

Emacs

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CS 490MT/5555
Software Methods and Tools

Emacs

- Fundamentals
- Emacs Command Structure
- Basic Commands

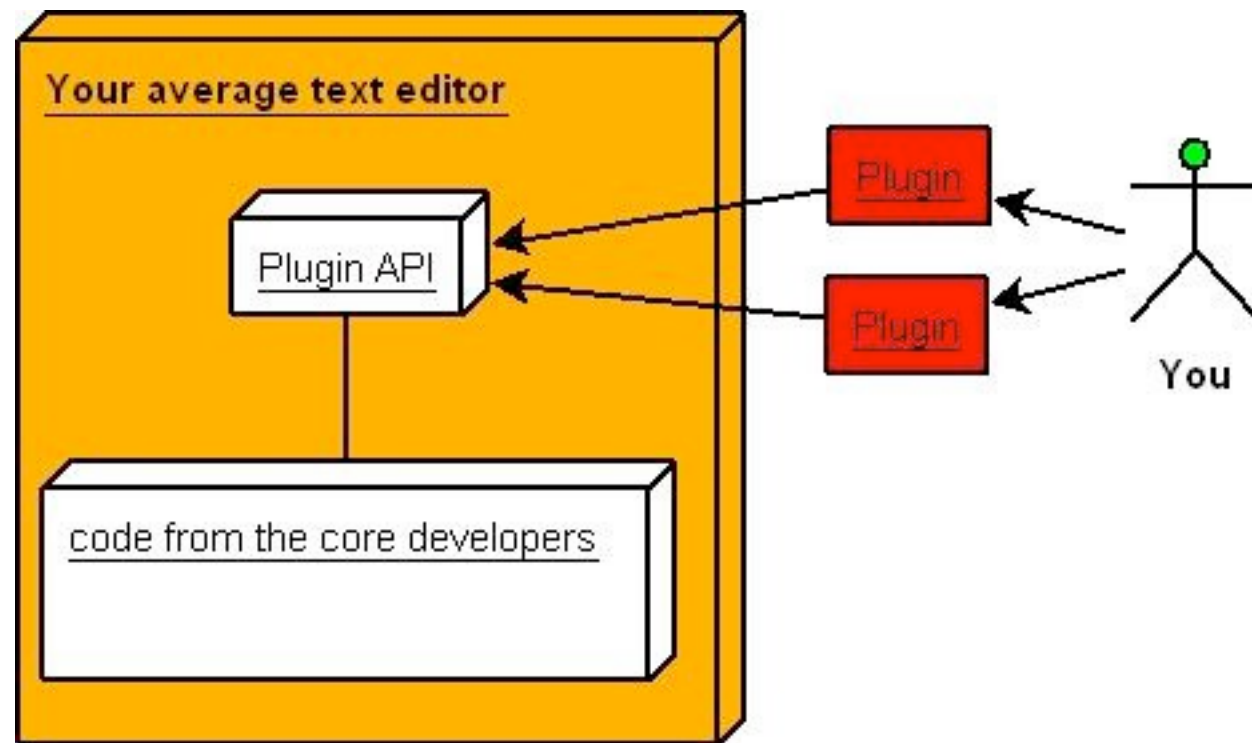
Emacs Fundamentals

- Emacs is a programmer's editor
- Emacs is not WYSIWYG.
- Emacs is free, open-source, and can run on most major operating systems.
- Emacs history, from Wikipedia.
 - First developed by Richard Stallman and Guy L. Steele, Jr. in 1976.
 - The most popular, and most ported version of Emacs is GNU Emacs from the GNU project.
 - XEmacs is a common variant that branched from GNU Emacs in 1991.

