The at* package

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1 User guide

The at package is an attempt to remove a lot of tedious typing that ends up in
\LaTeX documents, by expanding the number of short command names available.
The new command names begin with the ‘@’ character, rather than the conven-
tional ‘\’, so you can tell them apart.

The package provides some general commands for defining @-commands, and
then uses them to define some fairly simple ones which will be useful to most
people.

The rules for @-command names aren’t terribly complex:

• If the first character of the name is a letter, then the command name consists
  of all characters up to, but not including, the first nonletter. Spaces following
  the command name are ignored.

• If the first character of the name is a backslash, then the @-command name
  consists of the control sequence introduced by the backslash.
• Otherwise, the command name consists only of that first character. Spaces following the name are not ignored, unless that character was itself a space character.

Usually, digits are not considered to be letters. However, the at package will consider digits to be letters if you give it the digits option in the \usepackage command. (Note that this only affects the at package; it won’t change the characters allowed in normal command names.)

You can enable and disable digits being considered as letters dynamically. The \allowdigits command allows digits to be used as letters; \disallowdigits prevents this. Both declarations follow \TeX’s usual scoping rules. Both of these commands have corresponding environments with the same names (without the leading ‘\’, obviously).

1.1 Defining @-commands

The \newatcommand command will define a new @-command using a syntax similar to \newcommand. For example, you could define
\newatcommand c{\chapter{#1}}
to make@c{(name)} equivalent to \chapter{⟨name⟩}.

A \renewatcommand is also provided to redefine existing commands, should the need arise.

\atdef

For \TeX hackers, the \atdef command defines @-commands using a syntax similar to \TeX’s built-in \def.

As an example, the following command makes @/⟨text⟩/ write its argument ⟨text⟩ in italics:
\atdef/#1/{\textit{#1}}
The real implementation of the @/…/ command is a bit more complex, and is given in the next section.

You can use all of \TeX’s features for defining the syntax of your command. (See chapter 20 of \TeXbook for more details.)

\atlet

Since \atdef is provided to behave similarly to \def, \at provides \atlet which works similarly to \let. For example you can say
\atlet!=\index
to allow the short @! to behave exactly like \index.

Note that all commands defined using these commands are robust even if you use fragile commands in their definitions. Unless you start doing very strange things, @-commands never need \protecting.

1.2 Predefined @-commands

A small number of hopefully useful commands are provided by default. These are described in the table below:
Command | Meaning
---|---
@ | Typesets an ‘@’ character.
@/(text)/ | In text (LR or paragraph) mode, typesets its argument emphasised. In maths mode, it always chooses italics.
@*(text)* | Typesets its argument ⟨text⟩ in bold.
@i{⟨text⟩} | Equivalent to ‘\index{⟨text⟩}’.
@I{⟨text⟩} | As for @i, but also writes its argument to the document.

Package writers should not rely on any predefined @-commands – they’re provided for users, and users should be able to redefine them without fear of messing anything up. (This includes the ‘standard’ commands provided by the \at package, by the way. They’re provided in the vague hope that they might be useful, and as examples.)

## 2 Implementation

1 (**package**)

### 2.1 Options handling

We need a switch to say whether digits should be allowed. Since this is a user thing, I’ll avoid \newif and just define the thing by hand.

\begin{verbatim}
\def\atallowdigits{|let\ifat@digits\iftrue}
\def\atdisallowdigits{|let\ifat@digits\iffalse}
\end{verbatim}

Now define the options.

\begin{verbatim}
\DeclareOption{digits}{\atallowdigits}
\DeclareOption{nodigits}{\atdisallowdigits}
\ExecuteOptions{nodigits}
\ProcessOptions
\end{verbatim}

### 2.2 How the commands work

Obviously we make the ‘@’ character active. It inspects the next character (or argument, actually – it can be enclosed in braces for longer commands, although this is a bit futile), and builds the command name from that.

The \at command is equivalent to the active ‘@’ character always.

### 2.3 Converting command names

We need to be able to read an @-command name, and convert it to a normal \TeX control sequence. First, we declare some control sequences for braces, which we need later.

\begin{verbatim}
\begingroup
\catcode'\<1
\catcode'\>2
\catcode'\{12
\end{verbatim}
I’ll set up some helper routines now, to help me read the command names. The way this works is that we \futurelet the token into \@let@token. These routines will then sort out what to do next.

