CDLaTeX

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Contents

- Carsten Dominik's LaTeX autocompletion for AUCTeX LaTeX mode, Emacs latex mode and Orgmode LaTeX fragments.
  - `https://staff.fnwi.uva.nl/c.dominik/Tools/cdlatex/`
  - `https://orgmode.org/manual/CDLaTeX-mode.html`

1 Intallation and configuration

1. Install AUCTeX and CDlatex from MELPA.
2. In your `~/.emacs` or `~/.emacs.d/init.el`, add e.g.:

```
(add-hook 'LaTeX-mode-hook 'turn-on-cdlatex)      ; with AUCTeX LaTeX mode
(add-hook 'latex-mode-hook 'turn-on-cdlatex)      ; with Emacs latex mode
(add-hook 'org-mode-hook #'turn-on-org-cdlatex)  ; For embedded Orgmode LaTeX
↪  snippets
(setq cdlatex-make-sub-superscript-roman-if-pressed-twice t)  ; Pressing ^ or _
↪  twice adds \rm to ^{} or _{}
```

2 Overview

CDLaTeX is a minor mode supporting mainly mathematical and scientific text development with LaTeX. CDLaTeX is really about speed. AUCTeX (the major mode I recommend for editing LaTeX

files) does have a hook based system for inserting environments and macros - but while this is useful and general, it is sometimes slow to use. CDLaTeX tries to be quick, with very few and easy to remember keys, and intelligent on-the-fly help.

2.1 Abbreviations

CDLaTeX has an abbrev-like mechanism to insert full LaTeX environments and other templates into the buffer. Abbreviation expansion is triggered with the TAB key only, not with SPC or RET. For example, typing `ite<TAB>` inserts an itemize environment. A full list of defined abbreviations is available with the command `C-c ?` (`cdlatex-command-help`).

2.1.1 Available keyword commands with CDLaTeX

To execute, type the keyword into the buffer followed by `TAB`.

1. References, labels and citations

Abbreviation	Meaning	Environment
`pref`	Make page reference	text/math
`ref`	Make reference	text/math
`lbl`	Insert automatic label at point	text/math
`ct`	Insert `\cite`	text
`cte`	Make a citation interactively	text
`cite{`	Make a citation interactively	text

2. Environments

Abbreviation	Meaning	Environment
`beg`	Complete an environment name and insert template	text/math
`env`	Complete an environment name and insert template	text/math
`ite`	Insert an `itemize` environment template	text
`enu`	Insert an `enumerate` environment template	text
`it`	New item in current environment	text/math
`equ`	Insert an `equation` environment template	text
`eqn`	Insert an `equation` environment template	text
`ali`	Insert an `align` environment template	text
`ali*`	Insert an `align*` environment template	text
`alit`	Insert an `alignat` environment template	text
`alit*`	Insert an `alignat*` environment template	text
`xal`	Insert a `xalignat` environment template	text
`xal*`	Insert a `xalignat*` environment template	text
`xxa`	Insert a `xxalignat` environment template	text
`xxa*`	Insert a `xxalignat` environment template	text
`mul`	Insert a `multline` environment template	text
`mul*`	Insert a `multline*` environment template	text
`gat`	Insert a `gather` environment template	text
`gat*`	Insert a `gather*` environment template	text
`spl`	Insert `split` environment template	math
`fla`	Insert a `flalign` environment template	text
`fla*`	Insert a `flalign*` environment template	text
`fg`	Insert a `figure` environment template	text

3. Sections

Abbreviation	Meaning	Environment
sn	Insert a \section{} statement	text
ss	Insert a \subsection{} statement	text
sss	Insert a \subsubsection{} statement	text
pf	Insert a \paragraph{} statement	text
sp	Insert a \subparagraph{} statement	text
ssp	Insert a \subsubparagraph{} statement	text

4. Mathematics

Abbreviation	Meaning	Environment
lr(	Insert a \left(\right) pair	math
lr[	Insert a \left[\right] pair	math
lr{	Insert a \left{ \right} pair	math
lr<	Insert a \left\langle \right\rangle pair	math
lrPIPE	Insert a \leftPIPE \rightPIPE pair	math
fr	Insert \frac{}{}	math
sq	Insert \sqrt{}	math
intl	Insert \int\limits_{}^{}	math
suml	Insert \sum\limits_{}^{}	math
caseeq	Insert a = { construct	math
spl	Insert split environment template	math
nonum	Insert \nonumber\\	math
qq	Insert \quad	text/math
qqq	Insert \qquad	text/math

5. Cetera

Abbreviation	Meaning	Environment
cl	Insert \centerline	text
inc	Insert \includegraphics with file name	text
fn	Make a footnote	text

2.1.2 Environment templates

Typing C-c { (cdlatex-environment) uses the minibuffer to complete the name of a LaTeX environment and inserts a template for this environment into the buffer. These environment templates also contain labels created with RefTeX. In a template, text needs to be filled in at various places, which we call "points of interest". You can use the TAB key to jump to the next point of interest in the template. If there is an active region, the region will be wrappend into the environment, ignoring the template content.

