Hints & Tricks

Glistterings

Peter Wilson

Not all that tempts your wand’ring eyes
And heedless hearts, is lawful prize;
Nor all, that glisters, gold.

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Ode to a Favourite Cat

THOMAS GRAY

For many years Jeremy Gibbons has edited a very successful column in \TeX{} and TUG NEWS and TUGboat called Hey — It works!\textsuperscript{[?]}. I have learnt much from this but apparently not enough to decline when asked to take over the column. On the other hand I have learnt to my cost that the quickest way to get a correct answer to a question on the comp.text.tex (ctt) newsgroup is to give an incorrect answer. In order not to sully Jeremy’s reputation my first thought was to change the title to Hey — It might work but after some consideration the new title is as you see it above — Glistterings — implying that there might be some dross among the nuggets.

Corrections, suggestions, and contributions will always be welcome.

Several questions on ctt recently have been related to comparing two words or strings. To my chagrin I gave an incorrect answer to one of the questions, so I’ll now try and redeem myself.

If you can meet with triumph and disaster
And treat those two imposters just the same...

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If —

RUDYARD KIPLING

Checking for an optional argument

If you are defining a new command that has an optional argument you often need some way of checking whether or not it is present when the macro is called, especially when it should be ignored if it is not present. One convention is to use the kernel \empty macro as the default for the optional argument.

\newcommand{\mine}[2][\empty]{%
% if #1 is \empty do nothing else
% do something

To me the obvious way of performing the check was to use \TeX{}’s \ifx primitive to compare \empty and the actual value of the argument, as in
The \StrCfStr macro performs a case insensitive test on two strings. For example, it will set \ifsame true for any of the pairs (abc, abc), (abc, Abc), (abc, aBc), and so on. It uses \lowercase to convert any uppercase letter to a lowercase letter so all the letters will be lowercase at the time \strcfstr does the checking. This will not work if the arguments include differently cased macro names as \lowercase does not touch those.

The \strcfstr and \StrCfStr macros have provided all the string testing that I have needed, but I’ll show a couple of extensions. One thing is that \strcfstr relies on \def which is not expandable so, for example, it cannot be used in an \edef. Both Victor Eijkhout [?], section 13.8.7 and David Kastrup [?] have presented solutions for this. The other is that you may want to check if a macro expands to a particular string. David’s expandable macro also provides a solution for this and Michael Downes[?] gives a somewhat different method using \expandafter.

We can use \strcfstr as the basis for the macro to string comparison, by using \expandafters.

\newcommand{\macrocfstr}[2]{\expandafter\strcfstr\expandafter{#1}{#2}}

The first argument to \macrocfstr is either a string or a macro that is expected to expand to a string. The second argument is the test string.

We can also do a case insensitive test by using

\newcommand{\MacroCfStr}[2]{\lowercase{\macrocfstr{#1}{#2}}}

The \charscfchars expandable macro below is based on Victor’s code. It is tricky because it uses recursion to perform pairwise comparisons of the individual characters in its two arguments, and it requires two supporting macros.

\catcode`\^^G=11 \make at
\newcommand{\charscfchars}[2]{\IfAllChars#1\^^G\Are#2\^^G\theSame}

\charscfchars adds a character at the end of its arguments to mark the ends of the strings. Victor used $ as the marker which meant that neither argument could include $ among the characters. I chose to use \mbox{~}G (\TeX’s notation for the ASCII BEL control character, which is normally invalid \TeX). The \catcode changes first make \mbox{~}G appear to be a letter and then at the end of the macro definitions it is set back to its normal invalid state.

The next macro, which is presented with some interspersed commentary, does most of the work.

