The \texttt{refcount} package

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Abstract

References are not numbers, however they often store numerical data such as section or page numbers. \texttt{\ref} or \texttt{\pageref} cannot be used for counter assignments or calculations because they are not expandable, generate warnings, or can even be links. The package provides expandable macros to extract the data from references. Packages \texttt{hyperref}, \texttt{nameref}, \texttt{titleref}, and \texttt{babel} are supported.

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\*Please report any issues at \url{https://github.com/ho-tex/oberdiek/issues}
1 Usage

1.1 Setting counters

The following commands are similar to \LaTeX’s `\setcounter` and `\addtocounter`, but they extract the number value from a reference:

`\setcounterref`, `\addtocounterref`

`\setcounterpageref`, `\addtocounterpageref`

They take two arguments:

`\...counter...ref {⟨\LaTeX\ counter⟩} {⟨reference⟩}`

An undefined reference produces the usual LaTeX warning and its value is assumed to be zero. Example:

```
\newcounter{ctrA}
\newcounter{ctrB}
\refstepcounter{ctrA}\label{ref:A}
\setcounterref{ctrB}{ref:A}
\addtocounterpageref{ctrB}{ref:A}
```

1.2 Expandable commands

These commands that can be used in expandible contexts (inside calculations, `\edef`, `\csname`, `\write`, ...):

`\getrefnumber`, `\getpagerefnumber`

They take one argument, the reference:

`\get...refnumber {⟨reference⟩}`

The default for undefined references can be changed with macro `\setrefcountdefault`, for example this package calls:

`\setrefcountdefault{0}`

Since version 2.0 of this package there is a new command:

`\getrefbykeydefault {⟨reference⟩} {⟨key⟩} {⟨default⟩}`

This generalized version allows the extraction of further properties of a reference than the two standard ones. Thus the following properties are supported, if they are available:

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>⟨empty⟩</td>
<td>same as <code>\ref</code></td>
<td>\LaTeX</td>
</tr>
<tr>
<td>page</td>
<td>same as <code>\pageref</code></td>
<td>\LaTeX</td>
</tr>
<tr>
<td>title</td>
<td>section and caption titles</td>
<td>titleref</td>
</tr>
<tr>
<td>name</td>
<td>section and caption titles</td>
<td>nameref</td>
</tr>
<tr>
<td>anchor</td>
<td>anchor name</td>
<td>hyperref</td>
</tr>
<tr>
<td>url</td>
<td>url/file</td>
<td>hyperref/xr</td>
</tr>
</tbody>
</table>
Since version 3.2 the expandable macros described before in this section are expandable in exact two expansion steps.

### 1.3 Undefined references

Because warnings and assignments cannot be used in expandible contexts, undefined references do not produce a warning, their values are assumed to be zero. Example:

\begin{verbatim}
\label{ref:here} % somewhere
\refused{ref:here} % see below
\ifodd\getpagerefnumber{ref:here}%
  reference is on an odd page
\else
  reference is on an even page
\fi
\end{verbatim}

In case of undefined references the user usually want’s to be informed. Also \LaTeX{} prints a warning at the end of the \LaTeX{} run. To notify \LaTeX{} and get a normal warning, just use

\begin{verbatim}
\refused {(reference)}
\end{verbatim}

outside the expanding context. Example, see above.

#### 1.3.1 Check for undefined references

In version 3.2 macros were added, that test, whether references are defined.

\begin{verbatim}
\IfRefUndefinedExpandable {⟨refname⟩} {⟨then⟩} {⟨else⟩}
\IfRefUndefinedBabel {⟨refname⟩} {⟨then⟩} {⟨else⟩}
\end{verbatim}

If the reference is not available and therefore undefined, then argument ⟨then⟩ is executed, otherwise argument ⟨else⟩ is called. Macro \texttt{\IfRefUndefinedExpandable} is expandable, but ⟨refname⟩ must not contain babel shorthand characters. Macro \texttt{\IfRefUndefinedBabel} supports shorthand characters of babel, but it is not expandable.

### 1.4 Notes

- The method of extracting the number in this package also works in cases, where the reference cannot be used directly, because a package such as hyperref has added extra stuff (hyper link), so that the reference cannot be used as number any more.
- If the reference does not contain a number, assignments to a counter will fail of course.