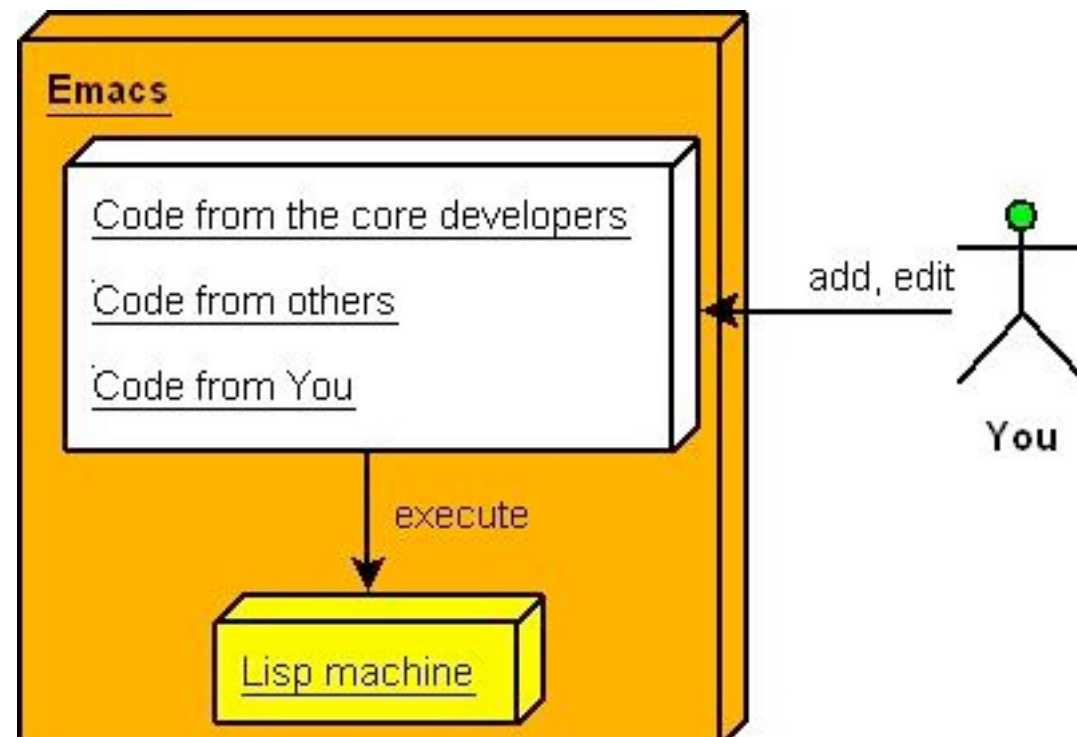
Emacs Fundamentals, cont.

- In general, Emacs consists of
 1. Emacs lisp machine (written in C) that interprets the language of Emacs Lisp.
 2. Emacs editor: implemented in Emacs Lisp and this is what people usually mean by “Emacs”.
 3. The set of packages included in a default Emacs installation.
 4. Your own code that adds additional functionalities to Emacs.
- Emacs is highly customizable and extendable.
 - You can change or redefine 2, 3, and 4 above for your own purpose.

Emacs v.s Other Editors (e.g. Eclipse)



Other Editor's
Architecture



Emacs
Architecture

Emacs Fundamentals, cont.

- Entering and Exiting Emacs
 - To enter: emacs
 - To open a file (e.g. HW.java) with emacs: emacs HW.java
 - To exit: C-x C-c
- Notations
 - C-x: For any x, the character Control-x.
 - M-x: For any x, the character Meta-x.
 - Meta by default may be bound to different keys (e.g. Alt, Esc, Command).
 - C-M-x: For any x, the character Control-Meta-x.

Emacs Fundamentals, cont.

- File: an actual file on disk. A copy of a file can be loaded into Emacs to initialize a buffer; a copy of a buffer can be written to a file to save it.
- Buffer: the internal data structure that holds the text you actually edit. Emacs can have any number of buffers active at any moment.
- Window: your view of a buffer. Windows can be created and deleted at will.

Emacs Fundamentals, cont.

- Every buffer has a major mode, and may have zero or more minor modes.
- Emacs chooses a major mode for you automatically, typically based on a file extension.
- You can always set the mode explicitly.
 - M-x c mode, M-x fundamental-mode, etc.
- Mode alters behavior, key bindings, and text display.
- Some major modes: Fundamental Mode, Text Mode, C Mode, etc.

Emacs Screen

- The mode line (near the bottom of the screen) displays the information about
 - The state of the buffer, one of modified (indicated by a pair of asterisks), unmodified (hyphens), or read-only (indicated by a pair of % signs).
 - The name of the file you are editing (it will be `*scratch*` if you are not editing any file).
 - The amount of the file that you can see on the screen:
 - All - You can see all of the file; Top - You can see the top of the file; Bot - You can see the bottom of the file.
 - The major mode (in parenthesis).
- The Minibuffer (echo area): the blank area below the mode line.

Backup and Autosave

- Backup files: Emacs always saves the previous version of your file when you save. If your file is named foo, the backup will be called foo~.
- Auto-save files: Emacs, by default, auto-saves your file while you are editing it. The auto-save file for a file foo is called #foo#. If Emacs (or the system) were to crash before you could save your edits, you can recover almost all of it from this file. Auto-saving happens (by default) every 300 characters, or when a system error is encountered.

