Linux 101

But I just installed Windows 10 though

5 Minute History Lesson

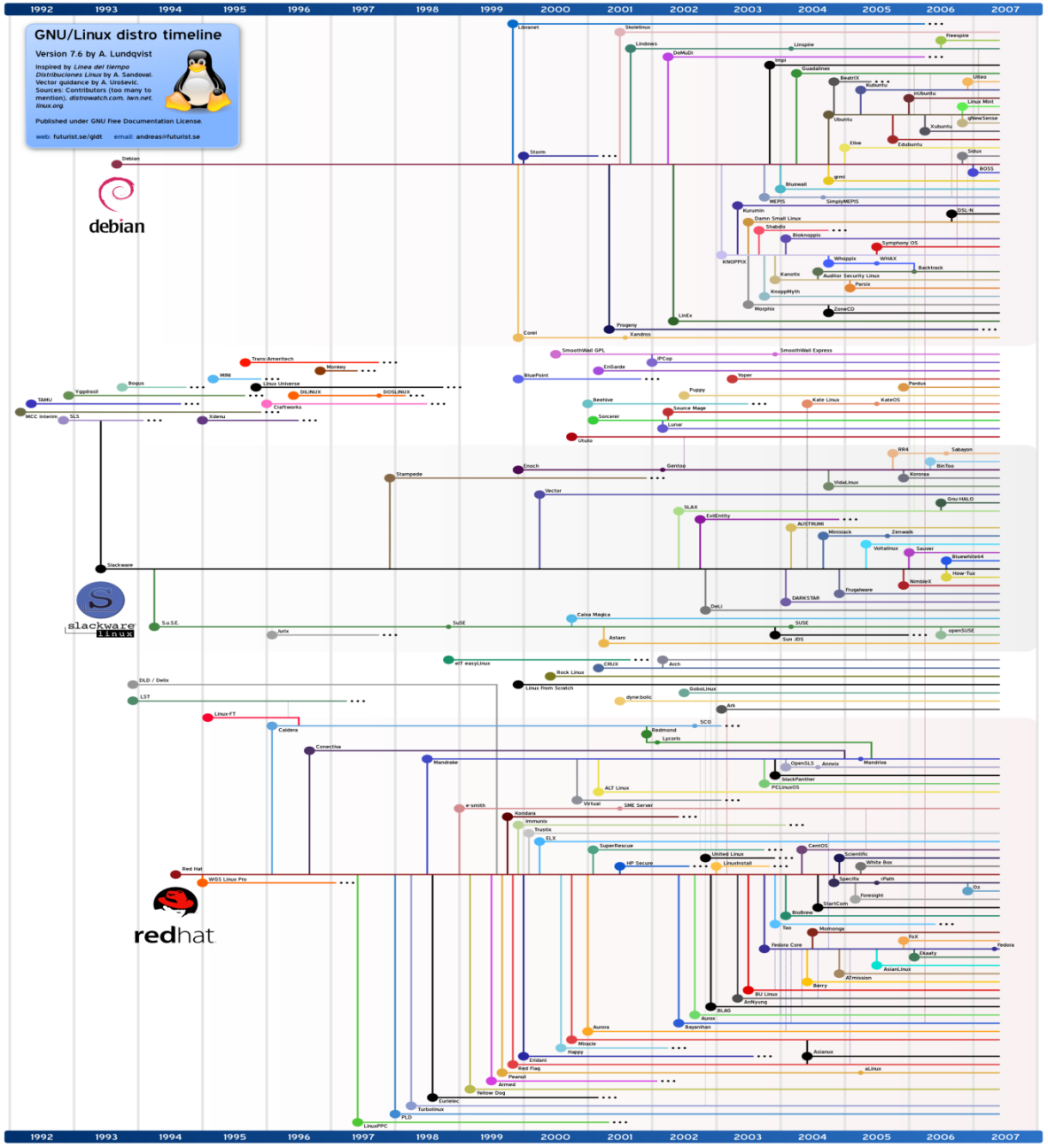
- Unix
  - Created at Bell Labs in 1969
- Richard Stallman
  - Started the Open Source movement (1989)
    - GPL
  - Built programs, but no kernel
    - Kernel? Take CS 537
- Linus Torvalds
  - Smart dude from Finland, low key built a kernel (1991)

Acroymns Frenzy Uno

- GNU
  - GNU's Not Unix!
    - Recursive jokes, ECE majors try to be funny when possible
  - Most programs found on Linux
    - GCC, Emacs, Bash, Git, etc.
    - Like Unix programs, but written from sctatch under GPL
- Linux
  - A Linux kernel running together with the GNU Operating System
  - Today, anything not Mac or Windows.
  - Free!
- POSIX
  - A set of standards
  - Mainly because of the number of Linux/Unix distros that popped up

Distros

- Everyone wants something different
- Many options for many different needs
- No “best” distro



