missing.
\verbatiminput \verbatiminput first checks whether the file exists, using the standard macro \IfFileExists which leaves the name of the file found in \@filef@und. Then everything is set up as in the \verbatim macro.

\verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput Then it reads in the file, finishes off the trivlist environment started by \verbatim and closes the group. This restores everything to its normal settings.

\verbatiminput \verbatiminput \verbatiminput \verbatiminput If the file is not found a more or less helpful message is printed. The final \verbatim is needed to close the group started in \verbatiminput above.

3.6 Getting verbatim text into arguments.

One way of achieving this is to define a macro (command) whose expansion is the required verbatim text. This command can then be used anywhere that the verbatim text is required. It can be used in arguments, even moving ones, but it is fragile (at least, the version here is).

Here is some code which claims to provide this. It is a much revised version of something I (Chris) did about 2 years ago. Maybe it needs further revision.

It is only intended as an extension to \verb, not to the verbatim environment. It should therefore, perhaps, treat line-ends similarly to whatever is best for \verb.

\newverbtext

This is the command to produce a new macro whose expansion is verbatim text. This command itself cannot be used in arguments, of course! It is used as follows:

\newverbtext\verbtext{\myverb}’%{ &~_\}}@ #"

The rules for delimiting the verbatim text are the same as those for \verb.

\newverbtext

\verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput %
\verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput %
\verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput %
\verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput %

I think that a temporary switch is safe here: if not, then suitable \let\s can be used.

\verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput %
\verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput %
\verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput %
\verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput %
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\verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput \verbatiminput %

We use a temporary macro here and a trick so that the definition of the command itself can be done inside the group and be a local definition (there may be better ways to achieve this).
If these \noexpand\protect\noexpand would this make these things robust?

\edef #1{\noexpand \@verbtextmcheck
\bgroup
\if@tempswa
\noexpand \visiblespaces
\fi
\noexpand \@verbtextsetup
##1%
\egroup}%
}
\expandafter\endgroup\@tempa
}

This sets up the correct type of group for the mode: it must not be expanded at define time!

\def \@verbtextmcheck {%
\relax\ifmmode
\hbox
\else
\leavevmode
\null
\fi
}

This contains other things which should not be expanded during the definition.

\def \@verbtextsetup {%
\frenchspacing
\verbatim@font
\verbtextstyle
}

The command \verbtextstyle is a document-level hook which can be used to override the predefined typographic treatment of commands defined with \newverbtext commands.

\visiblespaces and \whitespaces are examples of possible values of this hook.

\let \verbtextstyle \relax
\def \visiblespaces {\chardef \ 32\relax}
\def \whitespaces {\let \ \@space}
\let \@@space \ %

4 Testing the implementation

For testing the implementation and for demonstration we provide an extra file. It can be extracted by using the conditional ‘testdriver’. It uses a small input file called ‘verbtest.tst’ that is distributed separately. Again, we use individual ‘+’ guards.

(*testdriver)
\documentclass{article}
\usepackage{verbatim}

\newenvironment{myverbatim}{\endgraf\noindent MYVERBATIM:\verbatim}{\endverbatim}

\makeatletter

\newenvironment{verbatimlisting}{\def\verbatim@startline\input{#1}\verbatim@startline}{\endverbatim}

\newwrite\verbatim@out

\newenvironment{verbatimwrite}{\@bsphack\immediate\openout \verbatim@out #1\let\do\@makeother\dospecials\catcode`\^^M\active\def\verbatim@processline{\immediate\write\verbatim@out{\the\verbatim@line}}\verbatim@start}{\immediate\closeout\verbatim@out\@esphack}

\makeatother

\addtolength{\textwidth}{30pt}

\begin{document}

Text Text Text Text Text Text Text Text Text Text Text

\begin{verbatim}
\text
\end{verbatim*}
\text
\end{verbatim
\text
\begin{verbatim}
\text
\end{verbatim} Further text to be typeset: $\alpha$. 

Text Text Text Text Text Text Text Text Text Text Text
Verbatim style option

First of Chris Rowley's fiendish tests:

\begin{verbatim}
the double end test<text>
\end{verbatim} or even \end{verbatim}
%
%not \end\ended??
%\end{verbatim}
Back to my own tests:

\begin{myverbatim}
test
\end{myverbatim} rest of line
Test of empty verbatim:
\begin{verbatim}
\end{verbatim}

Another of Chris' devils:

\begin{verbatim}
the single brace test<text>
\end{verbatim}
%
%not \end{verbatim}
Back to my own tests:

\begin{verbatim}
test
\end{verbatim}
Test of empty verbatim:
\begin{verbatim}
\end{verbatim}

Additonal verbatim text
... 
\end{verbatim}
And here for listing a file:
\verbatiminput{verbtest.tex}

And again, with explicit spaces:
\verbatiminput*{verbtest.tex}
Text Text Text Text Text Text Text Text Text Text Text
Text Text Text Text Text Text Text Text Text Text Text
Text Text Text Text Text Text Text Text Text Text Text
\begin{comment}
test
\end{verbatim*}
test
\end{verbatim}

Further text to be typeset: $\alpha$.
\verbatimwrite{verbtest.txt}
asfa<fa<df
sdfsdfasd
asdfa<fsa
\end{verbatimwrite}
\end{document}