ltcounts.dtx

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1 Counters and Lengths

Commands for defining and using counters. This file defines:

`\newcounter` To define a new counter.

`\setcounter` To set the value of counters.

`\addtocounter` Increase the counter `#1` by the number `#2`.

`\stepcounter` Increase a counter by one.

`\refstepcounter` Increase a counter by one, also setting the value used by `\label`.

`\value` For accessing the value of the counter as a TeX number (as opposed to `\the`⟨*counter*⟩ which expands to the *printed* representation of ⟨*counter*⟩)

`\arabic` `\arabic{`⟨*counter*⟩`}`: 1, 2, 3, ...

`\roman` `\roman{`⟨*counter*⟩`}`: i, ii, iii, ...

`\Roman` `\Roman{`⟨*counter*⟩`}`: I, II, III, ...

`\alph` `\alph{`⟨*counter*⟩`}`: a, b, c, ...

`\Alph` `\Alph{`⟨*counter*⟩`}`: A, B, C, ...

`\fnsymbol` `\fnsymbol{`⟨*counter*⟩`}`: ∗, †, ‡, ...

`\counterwithin` `\counterwithin{`⟨*counter*⟩`}{`⟨*within-counter*⟩`}`: Resets ⟨*counter*⟩ whenever ⟨*within-counter*⟩ is stepped. Also redefines `\the`⟨*counter*⟩ command to produce `\the`⟨*within-counter*⟩`.\arabic{`⟨*counter*⟩`}`. Star form omits redefining the print representation.

`\counterwithout` `\counterwithout{`⟨*counter*⟩`}{`⟨*within-counter*⟩`}`: Removes ⟨*counter*⟩ from the reset list of ⟨*within-counter*⟩. Also redefines `\the`⟨*counter*⟩ command to produce `\arabic{`⟨*counter*⟩`}`. Star form omits redefining the print representation.

1 ⟨∗2ekernel⟩

1.1 Environment Counter Macros

An environment foo has an associated counter defined by the following control sequences:

`\c@foo` Contains the counter's numerical value. It is defined by `\newcount\foocounter`.

`\thefoo` Macro that expands to the printed value of `\foocounter`. For example, if sections are numbered within chapters, and section headings look like
Section II-3. The Nature of Counters
then `\thesection` might be defined by:

```
\def\thesection
    {\@Roman{\c@chapter}-\@arabic{\c@section}}
```

`\p@foo` Macro that expands to a printed 'reference prefix' of counter foo. Any `\ref` to a value created by counter foo will produce the expansion of `\p@foo\thefoo` when the `\label` command is executed. See file `ltxref.dtx` for an extension of this mechanism.

`\cl@foo` List of counters to be reset when foo stepped. Has format `\@elt{countera}\@elt{counterb}\@elt{counterc}`.

NOTE:
`\thefoo` and `\p@foo` *must* be defined in such a way that `\edef\bar{\thefoo}` or `\edef\bar{\p@foo}` defines `\bar` so that it will evaluate to the counter value at the time of the `\edef`, even after `\foocounter` and any other counters have been changed. This will happen if you use the standard commands `\@arabic`, `\@Roman`, etc.

The following commands are used to define and modify counters.

`\refstepcounter{`⟨*foo*⟩`}`
Same as `\stepcounter`, but it also defines `\@currentreference` so that a subsequent `\label{`⟨*bar*⟩`}` command causes `\ref{`⟨*bar*⟩`}` to generate the current value of counter ⟨*foo*⟩.

`\@definecounter{`⟨*foo*⟩`}`
Initializes counter `{`⟨*foo*⟩`}` (with empty reset list), defines `\p@foo` and `\thefoo` to be null. Also adds ⟨*foo*⟩ to `\cl@@ckpt` – the reset list of a dummy counter `@ckpt` used for taking checkpoints for the `\include` system.

`\@addtoreset{`⟨*foo*⟩`}{`⟨*bar*⟩`}` : Adds counter ⟨*foo*⟩ to the list of counters `\cl@bar` to be reset when counter ⟨*bar*⟩ is stepped.

`\@removefromreset{`⟨*foo*⟩`}{`⟨*bar*⟩`}` : Removes counter ⟨*foo*⟩ to the list of counters `\cl@bar` to be reset when counter ⟨*bar*⟩ is stepped.

