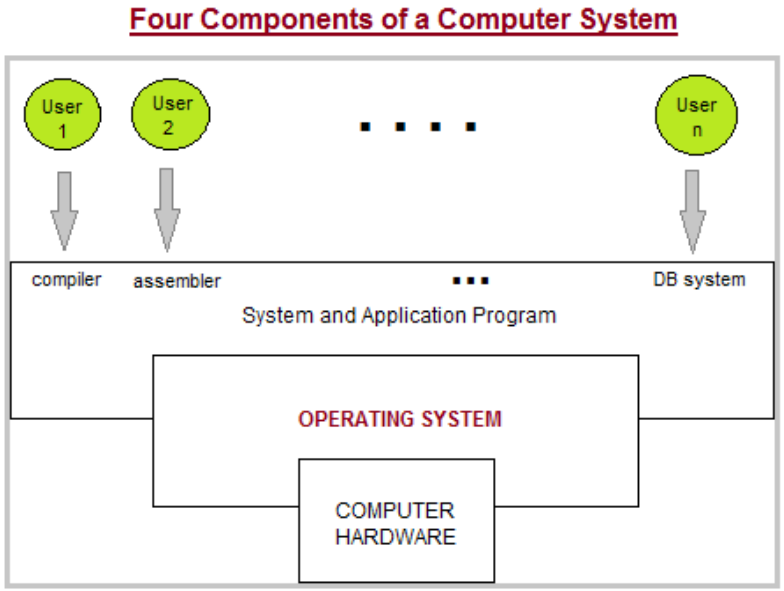
# Chapter 01

Introduction to Unix and Linux

# Computers as you know them

- User
  - Run programs written by others
- Application Programmer
  - Write high level programs others will run
- Systems Programmer
  - Write low level programs others will use
- Kernel developer
  - Write code for the Operating System

