CS242: Systems Software Lab

Overview of Unix System

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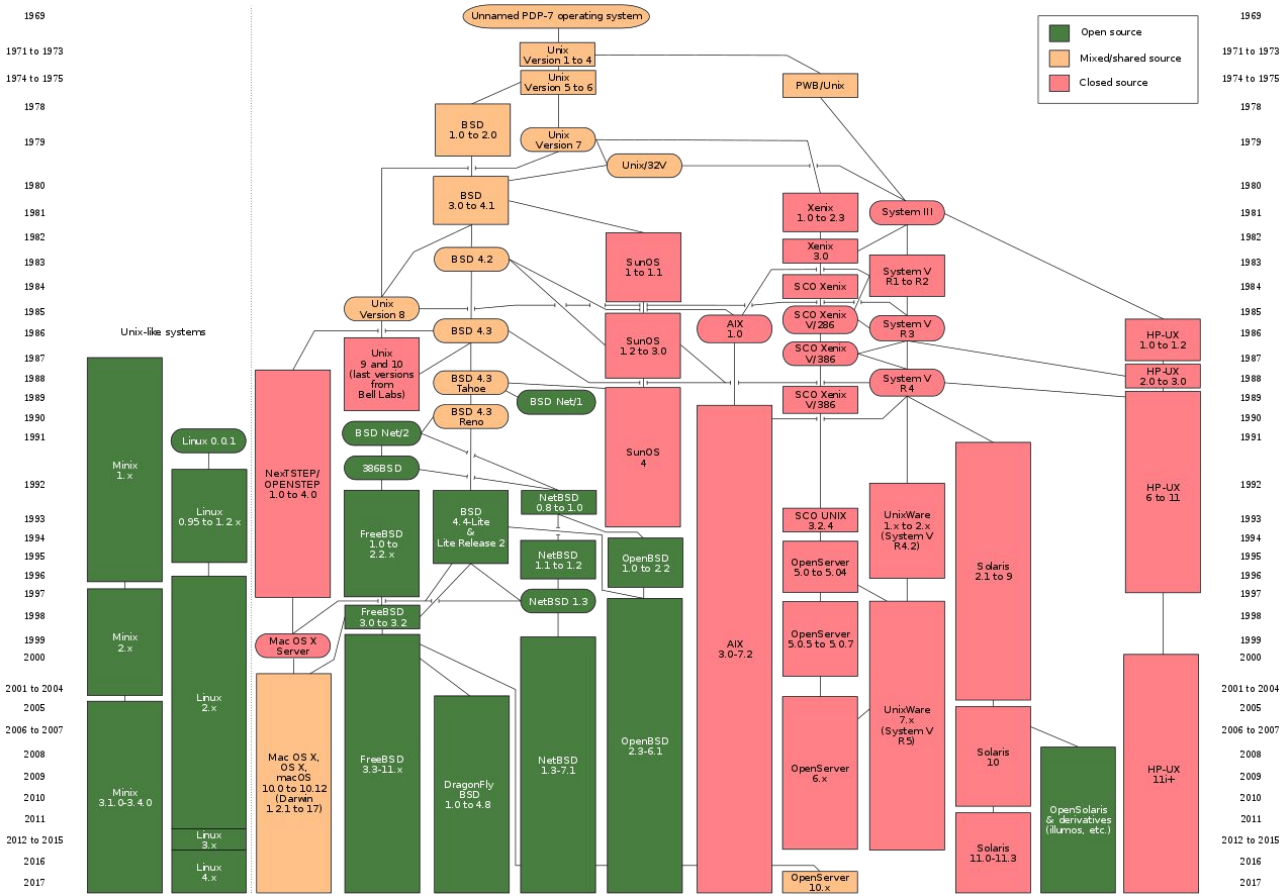
Overview

- Unix, its family tree and Unix like distributions.
- Basic Terminologies used in Unix/Linux
- What happens when an Unix/Linux OS powers on
- Some basic commands

What is Unix?