`\setcounter` `\setcounter{`⟨*foo*⟩`}{`⟨*val*⟩`}` : Globally sets `\foocounter` equal to ⟨*val*⟩.

```
\def\setcounter#1#2{%
  \@ifundefined{c@#1}%
    {\@nocounterr{#1}}%
    {\global\csname c@#1\endcsname#2\relax}}
```

`\addtocounter` `\addtocounter{`⟨*foo*⟩`}{`⟨*val*⟩`}` Globally increments `\foocounter` by ⟨*val*⟩.

```
\def\addtocounter#1#2{%
  \@ifundefined{c@#1}%
    {\@nocounterr{#1}}%
    {\global\advance\csname c@#1\endcsname #2\relax}}
```

\newcounter `\newcounter{`⟨*newctr*⟩`}[`⟨*oldctr*⟩`]` Defines ⟨*newctr*⟩ to be a counter, which is reset when counter ⟨*oldctr*⟩ is stepped. If ⟨*newctr*⟩ already defined produces '`c@newctr already defined`' error.

```
\def\newcounter#1{%
  \expandafter\@ifdefinable \csname c@#1\endcsname
    {\@definecounter{#1}}%
  \@ifnextchar[{\@newctr{#1}}{}}
```

\value `\value{`⟨*ctr*⟩`}` produces the value of counter ⟨*ctr*⟩, for use with a `\setcounter` or `\addtocounter` command.

```
\def\value#1{\csname c@#1\endcsname}
```

\@newctr

```
\def\@newctr#1[#2]{%
  \@ifundefined{c@#2}{\@nocounterr{#2}}{\@addtoreset{#1}{#2}}}
```

\stepcounter `\stepcounter`foo Globally increments counter `\c@FOO` and resets all subsidiary counters.

```
\def\stepcounter#1{%
  \addtocounter{#1}\@ne
  \begingroup
    \let\@elt\@stpelt
    \csname cl@#1\endcsname
  \endgroup}
```

\@stpelt Rather than resetting the "within" counter to zero we set it to -1 and then run `\stepcounter` that moves it to 0 and also initiates resetting the next level down.

```
⟨/2ekernel⟩
⟨latexrelease⟩\IncludeInRelease{2015/01/01}{\@stpelt}
⟨latexrelease⟩                                {Reset nested counters}%
⟨*2ekernel | latexrelease⟩
\def\@stpelt#1{\global\csname c@#1\endcsname \m@ne\stepcounter{#1}}%
⟨latexrelease⟩\EndIncludeInRelease
⟨/2ekernel | latexrelease⟩
⟨latexrelease⟩\IncludeInRelease{0000/00/00}{\@stpelt}
⟨latexrelease⟩                                {Reset nested counters}%%
⟨latexrelease⟩\def\@stpelt#1{\global\csname c@#1\endcsname \z@}%
⟨latexrelease⟩\EndIncludeInRelease
⟨*2ekernel⟩
```

\cl@@ckpt

```
\def\cl@@ckpt{\@elt{page}}
```

\@definecounter

```
\def\@definecounter#1{\expandafter\newcount\csname c@#1\endcsname
    \setcounter{#1}\z@
    \global\expandafter\let\csname cl@#1\endcsname\@empty
    \@addtoreset{#1}{@ckpt}%
    \global\expandafter\let\csname p@#1\endcsname\@empty
    \expandafter
    \gdef\csname the#1\expandafter\endcsname\expandafter
         {\expandafter\@arabic\csname c@#1\endcsname}}
```

\@addtoreset

```
\def\@addtoreset#1#2{\expandafter\@cons\csname cl@#2\endcsname {{#1}}}
```

⟨/2ekernel⟩

\@removefromreset

```
⟨latexrelease⟩\IncludeInRelease{2018-04-01}
⟨latexrelease⟩                    {\@removefromreset}{Add interfaces}%
⟨*2ekernel | latexrelease⟩
```

```
\def\@removefromreset#1#2{%
```

Even through this is internal and the programmer should know what he/she is doing we test here if counter #2 is defined. If not, the execution would run into a tight loop.

```
  \@ifundefined{c@#2}\relax
  {\begingroup
     \expandafter\let\csname c@#1\endcsname\@removefromreset
     \def\@elt##1{%
       \expandafter\ifx\csname c@##1\endcsname\@removefromreset
       \else
         \noexpand\@elt{##1}%
       \fi}%
     \expandafter\xdef\csname cl@#2\endcsname
      {\csname cl@#2\endcsname}%
    \endgroup}}
```

\@ifbothcounters Test if arg #1 and #2 are counters and if so execute #3.

```
\def\@ifbothcounters#1#2#3{%
  \@ifundefined{c@#1}{\@nocounterr{#1}}%
    {% else counter is defined
     \@ifundefined{c@#2}{\@nocounterr{#2}}%
       {% else both counter and within  are defined
        #3}}}
```

\counterwithout

```
\def\counterwithout {\@ifstar\counterwithout@s\counterwithout@x}
\def\counterwithout@s#1#2{%
  \@ifbothcounters{#1}{#2}{\@removefromreset{#1}{#2}}}
```

```
\def\counterwithout@x#1#2{%
  \@ifbothcounters{#1}{#2}%
      {\@removefromreset{#1}{#2}%
       \expandafter
       \gdef\csname the#1\expandafter\endcsname\expandafter
            {\expandafter
             \@arabic\csname c@#1\endcsname}}}
```