### 2 Implementation

1 ⟨*package⟩

Reload check, especially if the package is not used with \LaTeX{}.

\begin{verbatim}
\begingroup\catcode61\catcode48\catcode32=10\relax%
3 \catcode13=5 % ^^M
4 \endlinechar=13 %
5 \catcode35=6 % #
6 \catcode39=12 % '
7 \catcode44=12 % ,
8 \catcode45=12 % -
9 \catcode46=12 % .
\end{verbatim}
\section*{Loading packages}
\begin{verbatim}
\begin{group}
\setattribute{rc@End}{endcsname}\
\end{group}
\input ltxcmds.sty\relax
\input infwarerr.sty\relax
\else
\RequirePackage{ltxcmds}[2011/11/09]\relax
\RequirePackage{infwarerr}[2010/04/08]\relax
\fi
\end{verbatim}
\subsection*{Defining commands}
\begin{verbatim}
\begin{group}
\ifx\@ifdefinable{1}\relax
\def\rc@IfDefinable{1}{% 
\ifx\@undefined{1}\relax
\expandafter\expandafter\expandafter\ltx@firstofone
\else
\expandafter\ltx@firstofone
\else
\PackageError{refcount}{% 
\end{verbatim}
Command \string#1 is already defined. MessageBreak
It will not redefined by this package%
\@ehc
\expandafter\expandafter\expandafter\ltx@gobble
\fi
\fi
\{%
\let\rc@IfDefinable\@ifdefinable
\rc@RobustDefOne
\rc@RobustDefZero
\ltx@IfUndefined{protected}{%
\ltx@IfUndefined{DeclareRobustCommand}{%
\def\rc@RobustDefOne#1#2#3#4{%#1\def#3##1{#4}%
}}%
\rc@IfDefinable#1{%}
\def\rc@RobustDefZero#1#2{%
\rc@IfDefinable#1{%}
\def#1{#2}%
}}%
\rc@RobustDefOne#1#2#3#4{%#1\def#3##1{#4}%
}\rc@IfDefinable#3{%}
\DeclareRobustCommand#2#3[1]{#4}%
}}%
\rc@RobustDefZero#1#2{%
\rc@IfDefinable#1{%}
\DeclareRobustCommand#1{#2}%
}}%
\rc@RobustDefOne#1#2#3#4{%#1\def#3##1{#4}%
}\rc@IfDefinable#3{%}
\protected#1\def#3##1{#4}%
}}%
\rc@RobustDefZero#1#2{%
\rc@IfDefinable#1{%}
\protected\def#1{#2}%
}}%
\rc@RobustDefOne#1#2#3#4{%#1\def#3##1{#4}%
}\rc@IfDefinable#3{%}
\newcommand{newcommand}{%
\rc@newcommand*#1[#2]#3{% hash-ok
\rc@IfDefinable#1{%
\ifcase#2 %
\def#1{#3}%
or
\def#1##1{#3}%
or
\def#1##1##2{#3}%
else
\rc@InternalError
\fi
}}%
2.3 \seterefcountdefault

2.4 \refused

2.5 Setting counters by reference data

2.5.1 Generic setting
#1: \setcounter, \addtocounter
#2: \ltx@car (for \ref), \ltx@cartwo (for \pageref)
#3: \textsc{La}\textsc{TeX} counter
#4: reference

\def\rc@set#1#2#3#4{% 
  \begingroup
  \csname @safe@activestrue\endcsname
  \refused{#4}\
  \expandafter\rc@@set\csname r@#4\endcsname{#1}{#2}{#3}\
  \endgroup
}

\rc@@set
#1: \r@<...>
#2: \setcounter, \addtocounter
#3: \ltx@car (for \ref), \ltx@carsecond (for \pageref)
#4: \textsc{La}\textsc{TeX} counter

\def\rc@RobustDefZero\setcounterref{% 
  \rc@set\setcounter\ltx@car
}

\addtocounterref
#1: \r@<...>
#2: \setcounter, \addtocounter
#3: \ltx@car (for \ref), \ltx@carsecond (for \pageref)
#4: \textsc{La}\textsc{TeX} counter

