

Primer on Text editing and more with GNU Emacs

3. Introduction to Scientific Computing with Linux Part II. Basic Tools

Nidish Narayanaa B¹

¹Department of Aerospace Engineering
Indian Institute of Space Science & Technology, Trivandrum

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editing and more
with GNU Emacs

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Summary

- ▶ As the need for computation grows, need for a comfortable workspace grows too
- ▶ We present here the "advanced, self- documenting, customizable, extensible editor Emacs"¹
- ▶ It is one of the oldest and highly developed text editors out there
- ▶ Innumerable text editors and more importantly, IDEs (for programmers) are out there - but why Emacs ?

¹Richard Stallman, *GNU Emacs Manual*, Ed 16, 2010

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- ▶ *Advanced*, since Emacs can do much more than simple insertion and deletion - from automatic indentation and split screen modes to controlling subprocesses

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- ▶ *Self-Documenting*, since there is an exhaustive documentation repository that comes with Emacs, which is expanded with each package that the user installs

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- ▶ *Customizable*, since the behavior of commands can easily be altered

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- ▶ *Customizable*, since the behavior of commands can easily be altered
- ▶ *Extensible*, since you can go beyond simple customization and create your own commands

Some Flashy Stuff

How Emacs?

Newsflash

If you've not realized it already, you're almost always faster with your hands on the keyboard and off that wretched mouse ;)

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- ▶ These commands are usually the shortcuts to pre-defined functions.

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- ▶ Emacs also doesn't come pre-loaded with all the features.

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- ▶ These commands are usually the shortcuts to pre-defined functions. Soon we shall learn how to create our own functions and assign commands
- ▶ Emacs also doesn't come pre-loaded with all the features. Most of the advanced features are organized as separate **packages**

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Distribution

Although there are a lot of Emacs distributions, we highly recommend the **GNU Emacs** for Linux users and **Aquamax** for Mac users and the door for Windows users ;)

Install

In ubuntu-based Linux distros, go to the terminal and type :

```
sudo apt-get install emacs24
```

In Mac, make sure homebrew is available and go to the terminal and type,

```
brew install aquamax
```

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CONTROL and META keys

The two keys that enable emacs to distinguish a command from the user's text.

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The Emacs Lexicography

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- ▶ $C - \langle chr \rangle$ and $M - \langle chr \rangle$ signify that we have to press the $\langle chr \rangle$ character key while holding the CONTROL/META keys respectively

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- ▶ $C - \langle chr \rangle$ and $M - \langle chr \rangle$ signify that we have to press the $\langle chr \rangle$ character key while holding the CONTROL/META keys respectively
- ▶ $M - \langle chr1 \rangle \langle chr2 \rangle$ signify that we have to press $\langle chr1 \rangle$ along with the META key and then press $\langle chr2 \rangle$ separately

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Getting to Move around

Moving around

Although I find myself comfortable with the arrow keys, the following are the inbuilt commands

C-f and **C-b** Move **f**orward or **b**ackward by a letter

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M-f and **M-b** Move **f**orward or **b**ackward by a word

C-n and **C-p** Move to **n**ext or **p**revious line

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M-v and **C-v** Move up or down pages

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M-a and **M-e** Move to beginning or end of sentence

C-l Toggle where the text at the cursor should be on the screen (middle-top-bottom)

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C-u **#** Prefix this to any command and that command is executed "**#**" number of times

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C-g Stop executing commands²

²may have to hit it twice or thrice

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Text Editing

C-d Delete character

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³S - Shift; spc - spacebar

⁴deletions will not save the characters in the clipboard

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M-d Delete word from current point to end

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C-S-spc Set mark to select text³

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Text Editing

C-d Delete character

M-d Delete word from current point to end

C-S-spc Set mark to select text³

C-k Kill selected

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C-d Delete character

M-d Delete word from current point to end

C-S-spc Set mark to select text³

C-k Kill selected

C-w Cut selected

C-y Yank, ie, Paste selected⁴

C-s Search for a regular expression (C-s to go to next occurrence; C-r to go to previous occurrence)

M-% Query replace a regular expression

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Basic Commands

Files and Buffers

C-x C-f Open a file - type the location and filename in the minibuffer

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C-x C-s Save changes to the current file

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C-x C-f Open a file - type the location and filename in the minibuffer

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Buffers

In Emacs, each file is opened in a buffer, which always exists in the background - Following are some commands to access and modify them

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C-x b Switch buffer - type the name of the buffer (if it's a file the name is the same as the filename)
Of course - it's got tab completion

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C-x C-b List all the buffers

Basic Commands

Files and Buffers

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C-x C-c End current session

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Of course - it's got tab completion

C-x C-b List all the buffers

C-x k Kill current buffer

Basic Commands

Multiple Windows and Modes

- C-x 2 Create a new window horizontally
- C-x 3 Create a new window vertically
- C-x { Decrease width of current window (M-x shrink-window-horizontally)
- C-x } Increase width of current window (M-x enlarge-window-horizontally)
- C-x Increase height of current window (M-x enlarge-window)

Modes

Emacs works in different modes - with each mode having its own set of commands apart from the above standard ones

M-x c-mode Mode for the C programming language

M-x shell-mode Mode for shell-scripting

M-x gnuplot-mode ..

