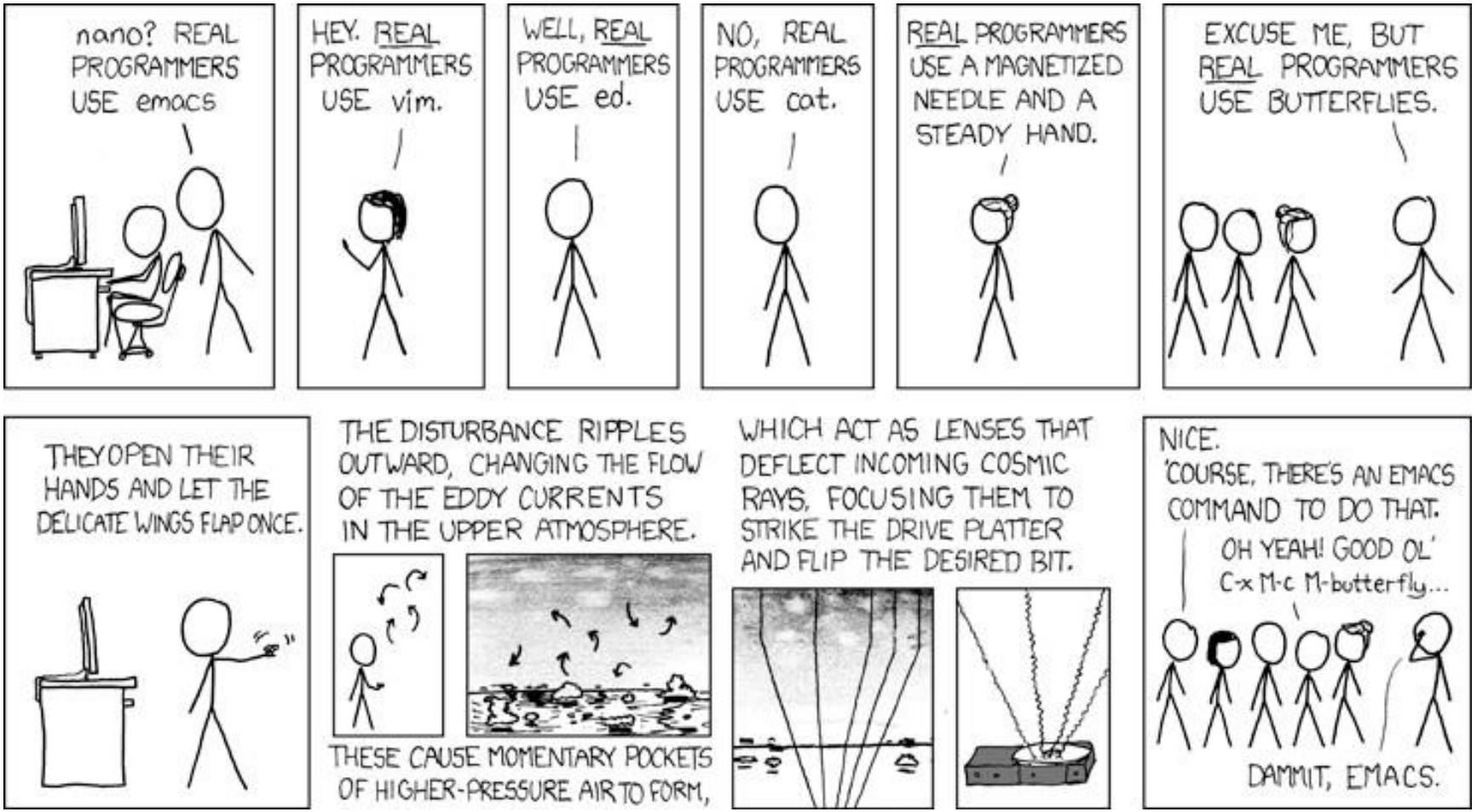
Text Editors for Programmers

EECS-678 Staff

Real Programmers



vim

- Based on vi
  - vi was written in 1976 and has become standard on Unix machines
- Basic design principles:
  - Retains each permutation of typed keys to resolve commands
  - Smaller and faster editor – but with less capacity for customization
  - Uses distinct editing “modes”

Using Vim on a Simple Example

- You should have received two source files (simple.c and simple.h), a Makefile and a dot_vimrc file from the lab website
  - Save *dot_vimrc* as *.vimrc* in your home directory i.e.
  - mv dot_vimrc ~/.vimrc
- dot_vimrc
  - A collection of vim commands run each time you start vim
  - Used to set mappings / options that are not otherwise set by default