- Unix is an Operating System and set of tools which provide a development environment.
- Developed around 1970s at the Bell Labs research center by Ken Thompson, Dennis Ritchie, and others.
- Recommended reading: https://en.wikipedia.org/wiki/History_of_Unix

Unix Family Tree



https://upload.wikimedia.org/wikipedia/commons/7/77/Unix_history-simple.svg

Software Licences

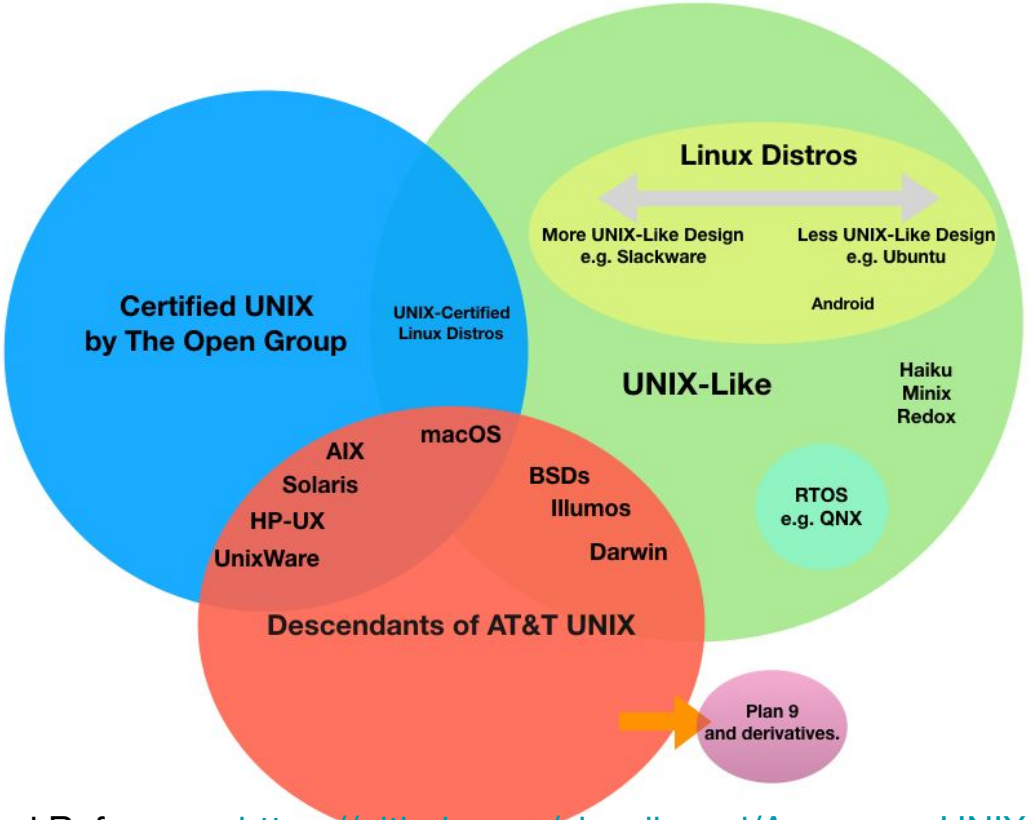
A **software license** is a legal instrument governing the use or redistribution of software.

Recommended Reading: https://choosealicense.com/licenses/

Common Licences of popular softwares:

