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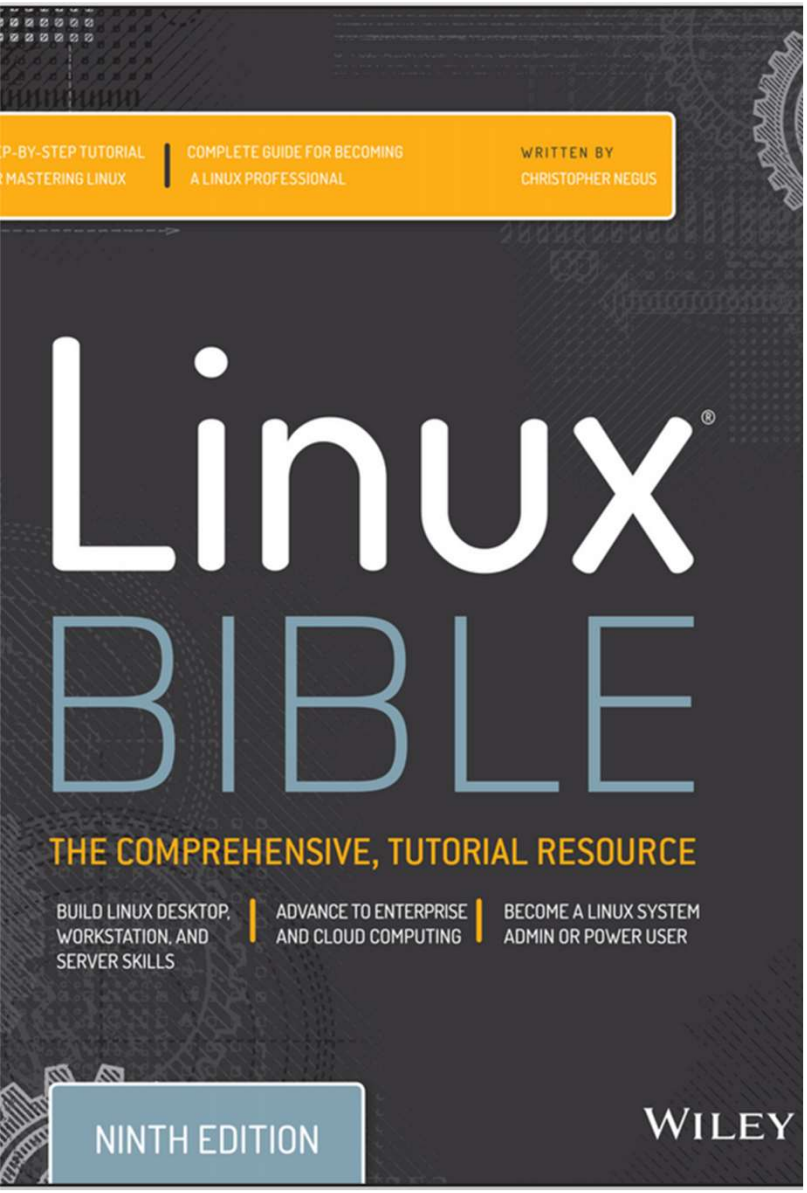
IT Trends

Operating System

Manatap Dolok Lauro, S.Kom, MMSI



Reference

- “Linux Bible”, Christopher Negus, Wiley, 2015

Operating systems provide a variety of functions to users

What is an OS?

An operating system (OS) is a set of programs that coordinate all the activities among computer or mobile device hardware.

What is an OS?

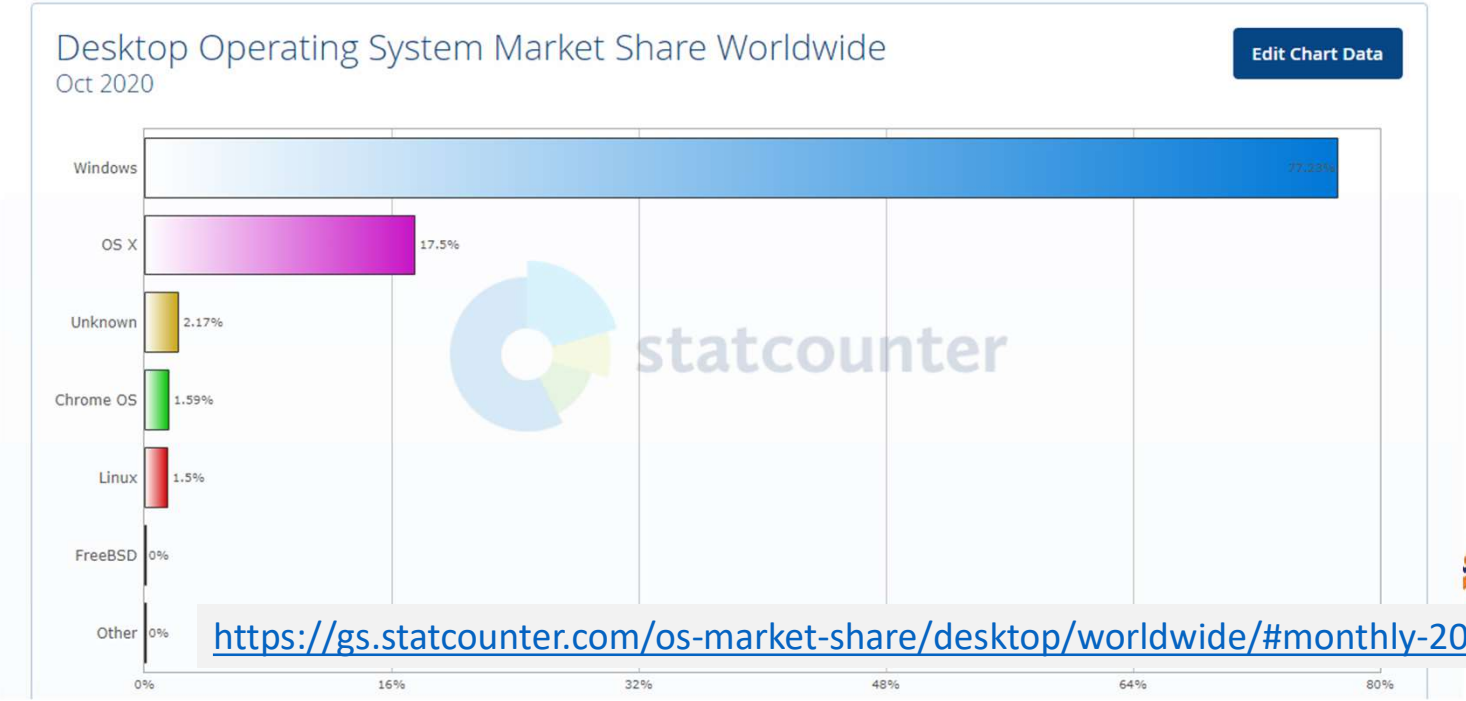
- Possible to run on USB Drive, Optical Drive, External Drive.
- Mostly, on hard drive.

- Often are written to run on specific types of computers, based on their computing needs and capabilities.
- Laptop / Server / Tablet → different computing tasks!
  - Laptops need to conserve battery power.
  - Server is needed to perform full power.

Desktop Operating System Share Worldwide

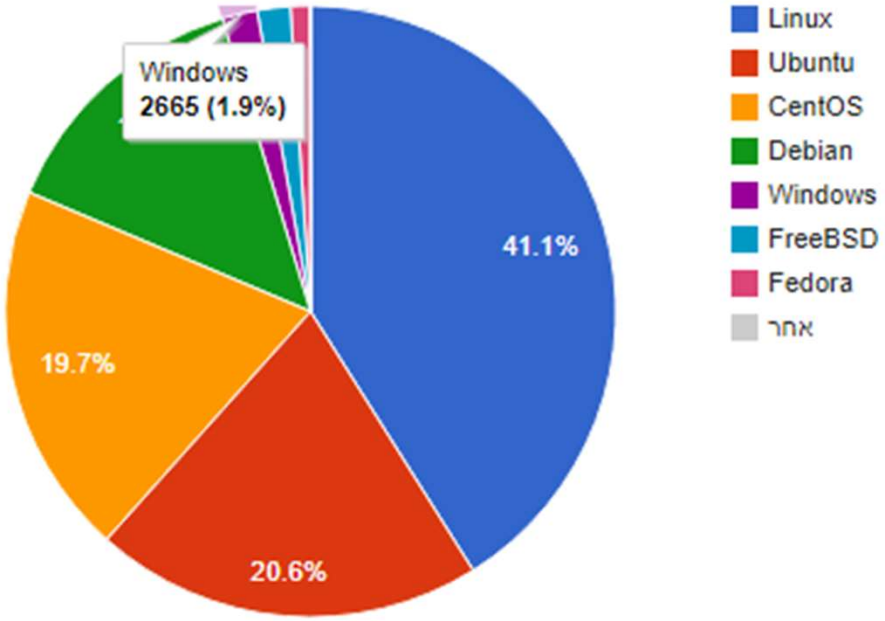
Windows	OS X	Unknown	Linux	Chrome OS	FreeBSD
77.12%	17.56%	2.06%	1.74%	1.52%	0%

Desktop Operating System Market Share Worldwide - September 2020



https://gs.statcounter.com/os-market-share/desktop/worldwide/#monthly-202010-202010-bar