For many frequently used LaTeX environments, abbreviations are available. Most of the time, the abbreviation consists of the first three letters of the environment name: equ<TAB> expands into

(1)

Similarly, ali<TAB> inserts an AMS-LaTeX align environment template etc. For a full list of environment abbreviations, use C-c ?.

Use the command C-c - (cdlatex-item) to insert a generalized new "item" in any "list"-like environment. For example, in an itemize environment, this inserts \item, in an enumerate environment it inserts \item\label{item:25} and in an eqnarray environment, it inserts \label{eq:25} \n & &.

When appropriate, newlines are inserted, and the previous item is also closed with \\. `cdlatex-item` can also be invoked with the abbreviation `it<TAB>`.

2.1.3 Math templates

Abbreviations are also used to insert simple math templates into the buffer. The cursor will be positioned properly. For example, typing `fr<TAB>` will insert `\frac{}{}` with the cursor in the first pair of parenthesis. Typing `lr(<TAB>` will insert a `\left( \right)` pair and position the cursor in between, etc. Again, the TAB key can be used to jump to the points in the template where additional text has to be inserted. For example in the `\frac{}{}` template, it will move you from the first argument to the second and then out of the second. For a list of available templates, type `C-c ?`.

2.2 Mathematical symbols

This feature is similar to the functionality in the Math minor mode of AUCTeX, and to the input methods of the X-Symbol package. It is introduced by the backquote character `‘`. Backquote followed by any character inserts a LaTeX math macro into the buffer. If necessary, a pair of `$` is inserted to switch to math mode. For example, typing `‘a` inserts `$\alpha$`. Since LaTeX defines many more mathematical symbols than the alphabet has letters, (currently three) different sets of math macros are provided. We call the different sets "levels". On each level, another LaTeX macro is assigned to a given letter. To select the different levels, simply press the backquote character several times before pressing the letter. For example, typing `‘d` inserts `\delta` (level 1), and typing `‘‘d` inserts `\partial` (level 2). Similarly, `‘e` inserts `\epsilon`, `‘‘e` inserts `\varepsilon` and `‘‘‘e` inserts `\exp`.

On each level, on-thy-fly help will pop up automatically if you hesitate to press the next key. The help screen is a window which lists all math macros available on the current level. Initially, when you type slowly, this window will pop up each time you press backquote. However, after you have learned the different keys, you will type more quickly and the help window is not shown. Try it out: First press `‘` (backquote), wait for the help window and then press `a` to get `\alpha`. Then press `‘` and `b` as a quick sequence to get `\beta`, without the help window.

The LaTeX macros available through this mechanism are fully configurable - see the variable `cdlatex-math-symbol-a`

2.3 Accents and fonts

Putting accents on mathematical characters and/or changing the font of a character uses key combinations with the single-quote character `’` as a prefix. The accent or font change is applied to the character or LaTeX macro **before** point. For example

Keys	Result	Note
`a’~`	ERROR	in text mode
`$a’~`	`\tilde{a}`	in math mode
`a’:`	`\ddot{a}`	
`ab’b`	`\textbf{ab}`	in text mode
`$ab’b`	`a\mathbf{b}`	in math mode
`\alpha’.`	`\dot{\alpha}`	
`r_{dust}’r`	`r_\mathrm{dust}`	in math mode
`<SPC> ’e`	`\emph{}`	
`this is important M-2 ’b`	`this \textbf{is important}`	

As you can see:

- using math accents like `~` outside math mode will throw an error.
- the font change used automatically adapts to math mode.
- if the item before point is a LaTeX macro, the change applies to the whole macro.

- in text mode, the change applies to the entire word before point, while in math mode only the last character is modified.
- if the character before point is a white space, a dollar, or an opening parenthesis, this command just opens an empty template and positions the cursor inside.
- when a numeric prefix argument (e.g. `M-3`) is supplied, the command acts on that number of whole words before the cursor.

In order to insert a normal quote, you can press the quote character twice. Also, if the key character is not associated with an accent or font, the quote will be inserted. For example, `'t` and `'s` insert just that, so that normal text typing will not be disturbed. Just like during the insertion of math macros (see Sect. 2.2), automatic on-the-fly help will pop up when you pause after hitting the quote character, but will be suppressed when you continue quickly. The available accents and also the prefix key can be can be configured - see documentation of the variables `cdlatex-math-modify-alist` and `cdlatex-math-modify-prefix`.

2.4 Pair insertion of `()`, `[]`, `{}`, and `$$`

Dollars and parens can be inserted as pairs. When you type the opening delimiter, the closing delimiter will be inserted as well, and the cursor positioned between them. You can configure which delimiter are inserted pairwise by configuring the variable `cdlatex-paired-parens`.