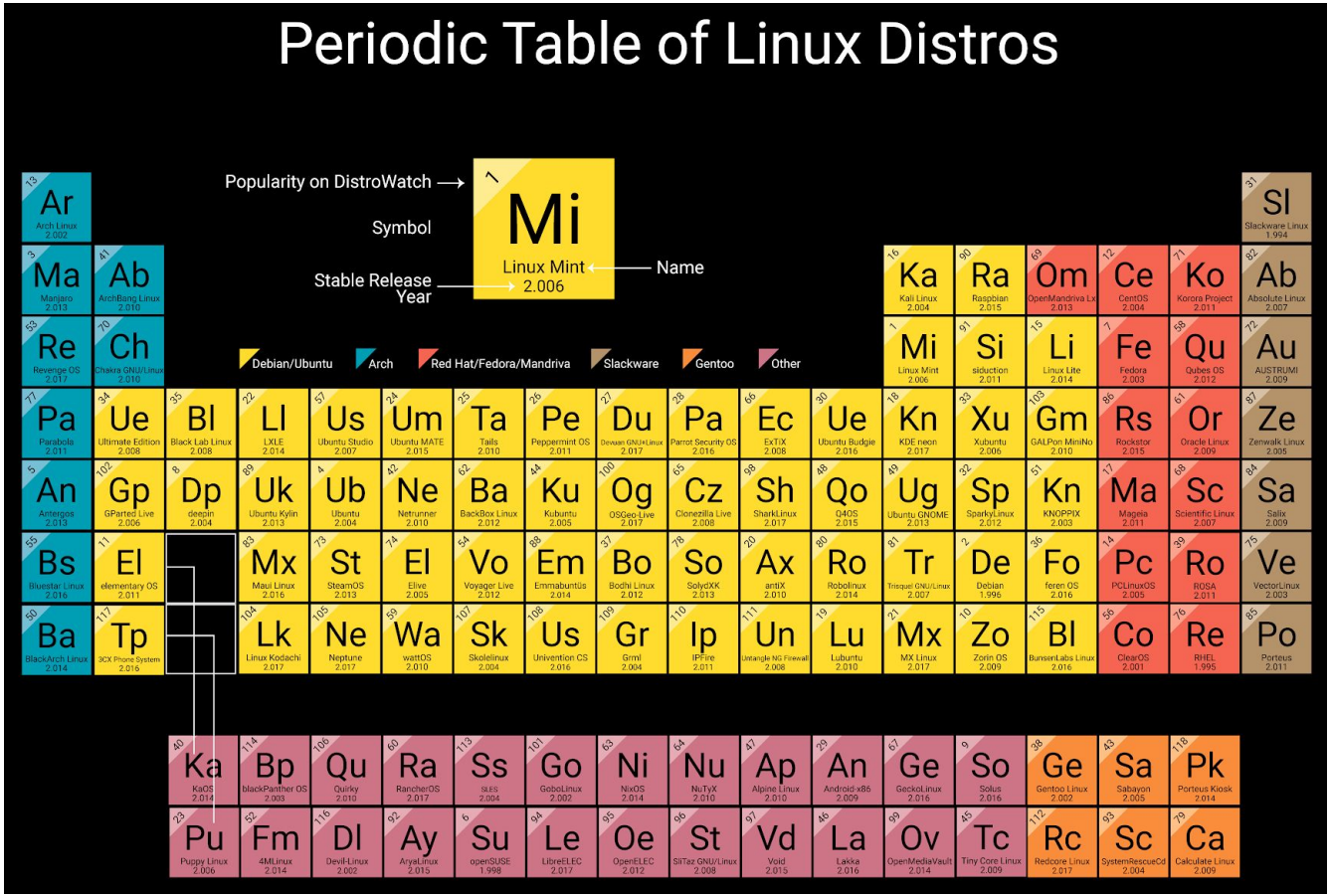
GPL: Linux Kernel, MySQL, Notepad++, OpenJDK
MIT: Ruby on Rails, Node.js, jQuery, X Window System
Apache: Android, Hadoop
Proprietary freeware: Google Chrome