Emacs Command Structure

- Emacs command
 - All Emacs commands are entered as 8-bit ASCII characters.
 - Every command has a long name, such as kill-line, delete-backward-char.
 - Key binding: pairing of keystroke and command
 - Emacs command set: the set of all bindings
- About ASCII
 - 7 bit ASCII: 95 printable characters + 32 control characters + DEL (the delete character)
 - 8-bit ASCII: with the high-order bit set

Dec	Hx	Oct	Char	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr
0	0	000	NUL (null)	32	20	040	 	Space	64	40	100	@	@	96	60	140	`	`
1	1	001	SOH (start of heading)	33	21	041	!	!	65	41	101	A	A	97	61	141	a	a
2	2	002	STX (start of text)	34	22	042	"	"	66	42	102	B	B	98	62	142	b	b
3	3	003	ETX (end of text)	35	23	043	#	#	67	43	103	C	C	99	63	143	c	c
4	4	004	EOT (end of transmission)	36	24	044	$	\$	68	44	104	D	D	100	64	144	d	d
5	5	005	ENQ (enquiry)	37	25	045	%	%	69	45	105	E	E	101	65	145	e	e
6	6	006	ACK (acknowledge)	38	26	046	&	&	70	46	106	F	F	102	66	146	f	f
7	7	007	BEL (bell)	39	27	047	'	'	71	47	107	G	G	103	67	147	g	g
8	8	010	BS (backspace)	40	28	050	((72	48	110	H	H	104	68	150	h	h
9	9	011	TAB (horizontal tab)	41	29	051))	73	49	111	I	I	105	69	151	i	i
10	A	012	LF (NL line feed, new line)	42	2A	052	*	*	74	4A	112	J	J	106	6A	152	j	j
11	B	013	VT (vertical tab)	43	2B	053	+	+	75	4B	113	K	K	107	6B	153	k	k
12	C	014	FF (NP form feed, new page)	44	2C	054	,	,	76	4C	114	L	L	108	6C	154	l	l
13	D	015	CR (carriage return)	45	2D	055	-	-	77	4D	115	M	M	109	6D	155	m	m
14	E	016	SO (shift out)	46	2E	056	.	.	78	4E	116	N	N	110	6E	156	n	n
15	F	017	SI (shift in)	47	2F	057	/	/	79	4F	117	O	O	111	6F	157	o	o
16	10	020	DLE (data link escape)	48	30	060	0	0	80	50	120	P	P	112	70	160	p	p
17	11	021	DC1 (device control 1)	49	31	061	1	1	81	51	121	Q	Q	113	71	161	q	q
18	12	022	DC2 (device control 2)	50	32	062	2	2	82	52	122	R	R	114	72	162	r	r
19	13	023	DC3 (device control 3)	51	33	063	3	3	83	53	123	S	S	115	73	163	s	s
20	14	024	DC4 (device control 4)	52	34	064	4	4	84	54	124	T	T	116	74	164	t	t
21	15	025	NAK (negative acknowledge)	53	35	065	5	5	85	55	125	U	U	117	75	165	u	u
22	16	026	SYN (synchronous idle)	54	36	066	6	6	86	56	126	V	V	118	76	166	v	v
23	17	027	ETB (end of trans. block)	55	37	067	7	7	87	57	127	W	W	119	77	167	w	w
24	18	030	CAN (cancel)	56	38	070	8	8	88	58	130	X	X	120	78	170	x	x
25	19	031	EM (end of medium)	57	39	071	9	9	89	59	131	Y	Y	121	79	171	y	y
26	1A	032	SUB (substitute)	58	3A	072	:	:	90	5A	132	Z	Z	122	7A	172	z	z
27	1B	033	ESC (escape)	59	3B	073	;	;	91	5B	133	[[123	7B	173	{	{
28	1C	034	FS (file separator)	60	3C	074	<	<	92	5C	134	\	\	124	7C	174	|	
29	1D	035	GS (group separator)	61	3D	075	=	=	93	5D	135]]	125	7D	175	}	}
30	1E	036	RS (record separator)	62	3E	076	>	>	94	5E	136	^	^	126	7E	176	~	~
31	1F	037	US (unit separator)	63	3F	077	?	?	95	5F	137	_	_	127	7F	177		DEL

Source: www.LookupTables.com

Simple Commands

- self-insert-command: 95 printable ASCII characters.
- 32 editing commands: 32 control characters (E.g. C-a, C-b).
- Another 128 editing commands: characters in the upper half of ASCII with the high-order bit set.
- Use the meta key, such as M-a, M-b, for printable characters, and C-M-a, for the control characters.