Also, the keys `_` and `^` will insert `_{}` and `^{}`, respectively, and, if necessary, also a pair of dollar signs to switch to math mode. You can use TAB to exit paired parenthesis. As a special case, when you use TAB to exit a pair of braces that belong to a subscript or superscript, CDLaTeX removes the braces if the sub/superscript consists of a single character. For example typing `$10^3<TAB>` inserts `$10^3$`, but typing `$10^34<TAB>` inserts `$10^{34}$`.

If you press `_` or `^` twice, the template inserted will be `_{\rm }` or `^{\rm }`, respectively, to insert a roman sub/superscript. Style guides require that all sub and superscipts that are descriptive (so not a mathematical or physical quantity themselves) need to be roman. So x_i is i is an index, but $x_{\rm max}$ to indicate the maximum value. You can disable this behavior through the variable `cdlatex-make-sub-superscript-roman-if-pressed-twice`.

2.5 The overloaded TAB key

You may have noticed that we use the TAB key for many different purposes in this package. While this may seem confusing, I have gotten used to this very much. Hopefully this will work for you as well: "when in doubt, press TAB". Here is a summary of what happens when you press the TAB key:

1. The function first tries to expand any abbreviation before point.
2. If there is none, it cleans up short subscripts and superscripts at point. I.e., if the cursor is just before the closing brace in `a^{2}`, it changes it to `a^2`, since this is more readable. If you want to keep the braces also for simple superscripts and subscripts, set the variable `cdlatex-simplify-sub-super-scripts` to nil.
3. After that, the TAB function jumps to the next point of interest in a LaTeX text where one would reasonably expect that more input can be put in. This does **not** use special markers in the template, but a heuristic method which works quite well. For the detailed rules which govern this feature, check the documentation of the function `cdlatex-tab`.

3 Configuration examples

Check out the documentation of the variables in the configuration section. The variables must be set before cdlatex-mode is turned on, or, at the latest, in `cdlatex-mode-hook`, in order to be effective. When changing the variables, toggle the mode off and on to make sure that everything is up to date.

Here is how you might configure CDLaTeX to provide environment templates (including automatic labels) for two theorem-like environments.

```
(setq cdlatex-env-alist
   '(("axiom" "\\begin{axiom}\nAUTOLABEL\n?\n\\end{axiom}\n" nil)
     ("theorem" "\\begin{theorem}\nAUTOLABEL\n?\n\\end{theorem}\n" nil)))
```

The "AUTOLABEL" indicates the place where an automatic label should be inserted, using RefTeX. The question mark defines the position of the cursor after the template has been inserted into the buffer.

You could also define your own keyword commands `axm` and `thr` to make the template insertion quicker (e.g. `axm<TAB>` and `thm<TAB>`):

```
(setq cdlatex-command-alist
 '(("axm" "Insert axiom env"   "" cdlatex-environment ("axiom") t nil)
   ("thr" "Insert theorem env" "" cdlatex-environment ("theorem") t nil)))
```

Here is how to add new math symbols to CDLaTeX's list: In order to put all rightarrow commands onto `‘>`, `‘‘>`, `‘‘‘>`, and `‘“‘>` (i.e. several backquotes followed by `>`) and all leftarrow commands onto `’<`, `‘‘<`, `‘‘‘<`, and `‘“‘<`, you could do this in `.emacs`:

```
(setq cdlatex-math-symbol-alist
'((?< ("\\leftarrow" "\\Leftarrow" "\\longleftarrow" "\\Longleftarrow"))
  (?> ("\\rightarrow" "\\Rightarrow" "\\longrightarrow" "\\Longrightarrow"))
   ))
```

To change the prefix key for math accents and font switching, you could do something like

```
(setq cdlatex-math-modify-prefix [f7])
```

4 Key bindings

Here is the default set of keybindings from CDLaTeX. A menu is also installed.

Key	Command
`$`	cdlatex-dollar
`(`	cdlatex-pbb
`{`	cdlatex-pbb
`[`	cdlatex-pbb
	cdlatex-pbb
`<`	cdlatex-pbb
`^`	cdlatex-sub-superscript
`_`	cdlatex-sub-superscript
`TAB`	cdlatex-tab
`C-c ?`	cdlatex-command-help
`C-c {`	cdlatex-environment
`C-c -`	cdlatex-item
`‘`	cdlatex-math-symbol
`’`	cdlatex-math-modify

5 FAQ

1. Some people find it disturbing that the quote character (`’`) is active for math accents and font switching. I have tried to avoid any letters which are frequently following `’` in normal text. For example, `’s` and `’t` insert just this. If you still prefer a different prefix key, just configure the variable `cdlatex-math-modify-prefix`.

2. To insert a backquote into the buffer, use `C-q ‘`.

6 Note

This documentation, like CDLaTeX itself, was written by Carsten Dominik. It was converted to Orgmode format (with some minor changes) for easier access and optional export to e.g. markdown or LaTeX/pdf by Marc van der Sluys. See `https://github.com/MarcvdSluys/SundryNotes/CDLaTeX-docs` for the source of that version.