Disambiguation: AT&T UNIX®, UNIX® Certification, UNIX®-Like, and Linux®



Recommended reading and Reference: https://github.com/sirredbeard/Awesome-UNIX

Popular Linux Distributions

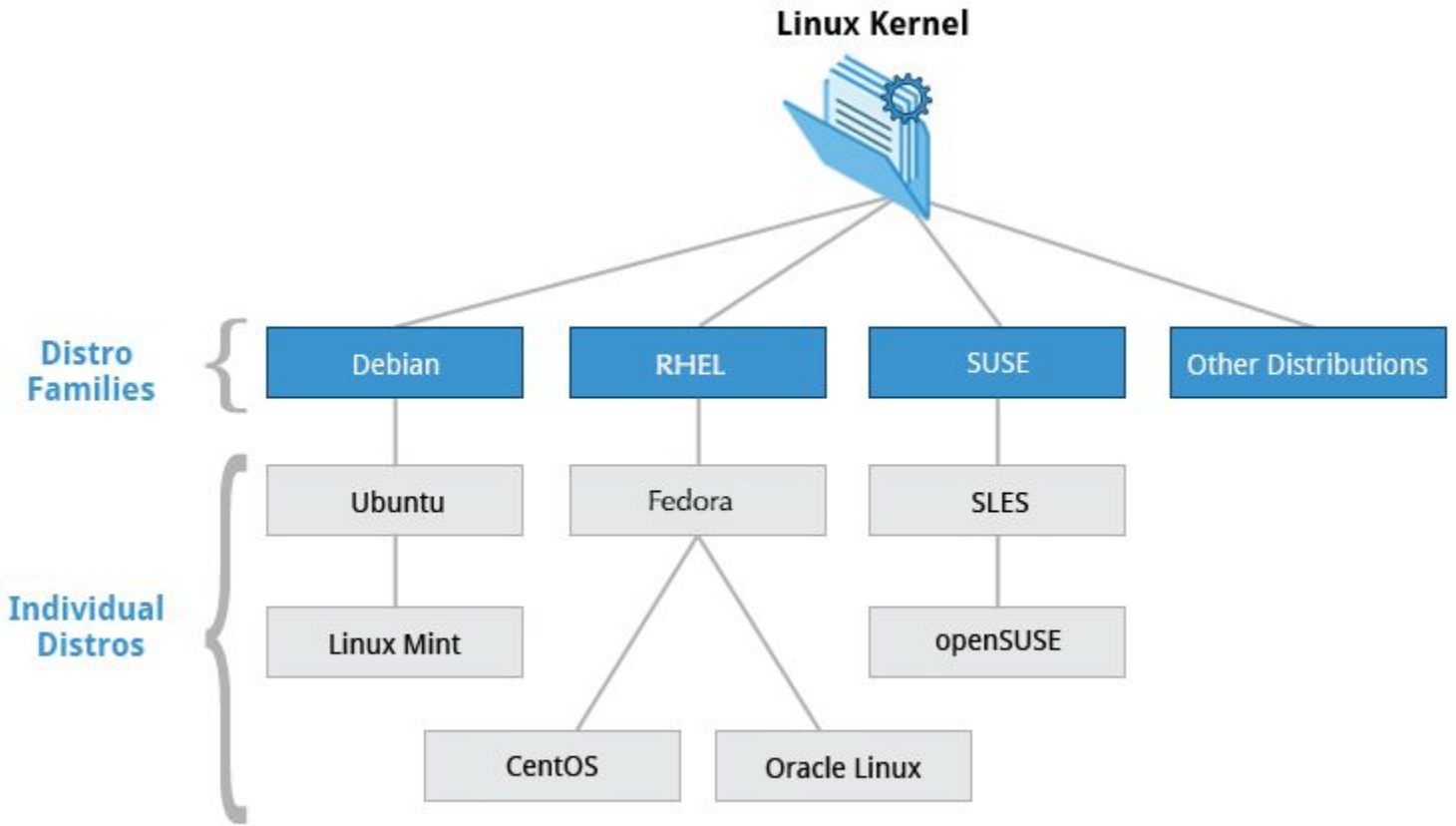


Reference: https://distrowatch.com/images/other/periodic-table-of-distro.png

Some Facts about Linux

- More than 300 Linux distributions available.
- Started in 1991 by Linus Torvalds for his own use.
- Linux kernel: Over 2000 developers from 500 companies contribute every year.
- Largest single software project in the history of mankind!
- 20 millions line of code.
- More than 90% of supercomputers use Linux.
- Android is powered by Linux kernel.
- Linux is used in every major space program.
- Google, amazon, twitter, facebook, instagram are all powered by Linux.