\at@test  Given an \if... test, does its first or second argument.
\begin{verbatim}
17 \def\at@test#1\then{%
18   #1\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi%
19 }
\end{verbatim}

\at@ifcat  Checks the category code of the current character. If it matches the argument, it does its second argument, otherwise it does the third.
\begin{verbatim}
20 \def\at@ifcat#1{\at@test\ifcat#1
noexpand\@let@token\then}
\end{verbatim}

\at@ifletter  This routine tests the token to see if it’s a letter, and if so adds it to the token list and does the first argument; otherwise it does the second argument. It accepts digits as letters if the switch is turned on.

There’s some fun later, so I’ll describe this slowly. First, we compare the category code to a letter, and if we have a match, we know we’re done; we need to pick up the letter as an argument. If the catcode is ‘other’, we must compare with numbers to see if it’s in range.

\begin{verbatim}
21 \def\at@ifletter#1#2{%
22   \at@ifcat x%
23   {\at@ifletter@ii{#1}}%
24   {\at@ifcat 0%
25     {\at@ifletter@i{#1}{#2}}%
26     {#2}%
27   }%
28 }
\end{verbatim}

Right. It’s ‘other’ (so it’s safe to handle as a macro argument) and we need to know if it’s a digit. This is a little tricky: I use \if to compare two characters. The first character is ‘1’ or ‘0’ depending on the ‘digit’ switch; the second is ‘1’ or ‘x’ depending on whether it’s actually a digit. They’ll only match if everything’s worked out OK.

\begin{verbatim}
29 \def\at@ifletter@i#1#2#3{%
30   \at@test\if%
31   \ifat@digt1\else0\fi%
32     \ifnum'#3<'0x\else\ifnum'#3>'9x\else1\fi\fi%
33     \then%
34     {\at@ifletter@ii{#1}{#3}}%
35     {#2#3}%
36 }
\end{verbatim}

Right; we have the character, so add it to the list and carry on.
\begin{verbatim}
37 \def\at@ifletter@ii#1#2{\toks0\expandafter{\the\toks0#2}#1}
\end{verbatim}
Now we define the command name reading routines. We have *almost* the same behaviour as \TeX{}, although we can’t support '%' characters for reasons to do with \TeX{}’s tokenising algorithm.

\at@read@name

The routine which actually reads the command name works as follows:

1. Have a peek at the next character. If it’s a left or right brace, then use the appropriate character.

2. If the character is not a letter, just use the character (or whole control sequence).

3. Finally, if it’s a letter, keep reading letters until we find one that wasn’t.

First, we do some setting up and read the first character

\begin{verbatim}
\def\at@read@name#1{%
  \let\at@next=#1%
  \toks{}%
  \futurelet\@let@token\at@rn@i%
}\end{verbatim}

Next, sort out what to do, based on the category code.

\begin{verbatim}
\def\at@rn@i{%
  \def\@tempa{\afterassignment\at@rn@iv\let\@let@token=}%
  \at@ifletter%{
    \futurelet\@let@token\at@rn@iii%
  }{
    \at@ifcat\bgroup{
      \toks\expandafter{\at@lb}\@tempa
    }{
      \at@ifcat\egroup{
        \toks\expandafter{\at@rb}\@tempa
      }{
        \at@ifcat\at@spc{
          \toks{ }\@tempa
        }{
          \at@rn@ii%
        }
      }
    }
  }
}\end{verbatim}

Most types of tokens can be fiddled using \string{}.

\begin{verbatim}
\def\at@rn@ii#1{%
  \toks\expandafter{\string#1}%
  \at@rn@iv%
}\end{verbatim}

We’ve found a letter, so we should check for another one.

\begin{verbatim}
\def\at@rn@iii{%
  \at@ifletter%
    \futurelet\@let@token\at@rn@iii%
  \at@ifnextchar.\at@rn@iv\at@rn@iv%
}\end{verbatim}

Finally, we need to pass the real string, as an argument, to the macro. We make \@let@token relax, since it might be something which will upset \TeX{} later, e.g., a # character.
\def\at@rn@iv{%
  \let\@let@token\relax%
  \expandafter\at@next\csname at.@\the\toks0\endcsname%
}\at@cmdname

Given a control sequence, work out which @-command it came from.
\def\at@cmdname#1{\expandafter\at@cmdname@i\string#1\@@foo}

