Linux, vim, and git Workshop

A Sequence of (Very) Brief Introductions

Slides: github.com/jleightcap/LinuxVimWorkshop

Wireless Club – Jack Leightcap

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Workshop Structure

- 15 Minutes – Linux
- 15 Minutes – vim
- 30 Minutes – git
- We have the room booked until 8:30, if you want to delve into anything in more depth, we'd love to stick around!

What is Linux?

- An open source, cross-platform Operating System
  - Linux distributions are completely free to download and use indefinitely
  - Culture of making source code publicly available, if something is broken you almost always have the ability to debug it
- Could be described as an ecosystem of software
  - If you don't like the way some component works, someone probably has already written an alternative
  - Or you have the complete power to write your own implementation
  - With most problems there is probably already a thread somewhere online from 2006 about the exact issue you're having

What is Linux used for, and why should you learn it?

- A lot here at Northeastern! COE/CCS (sorry, *Khoury*) Linux servers for storage space and remote execution, used heavily in Embedded Design...
- A large part of software development takes place using Linux
- Embedded Systems programming heavily relies on familiarity with Linux
- Devices ranging from Android phones to PS4s all run some modified versions of Unix
- Generally most non-desktop processors you can think of run some form of Linux
  - Of all processors (micro or not), any guesses what percentage are used in personal computers?
- The skills learned in one Linux environment are usually extremely transferable to a wide range of enironments.

Figure: Embedded Linux on business card for $1.40

Figure: 1/3 of Microsoft Azure servers run Linux!

Linux Basics - The Terminal

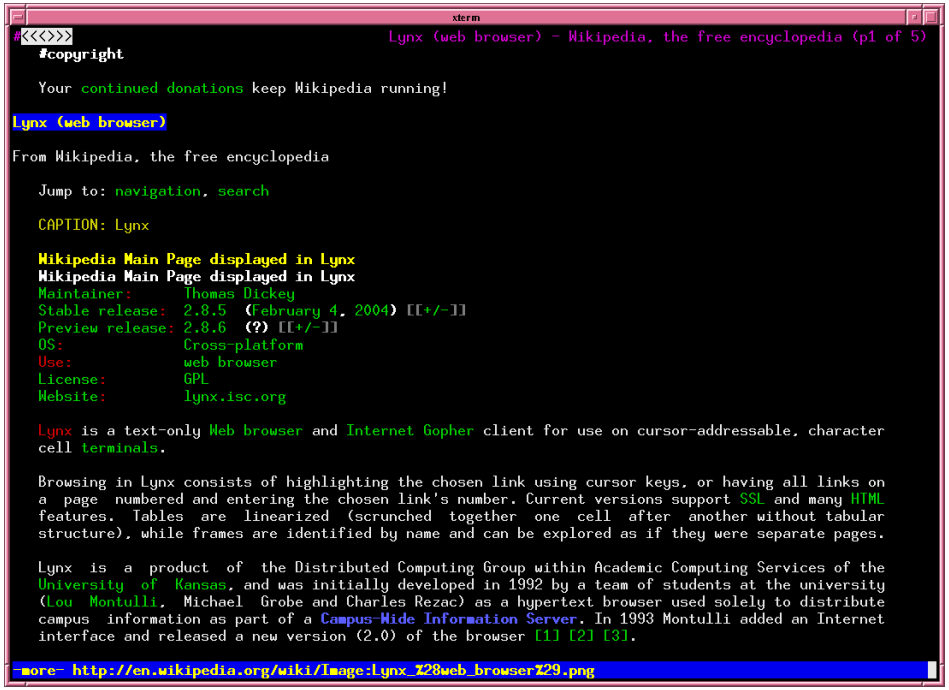


Figure: `Lynx` - a terminal-based browser

- A method of "communicating with your computer" through text-based commands rather than a point-and-click GUI
- Can be used for
  - Navigating your filesystem
  - Creating, deleting, or modifying files
  - Browsing the internet
  - Checking email
  - Basically, anything you would use a computer for
- You can "live in the terminal"

Linux Basics – File Organization 1

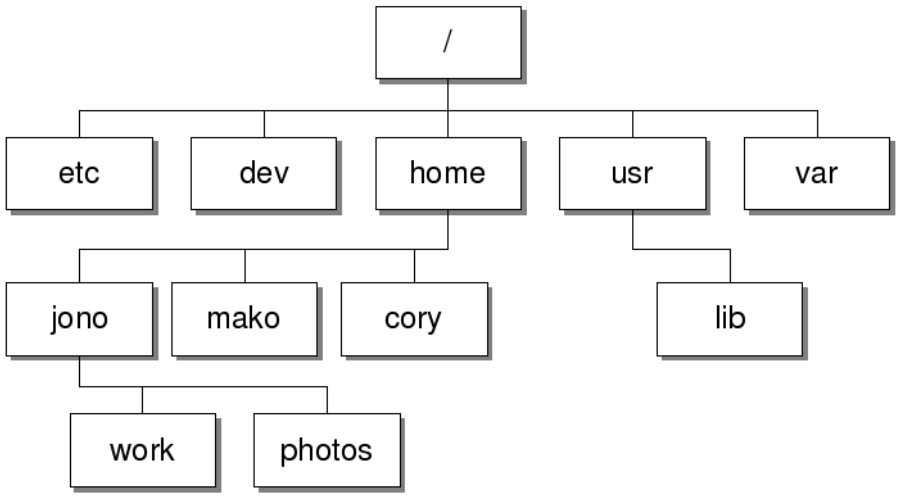


Figure: Basic Linux Directory Structure

- `cd [directory]`
  move your current location to `directory`
- `mv [source] [destination]`
  move a file from `source` to `destination`
- `pwd`
  print working directory
- `ls`
  list the files in the current directory