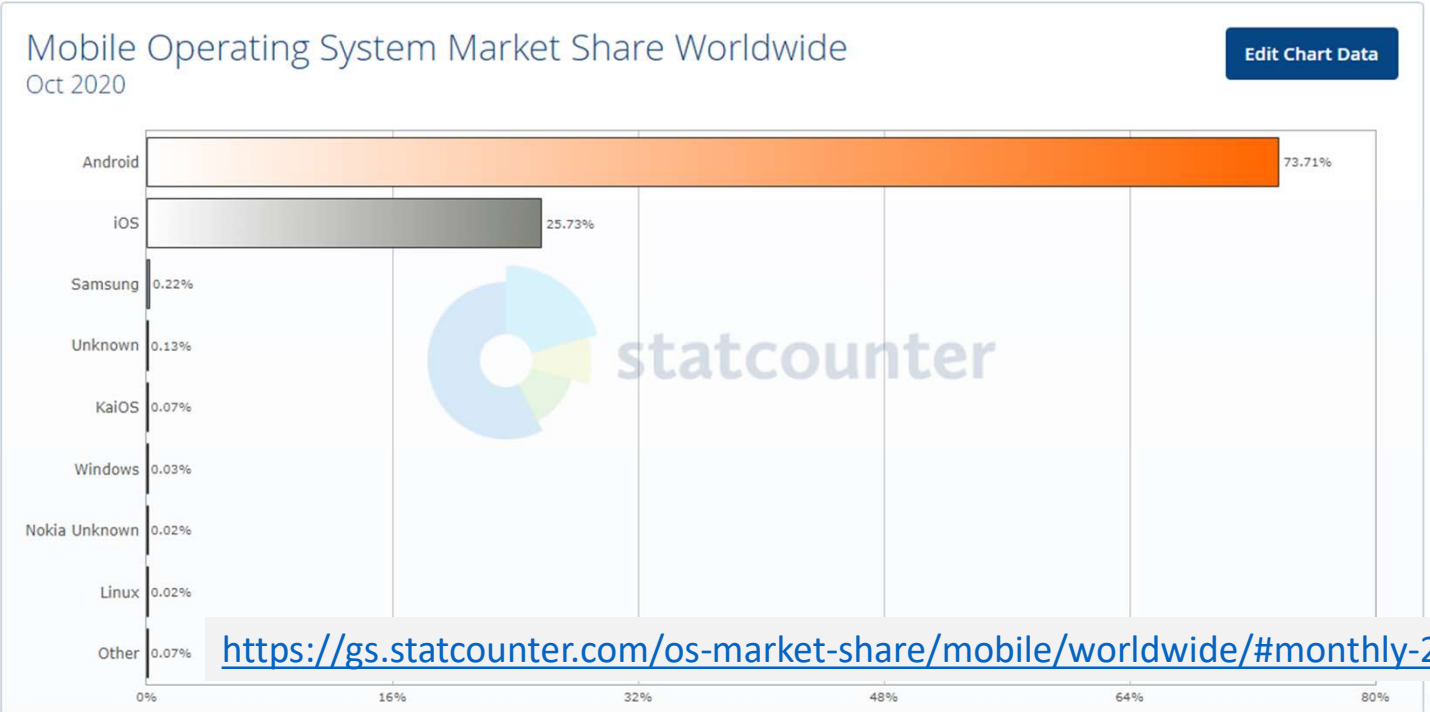
Server Operating System Share Worldwide



Mobile Operating System Share Worldwide

Android	iOS	Samsung	Unknown	KaiOS	Windows
74.43%	24.99%	0.22%	0.14%	0.08%	0.03%

Mobile Operating System Market Share Worldwide - September 2020

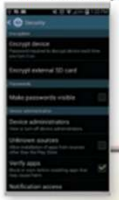


https://gs.statcounter.com/os-market-share/mobile/worldwide/#monthly-202010-202010-bar

Operating System Functions

operating system functions

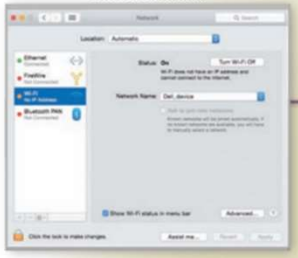
administer security



start and shut down the computer

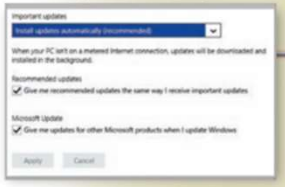
provide a user interface

control a network

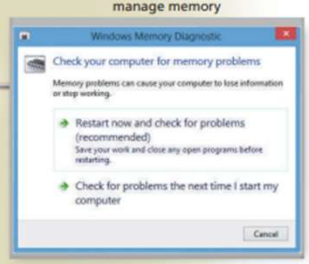


manage programs

update automatically

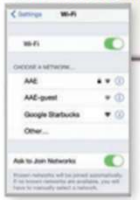


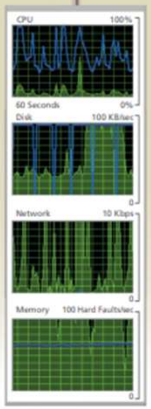
manage memory



provide file management and other tools

establish an Internet connection





monitor performance

coordinate tasks and configure devices

1] Start-up Device

1. The power supply or battery sends an electrical current to circuitry in the device.
2. The charge of electricity causes the processor chip to reset itself and finds the firmware that contains start-up instructions.
3. The start-up process executes a series of tests to check the various components.
    1. Checking the buses, system clock, adapter cards, RAM chips, mouse, keyboard, and drives.
    2. Making sure that any peripheral devices are connected properly and operating correctly. If any problems are identified, the computer or device may beep, display error messages, or cease operating — depending on the severity of the problem.

1] Start-up Device

4. If the tests are successful, the kernel of the operating system and other frequently used instructions load from the computer or mobile device's internal storage media to its memory (RAM). The kernel is *memory resident*.
5. The operating system in memory takes control of the computer or mobile device and loads system configuration information.
   - The OS may verify that the person attempting to use the computer or mobile device is a legitimate user.
   - Finally, the user interface appears on the screen, and starting-up applications, such as antivirus software.

2] Shutting-down Device

Two types of people:

Leave their computers or mobile devices running continually and rarely turn them off.

Always available, no wait for boot process.

Regularly turn off the device.

Concerned with security, reduce energy costs, prefer to clear memory often.

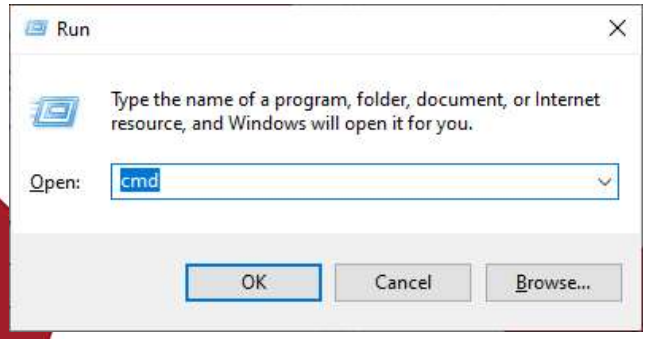
2] Shutting-down Device

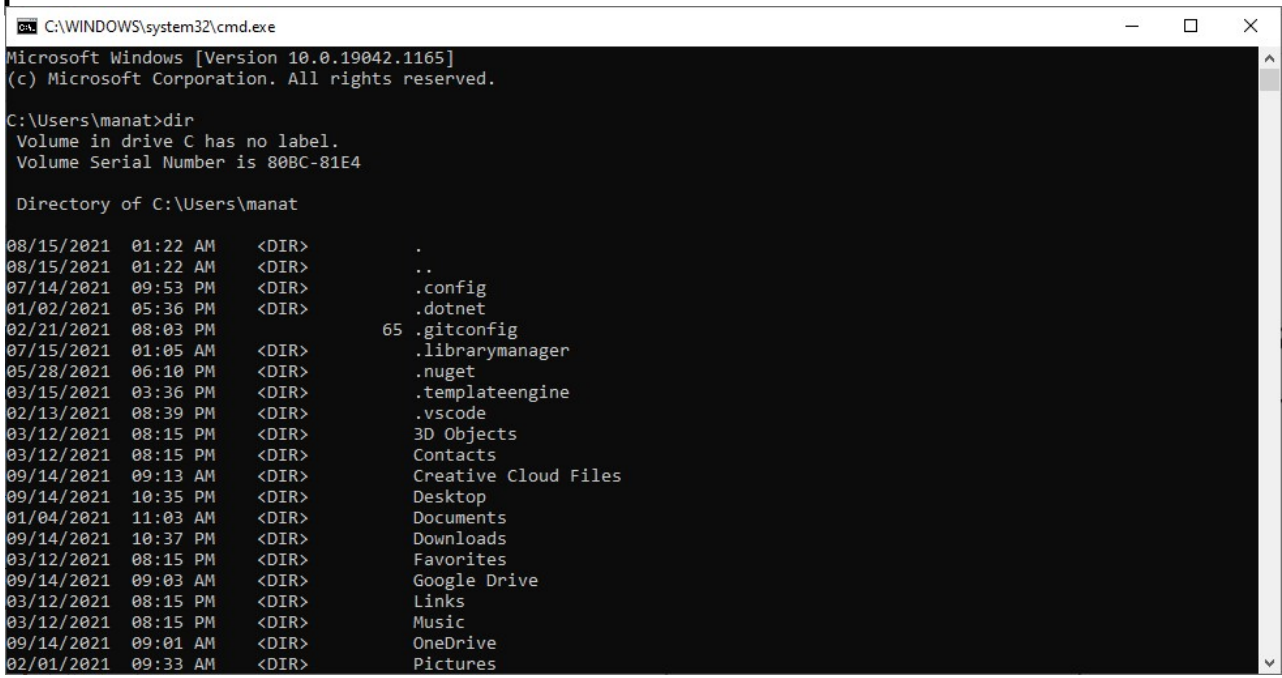
Shut-down methods:

Powering Off	**Sleep Mode**	**Hibernate**
Close all apps. Close all background services. Perform clean up, then remove the power from system.	Saves time to start-up. Preserve Memory, set to low power mode.	Saves time to start-up. Move memory to hard-drive, then remove the power.

