Demystifying Linux

Penn State IEEE Projects 2022

Getting some downloads started

Roadmap

- What is Linux
- Setting up a VM
- Using the desktop environment
- Navigating the filesystem
- Basic terminal usage
- Program installation
- Q&A

What is Linux?

- Family of operating systems based on the Linux kernel
  - Linus Torvalds, September 1991
  - Unix-like
  - Different "flavors" of Linux, called distributions
- Known for being...
  - Free
  - Unfriendly to beginners
  - Community supported
  - In a *lot* of things
- Say hi to Tux!
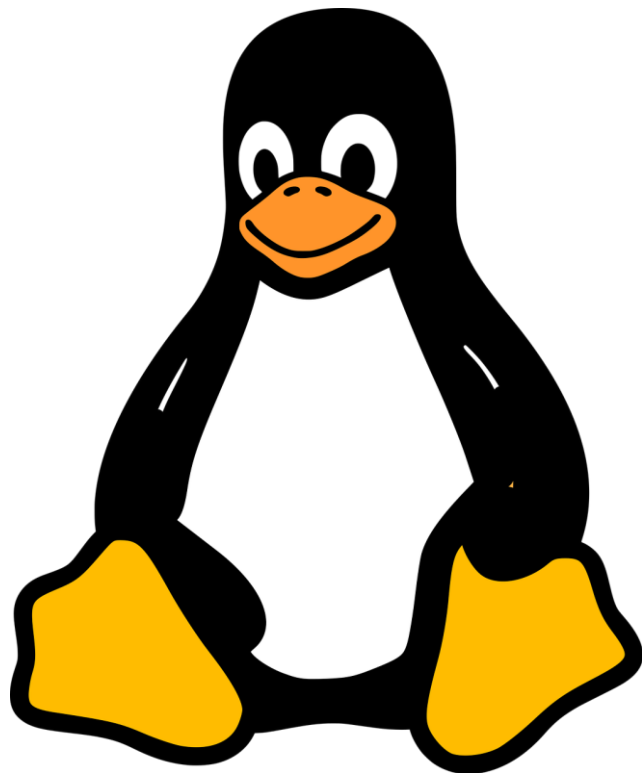
Distributions

- "Flavors" of Linux
- Most are general purpose
- Many are derived from other distribution
- Some common distributions
  - Ubuntu (Debian-based)
  - Manjaro (Arch-based)
  - Linux Mint (Ubuntu-based)
  - Elementary OS (Ubuntu-based)
  - And many more!
- If you've used Linux before, it was probably Ubuntu

Getting set up with a VM

What's a VM?

- Emulates computer hardware with software
  - Will be slower than on bare metal
  - Pretty damn close now, though
- Hypervisor
  - Separates VM from host machine's hardware
  - Provisions host resources to VM
- What this means for you:
  - Sandbox PC that you can screw around with without putting your real PC at risk
  - You can run _most_ OSes on _most_ computers
    - ARM chip support for most VM software isn't ready yet

Getting set up with a VM

Navigating the desktop

Navigating the filesystem with the terminal

- *pwd*
  - Where am I?
  - Print working directory
- *cd [location]*
  - Change directory
  - "." is the current directory
  - ".." is the parent directory
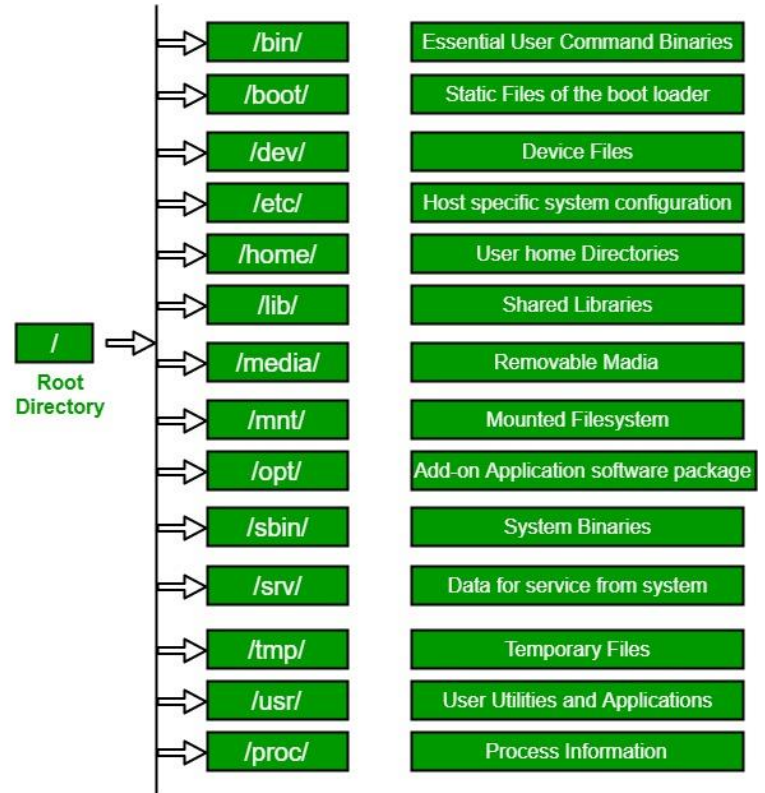- *ls [-la]*
  - Show files in current dir

The Linux file structure

Everything is a file.