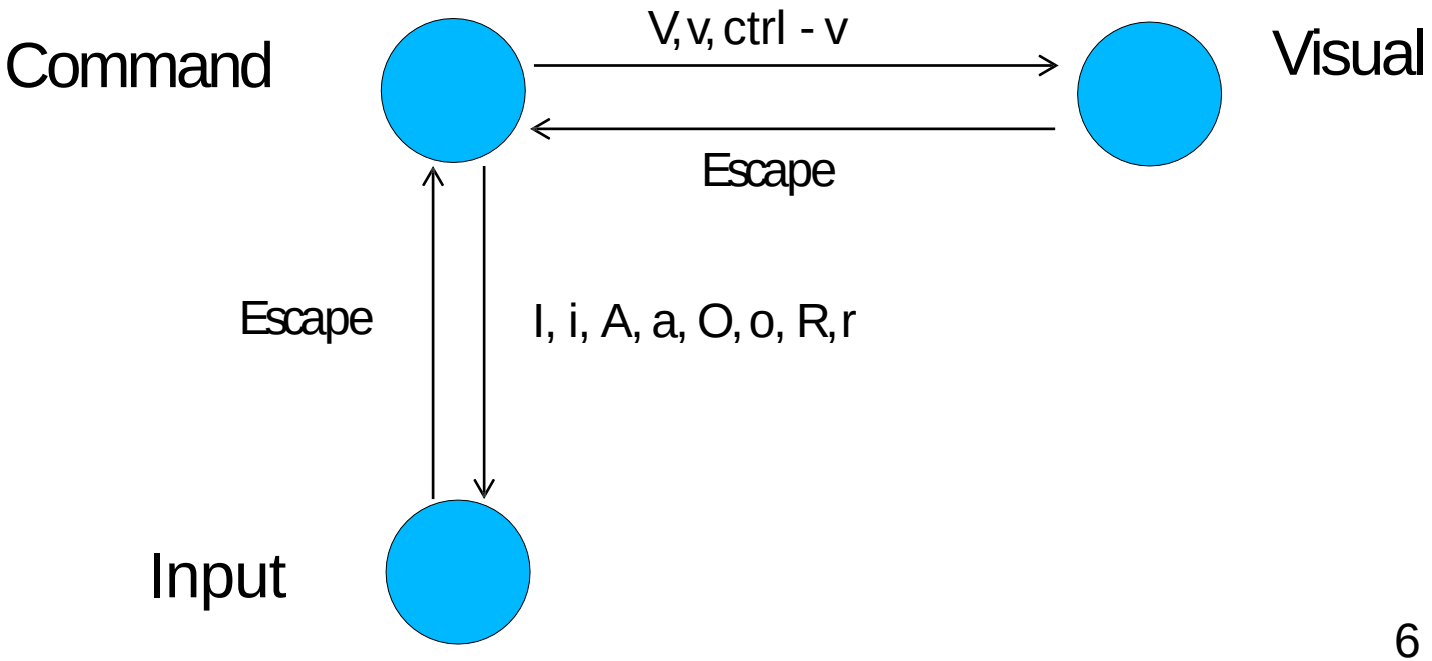
Using Vim to Create / Edit a File

- Start a session
  - vim simple.c / vi simple.c
- Press 'i' to enter insert mode
  - Now type any text you want to insert
- Press ‘Esc’ to enter command mode
  - Type ‘:wq’ to save changes and exit the session

  (Type ‘:q!’ if you want to exit without saving.)

Vim – Modes of Operation

- Command Mode
- Input Mode
- Visual Mode

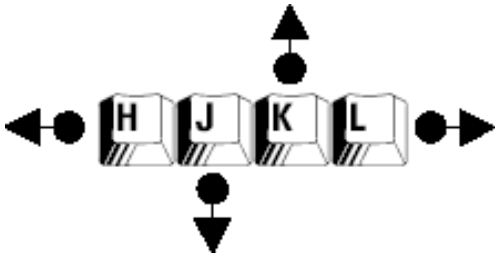


Essential Commands

- :e <file-name>
  - Edit *file* in a new buffer
- :w
  - Save any modifications to the current buffer
- :q
  - Quit Vim. If you have any modifications that you do not want to save, use :q!
- u, <ctr-r>
  - Undo, redo

Command Mode: Navigation

- Reopen simple.c
  - Use j, k, l, and h to navigate around the file as shown. This may take awhile to get used to, but is very nice once you have it down. (Avoid the use of 'arrow' keys.)
  - For faster page scrolling, use <ctrl-b> and <ctrl-f> for page up and page down.
  - These commands have been mapped to spacebar and backspace in the provided .vimrc script.`