3] UI,GUI,NUI

- User interact with an operating system through its User Interface.
- UI controls how you enter data and instructions and how information is displayed on the screen
- Two types:
  - Command Line
  - Graphical





3] UI,GUI,NUI

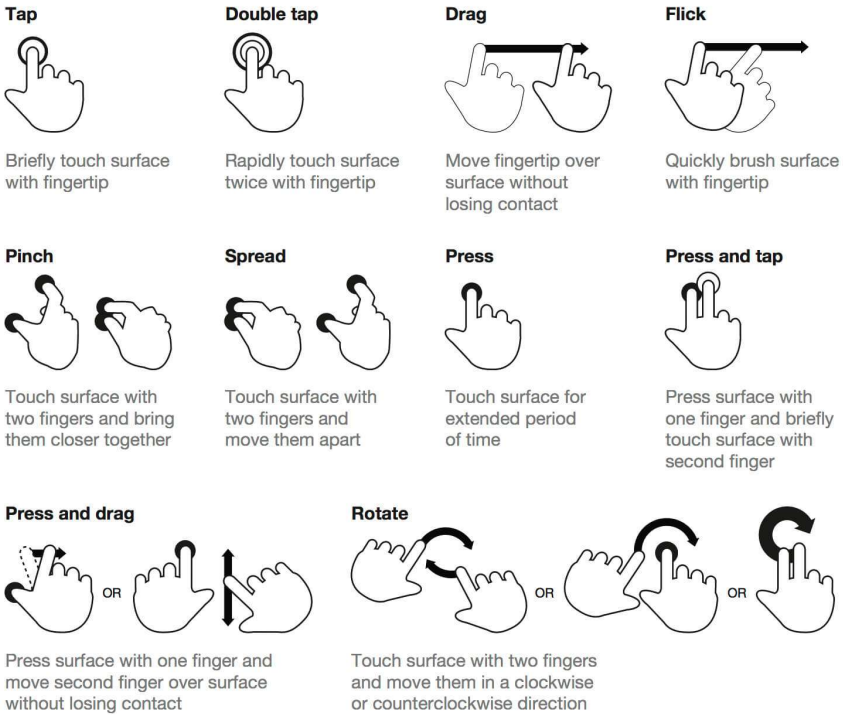

App Store
Calendar
Contacts
FaceTime
Finder
Game Center
iBooks
iTunes
Launchpad
Maps
Messages
Notes
Reminders
Safari
System Preferences
Time Machine
Trash
Folder
Icon notification
Dock bar

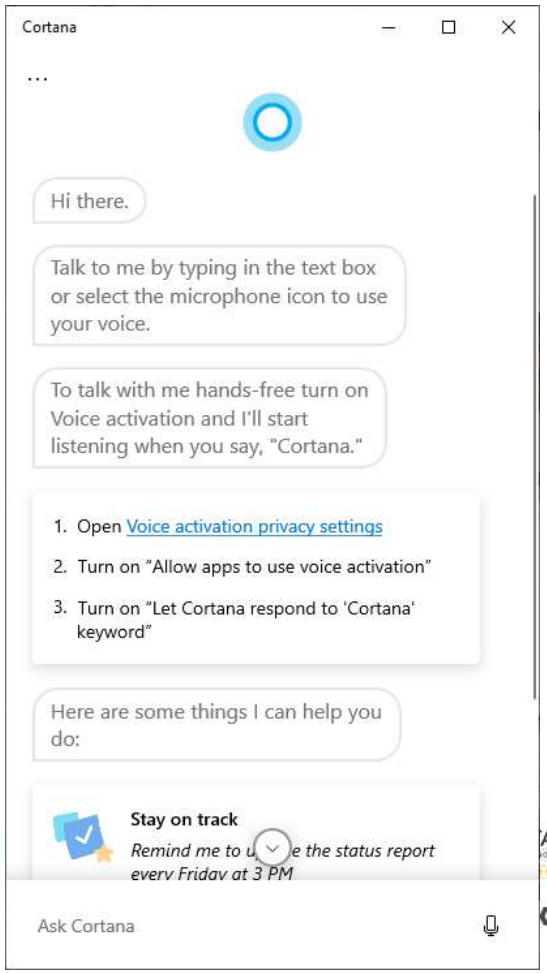
3] UI,GUI,NUI

- NUI Natural User Interface

- Users interact with the software through ordinary, intuitive behavior.
- NUIs are implemented in a variety of ways: touch screens (touch input), gesture recognition (motion input), speech recognition (voice input), and virtual reality (simulations).

3] UI,GUI,NUI

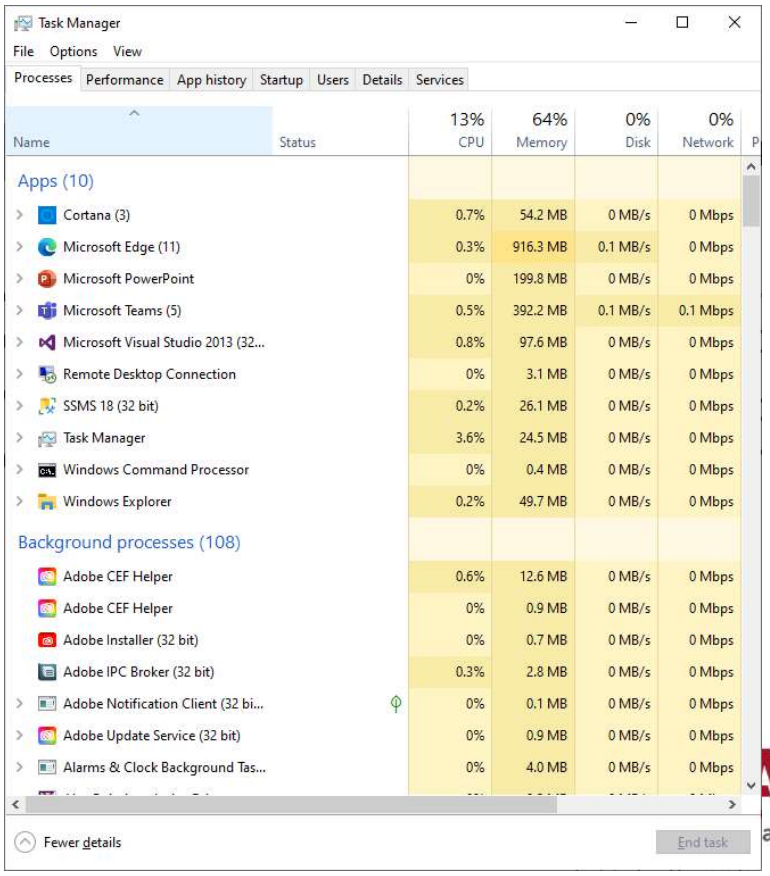

Tap
Briefly touch surface with fingertip
Double tap
Rapidly touch surface twice with fingertip
Drag
Move fingertip over surface without losing contact
Flick
Quickly brush surface with fingertip
Pinch
Touch surface with two fingers and bring them closer together
Spread
Touch surface with two fingers and move them apart
Press
Touch surface for extended period of time
Press and tap
Press surface with one finger and briefly touch surface with second finger
Press and drag
OR
Press surface with one finger and move second finger over surface without losing contact
Rotate
OR
OR
Touch surface with two fingers and move them in a clockwise or counterclockwise direction


Cortana
Hi there.
Talk to me by typing in the text box or select the microphone icon to use your voice.
To talk with me hands-free turn on Voice activation and I'll start listening when you say, "Cortana."
1. Open Voice activation privacy settings
2. Turn on "Allow apps to use voice activation"
3. Turn on "Let Cortana respond to 'Cortana' keyword"
Here are some things I can help you do:
Stay on track
Remind me to u e the status report every Friday at 3 PM
Ask Cortana

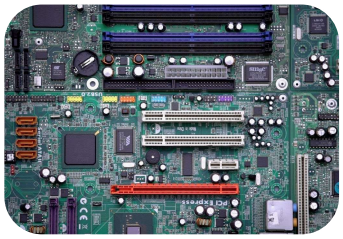
4] Managing Programs/Apps/Services

- Most operating systems today are multitasking, it allows two or more programs or apps to reside in memory at the same time.
- When a computer is running multiple programs concurrently, one program is in the foreground and the others are in the background.