GUI and what it caused

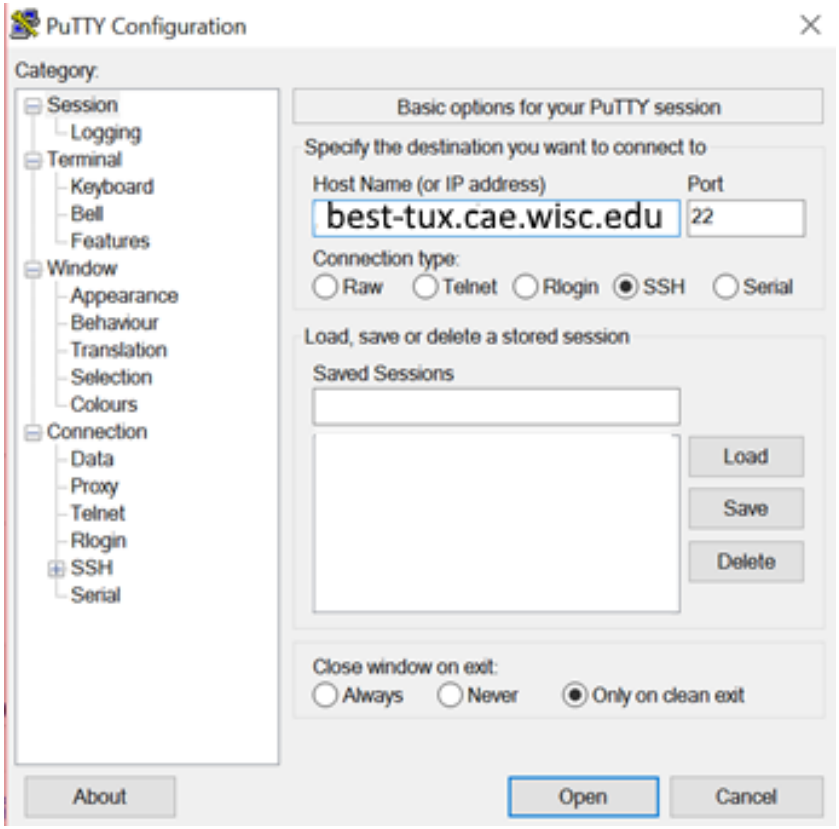
- Computers didn't always have **G**raphical **U**ser **I**nterfaces
- Apple tried suing Microsoft over this stuff
- Most "Engineering" tools are command line based
- We are only talking command line from here out

SSH and Putty

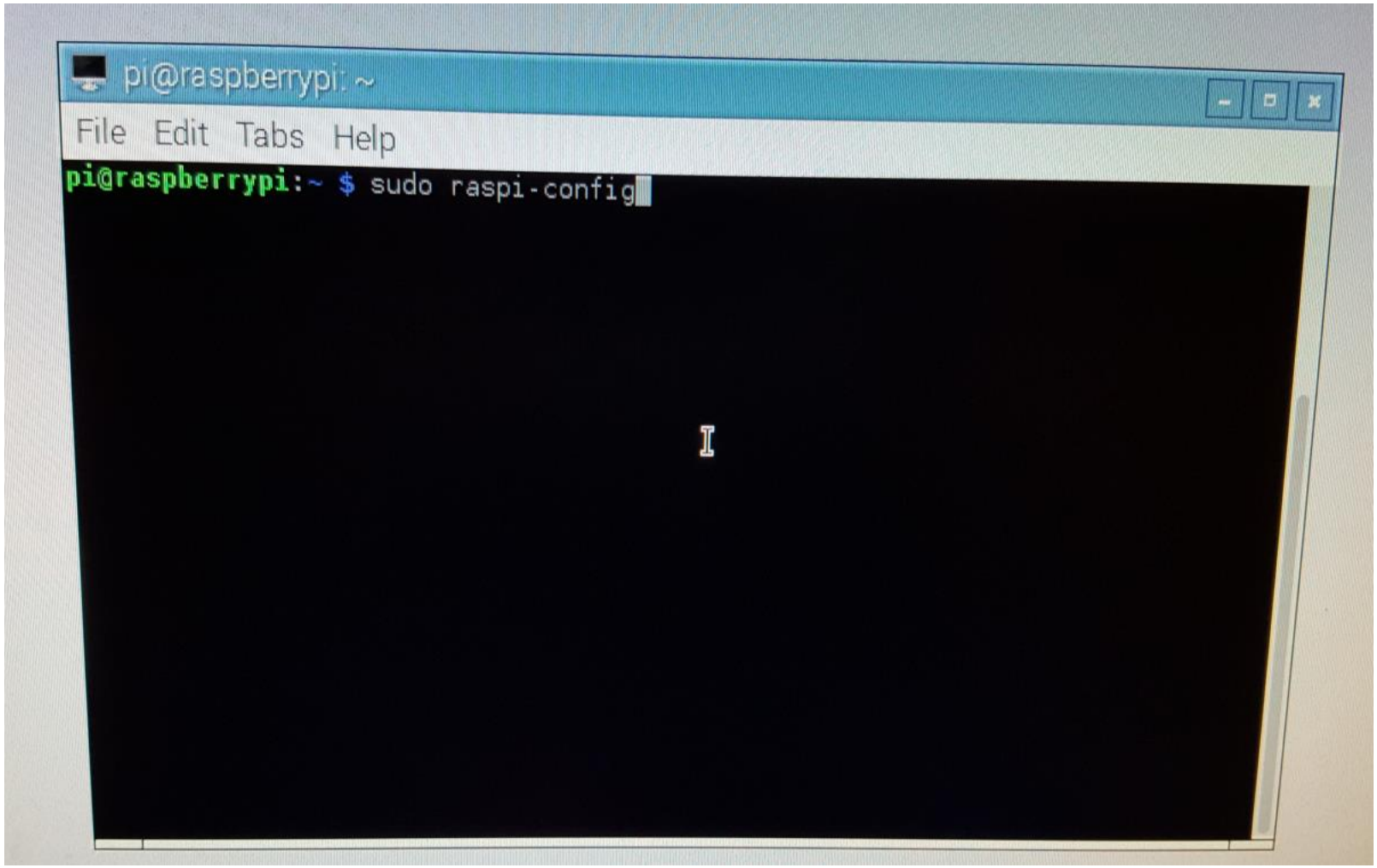
- SSH
  - Secure Shell Protocol
  - Way of gaining access to a terminal of another machine
  - Can't SSH ***INTO*** a Windows machine, but can SSH ***FROM*** a Windows machine
    - You will need a **SSH Client**
    - Putty, MobaXterm, etc
  - Macs are Unix based so can just run ssh in terminal