\def\rc@RobustDefZero\addtocounterref{% 
  \rc@set\addtocounter\ltx@car
}

\setcounterpageref
#1: \r@<...>
#2: \setcounter, \addtocounter
#3: \ltx@car (for \ref), \ltx@carsecond (for \pageref)
#4: \textsc{La}\textsc{TeX} counter

\def\rc@RobustDefZero\setcounterpageref{% 
  \rc@set\setcounter\ltx@carsecond
}

\addtocounterpageref
#1: \r@<...>
#2: \setcounter, \addtocounter
#3: \ltx@car (for \ref), \ltx@carsecond (for \pageref)
#4: \textsc{La}\textsc{TeX} counter

\def\rc@RobustDefZero\addtocounterpageref{% 
  \rc@set\addtocounter\ltx@carsecond
}

2.5.2 User commands

\setcounterref
#1: \rc@RobustDefZero\setcounterref{}
#2: \rc@set\setcounter\ltx@car

\addtocounterref
#1: \rc@RobustDefZero\addtocounterref{}
#2: \rc@set\addtocounter\ltx@car

\setcounterpageref
#1: \rc@RobustDefZero\setcounterpageref{}
#2: \rc@set\setcounter\ltx@carsecond

\addtocounterpageref
#1: \rc@RobustDefZero\addtocounterpageref{}
#2: \rc@set\addtocounter\ltx@carsecond

2.6 Extracting references

\getrefnumber
#1: \rc@newcommand*{\getrefnumber}{1}{%
#2: \romannumeral
#3: \ltx@ifundefined{r@#1}{%
#4: \expandafter\ltx@zero\rc@default%
#5: }{%
#6: \expandafter\expandafter\expandafter\rc@extract@
#7: \expandafter\expandafter\expandafter!%
#8: \csname r@#1\expandafter\endcsname

\csname r@#1\expandafter\endcsname

8
2.7 Macros for checking undefined references
3 Test

3.1 Catcode checks for loading

\catcode`\{=1 %
\catcode`\}=2 %
\catcode`#=6 %
\catcode`@=11 %
\expandafter\ifx\csname count@\endcsname\relax
\countdef\count@=255 %
\fi
\expandafter\ifx\csname @gobble\endcsname\relax
\long\def\@gobble#1{}%
\fi
\expandafter\ifx\csname @firstofone\endcsname\relax
\long\def\@firstofone#1{#1}%
\fi
\expandafter\ifx\csname loop\endcsname\relax
\else
\expandafter\@gobble
\fi
{%
def\loop#1\repeat{%
def\body{#1}%
\iterate
}%
def\iterate{%
\body
\let\next\iterate
\else
\let\next\relax
\fi
\next%
\let\repeat=\fi%
def\RestoreCatcodes{}
count@=0 %
\loop
def\RestoreCatcodes{}
count@=0 %
def\catcode\the\count@=\the\catcode\count@\relax)%
\ifnum\count@<255 %
\advance\count@ 1 %
\repeat
\def\RangeCatcodeInvalid#1#2{%
count@=#1\relax
\loop
\catcode\count@=15 %
\ifnum\count@<#2\relax
\advance\count@ 1 %
\repeat
}
def\RangeCatcodeCheck#1#2#3{%
3.2 Macro tests