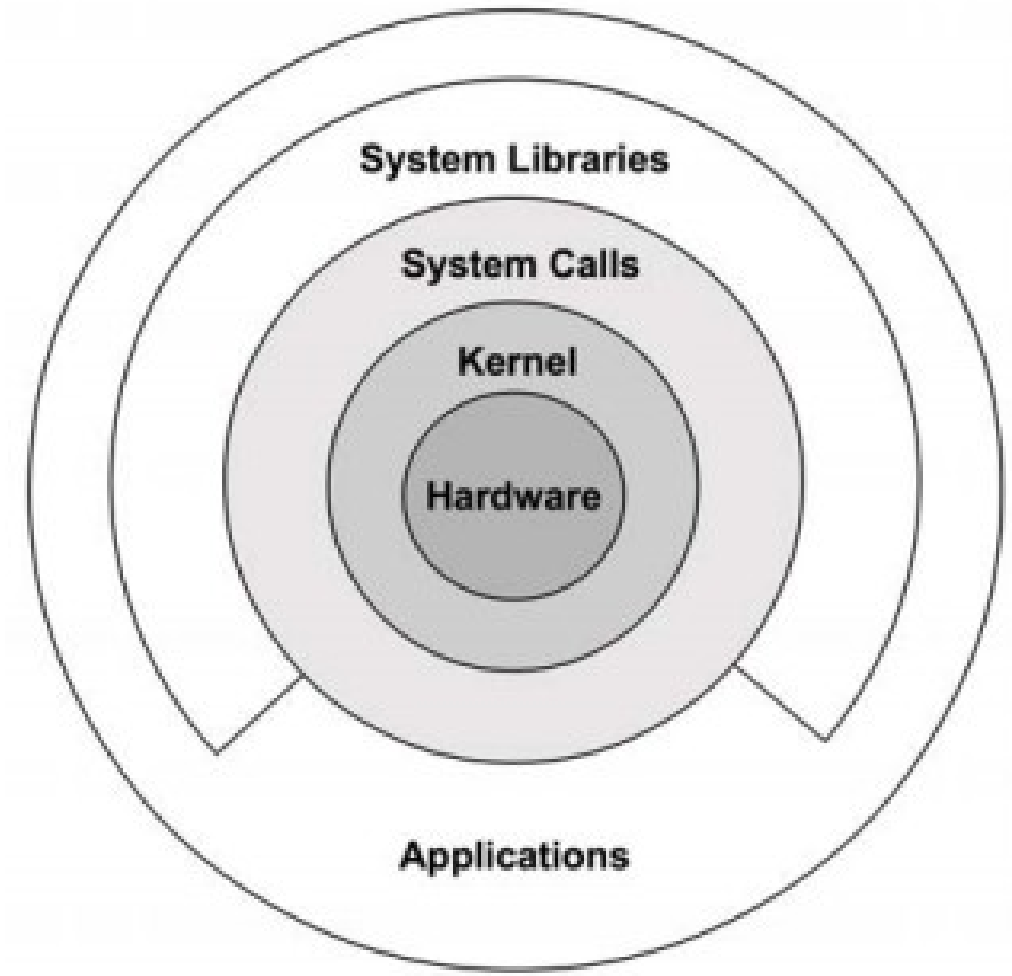


# Operating Systems

- Every program you write needs resources
  - Memory
  - Hard Disk
  - Network
  - CPU
- Imagine if you had to manually deal with these in your program

- Operating System is the layer of software between the hardware and your programs
- Provides all programs what they need in a safe and efficient manner

# Operating Systems



# Windows, Mac OS, Unix, Linux

# Windows, Mac OS, Unix, Linux

- Windows, Mac OS, and Unix are operating systems
- Linux is actually a kernel (more on that later)

- To be fair, there is no ‘perfect’ operating system
- You just have to know where each succeeds

# Windows

- Some Popular Versions
  - Windows 3.1
  - Windows NT
  - Windows 95
  - Windows 98
  - Windows 2000
  - Windows ME
  - Windows XP
  - Windows Vista (HAHAHAHAHA)
  - Windows 7
  - Windows 8
  - Windows 10

# Mac OS

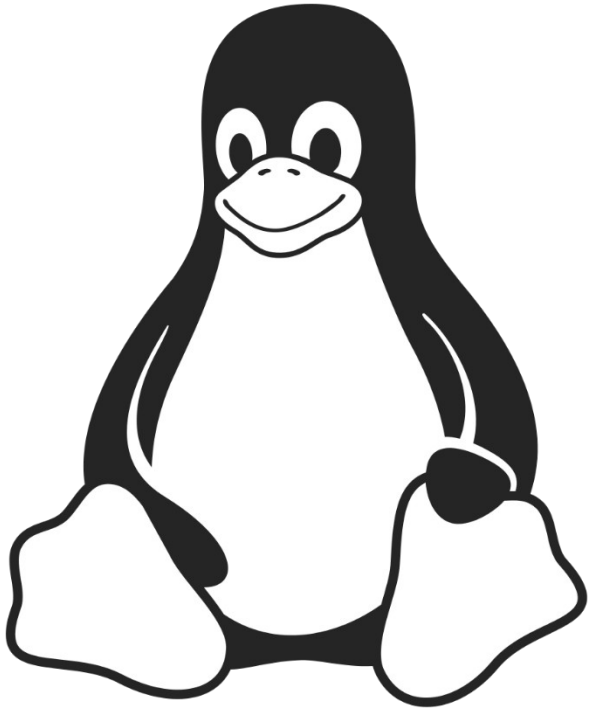
- Based on the Unix operating system

# Unix

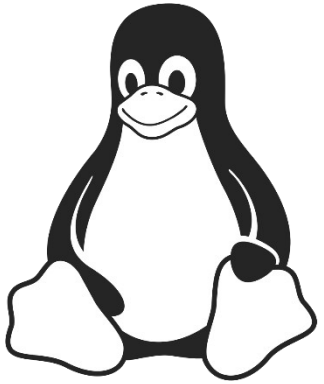
- Family of multitasking, multiuser computer operating systems
- Originally from AT&T Unix
- Commonly used in internet servers, workstations and PCs by Solaris, Intel, HP etc.
- Popular in universities, big enterprises, etc.
- Different flavors of Unix have different cost structures according to vendors
- Unix systems mostly developed by AT&T, various commercial vendors, and non-profit organizations