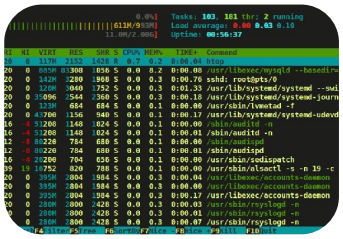
4] Managing Programs/Apps/Services



Common Operating System Features



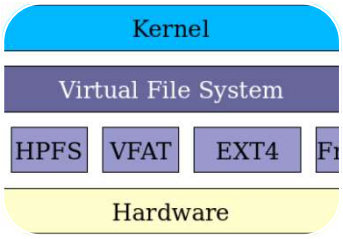
Hardware



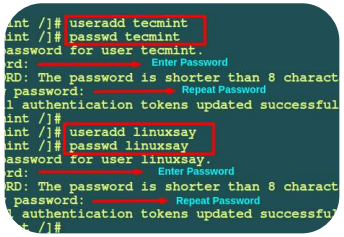
Process

Memory

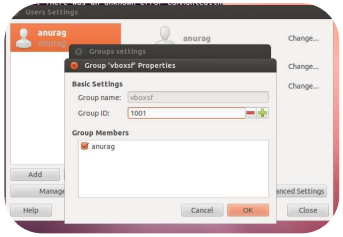
UI



Filesystem

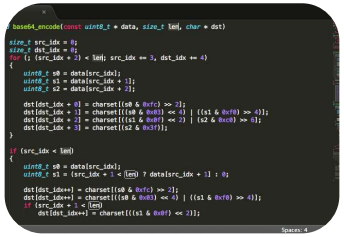


User Access & Authentication



Administrative Utilities

Services



Programming Tools

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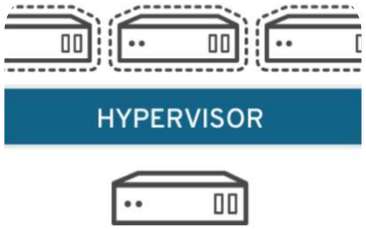
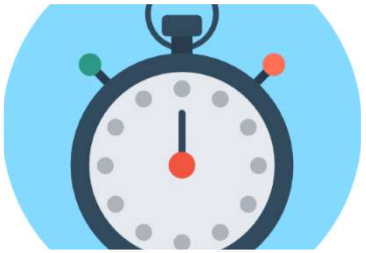
Advance Operating System Features

Clustering



Virtualization

Cloud Computing



Real-Time Computing

Specialized Storage

Operating System Types

1] Desktop OS

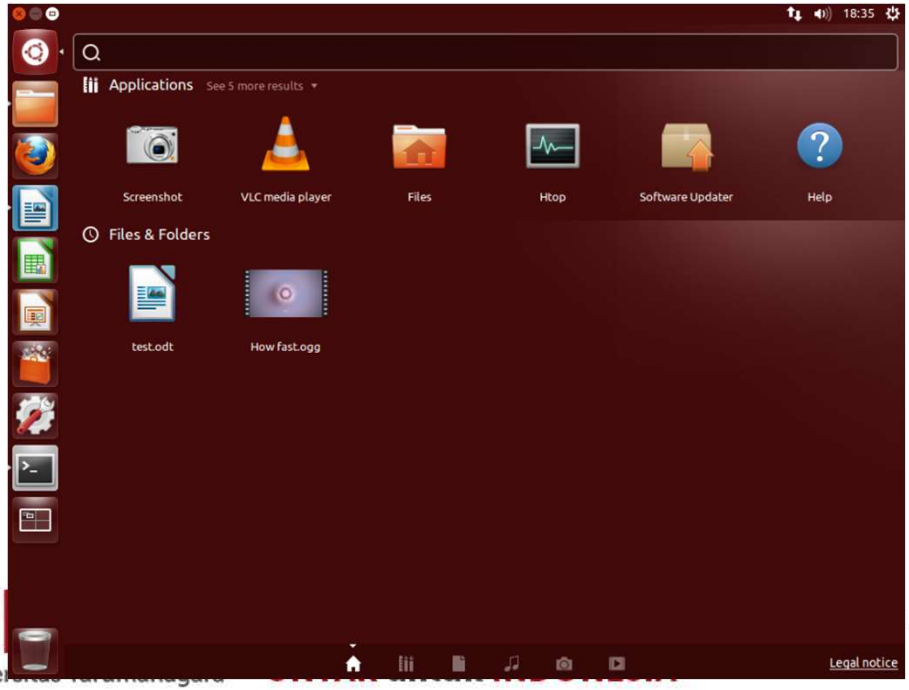
- A complete operating system that works on desktops, laptops, and some tablets.
- Desktop operating systems sometimes are called client operating systems in conjunction with a server operating system.
- Client operating systems can operate with or without a network.
- Examples of the more widely used desktop operating systems are Windows, Mac OS, UNIX, Linux, and Chrome OS.

1] Desktop OS

https://ubuntu.com/

Ubuntu PC operating system | Ubuntu

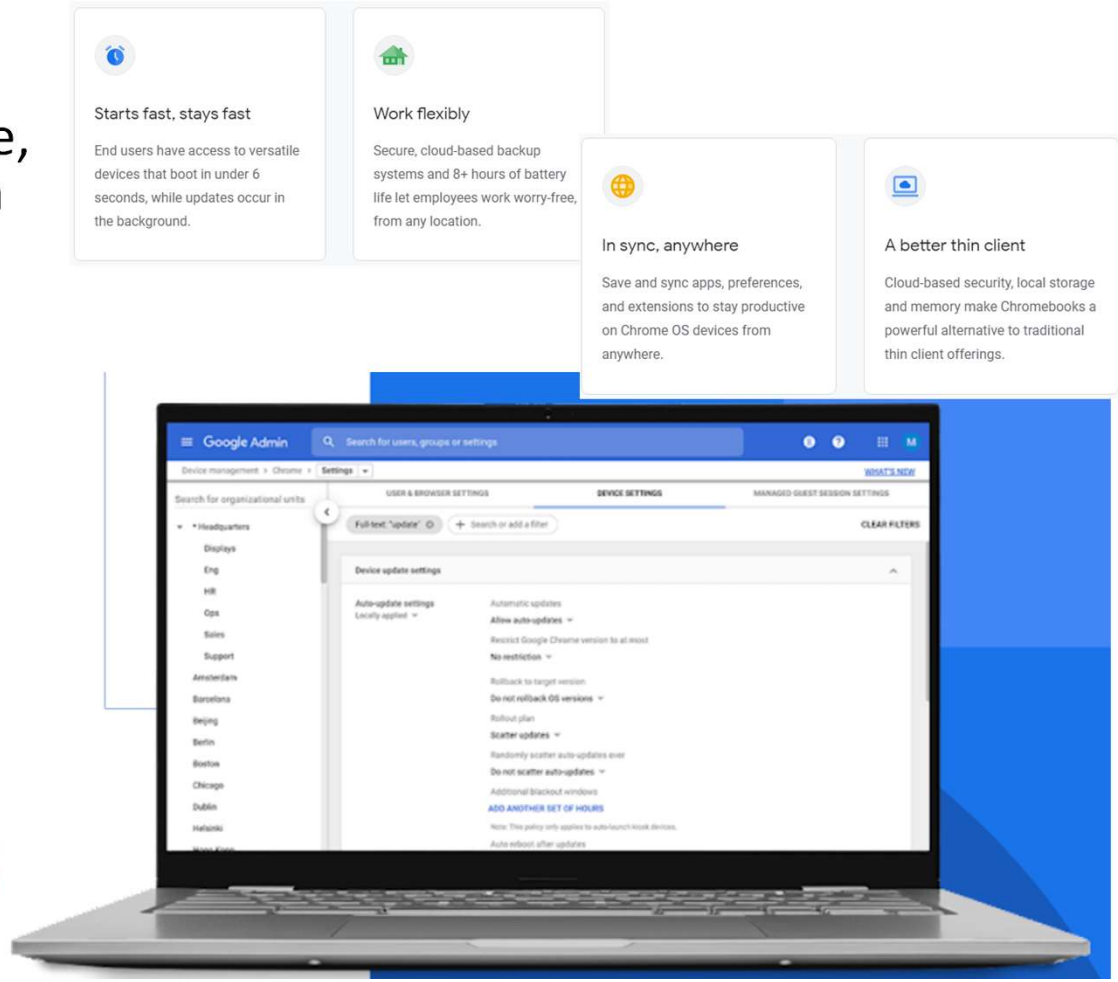
- Linux (pronounced LINN-uks), introduced in 1991, is a popular, multitasking UNIX-based operating system that runs on a variety of personal computers, servers, and devices.
- Linux also includes many free tools and programming languages.



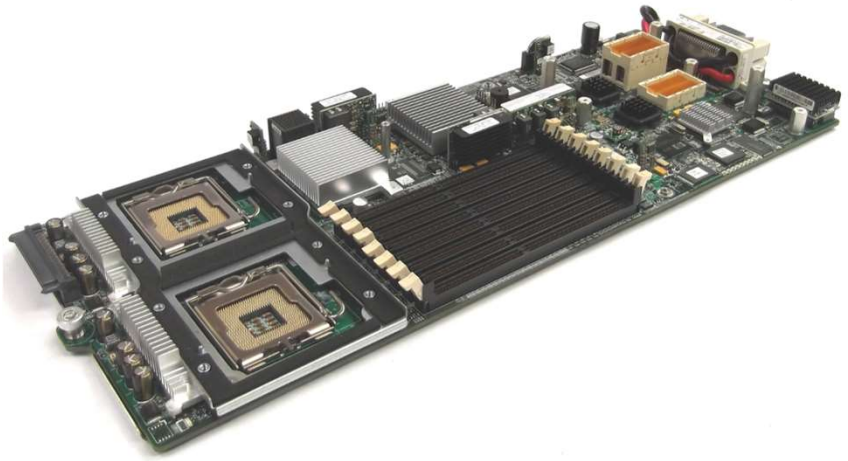
1] Desktop OS

[Chrome OS (Operating System) - Chrome Enterprise]

- Chrome OS, introduced by Google, is a Linux-based operating system designed to work primarily with web apps.
- Apps are available through the Chrome Web Store, and data is stored on Google Drive.
- The only apps typically installed a the Chrome browser, a media player, and a file manager.
- A specialized laptop that runs Chrome OS is called a Chromebook.