Basic Commands

Accessing Help

Help Documentation

Emacs comes with a vast help documentation

It even has its own "Starter's" tutorial - access with "C-h t"

- Highly recommended!

C-h ? Display all the help options

C-h c — Get help about a specific command

C-h f — Get help about a specific function

C-h i Read included manuals

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Program Compilation

If you have a makefile in the current directory, then using "C-x c" you can call the make command from inside emacs. A separate window will be opened for you to view the compilation message.

Shell Mode

Accessed with "M-x shell-mode", an instance of the shell is presented in a window inside emacs. Your experience will be some where between editing a text file and using the terminal. This, used as a second split screen, can be used to edit and execute a program side-by-side

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Debugging with gdb

Although I personally prefer *ddd* for interactive debugging, emacs has got a complete gdb environment, similar to that of gdb - with interactive code and variable displays

Autocompletion

Add the following to your `/.emacs` file:

```
(require 'package)
(add-to-list 'package-archives '("melpa" .
  "https://melpa.org/packages/"))
(when (< emacs-major-version 24)
  (add-to-list 'package-archives '("gnu" .
    "http://elpa.gnu.org/packages/"))))
```

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Autocompletion

After this list all the packages (from the archives) with "M-x package-list-packages" and search for the auto-complete-mode packages and install the required ones either by selecting it or by typing "M-x package-install <package-name>". You will now be able to see the corresponding files in the /.emacs.d directory.

Intermediate Stuff

User-defined commands

Init File

The file `/.emacs` can be used to store commands that are to be called at the startup of each emacs session. These are in a flavor of LISP called Elisp.

A heads up to Lisp

- ▶ All LISP statements are enclosed in parantheses - (statement) - get used to looking at such code
- ▶ The basic format of a lisp program is,

`(< function name > var1 var2 var3 ...)`

- ▶ Each statement has a return value; for example, `y=sin(x)` must be written as,

`(setq y (sin x))`

Intermediate Stuff

A heads up to Lisp

Lisp is not Case-Sensitive

Variable and Function Declarations

Variable *defvar* for variable declaration,

```
(defvar x 2)
(defvar x (read))
```

The former declares a variable *x* with value 2 and the latter declares a variable *x* which will take value from stdin. To change the value of an already existing variable use (setq *x* newval).

Function *defun* for function declaration,

```
(defun fname (*arg*)
  (format t "~a!~%" *arg*))
```

The function may be called by (fname var).

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Setting modes at startup

To enable/disable a mode at startup, say the menu-bar-mode (which displays a menu bar when enabled), use

(menu-bar-mode -1) - to disable

(menu-bar-mode 1) - to enable

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Creating a new keybinding (Command)

This can be done in two ways.

Suppose I want the shell to open up in the current window with "M-s RET" (RET denotes return - enter key), I would add,

(global-set-key "\M-s RET" 'shell)

or

(global-set-key (kbd "M-s RET") 'shell)

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A goto tool for cataloging and tracking your activities

Org-Mode

An org file is saved as .org and you can use it to track your status in a project in a systematic fashion

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Headlines

Prefixed with one or more "*"s these denote sections and subsections based on the number of "*", with the least having the highest preference

* *Section 1*

** *Subsection 1*

** *Subsection 2*

* *Section 2*

Use Tab and S-Tab to toggle subtree folding

M-RET to insert new heading with same level as current

There are other commands to shift the subtree up/down, etc

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Lists

Ordered Lists These may begin with 1), 2) .. or 1., 2., ..

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Description Lists Use :: to separate a text from its description

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Ordered Lists These may begin with 1), 2) .. or 1., 2., ..

Unordered Lists These may begin with + -

Description Lists Use :: to separate a text from its description

Tables

Type the entries of the first row and hit "C-c RET" and the setup becomes a table automatically. Lines starting with "|-" are taken to be horizontal separators automatically - just hit "Tab" or "C-c C-c" to make it auto-indent at any point.

The first row will have to be typed as,

```
| name | place | animal | things |  
|-< TAB >
```

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Summary

- ▶ We went through a few **basic commands** in emacs to try and familiarize ourselves with the editor
- ▶ Then we looked at the **basics of Lisp** to understand and better use the back end of Emacs
- ▶ Finally we looked at the Org-mode
- ▶ Outlook
 - ▶ What we have here seen is just the tip of the ice berg - we learn more with time in tools like Emacs
 - ▶ Please do keep in mind that this discussion is in no way meant to be exhaustive in any of the topics covered

For Further Reading I

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Appendix

For Further Reading



R.M. Stallman

GNU Emacs Manual.

Free Software Foundation, 2010.



C. Dominik

The compact Org-mode Guide.

Free Software Foundation, 2010.



C. Dominik

The Org Manual.

Free Software Foundation, 2004.