`\counterwithin`

```
\def\counterwithin{\@ifstar\counterwithin@s\counterwithin@x}
\def\counterwithin@s#1#2{%
  \@ifbothcounters{#1}{#2}{\@addtoreset{#1}{#2}}}
\def\counterwithin@x#1#2{%
  \@ifbothcounters{#1}{#2}%
      {\@addtoreset{#1}{#2}%
       \expandafter
       \gdef\csname the#1\expandafter\endcsname\expandafter
            {\csname the#2\expandafter\endcsname\expandafter
             \@arabic\csname c@#1\endcsname}}}
```

```
⟨/2ekernel | latexrelease⟩
⟨latexrelease⟩\EndIncludeInRelease
⟨latexrelease⟩\IncludeInRelease{0000-00-00}
⟨latexrelease⟩                  {\@removefromreset}{Add interfaces}%
⟨latexrelease⟩\let \@removefromreset \undefined
⟨latexrelease⟩\let \@ifbothcounters  \undefined
⟨latexrelease⟩\let \counterwithout   \undefined
⟨latexrelease⟩\let \counterwithout@s \undefined
⟨latexrelease⟩\let \counterwithout@x \undefined
⟨latexrelease⟩\let \counterwithin    \undefined
⟨latexrelease⟩\let \counterwithin@s  \undefined
⟨latexrelease⟩\let \counterwithin@x  \undefined
⟨latexrelease⟩\EndIncludeInRelease
⟨*2ekernel⟩
```

Numbering commands for definitions of `\theCOUNTER` and `\list` arguments. All commands can now be used in text and math mode.

`\arabic` Representation of⟨*counter*⟩ as arabic numerals. Changed 29 Apr 86 to make it print the obvious thing it COUNTER not positive.

```
\def\arabic#1{\expandafter\@arabic\csname c@#1\endcsname}
```

`\roman` Representation of ⟨*counter*⟩ as lower-case Roman numerals.

```
\def\roman#1{\expandafter\@roman\csname c@#1\endcsname}
```

`\Roman` Representation of ⟨*counter*⟩ as upper-case Roman numerals.

```
\def\Roman#1{\expandafter\@Roman\csname c@#1\endcsname}
```

`\alph` Representation of ⟨*counter*⟩ as a lower-case letter: 1 = a, 2 = b, etc.

```
\def\alph#1{\expandafter\@alph\csname c@#1\endcsname}
```

`\Alph` Representation of ⟨*counter*⟩ as an upper-case letter: 1 = A, 2 = B, etc.

```
\def\Alph#1{\expandafter\@Alph\csname c@#1\endcsname}
```

`\fnsymbol` Representation of ⟨*COUNTER*⟩ as a footnote symbol: 1 = ∗, 2 = †, etc.

```
\def\fnsymbol#1{\expandafter\@fnsymbol\csname c@#1\endcsname}
```

`\@arabic` `\@arabic\FOOcounter` Representation of `\FOOcounter` as arabic numerals.

```
\def\@arabic#1{\number #1}  %% changed 29 Apr 86
```

`\@roman` `\@roman\FOOcounter` Representation of `\FOOcounter` as lower-case Roman numerals.

```
\def\@roman#1{\romannumeral #1}
```

`\@Roman` `\@Roman\FOOcounter` Representation of `\FOOcounter` as upper-case Roman numerals.

```
\def\@Roman#1{\expandafter\@slowromancap\romannumeral #1@}
```

`\@slowromancap` Fully expandable macro to change a roman number to uppercase.

```
\def\@slowromancap#1{\ifx @#1% then terminate
     \else
       \if i#1I\else\if v#1V\else\if x#1X\else\if l#1L\else\if
       c#1C\else\if d#1D\else \if m#1M\else#1\fi\fi\fi\fi\fi\fi\fi
       \expandafter\@slowromancap
     \fi
}
```

`\@alph` `\@alph\FOOcounter` Representation of `\FOOcounter` as a lower-case letter: 1 = a, 2 = b, etc.

```
\def\@alph#1{%
  \ifcase#1\or a\or b\or c\or d\or e\or f\or g\or h\or i\or j\or
   k\or l\or m\or n\or o\or p\or q\or r\or s\or t\or u\or v\or w\or x\or
    y\or z\else\@ctrerr\fi}
```

`\@Alph` `\@Alph\FOOcounter` Representation of `\FOOcounter` as an upper-case letter: 1 = A, 2 = B, etc.

```
\def\@Alph#1{%
  \ifcase#1\or A\or B\or C\or D\or E\or F\or G\or H\or I\or J\or
   K\or L\or M\or N\or O\or P\or Q\or R\or S\or T\or U\or V\or W\or X\or
    Y\or Z\else\@ctrerr\fi}
```

`\@fnsymbol` Typesetting old fashioned footnote symbols. This can be done both in text or math mode now.