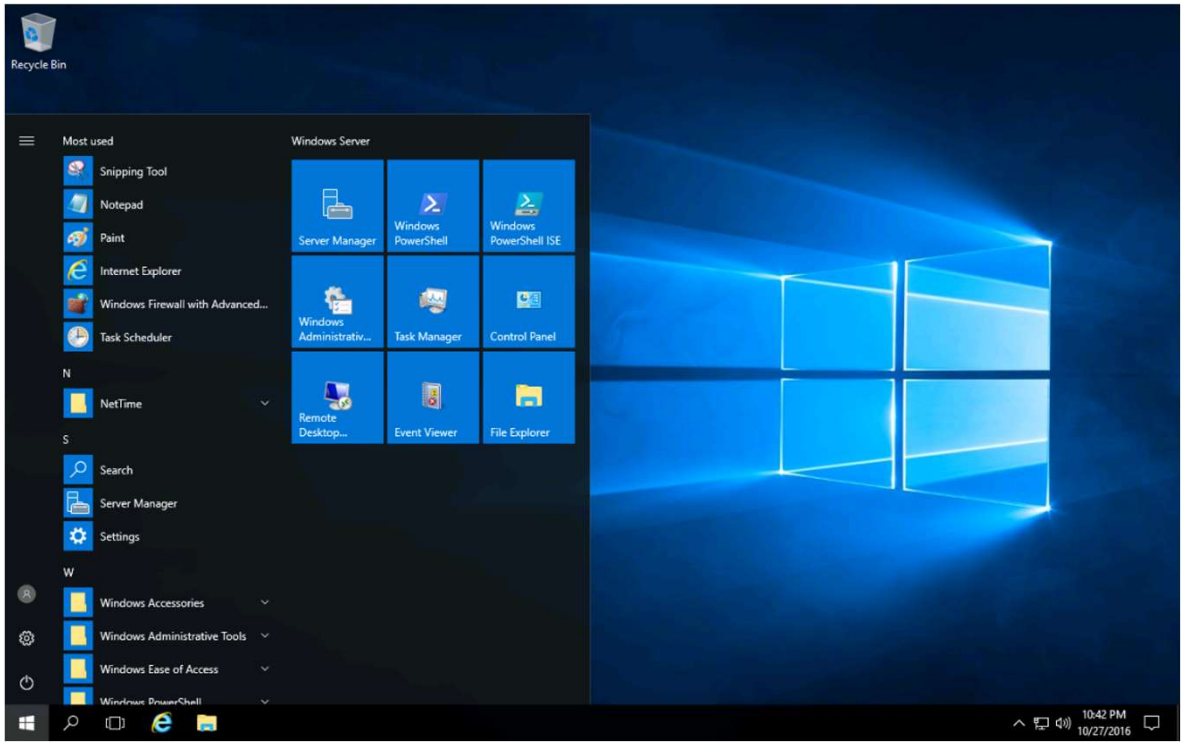
2] Server OS



- Designed specifically to support all sizes of networks, medium- to large-sized businesses and web servers.
- Can handle high numbers of transactions, support large-scale messaging and communications
- Have enhanced security and backup capabilities.
- Support virtualization
  - sharing or pooling computing resources, such as servers or storage devices.

2] Server OS

- Microsoft Windows Server
  - Application & Websites
- Apple OS X Server
  - Collaborate, file sharing, Website, Mail
- UNIX
  - Websites
- Linux
  - Websites, Supercomputers



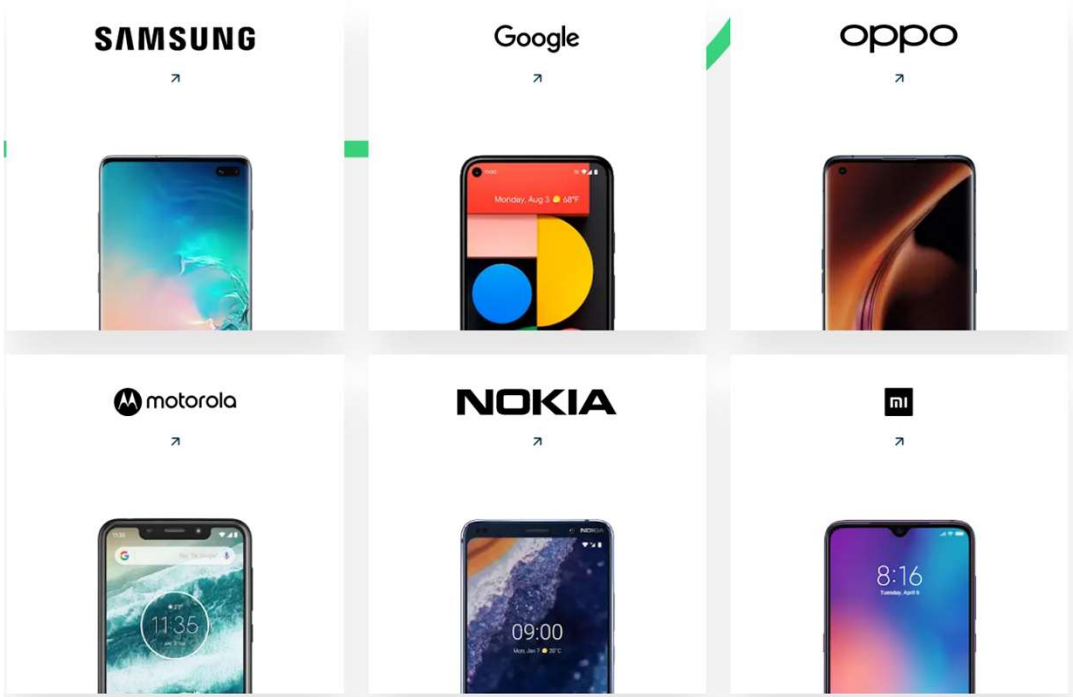
3] Mobile OS

- The operating system on mobile devices and many consumer electronics is called a mobile operating system and resides on firmware.

- Mobile operating systems typically include or support the following:
  - calendar and contact management,
  - text messaging, email,
  - touch screens, accelerometer (so that you can rotate the display), digital cameras,
  - media players, speech recognition, GPS navigation,
  - a variety of third-party apps, a browser, and wireless connectivity, such as cellular, Wi-Fi, and Bluetooth.

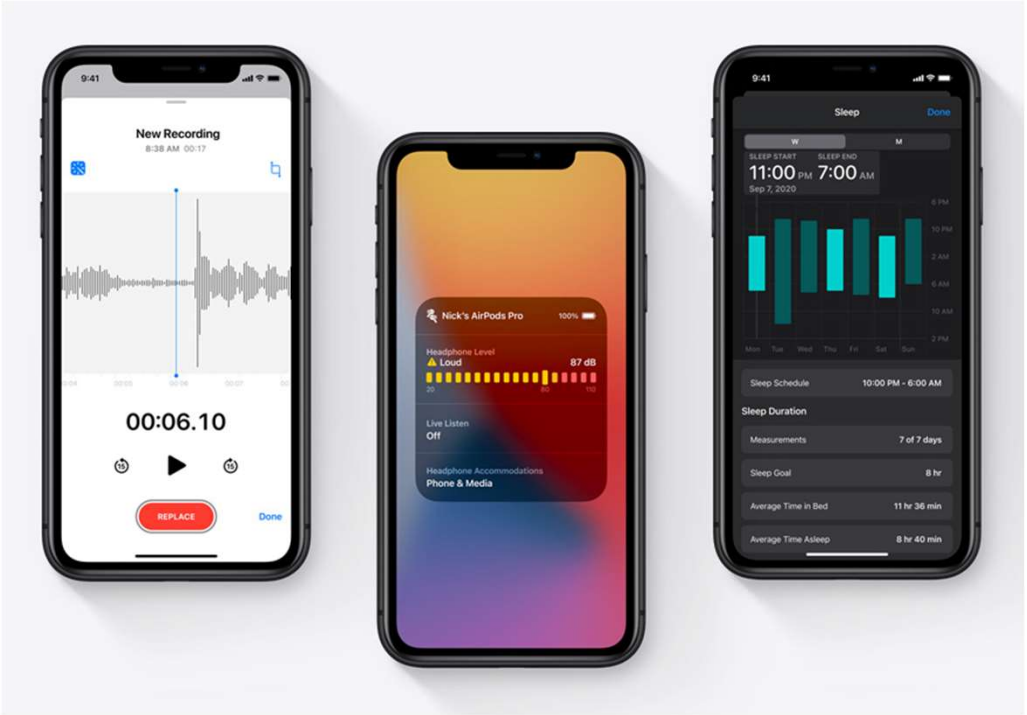
3] Mobile OS

- Android is an open source, Linux-based mobile operating system designed by Google for smartphones and tablets.
- A variety of manufacturers produce devices that run the Android operating system, adding their own interface elements and bundled software.
- As a result, an Android smartphone manufactured by Samsung may have different user interface features from one manufactured by Google.



3] Mobile OS

- iOS (originally called iPhone OS), developed by Apple, is a - proprietary mobile operating - system specifically made for Apple's mobile devices.
- Supported devices include the iPhone, iPod Touch, and iPad



Linux

August 25, 1991
os.minix newsgroup

Linus Benedict Torvalds

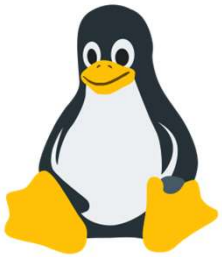
Hello everybody out there using minix -

I'm doing a (free) operating system (just a hobby, won't be big and professional like gnu) for 386(486) AT clones. This has been brewing since april, and is starting to get ready. I'd like any feedback on things people like/dislike in minix, as my OS resembles it somewhat (same physical layout of the file-system (due to practical reasons, among other things)...Any suggestions are welcome, but I won't promise I'll implement them :-)

Linus (torvalds@kruuna.helsinki.fi)

PS. Yes — it's free of any minix code, and it has a multi-threaded fs. It is NOT protable [*sic*] (uses 386 task switching etc), and it probably never will support anything other than AT-harddisks, as that's all I have :-(.