Linux Basics – File Organization 2

ABSOLUTE PATH

- `/home/`*`user`*
- The current directory
- The parent directory

RELATIVE PATH

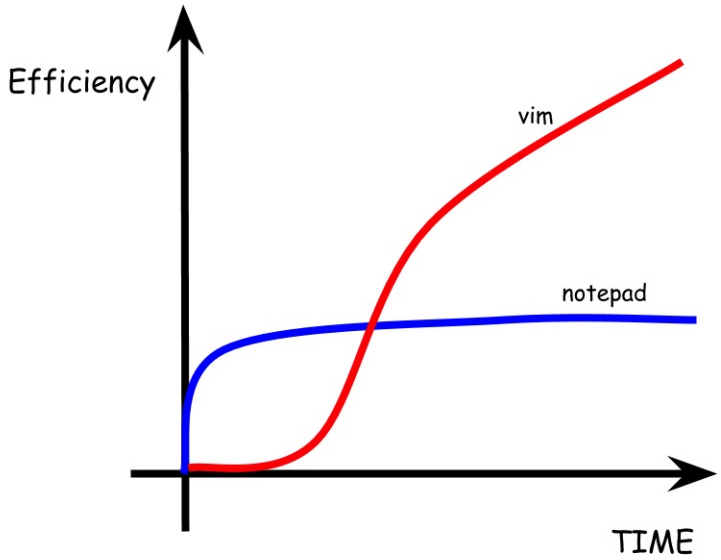
- `~`
- `.`
- `..`

FILE MANIPULATION

- `touch [file]` – create an empty file named `file`
- `rm [file]` – remove `file` (forcibly!)
- `mkdir [directory]` – make an empty directory named `directory`
- `rmdir [directory]` – remove a directory (checks if empty)
- `vim [file]` – edit a file in vim (foreshadowing?)

Vim! What is it?

- Vim is a terminal-based and standalone text editor
- Entirely based on keyboard interaction rather than point and click
- Hands stay close to the home row of the keyboard throughout text editing
- Frequently voted among the most popular text editors among Linux users



Vim Basics – Modes

Vim has different editing modes for different parts of the typing process,

- *Normal Mode* – the default mode, used for editor commands.
- *Visual Mode* – used to highlight text. Commands executed apply to all highlighted text.
- *Insert Mode* – actually write text from keyboard.
- *Command-line Mode* – execute commands.

To move between modes,

- Normal mode is the default, at any point press `esc`.
- Visual mode is enabled by pressing `v` or `V`.
- Insert mode is enabled by pressing *i* (or other shortcut keys)
- Command-line Mode is enabled by pressing `:`

Vim Basics – Normal Mode

- Typing in this mode doesn't actually insert any text!
- Some basic movements:
  - `{h, j, k, l}` → {left, down, up, right}
  - `w/W` – move forward by a word (punctuation, whitespace)
  - `b/B` – move backward by same rule as `w/W`
  - `e/E` – move forward by same rule as `w/W`, but to the end of word
  - `^/$` – the start/end of the current line
  - `gg/GG` – the first/last line of the current file
  - *n*`gg` – go to the *n*th line of the current file
  - all commands can be prefixed by a number, so `4k` would move up 4 lines
- Some basic editing:
  - `x` – delete character under cursor
  - `diw` - delete in word, delete word under cursor
  - `dd` – delete the current line

Vim Basics – Visual Mode

Much simpler than insert mode! Define selection start and end, then execute a command over that selection.

- `v` - start highlighting at current cursor position by character
- `V` - start highlighting at the current line by line

Visual mode is generally useful for commands repeated over multiple lines.

- <</>> – indent back/forward
- `d` - delete, equivalent to "cut" – move into "clipboard" (buffer in vim)
- `y` – yank, equivalent to "copy"
- `p` – paste text in buffer after the cursor

To repeat a command, prefix with a number as mentioned before, or use `.`

Vim Basics – Insert Mode

Actually input text! There's not much to say about this, so some shortcuts that enter insert mode:

- `a/A` – append, at end of word/line
- `i/I` - insert, at current cursor position, or at beginning of line
- `ct{x}` – change to `x`, delete text from cursor position to `x`, and enter insert mode
- `c^/c$` – change to beginning of line, change to end of line

Vim Basics – Command-line Mode

Enter commands after `:`,

- `:w`, `:q` – write, quit
- `:![command]` – run terminal `command` from inside vim!
- `/[string]` – search for `string` in current file, `n`/`N` to navigate instances

Actually Trying Vim and Linux!

A lecture about Vim is pretty dry, and is something that is learned through practice.
If we have time, some good resources:

- VIM Adventures (vim-adventures.com) – a browser game that visualizes vim commands very well
- `vimtutor` – frequently comes installed alongside vim.
- Vim Tips Wiki (vim.fandom.com) – if you end up going down this rabbit hole, as plenty examples of surprisingly efficient commands.
- Over the Wire (overthewire.org/wargames/bandit/) – SSH based game based on finding keys, targeted at Linux beginners.