\def\IfAllChars#1#2#3#4\theSame{\IfAllChars#1#2#3\@\samefalse\fi}

\newcommand{\testoptarg}[1]{\if\1\2\@empty\fi}

\begin{Verbatim}
\newcommand{\testoptarg}[1][\@empty]{\if\1\2\@empty\fi}
  \ifsame\Optional (#1) unused\else\Optional (#1) present\fi
\end{Verbatim}

If you try this you can get some odd results:
\testoptarg \Optional [full] \Optional [oops] \psOptional [oops] unused

It was kindly explained to me \footnote{1} that \ifsame checks the following two tokens and in \TeX a token is either a command sequence (e.g., \@empty) or a single character, like ‘o’. In the oops example, \ifsame checks ‘o’ and ‘o’, concludes that they are the same, and hence the strange result. Flipping the token ordering works better:
\ifsame\Optional #1\fi

Now \testoptarg and \testoptarg[\@empty] will report ‘Optional () unused’. Any other call, for example \testoptarg[], will report ‘Optional () present’, and in particular \testoptarg[oops] reports ‘Optional (oops) present’.

\newcommand{\charscfchars}[2]{\begin{group}
  \def\1{#1}\def\2{#2}\
  \if\1\2\@empty\samefalse\fi
\end{group}

The two arguments to \charscfchars\footnote{2} are the strings to be tested. \ifsame is set true if the two strings match character to character. If the arguments are macro names it checks the characters in the names, not their definitions. If there are any spaces in the arguments, each group is reduced to a single space before the strings are compared. \charscfchars\footnote{3} sets \ifsame false but \charscfchars\footnote{4} sets it true.

\newcommand{\strcfstr}[2]{\lowercase{\macrocfstr{#1}{#2}}}

\newcommand{\MacroCfStr}[2]{\lowercase{\macrocfstr{#1}{#2}}}

\newcommand{\testoptarg}[1][\@empty]{\if\1\2\@empty\fi}

\begin{Verbatim}
\newcommand{\StrCfStr}[2]{\ifsame
  \Optional (#1) present\else
  \Optional (#1) unused\fi
\end{Verbatim}

\newcommand{\charscfchars}[2]{\begin{group}
  \def\1{#1}\def\2{#2}\
  \if\1\2\@empty\samefalse\fi
\end{group}

\newcommand{\strcfstr}[2]{\lowercase{\macrocfstr{#1}{#2}}}

\newcommand{\MacroCfStr}[2]{\lowercase{\macrocfstr{#1}{#2}}}

\newcommand{\testoptarg}[1][\@empty]{\if\1\2\@empty\fi}

\begin{Verbatim}
\newcommand{\testoptarg}[1][\@empty]{\if\1\2\@empty\fi}
  \ifsame\Optional (#1) unused\else\Optional (#1) present\fi
\end{Verbatim}

By, among others, Donald Arseneau, Michael Downes and Stephan Lemke.

The cf used in the names of macros is the abbreviation cf (from the Latin \textit{confer} = compare).
The macro takes two pairs of arguments that are delimited by the tokens \Are and \TheSame. The first pair of arguments are for the first string under test and the second pair for the other string. More specifically, \#1 will be the first character in the first string and \#2 contains the remaining characters (including the "^^G marker), and similarly for \#3 and \#4. If the ends of both strings have been reached, then the strings are the same, but if only the end of the first string has been reached, the strings are different. If we are not at the end of the first string there is more work to be done.

\else\if#1#3\IfRest#2\TheSame#4\else
 \samefalse\fi\fi\}

If the corresponding characters in the two strings are the same then the rest of the character pairs must be checked, otherwise the characters don’t match and we are done.

The last of the macros takes three arguments which are delimited by the tokens \TheSame, \else, and \fi\fi. The first two arguments are strings to be compared, and it throws away the third.

\def\IfRest#1\TheSame#2\else#3\fi\fi{%
 \fi\fi \IfAllChars#1\Are#2\TheSame}

\catcode`^^G=15 % return to invalid

This macro simply calls \IfAllChars... to compare the strings.

\charscfchars can be used as a basis for case insensitive and macro to string comparisons exactly like \strcfstr.

Apart from \charscfchars being expandable while \strcfstr is not, it also ignores all space characters while \strcfstr does not. For example, \charscfchars\{ab\}{a_b} thinks that the arguments are identical but they will be reported as different if \strcfstr\{ab\}{a_b} is used.

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