(*test2*)
\errorcontextlines=10000 %
\showboxbreadth=10000 %
\showboxdepth=10000 %
\begingroup\expandafter\expandafter\expandafter\endgroup
\expandafter\ifx\csname RequirePackage\endcsname\relax
\RequirePackage{refcount}\[2016/05/16\]%
\else
\catcode`\@=11 %
\begingroup\expandafter\expandafter\expandafter\endgroup
\expandafter\ifx\csname @onelevel@sanitize\endcsname\relax
\begingroup\expandafter\expandafter\expandafter\endgroup
\expandafter\ifx\csname detokenize\endcsname\relax
12
\ifx\detokenize\expandafter{\meaning#1}\fi
\else
\def\@onelevel@sanitize#1{\edef#1{\detokenize\expandafter{#1}}}
\fi
\def\msg#1{\immediate\write16{\space\texttt{#1}}}
\def\empty{}
\def\space{ }
\Test\getrefbykeydefault{}{}\%
\Test\getrefbykeydefault{page}{}\%
\Test\getrefbykeydefault{anchor}{}\%
\Test\getrefbykeydefault{name}{}\%
\Test\getrefbykeydefault{url}{}\%
}
\TestGroup
\Test\getrefbykeydefault{title}{}\%
\msg{}
\def\r@foo{\par\par\par\par\par\par\par\par}
\long\def\Test#1#2\{%
\test{#1{foo}#2}{\par}%
\}
\TestGroup
\test{\getrefbykeydefault{title}{}{}}{}
\msg{}
\def\r@foo{{ }{ }{ }{ }{ }}
\def\Test#1#2\{%
\test{#1{foo}#2}{ }%
\}
\TestGroup
\msg{}
\long\def\TestDefault#1{\%
\begingroup
\setrefcountdefault{#1}%
\test{\getrefnumber{foo}}{#1}%
\test{\getpagerefnumber{foo}}{#1}%
\endgroup
}
\def\TestDefaultX{\%
\TestDefault{}% 
\TestDefault{\par}%
\TestDefault{ }%
\TestDefault{\space}%
\}
\let\r@foo@undefined
\TestDefaultX
\let\r@foo@undefined
\TestDefaultX
\let\r@foo\relax
\TestDefaultX
\def\r@foo{}
\TestDefaultX
\msg{}
\long\def\Test#1#2#3#4{\%
\begingroup
\def\TestTask{#1}%
@onelevel@sanitize\TestTask
\msg{\space \TestTask}%
\edef\TestResultA{\IfRefUndefinedExpandable{#1}{#2}{#3}}%
\IfRefUndefinedBabel{#1}{%
\def\TestResultB{#2}%
\}%
\def\TestExpected{#4}%
\ifx\TestResultA\TestExpected
\msg{\space ok.}%
\else
\begingroup
@onelevel@sanitize\TestResultA
@onelevel@sanitize\TestExpected
\msg{\space Result: \space\space\TestResultA}%
\msg{\space Expected: \TestExpected}%
\endgroup
\fi
\elsegroup
\errmessage{Test failed!} \fi
\ifx\TestResultB\TestExpected
\msg{ \space ok.} \else
\begingroup
\@onelevel@sanitize\TestResultB
\@onelevel@sanitize\TestExpected
\msg{ \space Result: \space\space[\TestResultB]}\msg{ \space Expected: [\TestExpected]} \errmessage{Test failed!} \endgroup
\fi
\endgroup
\begingroup
\def\r@foo{{}{}}
\let\r@bar\@undefined
\let\r@xyz\relax
\Test{foo}{true}{false}{false}
\Test{bar}{true}{false}{true}
\Test{xyz}{true}{false}{true}
\endgroup
\csname @@end\endcsname\end

\section{Hello World}
\label{sec:hello}
\section{\hbox{xy}}
\label{sec:foo}
%
\makeatletter
\@ifundefined{r@sec:hello}{{\typeout{==> Compile twice!}}{\def\test#1#2{\begingroup\def\TestTask{#1}\@onelevel@sanitize\TestTask\typeout{* \TestTask}\expandafter\expandafter\expandafter\def
\expandafter\expandafter\expandafter\TestResult{#1}\def\TestExpected{#2}\ifx\TestResult\TestExpected\@onelevel@sanitize\TestResult\@onelevel@sanitize\TestExpected\typeout{ \space Result: \space\space[\TestResult]}\typeout{ \space Expected: [\TestExpected]}\errmessage{Test failed!} \endgroup\fi\endgroup}}

3.3 Test with package titleref

\NeedsTeXFormat{LaTeX2e}
\documentclass{article}
\usepackage{refcount}[2016/05/16]
\usepackage{nameref}\usepackage{titleref}
\begin{document}
\section{Hello World}
\label{sec:hello}
\section{\hbox{xy}}
\label{sec:foo}
%
\makeatletter
\@ifundefined{r@sec:hello}{{\typeout{==> Compile twice!}}{\def\test#1#2{\begingroup\def\TestTask{#1}\@onelevel@sanitize\TestTask\typeout{* \TestTask}\expandafter\expandafter\expandafter\def
\expandafter\expandafter\expandafter\TestResult{#1}\def\TestExpected{#2}\ifx\TestResult\TestExpected\@onelevel@sanitize\TestResult\@onelevel@sanitize\TestExpected\typeout{ \space Result: \space\space[\TestResult]}\typeout{ \space Expected: [\TestExpected]}\errmessage{Test failed!} \endgroup\fi\endgroup}}

