

# The `visualtoks` Package, version 1.0a

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In The  $\text{\TeX}$ book, Knuth demonstrates the concept of tokens with the following example:

For example, if the normal conventions of plain  $\text{\TeX}$  are in force, the text ‘`\hskip 36 pt`’ is converted into a list of eight tokens:

$$\{_1 \quad \boxed{\text{hskip}} \quad 3_{12} \quad 6_{12} \quad \sqcup_{10} \quad p_{11} \quad t_{11} \quad \}_2$$

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  $\text{\TeX}$ book. 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  $\text{\TeX}$  or  $\text{\LaTeX}$  by `\input{visualtoks}`. The  $\varepsilon\text{\TeX}$  extensions are required for the `\detokenize` primitive.

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

`<token list>` must be balanced with respect to explicit braces, and must not contain the token `\visualtoks@cycle@nil`. It is assumed that `{` and `}` are the only characters with category codes 1 (beginning of group) and 2 (end of group) respectively.

## Samples

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

`def` `macro` #<sub>6</sub> 1<sub>12</sub> {<sub>1</sub> a<sub>11</sub> b<sub>11</sub> c<sub>11</sub> ␣<sub>10</sub> #<sub>6</sub> 1<sub>12</sub> `egroup` }<sub>2</sub>.

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

`$`<sub>3</sub> `$`<sub>3</sub> `halign` {<sub>1</sub> &<sub>4</sub> #<sub>6</sub> #<sub>6</sub> `hfil` `crr` }<sub>2</sub> `$`<sub>3</sub> `$`<sub>3</sub> `par`.

- Unbalanced `\if...` tokens:

`\visualtoks{\ifnum\iffalse{\fi'} = 0\else}` gives

`ifnum` `iffalse` {<sub>1</sub> `fi` ' <sub>12</sub> }<sub>2</sub> ␣<sub>10</sub> =<sub>12</sub> ␣<sub>10</sub> 0<sub>12</sub> `else`.

- To demonstrate how T<sub>E</sub>X tokenizes consecutive spaces:

`\makeatletter \edef\temp{{\␣␣␣␣}}{\@spaces}}`

`\expandafter\visualtoks\expandafter{\temp}` gives

{<sub>1</sub> ␣<sub>10</sub> }<sub>2</sub> {<sub>1</sub> ␣<sub>10</sub> ␣<sub>10</sub> ␣<sub>10</sub> ␣<sub>10</sub> }<sub>2</sub>.

- To demonstrate the `\lowercase` technique:

`\begingroup`

`\lccode'&=' $ \lccode'#=' $ \lccode'^=' $ \lccode'_'=' $`

`\lccode'␣=' $ \lccode'A=' $ \lccode'?=' $ \lccode'~=' $`

`\lowercase{\endgroup\def\temp{&##^_␣A?~}}`

`\expandafter\visualtoks\expandafter{\temp}` gives

`$`<sub>3</sub> `$`<sub>4</sub> `$`<sub>6</sub> `$`<sub>7</sub> `$`<sub>8</sub> `$`<sub>10</sub> `$`<sub>11</sub> `$`<sub>12</sub> `$`<sub>13</sub>.

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## Repository

The upstream repository of this package may be found at

<https://github.com/plante3/visualtoks/tree/main>.