Input Mode

- The following commands switch to input mode:
  - i – characters inserted just before the cursor position
  - I – characters inserted at the beginning of the line
  - a – characters inserted just after the cursor position
  - A – characters appended to the end of the line
  - o – characters inserted in a new line below the cursor
  - O – characters inserted in a new line above the cursor
  - C – Often overlooked, deletes the line after the cursor position and start inserting characters at this position

  - After you're done editing, press Escape to go back to command mode, and :w to write the changes

Common Editor Commands

- Cut/copy/paste in command mode:
  - dd – cut a line of text
  - yy – copy ("yank") a line of text
  - P/p – paste a line of text above / below the cursor position
- Commands in Vim can be applied to multiple lines by typing the number of lines you want before the command:
  - "12dd" cuts or yanks 12 lines of text
  - "4j" moves the cursor down 4 lines

Common Editor Commands

- Format a block of code to comply with text-width setting
  - gq <motion command>
  - <motion command> is any of the commands to move the cursor (i.e. j, k, h, and l)
- See examples in simple.c

Searching

- Search for next occurrence of *word*
  - /word
  - jump to the next / previous occurrence of word
    - n / N
- Ignore case while searching
  - :set ic
- th – toggle search highlighting

Find / Replace

- :s /*search_for*/*replace_with*/
- Takes regex for strings to find / replace
- Variations
  - :s /*s*/*r*/g – Replace every occurrence on the line (not just the first)
  - :%s/*s*/*r*/g – Replace every occurrence in the current buffer
  - :s /*s*/*r*/g 12 – Replace for the next 12 lines
  - :s /*s*/*r*/gc – Replace but get confirmation before doing so
  - :s /*s*/*r*/gi – Ignore case when searching for *s*

Setting the Mark

- ma – Sets the mark a to the current cursor position
  - a is not unique, any alphanumeric character can be used
- Now, pressing `a in command mode returns you to the position marked by a
  - Helpful for getting back to hard to find sections of code quickly
  - See the example in simple.c that shows how it can be used with the find/replace command to comment out large sections of code
- da – Deletes the mark a

Visual Mode

- V/v enter into visual mode
- Allows user to visually select text for commands
- Navigate in visual mode as in command mode (g,j,h,k)
- Issue commands with selected text ('y' to yank, 'd' to cut, etc.)
- Escape exits visual mode

Buffers

- Vim allows you to edit multiple files in one session using buffers
  - '<ctrl-w> v' or ':vsplit' to split the screen vertically
  - '<ctrl-w> S' or ':vsplit' to split the screen horizontally
  - '<ctrl-w> w' to switch to the other screen
  - :Sex/Vex – splits the screen horizontally or vertically and opens a file explorer in the new screen
- Select simple.h to open it in the new screen

Tagging the Source

- Big advantage to Vim is its integration with a source code tagging program.
- Inside a terminal, goto the directory of the simple source and type:
  - ctags –R *
- Should create a file named tags. Now, reopen simple.c in Vim.

Using tags with vim

- <ctrl-]> - With your cursor over a variable, jump to the declaration of that variable
- <ctrl-t> - Having jumped to a declaration, go back to the spot you jumped from
- You can use <ctrl-]> multiple times before using <ctrl- t>. The functionality operates like pushing and popping frames on a stack
- Extremely helpful for browsing and learning large programs

Colors

- Color-schemes can be downloaded from:
  - http://www.cs.cmu.edu/~maverick/VimColorSchemeTest/
- Current default color schemes for EECS machines are in:
  - /usr/share/vim/vim72/colors/
- Set a new color scheme with:
  - :colorscheme name

Vim Resources

- Vim Tips Wiki
  - http://vim.wikia.com/wiki/Main_Page
- Vim Cookbook
  - http://www.oualline.com/vim-cook.html
- Slashdot comments discussing Vim tips
  - http://ask.slashdot.org/article.pl?sid=08/11/06/206213
- For everything else, just use Google