Linux

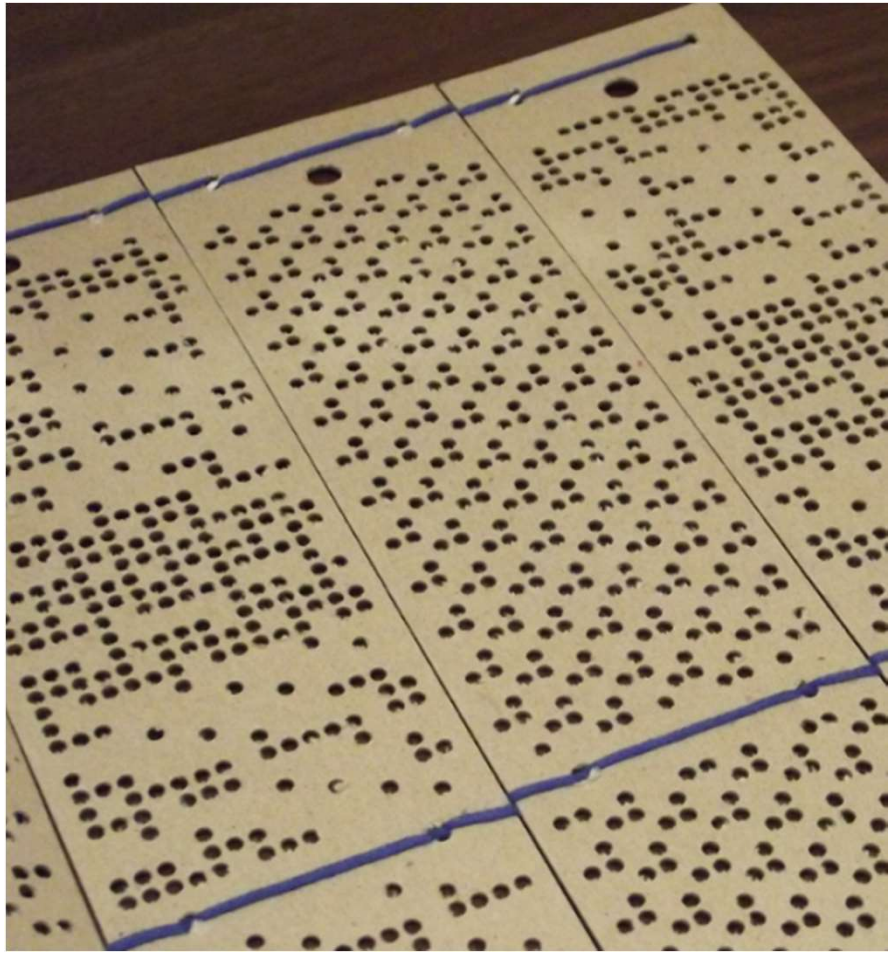


- First built in 1991.
- Open source Unix-like operating system.
- Linux is not Unix. (Unix is paid OS)
- Linux is a Kernel. Desktop/server version is called Distribution (distro).
- Linux is part of GNU (GNU's not Unix), so it is wholly free software.

https://www.youtube.com/watch?v=o8NPllzkFhE

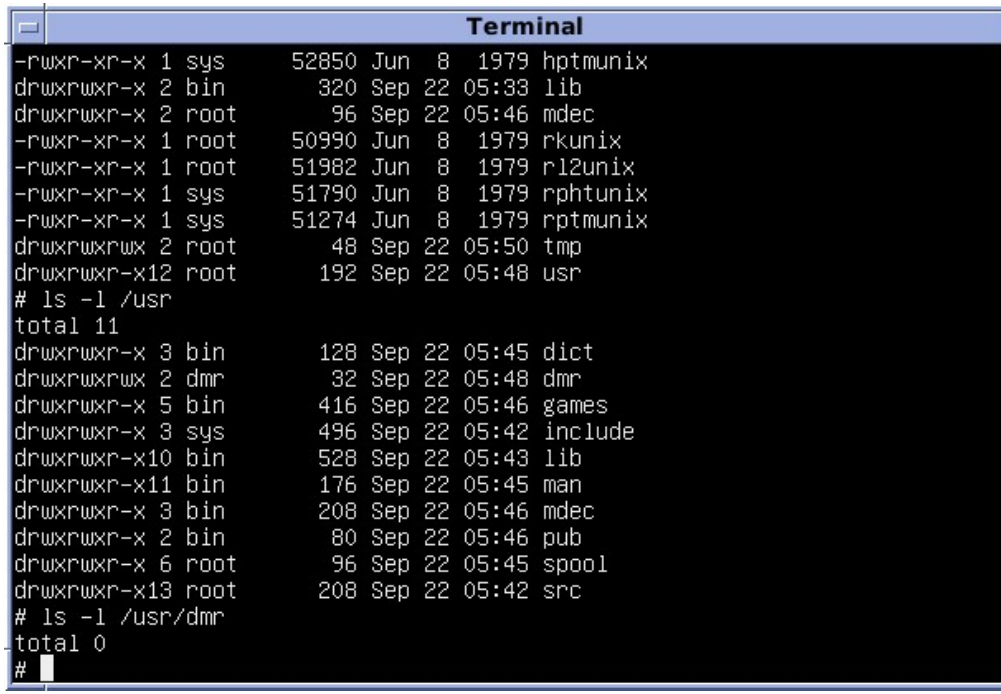
1969 Unix

- AT&T funded Bell Labs employees Ken Thompson and Dennis Ritchie create an operating system that would offer an improved environment for developing software.
- Up to that time, most programs were written on punch cards that had to be fed in batches to mainframe computers.
- Written in assembly.



1973 Unix

- Rewritten in C Language.
- UNIX development process was a free-flowing process, lacked ego, and was dedicated to making Unix excellent.
- This process led to a sharing of code (both inside and outside Bell Labs), which allowed rapid development of a high-quality UNIX operating system.



1975 Unix

- Unix V6 the first version available outside Bell Labs.
- From this early Unix source code, the first major variant was created at University of California at Berkeley. It was named the Berkeley Software Distribution (BSD).
- From now, there are 2 major Unix software: BSD and AT&T. BSD continued free-flowing process, AT&T start commercializing UNIX.

1980 Unix LAB

- Unix Lab start selling 2 kind of Unix license:
  - Source Code only. Every company must port Unix to its own equipment before selling their products.
  - Published Interface. POSIX and SVID is created as Unix standard. It was set to determine ports that must be available to consumer to be called Unix.

- Around this time, Microsoft Windows has existed and already has good market.

POSIX : Portable Operating System Interface (POSIX)

SVID : AT&T Unix System V Interface Definition

1984 GNU (GNU's Not Unix)

- Because Unix that was built based on open contribution, start making profit for other company, lawsuits were being initiated to protect the source code and trademarks. This started Free Software Foundation.

- Richard M. Stallman started GNU Project as Free Software Foundation. Intended to become a recoding of the entire Unix operating system that could be freely distributed.

- GNU is Unix-Like.

1984 GNU (GNU's Not Unix)

- During Unix Recoding, it was found that not only all Unix program can be recoded, but they can create better version.
- Since everyone could see the code, poorly written code could be corrected quickly or replaced over time.
- Free Software → Open Source Software. Then become FOSS Free and Open Source Software. (Promoted by Open Source Initiative http://www.opensource.org/)
- You are free to use the software as you like, you have some responsibility to make the improvements you make to the code available to others.

1984 GNU (GNU's Not Unix)

GNU

- GPL (GNU Public License)
  - Author rights—The original author retains the rights to his or her software.
  - Free distribution—People can use the GNU software in their own software, changing and redistributing it as they please. They do, however, have to include the source code with their distribution (or make it easily available).
  - Copyright maintained—Even if you were to repackage and resell the software, the original GNU agreement must be maintained with the software, which means all future recipients of the software have the opportunity to change the source code, just as you did.

1984 GNU Four Essential Freedoms

- The freedom to run the program as you wish, for any purpose (freedom 0).
- The freedom to study how the program works, and change it so it does your computing as you wish (freedom 1). Access to the source code is a precondition for this.
- The freedom to redistribute copies so you can help others (freedom 2).
- The freedom to distribute copies of your modified versions to others (freedom 3). By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.