The Linux file structure

- Root directory -> "/"
  - Top level directory that contains all other dirs
  - Similar to Windows' "C:\"
- Home directory -> "/home/"
  - Contains user directories
    - Documents, Downloads, etc.
  - Similar to Windows' "C:\Users"
  - "~" goes to your user directory

Directory	Description
/bin/	Essential User Command Binaries
/boot/	Static Files of the boot loader
/dev/	Device Files
/etc/	Host specific system configuration
/home/	User home Directories
/lib/	Shared Libraries
/media/	Removable Madia
/mnt/	Mounted Filesystem
/opt/	Add-on Application software package
/sbin/	System Binaries
/srv/	Data for service from system
/tmp/	Temporary Files
/usr/	User Utilities and Applications
/proc/	Process Information

/ Root Directory

Basic terminal usage

- *echo [text]*
  - Repeat text back to the terminal
- *touch [file]*
  - Create new blank file
- *cat [file]*
  - Outputs content of file to terminal
  - less [file]-- like cat, but better for long files
- *mkdir [dir]*
  - Make a new directory
- *rm [-rf] [file]*
  - Remove file
  - *-r* required if it's a directory
  - *-f* to force-- be careful

- *nano [file]*
  - Basic text editor
- *mv [source] [dest]*
  - Move or rename file
- *chmod [permissions] [file]*
  - Change file permissions
  - *chmod +x [file]* to make file executable
- *top*
  - Linux's version of task manager
- *kill [pid]*
  - Kill process with given pid
- *man [command]*
  - Get info on how to use a specific command

Advanced terminal usage

- ***./[executable]***
  - Run executable file in current directory
  - Files must be run with relative filepath
    - "./" does the trick
- **[command] > [file]**
  - "redirect"
  - Feed output of a terminal command to a new empty file
  - **>>** will append instead
- [command] | [command]
  - "pipe"
  - Feed command output to another command

- Bash scripting
  - Write a series of commands in a .sh file
  - Run using ***bash [file]*** command
- Tab autocompletion
  - Most terminals will try to autocomplete filenames for you

Nobody really knows what they're doing
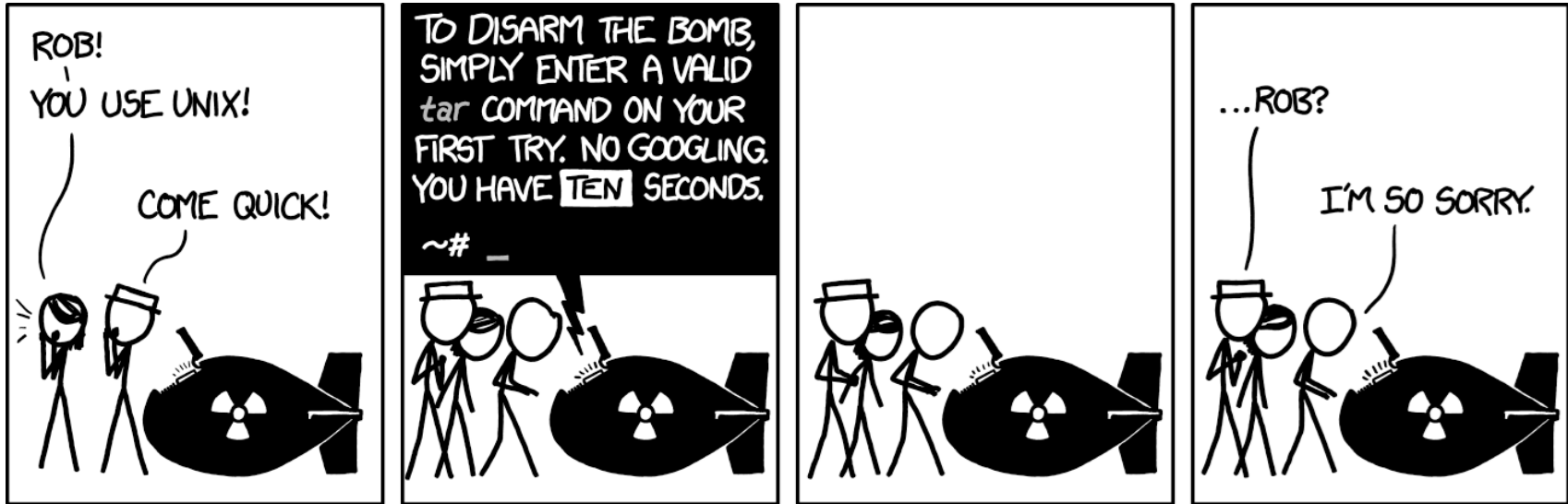
Sudo

- *Sudo [command]*
- **S**uper**u**ser **do**
- "Do this command with maximum permissions"
- Going to need to enter password
- Only certain users on a system can use *sudo*

● BE CAREFUL

Using package managers

- Apt is Ubuntu's default package manager
  - 90% of the time, you'll be using apt
  - Basic steps
    - *sudo apt update*
    - *sudo apt install [package]*
- Snap becoming more popular
  - More common for more complicated GUI programs
    - I.e. VSCode, IntelliJ products, etc.
  - Basic steps
    - *sudo snap install [package] [--classic]*

Recommended packages

- *htop* (for when you want a better *top*)
- *tree* (for when you're really lost)
- *cmatrix* (for when you are Keanu)
- *cowsay* (for when moo)
- *vim* (for if you hate yourself)
- *fortune* (for fortune)
- *lolcat* (for rainbow text)
- *sl* (for steam locomotive)

Q&A