TMUX

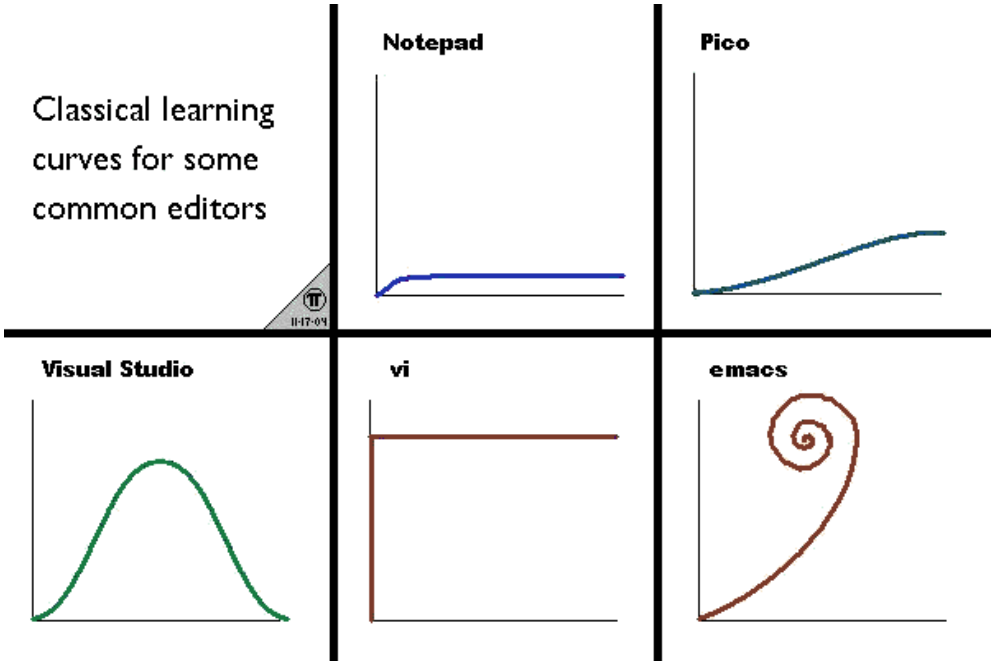
- tmux is a 'terminal multiplexer‘
- Allows users to access multiple separate terminal sessions from within a single terminal window or remote terminal session

TMUX Essential Commands

- Commands outside tmux
  - Create a new session: bash> tmux
- Commands within tmux
  - Create a new terminal: <ctrl-b> + c
  - Cycle through terminals: <ctrl-b> + n, <ctrl-b> + p
  - Kill terminal: <ctrl-d>

Comparison of Editors

- Vim vs. Emacs
  - Vim is primarily an editor
  - Emacs is a Lisp interpreter running an editor
- Wikipedia: Editor War



Emacs Navigation and Command Shortcuts

- Command shortcut syntax:
  - C- means hold Ctrl key
  - M- means hold Alt key or press Esc key
- Forward 1 character: C-f
- Backward 1 character: C-b
- Go to previous line: C-p
- Go to next line: C-n
- Forward 1 word: M-f
- Backward 1 word: M-b
- Page up: M-v
- Page down: C-v
- Go to top of buffer: M-<
- Go to bottom of buffer: M->
- Go to line “n”: M-g g “n”
- Repeat following command “n” times: <Esc> “n” command
- Repeat last command:
- C-x z [z z z …]
- All commands can be accessed with M-x “command name”

Basic Emacs Command Shortcuts

- Start Emacs from the command line:
  - emacs
  - emacs “file name”
- Close session: C-x C-c
- Suspend: C-x C-z
- Open file: C-x C-f
- Save file: C-x C-s
- Undo = Redo: C-_ or C-x u
- Abort command: C-g
- Begin mark region: C-<space>
- Copy region: M-w
- Kill region (Cut): C-w
- Yank (Paste): C-y
- Search buffer contents: C-s
- Select buffer: C-x C-b
- Previous buffer: C-x <left>
- Next buffer: C-x <right>
- Window - split:
- Vertically: C-x 2
- Horizontally: C-x 3
- Window - cycle cursor: C-xo

Homework and demonstration

Use the following questions for self study. These questions may be asked during the demonstration.

Vim is compulsory. Lab quiz and lab demonstration will be based on Vi.

1) Open a file with some C source code. Copy the first 12 lines of text from this file. Create three new files named a.c, b.c, and c.c and paste this text at the top of each new file. Save each new file.

2) Open two different source files for editing, ensuring both are visible on screen simultaneously, and switch between editing each of these two files and issuing commands to a terminal you have open.

3) As you are reading the code for a large C program (with multiple source files spanned across multiple directories), you come across a call to an unknown function. Find the definition of this function. Go back to the calling context where you started.

4) Given a file with a million lines of text, remove the whitespace (spaces, tabs, and newlines) from the beginning of every line. That is, when you have finished, each line should start with a non-whitespace character.

5) Find and replace every occurrence of the string 'Bill Self' in your source file with the string 'basketball genius Bill Self' (assume that case matters). After you're done, reformat your file so that each line adheres to an 80 character text width. If you are using vim, you may assume that your vimrc has the appropriate textwidth and format options settings so that lines are formatted correctly when the formatting command is used.