

Introduction to EMACS

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1 Prerequisites

EMACS (which stands for “Editor Macros”) is an advanced, highly extensible general purpose text editor. It is largely used by programmers, students and researchers, as it offers a large variety of features which facilitate writing code. EMACS itself is extensible via Emacs Lisp, which is a variation of the functional language Lisp.

This document aims to provide a short-and-fast introduction to editing text with EMACS, largely from a programmer’s point of view. It is particularly targeted toward users who are not familiar with an advanced text editor and looking for more power than can be provided by editors such as Pico or Nano.

1.1 EMACS Key bindings

EMACS is largely controlled by key bindings—sequences of key presses which invoke certain actions. For example, **Control-w** is a key binding, and it means “hold down the **Control** key while pressing the **w** key.”

EMACS key bindings can also be “chained.” For example, **Control-x Control-c** means “hit **Control-x** (as described in the previous paragraph) and then hit **Control-c**.” In a key binding like this, the user can simply hold **Control** down and hit **x** and **c** one after the other.

In this document, we use the following abbreviations when referring to key bindings:

Abbreviation	Meaning
C-k	Control-k
M-k	Meta-k (see below)
S-k	Shift-k
A-k	Alt-k

The **Meta** key is typically the “Windows key” on 104-key PC keyboards, between **Control** and **Alt**. On keyboards without a Windows key, **Meta** is sometimes **Alt**, since **Alt** is not as frequently used in EMACS key bindings as **Meta**. On Sun UNIX keyboards, the **Meta** key is next to the space bar, marked by a black diamond. If your keyboard lacks a **Meta** key, every key binding **M-k** can be “emulated” by hitting and releasing the **Escape** key, and then hitting **k**.

There is a special key binding, **M-x**, which prompts the user for an EMACS command to execute. In the rest of this document, **M-x command** means “hit **M-x**, type **command** and hit **Enter**.”

Finally, when we say “modifier key” we mean any one of **Control**, **Meta**, **Shift** or **Alt**.

2 Editing Text

Start EMACS by typing `emacs -nw filename.c` at the command line. This will start EMACS in terminal mode, editing a file named `filename.c`. At this point, you can begin typing text. To exit EMACS with the possibility of saving your changes, type **C-x C-c**.

Note: At any point during the editing session, you can hit **C-g** to cancel the current “action.” For example, if you want to hit **C-x C-c** but you first hit **C-c** by mistake, you can hit **C-g** to cancel and start over.

2.1 Code Highlighting

To enable color highlighting of source code, type **M-x global-font-lock-mode**. This process can be easily automated, see section 5.

2.2 Moving Around

It is possible that in your current setup, the arrow keys and **Home**, **End**, **PgUp** and **PgDn** keys can be used to navigate the file, but this might not always be the case, and it is not always desirable. The following commands are guaranteed to work to move around a file in EMACS. Note that by “move” we mean “move the cursor.”

Command	Action
C-f	Move forward one character
C-b	Move backward one character
C-n	Move down one line
C-p	Move up one line
C-v	Move down one page
M-v	Move up one page
C-l	Scroll the page so the cursor is in the middle
C-a	Move to the beginning of the line
C-e	Move to the end of the line
M-f	Move forward one word
M-b	Move backward one word
M-a	Move to the end of the paragraph
M-e	Move to the beginning of the paragraph
M-x goto-line	Move to a specific line number

All of these key bindings (with the exception of **C-a** and **C-e**) can be hit repeatedly to cause the given action to be executed several times.

When you want to hit a sequence of bindings which have the same modifier key, you can hold down the modifier for the duration of the sequence. If, for example, you want to move two lines down and two characters forward, you can type **n n f f** while holding down the **Control** key continuously.

2.3 Saving

To save a file, type **C-x C-s**. To save the current file under a different name, type **C-x C-w**. EMACS will prompt you for the file name you would like to write to.

2.4 Searching

To interactively search for a sequence of characters somewhere below the current position of the cursor, hit **C-s**. EMACS searches for the text as you type it, so the more characters you type, the more accurate the search match will be. Hit **C-s** again to jump to the next match.

To search backwards, i.e. to search the text above the cursor in the buffer, use **C-r** instead of **C-s**.