# Linux

- Welcome to Linux
- Meet Tux

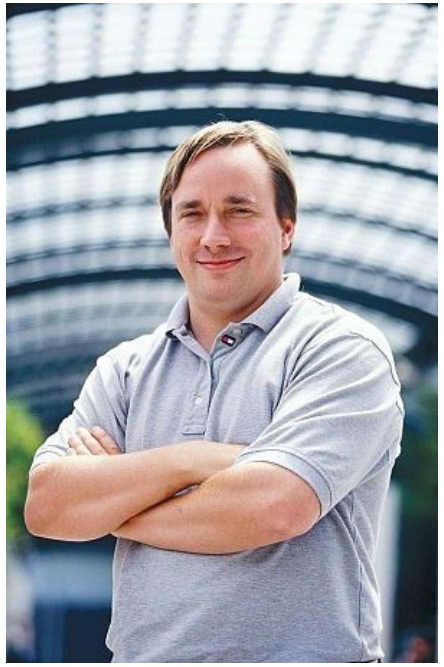


# Linux



- ‘Unix-like’ operating system
- Can be freely distributed, downloaded freely
- Open Source development
  - Sharing and collaboration of code and features through forums
  - Distributed by various vendors.
- Used by home users, developers, servers, and computer enthusiasts
- Can be installed on a wide variety of computer hardware, ranging from mobile phones, tablet computers and video game consoles, to mainframes and supercomputers

# Linux - Timeline



- 1987
  - Andrew S. Tanenbaum releases MINIX for academia
  - MINIX designed for 16-bit systems, unsuited for 32-bit systems
  - UNIX for 32-bit systems too expensive for private users
- 1991
  - Linus Torvalds starts a new free operating system kernel project
  - “… I'm doing a (free) operating system (just a hobby, won't be big and professional like gnu) for 386(486) AT clones…”
  - Originally called ‘Freax’