Now extract the trailing bits.
\def\at@cmdname@i#1.#2\@@foo{#2}

\at@decode

The \at@decode macro takes an extracted @-command name, and tries to execute the correct control sequence derived from it.
\def\at@decode#1{\at@test\ifx#1\relax\then{
  \PackageError{at}{Unknown @-command '@\at@cmdname#1'}{
    The @-command you typed wasn’t recognised, so I’ve ignored it.
  }
  }%  
  ){%  
    #1%  
  }%  
}

\@at

We’d like a measure of compatibility with amsmath. The @-commands provided by amsmath work only in maths mode, so this gives us a way of distinguishing. If the control sequence \Iat is defined, and we’re in maths mode, we’ll call that instead of doing our own thing.
\def\@at{\def\@tempa{\at@read@name\at@decode}\ifmmode\ifx\Iat\not@@defined\else%
  \let\@tempa\Iat%
  \fi\fi%
  \@tempa}

2.4 Defining new commands

\at@buildcmd

First, we define a command to build these other commands:
\def\at@buildcmd#1#2{%
  \expandafter\def\csname\expandafter
  \@gobble\string#1@decode\endcsname##1{#2##1}%
  \edef#1{\noexpand\at@read@name\expandafter
  \noexpand\csname\expandafter\@gobble\string#1@decode\endcsname%}
}

\newatcommand \renewatcommand \provideatcommand \atdef \atshow

Now we define the various operations on @-commands.
\def\atlet{\begingroup\@makeother\@\at@read@name\atlet@i\endgroup}

Put the name into a scratch macro for later use. Now see if there’s an equals sign up ahead. If not, this will gobble any spaces in between the \@-command name and the argument.

\def\atlet@i#1{\def\at@temp{#1}\@ifnextchar=}{}

Now we gobble the equals sign (whatever catcode it is), and peek at the next token up ahead using \let with no following space.

\def\atlet@ii{\afterassignment\atlet@iii\global\let\at@gnext=}

The control sequence \at@gnext is now \let to be whatever we want the \@-command to be, unless it’s picked up an ‘@’ sign. If it has, we’ve eaten the @ token, so just read the name and pass it on. Otherwise, we can \let the \@-command directly to \at@gnext. There’s some nastiness here to make \the\toks@ expand before we close the group and restore its previous definition.

\def\atlet@iii{\if @\noexpand\at@gnext\expandafter\at@read@name\expandafter\atlet@iv\else\expandafter\endgroup\expandafter\let\at@temp= \at@gnext\fi}

We’ve read the source \@-command name, so just copy the definitions over.

\def\atlet@iv{\if \noexpand\at@gnext\expandafter\at@read@name\expandafter\atlet@v\else\expandafter\endgroup\fi}

\expandafter\let\at@temp= \at@gnext

2.5 Robustness of \@-commands

We want all \@-commands to be robust. We could leave them all being fragile, although making robust \@-commands would then be almost impossible. There are two problems which we must face:
• The \texttt{\@at} command which scans the \@-command name is (very) fragile. I could have used \texttt{\DeclareRobustCommand} for it (and in fact I did in an earlier version), but that doesn’t help the other problem at all.

• The ‘name’ of the \@-command may contain active characters or control sequences, which will be expanded at the wrong time unless we do something about it now.

We must also be careful not to introduce extra space characters into any files written, because spaces are significant in \@-commands. Finally, we have a minor problem in that most auxiliary files are read in with the ‘@’ character set to be a letter.

\texttt{\at} Following the example of \LaTeX’s ‘short’ command handling, we’ll define \texttt{\at} to decide what to do depending on what \texttt{\protect} looks like. If we’re typesetting, we just call \texttt{\@at} (above) and expect it to cope. Otherwise we call \texttt{\at@protect}, which scoops up the \texttt{\fi} and the \texttt{\@at}, and inserts other magic.

\begin{verbatim}
\def\at{% 
\ifx\protect\at@protect\else\at@protect\fi\at}
\end{verbatim}

\texttt{\at@protect} Since we gobbled the \texttt{\fi} from the above, we must put that back. We then need to do things which are more complicated. If \texttt{\protect} is behaving like \texttt{\string}, then we do one sort of protection. Otherwise, we assume that \texttt{\protect} is being like \texttt{\noexpand}.