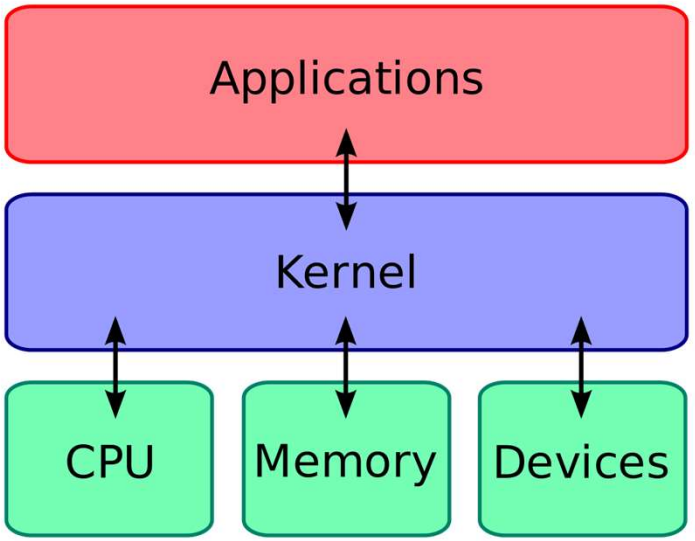
1989 BSD

https://www.freebsd.org/where.html

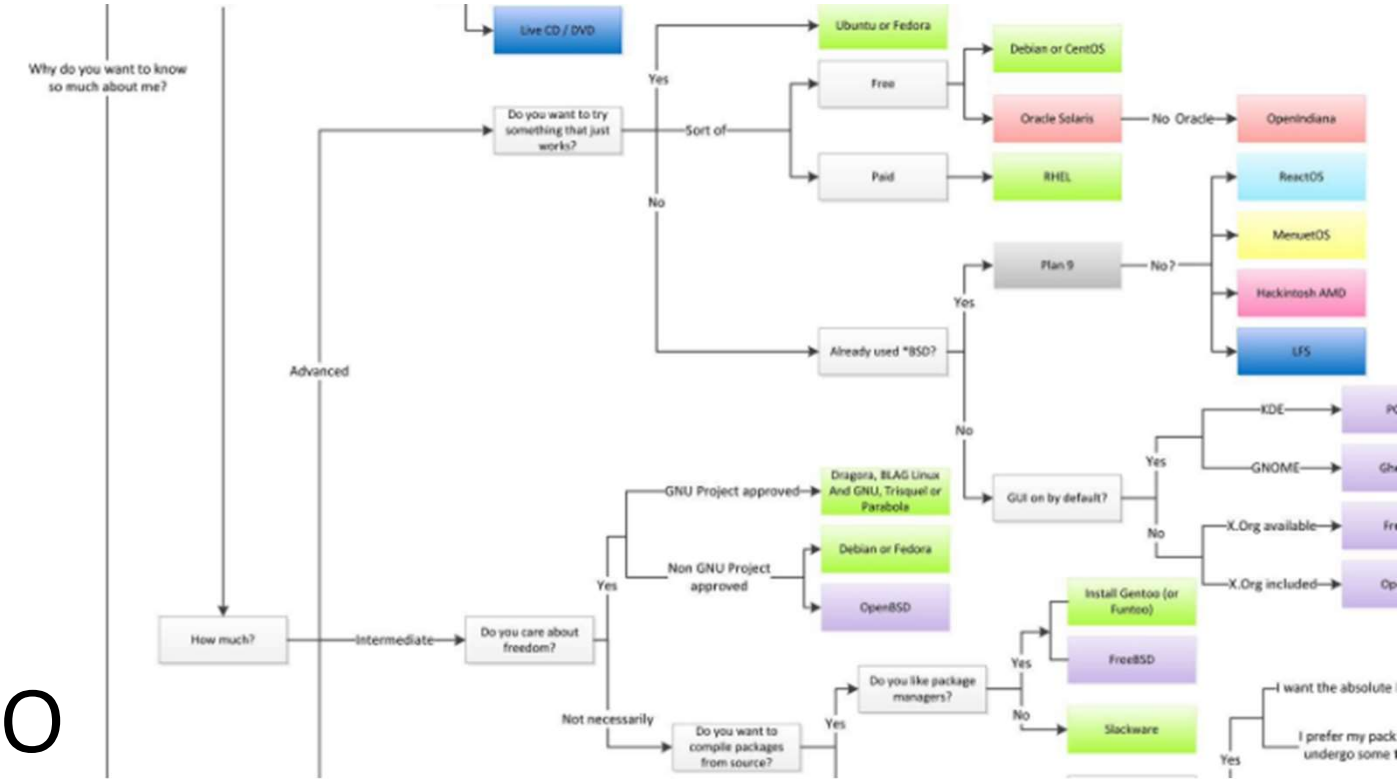
- By 1989 BSD Developer at University California completed UNIX code rewrite. It becomes Net/1 OS.
- AT&T sued BSD (at that time, AT&T also rewrite the UNIX), but dropped in 1994 when Novell bought AT&T.
- Today:
  - FreeBSD : POSIX Compatible, UNIX-like, easiest to use
  - NetBSD : FreeBSD but available on many computer platform (64bit)
  - OpenBSD : FreeBSD but with additional security (better than Linux)
  - Apple MacOS

1991 Linux

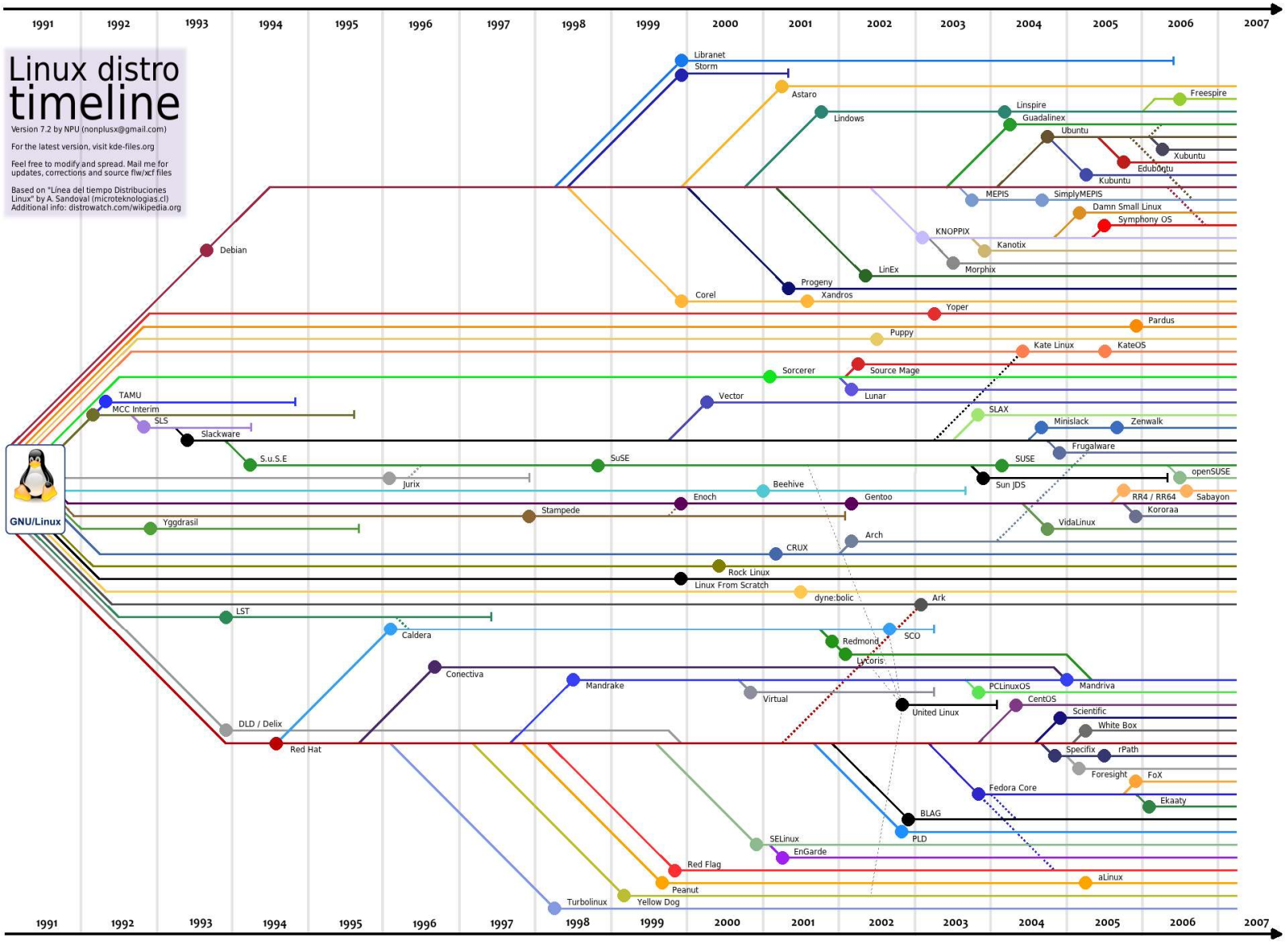
- Started with Minix (UNIX like OS) Commercially available, Minimum license for Education at that time. Linus want to add more capability to Minix.
- Linus rewrite the Minix, then become Linus's Minix, hence Linux.
- Linux is UNIX-like OS, combination of SVID, POSIX, BSD.
- Until today, Linus and thousand other still maintain Linux Kernel



Linux Distro



https://www.linuxtrainingacademy.com/wp-content/uploads/2015/01/choosing-a-linux-distro.jpg