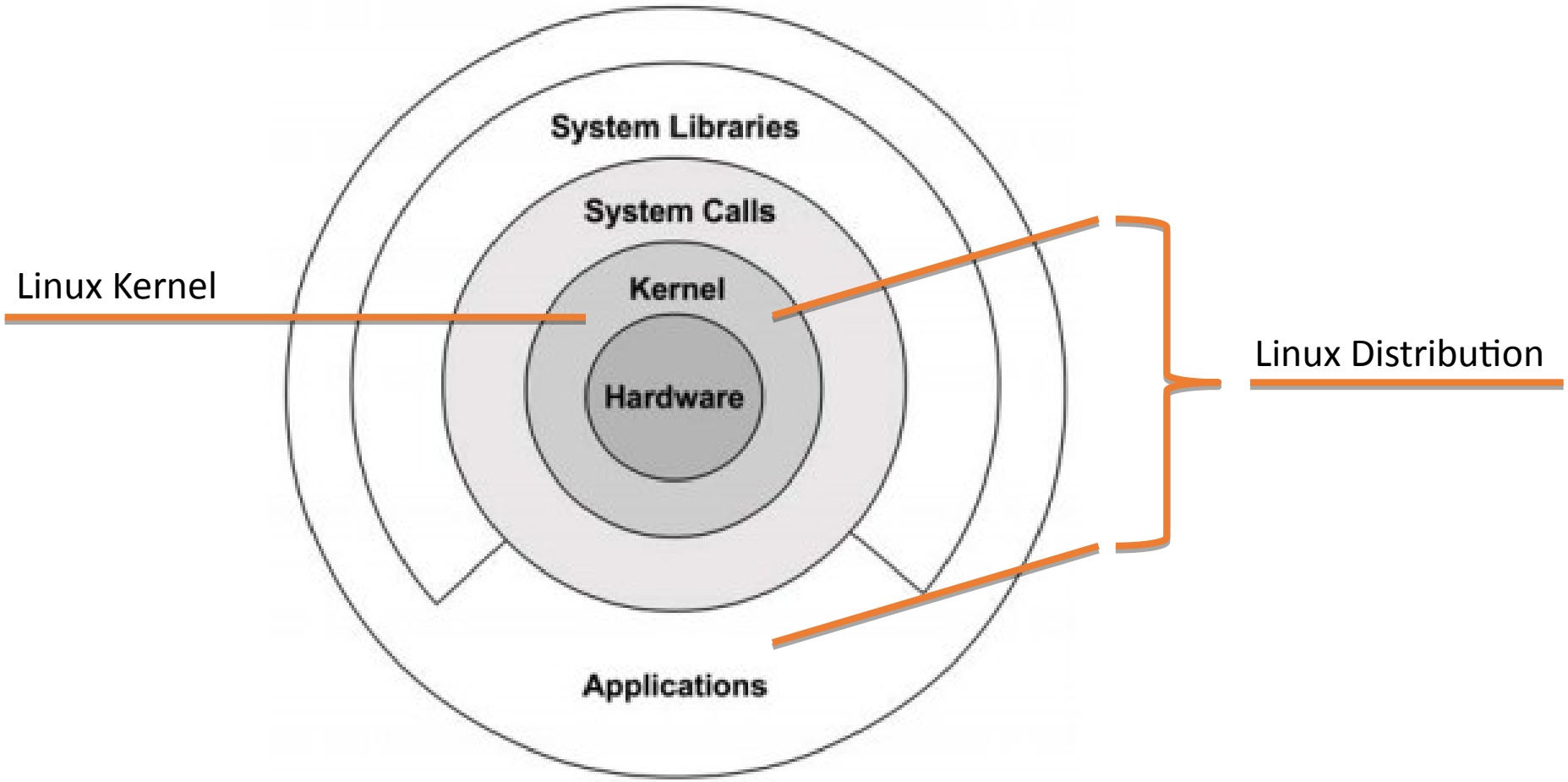
# Linux - Timeline

- 1992
  - Tanenbaum – Torvalds Flame Wars
  - Tanenbaum: "Linux is obsolete"
    - The kernel is old-fashioned.
    - Not Portable
    - No strict control of the source code by any individual
    - Employs a set of features which are useless
- 1994
  - Linux v1.0 released
- 1998
  - Microsoft begins to feel threatened
  - Conducts ‘study’ that concludes – Linux is worse in reliability, security, and total cost of ownership

# Linux - Timeline

- 20xx
  - 2006: Oracle releases its own distribution of Red Hat Enterprise Linux
  - 2007: Dell starts distributing laptops with Ubuntu pre-installed on them.
  - 2011: Version 3.0 of the Linux kernel is released.
  - 2012: The Linux server market revenue exceeds that of the rest of the Unix market
  - 2013: Google's Linux-based Android claims 75% of the smartphone market share
  - 2014: Ubuntu claims 22,000,000 users
  - 2015: Version 4.0 of the Linux kernel is released
- 2017
  - Thousands of developers all over the world contributing to Linux
  - Linus personally approves every line of code that becomes part of Linux
  - From a few C files in 1991 to more than 18 million code lines