2.5 Kill & Yank (Cut & Paste)

The terms “cut” and “paste” are known as “kill” and “yank,” respectively, in the EMACS world. Cutting, copying and pasting are commands which operate on text *regions*, not unlike “selections” which you would select with the mouse in graphical editors.

To select a region of text, move the cursor on top of the first character of the text you would like to select and hit **C-SPACE** (that is, hit the space bar while holding down **Control**). At this point we say that “the region is active.” Now move the cursor (See section 2.2) one character past the last character of the text you would like to select, and hit one of:

Command	Action
C-w	Kill (cut) the region
M-w	Copy the region

Once you have cut or copied the region, you can yank (paste) it at the cursor position by hitting **C-y**.

2.5.1 Advanced: Kill Ring

Unlike most other editors, EMACS saves the last N kills and copies into something called the Kill Ring—a clipboard history of sorts. Thus, if you copy some text X and then copy some text Y , you will then be able to yank (paste) X if you want to. This turns out to be quite useful in many situations.

To yank something from the Kill Ring, whenever you hit **C-y** to yank, hit **M-y** immediately afterward to yank the next entry in the Kill Ring. Hit **M-y** repeatedly until you yank the desired entry.

2.6 Spell-Check

EMACS comes with several command packages which can spell-check a portion of text interactively. The most popular spell-check package is probably `ispell`, which uses the `ispell` UNIX program in the background.

A partial summary of EMACS `ispell` functionality:

Command	Action
<code>M-x ispell-buffer</code>	Spell-check the whole current buffer
<code>M-x ispell-region</code>	Spell-check the currently active region
<code>M-x ispell-word</code>	Spell-check the word the cursor is on
<code>M-x ispell-comments-and-strings</code>	Does what it says, assuming the current buffer contains code

3 Advanced Document Manipulation

The previous section gives an introduction to EMACS' abilities to facilitate editing a single file. EMACS can do much, much more, however. It can keep multiple files open simultaneously so that you can switch between them, it can show you several files at the same time in a split view, it can allow you to look at different parts of the same file in a split view, and in Graphical mode, (see section 3.3) you can open several frames (windows), each with their own split views.

3.1 Buffers

When you edit a file in a text editor, you are not physically editing the actual file on disk. You are making changes to an intermediate representation of the file, which is somewhere in memory. When you are done making changes and "save the file," this intermediate representation of the file is flushed back to disk, overwriting what was previously there. EMACS calls this intermediate representation a *buffer*.

One instance of EMACS can have several open buffers. There is at least one open buffer, named `*scratch*`, which cannot be deleted. This is the buffer you see when you open EMACS without giving it a file argument. Note that not all buffers correspond to files on disk, and `*scratch*` is an example of such a buffer.

To open a new file from a running EMACS, type `C-x C-f`. This will prompt you for a file location, create a new buffer with that file's contents, and make that buffer the current buffer. Here are some common buffer-related commands:

Command	Action
<code>C-x k</code>	Delete/kill current buffer
<code>C-x b</code>	Switch to another buffer. (Default is last buffer you visited.)
<code>C-x C-b</code>	Open a new window (see section 3.2) showing the current buffers.

3.2 Windows

In addition to buffers (ability to edit multiple files simultaneously), EMACS has windows: the ability to give you several views into several files simultaneously. An emacs window is not a window in the graphical user interface sense—it cannot be moved around the screen, etc. It is a window in the sense of “a limited view into something larger.” Any EMACS instance has at least one window, which cannot be closed.

To split the current window horizontally, hit **C-x 2**. Now you have two windows, each giving a different view of the same buffer. You can “jump” between them by hitting **C-x o**. You can scroll each one to a different point in the buffer. If two windows “share” the same buffer, changing text in one window is immediately visible in the other.

Here are some common window-related commands:

Command	Action
C-x 2	Split current window horizontally
C-x 3	Split current window vertically
C-x o	“Jump” to another window
C-x 0	Close current window
C-x 1	Close all windows except the current one

3.3 Frames

If the graphical version of EMACS (See section 4) is available, you can make use of frames. Essentially, a frame is a physical window—here, in the graphical user interface sense. What you are looking at when you start a graphical EMACS session is a frame. There is at least one frame for any session, which cannot be deleted. The only way to delete it is the same way you can delete the last window or the last buffer: by quitting the editor.