\begin{verbatim}
\def\at@protect\protect\@protection{% 
\fi% 
\ifx\protect\string% 
\expandafter\at@protect\string% 
\else% 
\expandafter\at@protect\noexpand% 
\fi% 
\fi% 
}
\end{verbatim}

\texttt{\at@protect\string} When \texttt{\protect} is \texttt{\string}, we don’t need to be able to recover the original text particularly accurately – it’s for the user to look at. Therefore, we just output the \texttt{@11} and use \texttt{\string} on the next token. This must be sufficient, since we only allow multi-token command names if the first token is a letter (code 11).

\begin{verbatim}
\def\at@protect\string{% 
\@at@0
}
\end{verbatim}

\texttt{\at@protect\noexpand} This is a little more complex, since we’re still expecting to be executed properly at some stage. However, there’s a cheeky dodge we can employ since the \texttt{\at} command is thoroughly robustified (or at least it will be by the time we’ve finished this). All \texttt{@unexpable\@protect} does is confer repeated robustness on a fragile command. Since our command is robust, we don’t need this and we can get away with just using a single \texttt{\noexpand}, both for the \texttt{@at\@} command and the following token (which we must robustify, because no-one else can do it for us – if anyone tries, they end up using the \texttt{@\protect} command which is rather embarrassing).

I’ll give the definition, and then examine how this expands in various cases.

\begin{verbatim}
\def\at@protect\noexpand\noexpand\@at@{\at}
\end{verbatim}

8
A few points, before we go into the main examination of the protection. I’ve inserted a 11 token, which is gobbled by \@at@ when the thing is finally expanded fully. This prevents following space tokens in an \input file from being swallowed because they follow a control sequence. (I can’t use the normal 13 token, because when files like the .aux file are read in, @ is given code 11 by \makeatletter.)

Now for a description of why this works. When \at is expanded, it works out that \protect is either \noexpand or \@unexpandable@protect, and becomes \at@protect@noexpand. Because of the \noexpand tokens, this stops being expanded once it reaches 11 x (where x is the token immediately following the 13 character). If this is expanded again, for example in another \edef, or in a \write or a \mark, the \at wakes up, gobbles the following @ (whatever catcode it is – there may be intervening \write and \input commands) and becomes \at, and the whole thing can start over again.

2.6 Enabling and disabling @-commands

\aton We define the \aton command to enable all of our magic. We store the old catcode in the \atoff command, make ‘@’ active, and make it do the stuff.
\aton
\atoff The \atoff command makes ‘@’ do the stuff it’s meant to. We remember the old catcode and revert to it. This is largely unnecessary.

\makeatother Now we make our active ‘@’ the default outside of package files.
\makeatother

\dospecials \@sanitize We must add the ‘@’ character to the various specials lists.
\dospecials \@sanitize

2.7 Default @-commands

We define some trivial examples to get the user going.
\dospecials \@sanitize
Appendix

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such damages.

END OF TERMS AND CONDITIONS

A.3 Appendix: How to Apply These Terms to Your New
Programs

If you develop a new program, and you want it to be of the greatest possible use to
the public, the best way to achieve this is to make it free software which everyone
can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach
them to the start of each source file to most effectively convey the exclusion of
warranty; and each file should have at least the “copyright” line and a pointer to
where the full notice is found.

<one line to give the program’s name and a brief idea of what it does.>
Copyright (C) 19yy <name of author>

This program is free software; you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation; either version 2 of the License, or
(at your option) any later version.

This program is distributed in the hope that it will be useful,
but WITHOUT ANY WARRANTY; without even the implied warranty of
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GNU General Public License for more details.

You should have received a copy of the GNU General Public License
along with this program; if not, write to the Free Software
Foundation, Inc., 675 Mass Ave, Cambridge, MA 02139, USA.

Also add information on how to contact you by electronic and paper mail.
If the program is interactive, make it output a short notice like this when it
starts in an interactive mode:

Gnomovision version 69, Copyright (C) 19yy name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type ‘show w’.
This is free software, and you are welcome to redistribute it
under certain conditions; type ‘show c’ for details.

The hypothetical commands ‘show w’ and ‘show c’ should show the appropriate
parts of the General Public License. Of course, the commands you use may be
called something other than ‘show w’ and ‘show c’; they could even be mouse-clicks
or menu items–whatever suits your program.
You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the program ‘Gnomovision’ (which makes passes at compilers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

This General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Library General Public License instead of this License.

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