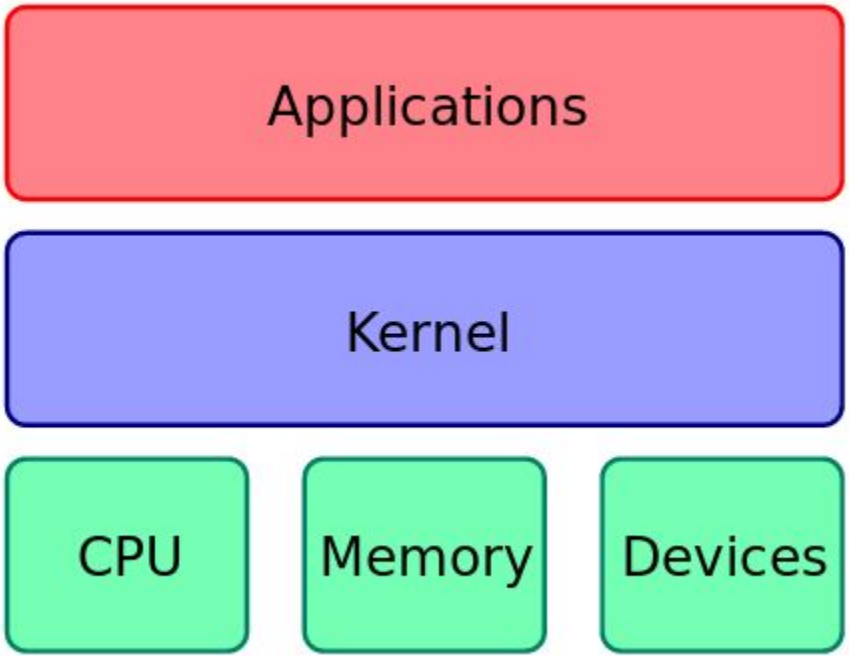
Major Linux Distribution Families



Basic Terminologies Unix/Linux

- Kernel
- Distribution
- Bootloader
- Service
- Filesystem
- X window
- Desktop environment
- Command line
- Shell
- Terminal

Kernel: The Glue between hardware and Software Applications



Examples: Linux Kernel, GNU Hurd.

Distribution: Collection of software combined with kernel to make a Operating System

Some popular Unix-based Distributions:

- MacOS
- FreeBSD
- OpenBSD
- Solaris

Some popular Linux Distributions:

- Red had
- Fedora
- Ubuntu
- Gentoo
- Arch Linux
- Linux Mint

Bootloader: The program that loads the OS when a computer is powered on

Example: GRUB, Syslinux, BOOTMGR

Recommended reading: https://en.wikipedia.org/wiki/Booting

Service: It is program that runs as a background process

Example: httpd, named, nfsd, ntpd, ftpd, dscpd

Also known as **daemon**.