*/test2*
\errmessage{Test failed!} \fi \endgroup 
\test{\getrefbykeydefault{sec:hello}{title}{}}{(Hello World)} \test{\getrefbykeydefault{sec:foo}{title}{}}{\hbox{xy}} \def\hbox#1{[#1]}% hash-ok \test{\getrefbykeydefault{sec:foo}{title}{}}{\hbox{xy}} \begingroup \def\hbox#1{[#1]}% hash-ok \test{\getrefbykeydefault{sec:foo}{title}{}}{\hbox{xy}} \endgroup \makeatother \end{document} \langle/\test3\rangle \langle*\test5\rangle \NeedsTeXFormat{LaTeX2e} \documentclass{book} \usepackage{refcount}[2016/05/16] \usepackage{zref-runs} \newcounter{test} \begin{document} \ifnum\zruns>1 \makeatletter \def\Test#1#2#3{\begingroup \setcounter{test}{10} \sbox0{#1{test}{#2} \ifnum#3=\value{test} \else \PackageError{test}{\string#1{#2} <> #3 (\the\value{test})} \fi \ifdim\wd0=0pt \else \PackageError{test}{Non-empty box}\@ehc \fi \endgroup} \makeatother \Test\setcounterpageref{ch:two}{1} \Test\setcounterpageref{ch:three}{3} \Test\setcounterpageref{ch:four}{5} \Test\setcounterpageref{ch:five}{7} \Test\setcounterpageref{ch:six}{9} \Test\setcounterpageref{ch:seven}{13} \Test\addtocounterpageref{ch:two}{11} \Test\addtocounterpageref{ch:three}{13} \Test\addtocounterpageref{ch:four}{15} \Test\addtocounterpageref{ch:five}{17} \Test\addtocounterpageref{ch:six}{19} \Test\addtocounterpageref{ch:seven}{23} \Test\setcounterref{ch:two}{1} \Test\setcounterref{ch:three}{2} \Test\setcounterref{ch:four}{11} \Test\addtocounterref{ch:two}{11} \Test\addtocounterref{ch:three}{12} \Test\addtocounterref{ch:four}{21} \fi \frontmatter \chapter{Chapter one} \label{ch:one} \cleardoublepage
4 Installation

4.1 Download

Package. This package is available on CTAN¹:


Bundle. All the packages of the bundle ‘oberdiek’ are also available in a TDS compliant ZIP archive. There the packages are already unpacked and the documentation files are generated. The files and directories obey the TDS standard.

CTAN:install/macros/latex/contrib/oberdiek.tds.zip

TDS refers to the standard “A Directory Structure for \TeX\ Files” (CTAN:tds/tds.pdf). Directories with texmf in their name are usually organized this way.

4.2 Bundle installation

Unpacking. Unpack the oberdiek.tds.zip in the TDS tree (also known as texmf tree) of your choice. Example (linux):

```
unzip oberdiek.tds.zip -d -/texmf
```

Script installation. Check the directory TDS:scripts/oberdiek/ for scripts that need further installation steps. Package attachfile2 comes with the Perl script pdfatfi.pl that should be installed in such a way that it can be called as pdfatfi. Example (linux):

```
chmod +x scripts/oberdiek/pdfatfi.pl
cp scripts/oberdiek/pdfatfi.pl /usr/local/bin/
```

4.3 Package installation

Unpacking. The .dtx file is a self-extracting docstrip archive. The files are extracted by running the .dtx through plain \TeX:

```
tex refcount.dtx
```

¹http://ctan.org/pkg/refcount
TDS. Now the different files must be moved into the different directories in your installation TDS tree (also known as texmf tree):

- refcount.sty → tex/latex/oberdiek/refcount.sty
- refcount.pdf → doc/latex/oberdiek/refcount.pdf
- test/refcount-test1.tex → doc/latex/oberdiek/test/refcount-test1.tex
- test/refcount-test2.tex → doc/latex/oberdiek/test/refcount-test2.tex
- test/refcount-test3.tex → doc/latex/oberdiek/test/refcount-test3.tex
- test/refcount-test4.tex → doc/latex/oberdiek/test/refcount-test4.tex
- test/refcount-test5.tex → doc/latex/oberdiek/test/refcount-test5.tex
- refcount.dtx → source/latex/oberdiek/refcount.dtx

If you have a docstrip.cfg that configures and enables docstrip’s TDS installing feature, then some files can already be in the right place, see the documentation of docstrip.