This macro is another example of an ever recurring problem in TEX: Determining if something is text-mode or math-mode. It is imperative for the decision between text and math to be delayed until the actual typesetting is done as the code in question may go through an `\edef` or `\write` where an `\ifmmode` test would be executed prematurely. Hence in the implementation below, `\@fnsymbol` is not robust in itself but the parts doing the actual typesetting are.

In the case of `\@fnsymbol` we make use of the robust command `\TextOrMath` which takes two arguments and typesets the first if in text-mode and the second if in math-mode. Note that in order for this command to make the correct decision, it must insert a `\relax` token if run under regular TEX, which ruins any kerning between the preceding characters and whatever awaits typesetting. If you use eTEX as engine for LATEX (as recommended) this unfortunate side effect is not present.

```
⟨/2ekernel⟩
⟨latexrelease⟩\IncludeInRelease{2015/01/01}{\@fnsymbol}{Use \TexOrMath}%
⟨*2ekernel | latexrelease⟩
\def\@fnsymbol#1{%
   \ifcase#1\or \TextOrMath\textasteriskcentered *\or
   \TextOrMath \textdagger \dagger\or
   \TextOrMath \textdaggerdbl \ddagger \or
   \TextOrMath \textsection  \mathsection\or
   \TextOrMath \textparagraph \mathparagraph\or
   \TextOrMath \textbardbl \|\or
   \TextOrMath {\textasteriskcentered\textasteriskcentered}{**}\or
   \TextOrMath {\textdagger\textdagger}{\dagger\dagger}\or
   \TextOrMath {\textdaggerdbl\textdaggerdbl}{\ddagger\ddagger}\else
   \@ctrerr \fi
}%
⟨/2ekernel | latexrelease⟩
⟨latexrelease⟩\EndIncludeInRelease
⟨latexrelease⟩\IncludeInRelease{0000/00/00}{\@fnsymbol}{Use \TexOrMath}%
⟨latexrelease⟩\def\@fnsymbol#1{\ensuremath{%
⟨latexrelease⟩    \ifcase#1\or *\or \dagger\or \ddagger\or \mathsection\or
⟨latexrelease⟩      \mathparagraph\or \|\or **\or \dagger\dagger
⟨latexrelease⟩      \or \ddagger\ddagger \else\@ctrerr\fi}}%
⟨latexrelease⟩\EndIncludeInRelease
⟨*2ekernel⟩
```

`\TextOrMath` When using regular TEX, we make this command robust so that it always selects the correct branch in an `\ifmmode` switch with the usual disadvantage of ruining kerning. For the application we use it for here that shouldn't matter. The alternative would be to mimic `\IeC` from inputenc but then it wil have the disadvantage of choosing the wrong branch if appearing at the beginning of an alignment cell. However, users of eTEX will be pleasantly surprised to get the best of both worlds and no bad side effects.

First some code for checking if we are running eTEX but making sure not to permanently turn `\protected` into `\relax`.

```
⟨/2ekernel⟩
⟨latexrelease⟩\IncludeInRelease{2015/01/01}{\TextOrMath}{\TextOrMath}%
⟨*2ekernel | latexrelease⟩
\begingroup\expandafter\expandafter\expandafter\endgroup
\expandafter\ifx\csname protected\endcsname\relax
```

In case of ordinary TEX we define `\TextOrMath` as a robust command but make sure it always grabs its arguments. If we didn't do this it might very well gobble

spaces in the input stream.

```
\DeclareRobustCommand\TextOrMath{%
  \ifmmode  \expandafter\@secondoftwo
  \else     \expandafter\@firstoftwo  \fi}
\protected@edef\TextOrMath#1#2{\TextOrMath{#1}{#2}}
\else
```

For eTEX the situation is similar. The robust macro is a hidden one so that we again avoid problems of gobbling spaces in the input.

```
\protected\expandafter\def\csname TextOrMath\space\endcsname{%
  \ifmmode  \expandafter\@secondoftwo
  \else     \expandafter\@firstoftwo  \fi}
\edef\TextOrMath#1#2{%
  \expandafter\noexpand\csname TextOrMath\space\endcsname
  {#1}{#2}}
\fi
⟨/2ekernel | latexrelease⟩
⟨latexrelease⟩\EndIncludeInRelease
⟨latexrelease⟩\IncludeInRelease{0000/00/00}{\TextOrMath}{\TextOrMath}%
⟨latexrelease⟩\let\TextOrMath\@undefined
⟨latexrelease⟩\EndIncludeInRelease
⟨*2ekernel⟩

⟨/2ekernel⟩
```