Linux distro timeline
Version 7.2 by NPU (nonplusx@gmail.com)
For the latest version, visit kde-files.org
Feel free to modify and spread. Mail me for updates, corrections and source flw/xcf files
Based on "Línea del tiempo Distribuciones Linux" by A. Sandoval (microteknologias.cl)
Additional info: distrowatch.com/wikipedia.org
1991
1992
1993
1994
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2001
2002
2003
2004
2005
2006
2007
GNU/Linux
Libranet
Storm
Astaro
Freespire
Linspire
Lindows
Guadalinex
Ubuntu
Xubuntu
Edubuntu
Kubuntu
MEPIS
SimplyMEPIS
Damn Small Linux
Symphony OS
KNOPPIX
Kanotix
Morphix
LinEx
Debian
Progeny
Corel
Xandros
Yoper
Pardus
Puppy
Kate Linux
KateOS
Sorcerer
Source Mage
Lunar
TAMU
MCC Interim
SLS
Slackware
Vector
SLAX
Minislack
Zenwalk
Frugalware
S.u.S.E
SuSE
SUSE
Sun JDS
openSUSE
Jurix
Beehive
Enoch
Gentoo
RR4 / RR64
Sabayon
Kororaa
Stampede
Yggdrasil
VidaLinux
Arch
CRUX
Rock Linux
Linux From Scratch
dyne:bolic
Ark
LST
Caldera
SCO
Redmond
Lycoris
Conectiva
Mandrake
Mandriva
PCLinuxOS
Virtual
CentOS
United Linux
Scientific
White Box
DLD / Delix
Red Hat
Specifix
rPath
Foresight
FoX
Fedora Core
Ekaaty
BLAG
PLD
SELinux
EnGarde
Red Flag
aLinux
Peanut
Turbolinux
Yellow Dog

https://www.redhat.com/

https://getfedora.org/

Linux Distro: Red Hat

- At first, Linux is Kernel only.
- Red Hat gains first Linux Distribution to gain attention.
  - RPM (Red Hat Package Manager)
  - Simple installation (anaconda installer)
  - Graphical administration.
- Red Hat Linux is abandoned, but comes two distributions
  - Red Hat Enterprise (paid & subscription)
  - Fedora (FOSS)

https://www.debian.org/

Linux Distro: Debian GNU/Linux

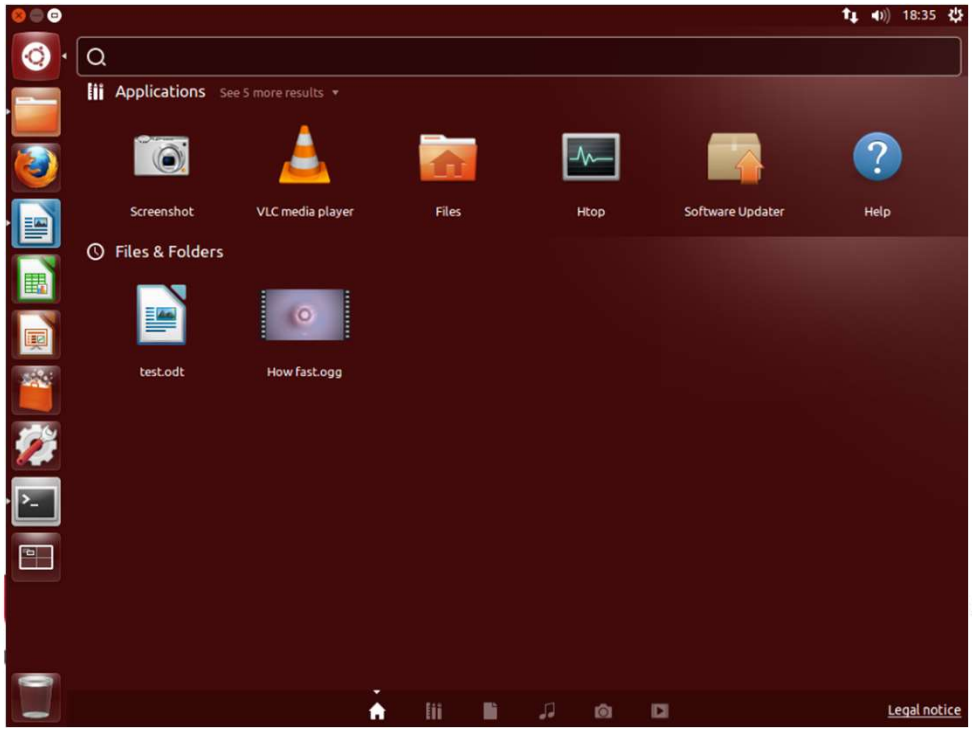
- Many Linux distro can be traced back to Debian.
- Ex: Linux Mint, elementary OS, Kali Linux, also Ubuntu.
- Debian has software packaging better than RPM. This makes many application built for Debian Linux.
- Google recommends Debian as OS when developing Android App.

debian

Linux Distro: Ubuntu

https://ubuntu.com/

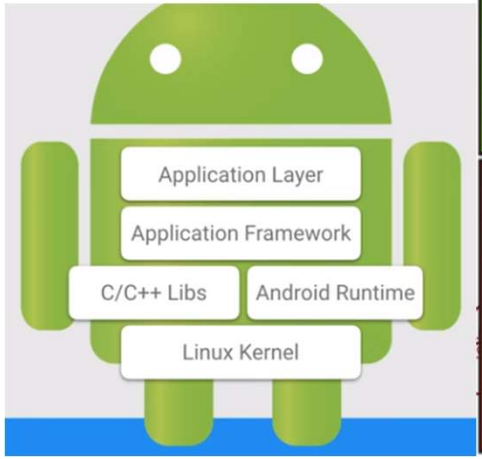
- Probably the most supported Linux distro in the world. Has many edition to suit user.
- Desktop, Server, IoT, Cloud.
- Also Ubuntu sub-distro : Lubuntu, Kubuntu, Xubuntu, Kylin, etc

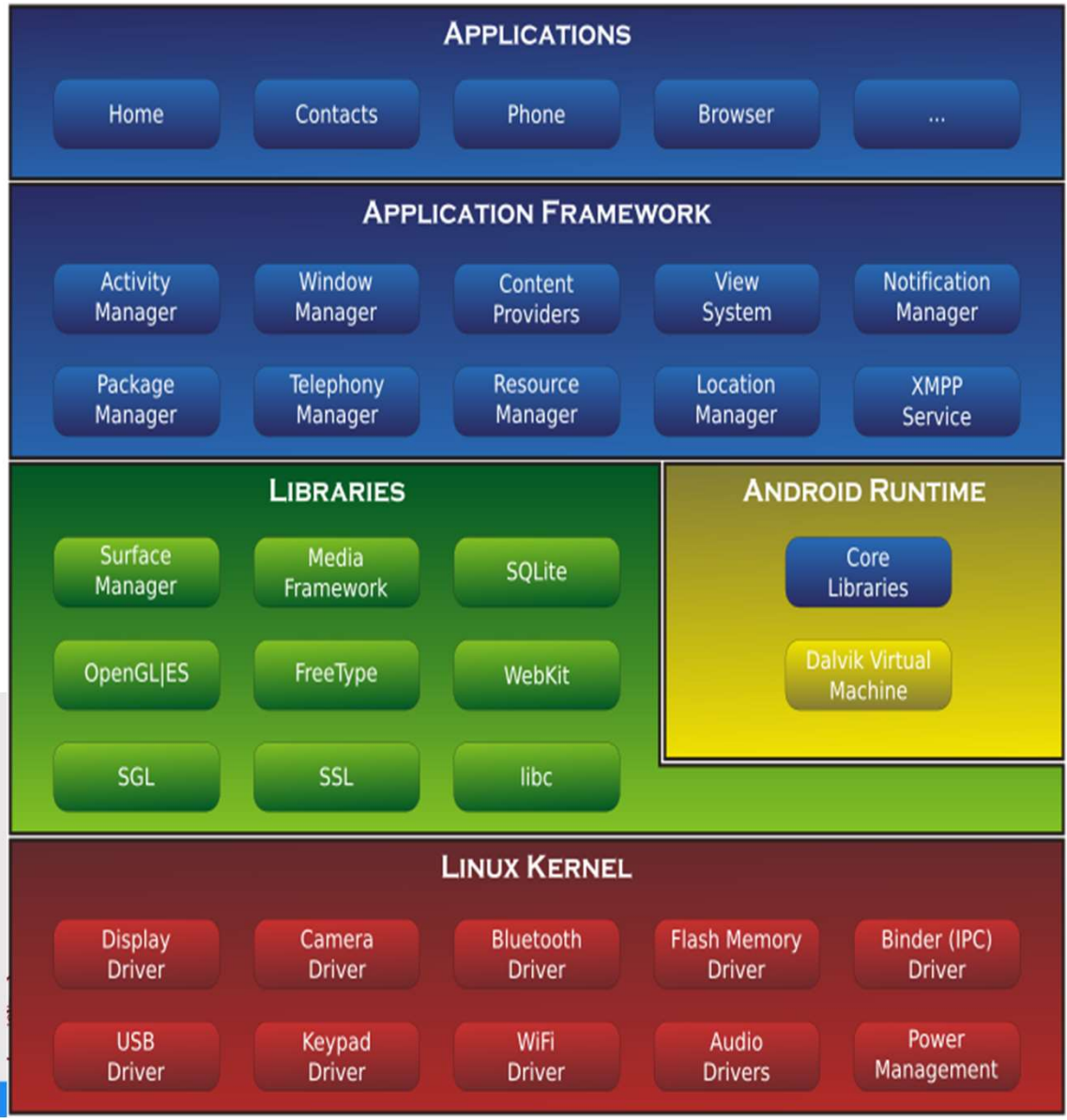


Android

- Is it Linux? Is it Distro?

- Linux Kernel
- Bionic (instead of GNU/Linux)





Q/A

Task: Linux Try Out

- Work in group.
- Download & Try Linux on your system. Some Linux distro doesn't need installation just for trying out, ex: Ubuntu/ Linux Mint / Slackware / Debian https://ubuntu.com/tutorials/try-ubuntu-before-you-install#1-getting-started
- Install on USB flash drive, run on your computer. **No need to install.**
- Try out some of the feature, then write the report. You may tell anything about your experience using Linux. Also, create some screen capture to support your report.