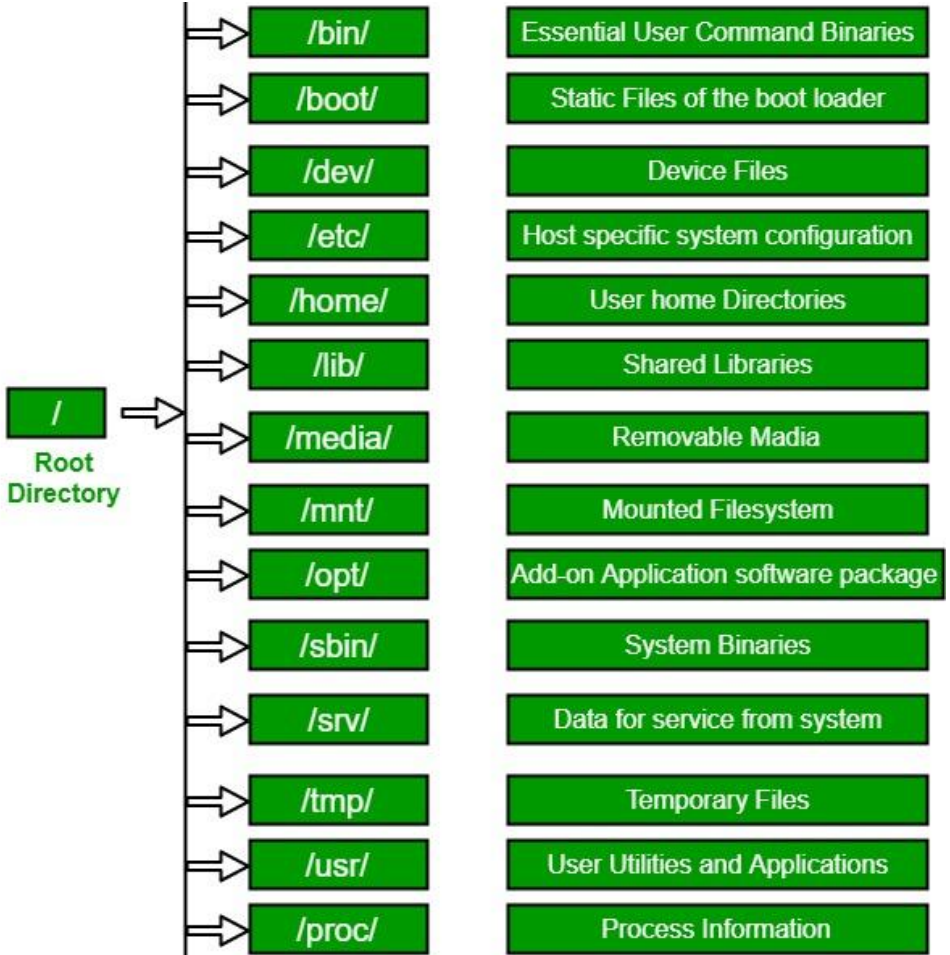
Recommended reading: https://en.wikipedia.org/wiki/Daemon_(computing)

Filesystem: A method for storing and organizing files.

