The `visualtoks` Package, version 1.0

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June 20, 2025

In The TEXbook, Knuth demonstrates the concept of tokens with the following example:

> For example, if the normal conventions of plain TEXare in force, the text '`{\hskip 36 pt}`' is converted into a list of eight tokens:
>
> $$\texttt{\{}_1 \quad \boxed{\texttt{hskip}} \quad \texttt{3}_{12} \quad \texttt{6}_{12} \quad \texttt{␣}_{10} \quad \texttt{p}_{11} \quad \texttt{t}_{11} \quad \texttt{\}}_2$$
>
> The subscripts here are the category codes, as listed earlier: 1 for "beginning of group," 12 for "other character," and so on. The `\hskip` doesn't get a subscript, because it represents a control sequence token instead of a character token. Notice that the space after `\hskip` does not get into the token list, because it follows a control word. (p. 38)

The same style of token display is used several times in the TEXbook. It would be useful to be able to generate the display automatically for an arbitrary list of tokens, for pedagogical or debugging purposes. This package provides the `\visualtoks` command which does exactly that.

Usage

Usage: `\visualtoks{` ⟨*token list*⟩ `}`.

This package may be used in plain TEX or LATEX by `\input{visualtoks}`. The ε-TEX extensions are required for the `\detokenize` primitive.

⟨*token list*⟩ must be balanced with respect to explicit braces, and must not contain the token `\visualtoks@cycle@nil`. It is assumed that `{` is the only character with category code 1 (beginning of group).

The horizontal separation between displayed tokens may be configured by the `\dimen` register `\visualtokskip`. The default value is 1em.

Samples

- `\visualtoks{\def \macro {abc #1\egroup}}` gives

  $\boxed{\texttt{def}}\ \boxed{\texttt{macro}}\ \#_6\ 1_{12}\ \{_1\ a_{11}\ b_{11}\ c_{11}\ \sqcup_{10}\ \#_6\ 1_{12}\ \boxed{\texttt{egroup}}\ \}_2.$

- `\visualtoks{$$\halign{&##\hfil\crcr}$$\par}` gives

  $\$_3\ \$_3\ \boxed{\texttt{halign}}\ \{_1\ \&_4\ \#_6\ \#_6\ \boxed{\texttt{hfil}}\ \boxed{\texttt{crcr}}\ \}_2\ \$_3\ \$_3\ \boxed{\texttt{par}}.$

- Unbalanced `\if...` tokens:
  `\visualtoks{\ifnum\iffalse{\fi‘} = 0\else}` gives

  $\boxed{\texttt{ifnum}}\ \boxed{\texttt{iffalse}}\ \{_1\ \boxed{\texttt{fi}}\ \text{‘}_{12}\ \}_2\ \sqcup_{10}\ =_{12}\ \sqcup_{10}\ 0_{12}\ \boxed{\texttt{else}}.$

- To demonstrate how TEX tokenizes consecutive spaces:
  `\makeatletter \edef\temp{{␣␣␣␣}{\@spaces}}`
  `\expandafter\visualtoks\expandafter{\temp}` gives

  $\{_1\ \sqcup_{10}\ \}_2\ \{_1\ \sqcup_{10}\ \sqcup_{10}\ \sqcup_{10}\ \sqcup_{10}\ \}_2.$

- To demonstrate the `\lowercase` technique:
  `\begingroup \lccode‘a=‘$ \lccode‘?=‘$ \lccode‘#=‘$ \lccode‘␣=‘$`
  `\lowercase{\endgroup\def\temp{$a?## }}`
  `\expandafter\demotokens\expandafter{\temp}` gives

  $\$_3\ \$_{11}\ \$_{12}\ \$_6\ \$_{10}.$