4.4 Refresh file name databases

If your TeX distribution (teTeX, miktex, ...) relies on file name databases, you must refresh these. For example, teTeX users run texhash or mktexlar.

4.5 Some details for the interested

Unpacking with \LaTeX. The .dtx chooses its action depending on the format:

plain TeX: Run docstrip and extract the files.
\LaTeX: Generate the documentation.

If you insist on using \LaTeX for docstrip (really, docstrip does not need \LaTeX), then inform the autodetect routine about your intention:

\latex \let\install=y\input{refcount.dtx}

Do not forget to quote the argument according to the demands of your shell.

Generating the documentation. You can use both the .dtx or the .drv to generate the documentation. The process can be configured by the configuration file ltxdoc.cfg. For instance, put this line into this file, if you want to have A4 as paper format:

\PassOptionsToClass{a4paper}{article}

An example follows how to generate the documentation with pdf\LaTeX:

\pdflatex refcount.dtx
makeindex -s gind.ist refcount.idx
\pdflatex refcount.dtx
makeindex -s gind.ist refcount.idx
\pdflatex refcount.dtx

5 Catalogue

The following XML file can be used as source for the TeX Catalogue. The elements caption and description are imported from the original XML file from the Catalogue. The name of the XML file in the Catalogue is refcount.xml.

740 (*catalogue)
741 <!xml version='1.0' encoding='us-ascii'?>
742 <!DOCTYPE entry SYSTEM 'catalogue.dtd'>
743 <entry datestamp='$Date$' modifier='$Author$' id='refcount'>
744 <name>refcount</name>
Counter operations with label references.

Provides commands `\setcounterref` and `\addtocounterref` which use the section (or whatever) number from the reference as the value to put into the counter, as in:

\begin{verbatim}
...\label{sec:foo}
...
\setcounterref{foonum}{sec:foo}
\end{verbatim}

Commands `\setcounterpageref` and `\addtocounterpageref` do the corresponding thing with the page reference of the label.

No `\ins` file is distributed; process the `\dtx` with plain TeX to create one.

The package is part of the `oberdiek` bundle.

### 6 History

**[1998/04/08 v1.0]**
- First public release, written as answer in the newsgroup `comp.text.tex`:
  
  “Re: Adding a `\ref` to a counter?”

**[2000/09/07 v2.0]**
- Documentation added.
- LPPL 1.2
- Package rewritten, new commands added.

**[2006/02/20 v3.0]**
- Support for `hyperref` and `nameref` improved.
- Support for `titleref` and `babel`'s shorthands added.
- New: `\refused`, `\getrefbykeydefault`

\[^2\]Url: [http://groups.google.com/group/comp.text.tex/msg/c3f2a135ef5ee528](http://groups.google.com/group/comp.text.tex/msg/c3f2a135ef5ee528)
[2008/08/11 v3.1]
- Code is not changed.
- URLs updated.

[2010/12/01 v3.2]
- \IfRefUndefinedExpandable and \IfRefUndefinedBabel added.
- \getrefnumber, \getpagerefnumber, \getrefbykeydefault are expandable in exact two expansion steps.
- Non-expandable macros are made robust.
- Test files added.

[2011/06/22 v3.3]
- Bug fix: \rc@refused is undefined for \setcounterpageref and similar macros. (Bug found by Marc van Dongen.)

[2011/10/16 v3.4]
- Bug fix: \setcounterpageref and \addtocounterpageref fixed. (Bug found by Staz.)
- Macros (setaddtocounter)page)ref are made robust.

[2016/05/16 v3.5]
- Documentation updates.

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Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; plain numbers refer to the code lines where the entry is used.

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