Examples: ext3, ext4, FAT, NTFS, BRTFS, XFS

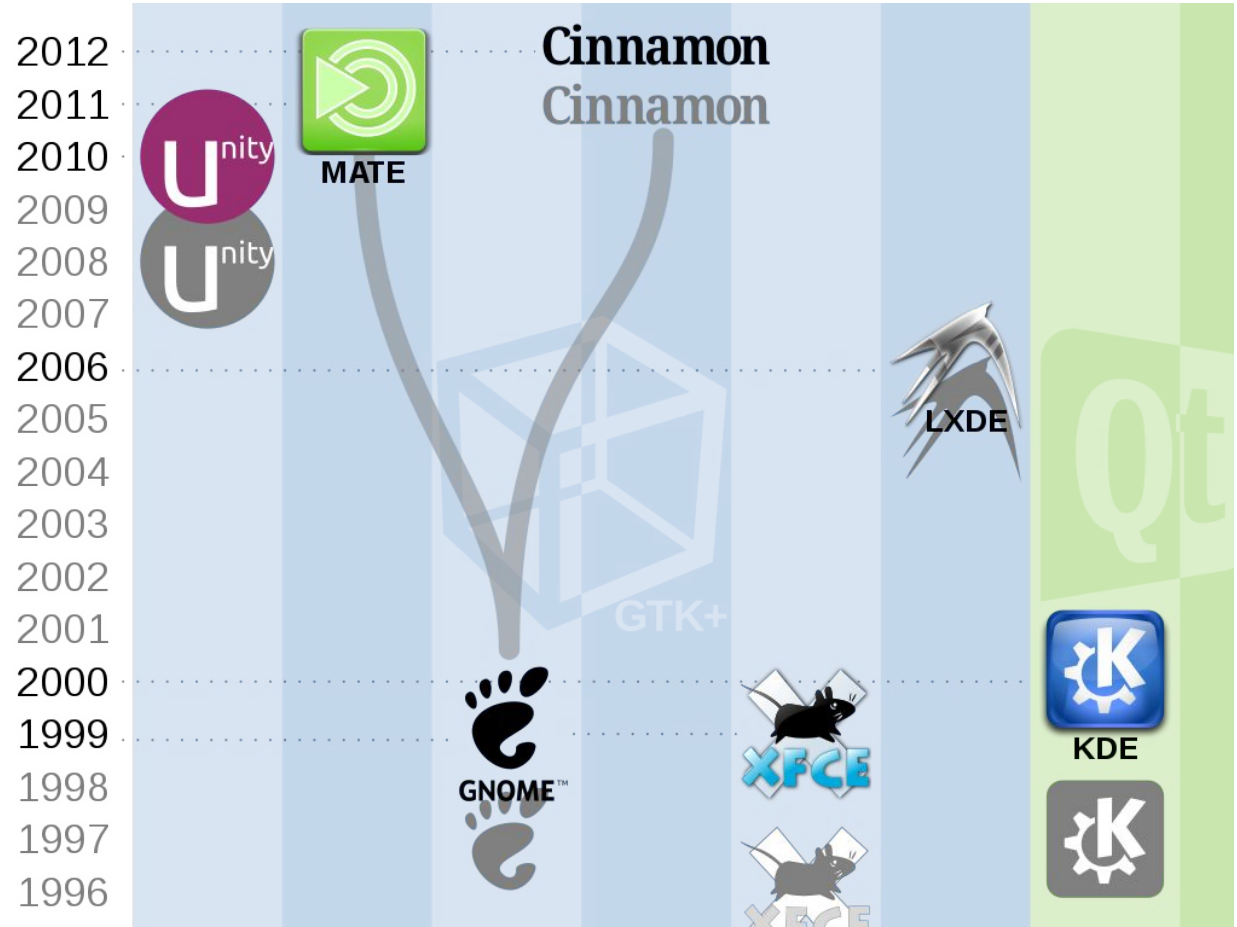
Filesystem Hierarchy Standard (FHS)

Recommended Reading:
Wikipedia:
[Filesystem_Hierarchy_Standard]



X Window System: Provide toolkit and protocols to build graphical interface systems.