# Linux – Kernel vs Distributions



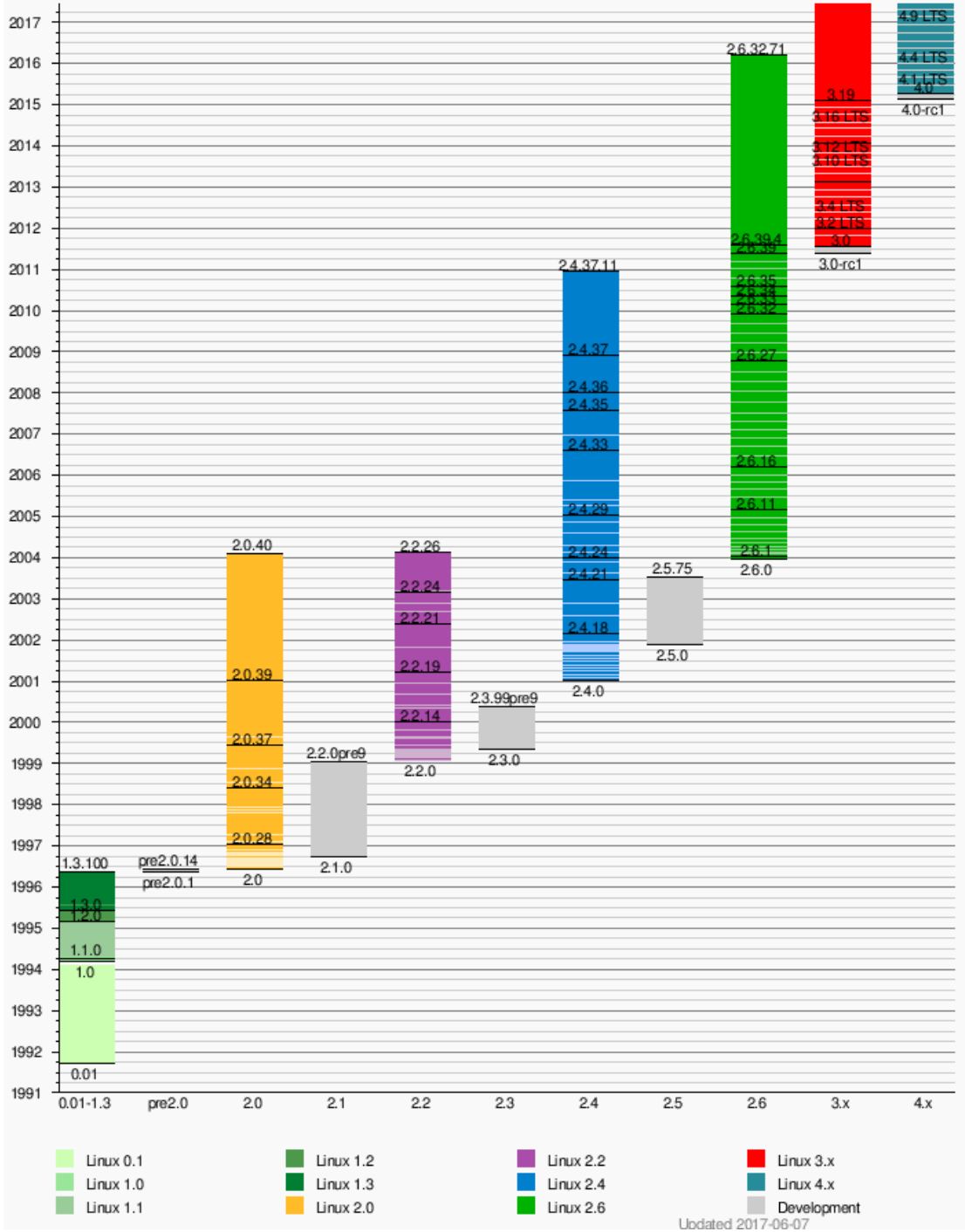
# Linux – Kernel vs Distributions

- Kernel: The core code that
  - Manages Hardware
  - Allows access to Hardware and Resources
  - Offers management features like scheduling, memory allocation, etc.

- Distribution:
  - Kernel + Tools and Libraries + Additional Software + Documentation + Optional GUI

# Linux – Kernels

- Versions
  - 1.0.0, … ,
  - 2.0.0, … ,
  - 3.0.0, … ,
  - 4.0.0, … , 4.11.1, …, 4.12.9
- Naming X.Y.Z –
  - X = MajorVersion
  - Y = MinorVersion
  - Z = BugFixedVersion



# Linux – Distributions

- Popular Distributions (Distros)

  - Debian
    - Knoppix
    - Ubuntu
    - Kubuntu
    - Linux Mint
    - Elementary OS
  - Fedora
    - Red Hat Enterprise Linux (RHEL)
      - CentOS
      - Scientific Linux
  - openSUSE
  - Arch Linux
  - Gentoo
    - Chrome OS
  - Slackware