SSH into your CAE Lab computers

- Can follow along from here on out
- best-tux.cae.wisc.edu



If on a Linux GUI



- Type “Ctrl+Alt+T” to open a terminal

Before we start - keywords

- Commands are seperated by spaces
  - Thats_why_people_use_underscores
  - The first word is the program name
- **Flags**
  - Ways of turning on optional settings to command programs
  - Will either be look like “-a” or “--off”
    - These are set by developer, not “official” system used
  - When in doubt “--help” will probably list options
- **User**
  - Everyone is a user with set of permissions
  - “root” is FULLY in charge
  - sudo
    - Lets you run root commands without being root

Caution to all Window users

- / is not the same as \
  - / is a forward slash
  - \ is a back slash
  - EVERYONE uses a forward slash...except Windows
  - Also Windows is **NOT** case sensative
  - “Test” != “test” in the unix world
- **Don’t copy and paste commands in from Windows to Linux!!! #YouBeenWarned**

Getting around

- ls
  - Will list all items in directory
  - Try with the –a and/or –l flag
- pwd
  - Will show you where you are on the system
- cd
  - Changes directory
  - / vs ./ vs ../
    - / is the root directory (the top part)
    - ./ is the current directory
    - ../ is the parent directory
      - Can compound these like ../../../../../
- ~
  - Your home directory
  - When in doubt just do a *cd ~*

File fun

- mkdir
  - Makes directory, make a test folder for this fun to keep your files clean
- touch
  - Will make a file but it will be empty
- cp
  - Copy
    - cp <source> <destination>
- mv
  - Move
    - mv <source> <destination>
- rm
  - Remove
    - rm <file(s)>

Text Editor

- Many editors
  - Vi vs Emacs

- Nano
  - The easier cop-out for today
  - Two things to know
  - ^ means CTRL key
  - M means ALT key
  - ^X means CTRL+X to quit

More Fun

- cat
  - Will list all the contents of the file
    - Also use “more”, “head” or “tail”
- grep
  - Lets you search inside folder
  - “grep test ./ -r”
- wildcard
  - *
  - Means “everything”
  - “grep *.txt ./ -r” grabs all text files

Piping

- Unix programs designed to be small programs that can be “piped” together
- Every program has an input and out
- Can send output from one program to the input of another

Piping tools

- >
  - Will save into file
  - “cat myText.txt > newText.txt”
- >>
  - Will append to file
- |
  - The “pipe”
  - ls | head -3

The File System

- 3 letters, not a fan neither
- Linux is much more hierarcal than Windows
  - Everything starts at the root
  - /
    - Boot -- contains the kernel and system map
    - Bin -- contains the basic system binaries
    - Dev -- all the device entries
    - Etc -- can't think of any other place to put it
    - Home -- where all the users live
    - Lib -- system libraries
    - Mnt -- place to mount filesystems
    - Proc -- system information
    - Root -- the root user's home
    - Sbin -- system binaries
    - Usr -- where user accessible programs go
    - Var -- logs and such

Bash

- Is a terminal program
  - Created with GNU tools in 1989
- Can write “Bash Scripts”
  - Will do commands for you
  - .sh files usually
    - Stands for shell script

Before we Bash

- chmod
  - Way to set permissions of files
  - File uesr, group user, other user
- We will want to “execute” our scripts
  - “chmod u+x <scriptName>

#	Permission	rwx
7	read, write and execute	rwx
6	read and write	rw-
5	read and execute	r-x
4	read only	r--
3	write and execute	-wx
2	write only	-w-
1	execute only	--x
0	none	---

Linux and my Pi

– Whats the difference?

VS

GPIO PINS!!!

- Take ECE 353
- Way to send data
- Can interact with board
- “Raspbian” is a distro made for this

Questions