Desktop Environment: Provides GUI on top of OS



Guess this Desktop Environment

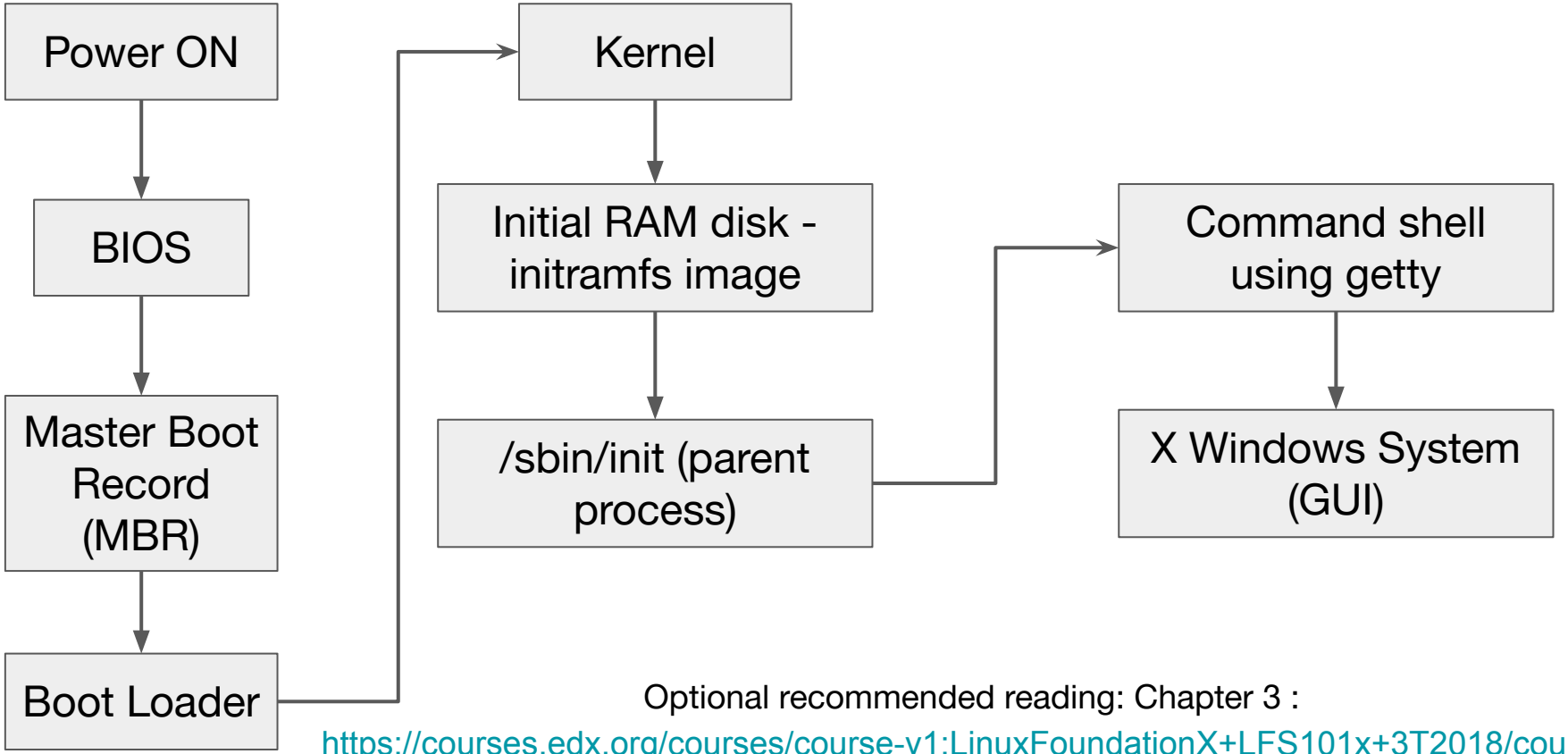
Command line, Shell and Terminal

Command line: It is an interface for typing commands on top of OS

Shell: It is a command line interpreter that interprets the command line input and instruct OS to perform any necessary task.

Terminal: It is a computer program that emulates a video terminal within some other display architecture.

What Happens when we power on a computer?



Optional recommended reading: Chapter 3 :
https://courses.edx.org/courses/course-v1:LinuxFoundationX+LFS101x+3T2018/course/

Choosing a Linux Distribution

- What is the main function of the system (server or desktop)?
- What types of packages are important to the organization? For example, web server, word processing, etc.
- How much hard disk space is required and how much is available? For example, when installing Linux on an embedded device, space is usually constrained.
- How often are packages updated?
- How long is the support cycle for each release? For example, LTS releases have long-term support.
- Do you need kernel customization from the vendor or a third party?
- What hardware are you running on? For example, it might be X86, ARM, etc.
- Do you need long-term stability? Can you accept (or need) a more volatile cutting edge system running the latest software?

Source: https://courses.edx.org/courses/course-v1:LinuxFoundationX+LFS101x+3T2018/course/

Recommended OS for CS242: Ubuntu 18.04

Other options:

- Fedora
- Linux Mint
- Arch Linux
- Manjaro
- Kali Linux
- Elementary OS
- Deepin OS

Basic Unix/Linux Commands

- Open a terminal emulator.
- Type: whoami
- Type: w
- Type: date
- Type: cal
- Type: uname -a
- Type: ls
- Type: cat a_file_path

Recommended practice commands:
http://jatinga.iitg.ernet.in/~asahu/cs241/linuxcommands.pdf

Lab Session: 31/07

- Ensure that any Linux OS is installed on your desktops.
- Assignment will be emailed few minutes before Lab session.
- Not a evaluation lab.
- Internet will be available.
- Objective: Make students familiar with basic and advance linux commands.