Prefix (Compound) Commands

- Emacs has more than 160 commands!
- A prefix command makes a pair of keystrokes (typed consecutively, not simultaneously) bound to one command.
- The standard prefix commands are:
 - C-c: used for commands that are specific to particular modes.
 - C-h: used for Help commands.
 - C-x: Character eXtend. Followed by one character.
 - M-x: Named command eXtend. Followed by a long name.

Too Many Commands?

- In practice, you may only need a small portion of these commands.
- You learn new commands all the time.
- Getting help with Emacs
 - C-h a: Prompts for a keyword and then lists all the commands with that keyword in their long name.
 - C-h k: Prompts for a keystroke and describes the command bound to that key, if any.
 - C-h m: Describes the current major mode and its particular key bindings.
 - C-h t: run the Emacs tutorial.

Basic Commands

- Undo and Quit
- Commands to Manipulate Files/Buffers/Windows
- Moving Around in Buffers
- Searching and Replacing
- Deleting, Killing, and Yanking
- Copying and Moving Text
- The Mark and The Region

Undo and Quit

- Undo: C-_ or C-x u
- Cancel: C-g
- M-x shell: run Unix shell

Commands of Files/Buffers/Windows

- Commands to Manipulate Files
 - C-x C-f: read a file into a buffer for editing.
 - C-x C-s: save a file.
 - C-x s: save all the buffers.
- Commands to Manipulate Buffers
 - C-x b: switch to another buffer.
 - C-x C-b: pop up a new window that lists all your buffers.
 - C-x k: kill a buffer.
- Commands to Manipulate Windows
 - C-x 0: close the current window.
 - C-x 1: delete all other windows except the current one.
 - C-x 2, C-x 3: split the current window in two (vertically, horizontally).
 - C-x o: switch to another window.

Moving Around in Buffers

- Move to the beginning, end of the current buffer:
C-x [, C-x]
- Move to the beginning, end of the current buffer
(with the mark set to where you were): M-<, M->
- Page down and up: C-v, M-v
- Go to specific line of number: M-g g

Searching and Replacing

- Search for a text
 - Search: C-s TEXT
 - Search for next occurrence: C-s
 - Stop at found occurrence: RET (Return Key)
 - C-r to search backwards
- Search and replace, asking for confirmation
 - M-%: prompts you for the text to replace, and the text to replace it with, and then searches and replaces within the current buffer.
 - For each match, you have the following options:
 - SPC (Space Key): perform this replacement.
 - DEL (Delete Key): don't perform this replacement.

Deleting, Killing, and Yanking

- Deleting
- Killing (Cutting)
 - C-k: Kills to the end of the current line, not including the newline.
 - M-d: Kills to the end of the word to the right of the cursor (forward).
 - M-DEL: Kills to the beginning of the word to the left of the cursor (backward).
- Yanking (Pasting)
 - The kill ring: almost all commands which delete text save it for possible later retrieval.
 - C-y: yank earlier killed text.

Copying and Moving Text

- To copy text, kill it, yank it back immediately.
- To move text, just kill it and yank it back elsewhere.

The Mark and the Region

- The region is the text between point and mark.
 - Point is just where the cursor is.
 - The mark, on the other hand, is set with a special command C-SPC (set-mark-command).
- Related commands
 - M-w: copy region without killing.
 - C-w: kill region.
 - C-x h: set the region around the entire buffer.

To summarize: some popular commands

- C-x C-f open a file; C-x C-s: save the file; C-x C-c: exit Emacs; C-x b: new buffer; C-x k: kill buffer.
- C-v, M-v: page down and page up.
- C-s TEXT: search text, C-s (forward) and C-r (backward).
- M-%: find and replace, SPC (replace) and DEL (skip).
- C-k: kill (cut) the line; M-d: kill (cut) the word; C-y: yank (paste) the killed text.
- C-SPC: set the mark; M-w: copy region without killing; C-w: kill region.
- C-x u: undo changes made to the buffer.
- C-g: quit (revoke previous commands).

Reference

- Emacs command structure: A Tutorial Introduction to GNU Emacs <http://www2.lib.uchicago.edu/keith/tcl-course/emacs-tutorial.html>
- About Emacs architecture: <http://blog.bookworm.at/2007/03/introduction-to-all-these-emacs.html>
- Some other resources: <http://stuff.mit.edu/iap/2009/emacs/>