# Linux – Myths

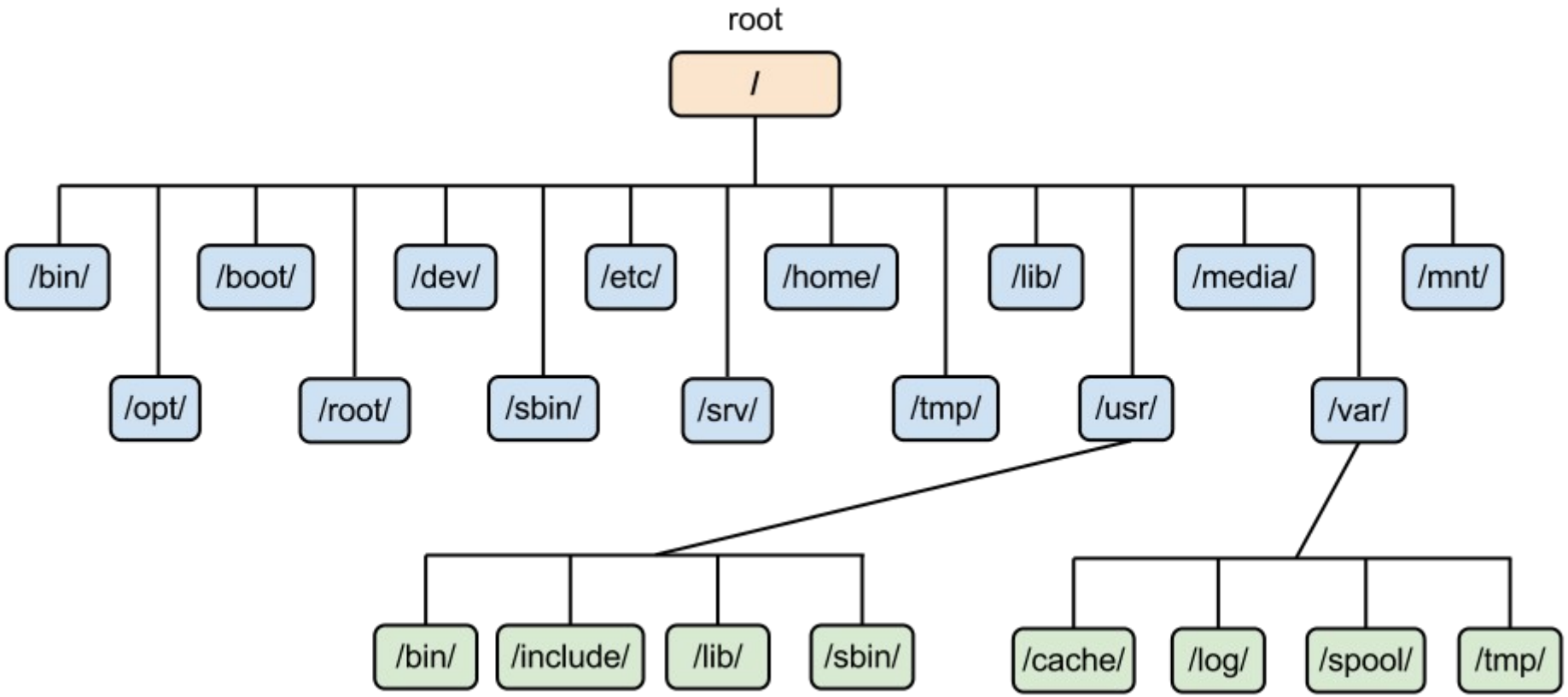
- Linux is very difficult to use
  - There are distros that look and behave exactly like Windows or Mac or both!
- You need to know commands to use Linux
  - You can spend your entire life clicking the mouse in Linux
- Linux does not have enough applications
  - Most apps on Linux
  - If not, there's probably an alternative
  - In the worst case, use 'WINE' to run Windows apps
- Linux is not for gamers
  - Partly true
  - Steam is now on Linux
- Linux is for servers only
  - Linux is for servers, data centers, scientific research, databases, AND your home computer

Reference: https://itsfoss.com/myths-about-linux/

# Get familiar with Linux

- Login and play around
- Open up a text editor (try gedit)
- Open up file explorer to check files and folders (directories)
- Wait there is no Microsoft Office?!

# Linux – Directory Structure



# Linux – GUI vs CLI

- Graphical User Interface, Command Line Interface

- You could spend your life using GUI only
- You would be missing out on tons of power!

# Linux – Shell

- Shell is a user program provided for user interaction
- Allows running Unix-like commands
- Command Line Interface (CLI) – Text/Command Based

| Shell Name | Remark |
|---|---|
| BASH ( Bourne-Again SHell ) | Most common Linux shell |
| CSH (C SHell) | The C shell's syntax and usage are very similar to the C programming language. |
| KSH (Korn SHell) | -- |

# Linux – Terminal

- Originally –
  - Physical monitor-keyboard systems where you typed commands for the shell
- Now –
  - Terminal Emulators
  - Program that allows use of the terminal in a graphical environment
  - Shell commands will be typed in this
  - Saying ‘terminal’ these days usually means ‘terminal emulator’
  - E.g. Terminal, KDE Konsole, XTerm

# Linux – Some Tools

- Open up the terminal
- Check kernel version
  - uname -r
- Display all running applications
  - top
- Display date
  - date
- List all the files and directories in current directory
  - ls
- Change directory
  - cd name_of_sub_directory
  - cd ..
- Run a program (gedit)
  - gedit