To start a new frame, hit **C-x 5 2**. You can now do in the new frame everything that you could in the previous. The two frames share all the open buffers, so a change to a buffer in one frame is immediately visible in the other. To close the current frame, hit **C-x 5 0**.

4 Graphical EMACS

Typically, the same EMACS binary is capable of running in graphical mode as well as terminal mode. So far we have been talking in the context of terminal mode. If you are capable of running graphical programs (i.e. you are in front of an X11-capable computer or something equivalent), you can type `emacs` to start EMACS in graphical mode.

Graphical mode has clickable icons, regions can be selected with the mouse, and much of the core editor functionality is available through graphical menus. All of the keyboard commands discussed in this document are valid for both graphical and terminal EMACS.

5 Customization

EMACS can be customized and extended by placing the appropriate commands in a file named `.emacs` (note the dot) in the user's home directory. We will not go into the details of extending EMACS here, but we give an example of a simple `.emacs` file, which can be used as a starting point.

Minimal `.emacs` file:

```
(global-font-lock-mode t)           ; always highlight source code
(blink-cursor-mode -1)              ; make cursor not blink
(setq-default indent-tabs-mode nil) ; use 8 spaces instead of 1 tab
(setq require-final-newline t)       ; make sure all files end in \n
(setq case-fold-search t)            ; search is case-insensitive
(if window-system
    (setq mouse-wheel-mode t))       ; enable mouse wheel in graphical mode
(setq c-basic-offset 4)              ; make indent size 4 spaces in C
(global-set-key [(meta g)] 'goto-line) ; bind M-g to the goto-line command
```

6 Further Reading

EMACS is a popular editor, so the documentation is plentiful. Googling for “emacs cheat sheet,” “emacs manual” and “emacs tutorial” turns up useful results. We describe a few sources of information:

- **Built-in Tutorial** (`M-x help-with-tutorial`)

This is an interactive tutorial geared toward beginners. It is provided with every installation.

- **Built-in Help** (`M-x help`)

The help system is designed for users already familiar with the basics, mainly to help them learn and remember EMACS functionality. For example, to list all the current key bindings, type `M-x help`, followed by `b`.

- **Info Manual** (`M-x info-emacs-manual`)

Once you are familiar with editing basics and need a thorough reference, the EMACS `info` pages are very handy. An HTML version can be found here: <http://www.gnu.org/software/emacs/>

- **O'Reilly Book**

A book on EMACS, much more advanced and thorough than this tutorial and possibly easier to read than the `info` manual, is provided by O'Reilly: http://www.oreilly.com/catalog/g

7 Cheat Sheet

A list of essential EMACS commands:

Fundamental	
C-x C-c	Exit EMACS
C-x C-s	Save file
C-x C-w	Save file as
C-g	Cancel whatever you're doing
Movement	
C-f	Move forward one character
C-b	Move backward one character
C-n	Move down one line
C-p	Move up one line
C-v	Move down one page
M-v	Move up one page
C-l	Scroll the page so the cursor is in the middle
C-a	Move to the beginning of the line
C-e	Move to the end of the line
M-f	Move forward one word
M-b	Move backward one word
M-a	Move to the end of the paragraph
M-e	Move to the beginning of the paragraph
M-x goto-line	Move to a specific line number
Search	
C-s	Search forward
C-r	Search backward
Kill & Yank	
C-SPACE	Activate a region
C-w	Kill (Cut)
C-y	Yank (Paste)
M-w	Copy
M-y	After C-y , yank next entry in the Kill Ring
Buffers	
C-x C-f	Open new file in new buffer
C-x k	Delete/kill current buffer
C-x b	Switch to another buffer.
C-x C-b	Open a new window showing the current buffers.
Windows/Frames	
C-x 2	Split current window horizontally
C-x 3	Split current window vertically
C-x o	"Jump" to another window
C-x 0	Close current window
C-x 1	Close all windows except the current one
C-x 5 2	Open new frame
C-x 5 0	Close frame
Spell-check	
M-x ispell-buffer	Spell-check the whole current buffer
M-x ispell-region	Spell-check the currently active region
M-x ispell-word	Spell-check the word the cursor is on
M-x ispell-comments-and-strings	Does what it says, assuming the current buffer contains code
Help	
M-x help-with-tutorial	Interactive tutorial
M-x help	Interactive help
M-x info-emacs-manual	Complete EMACS manual