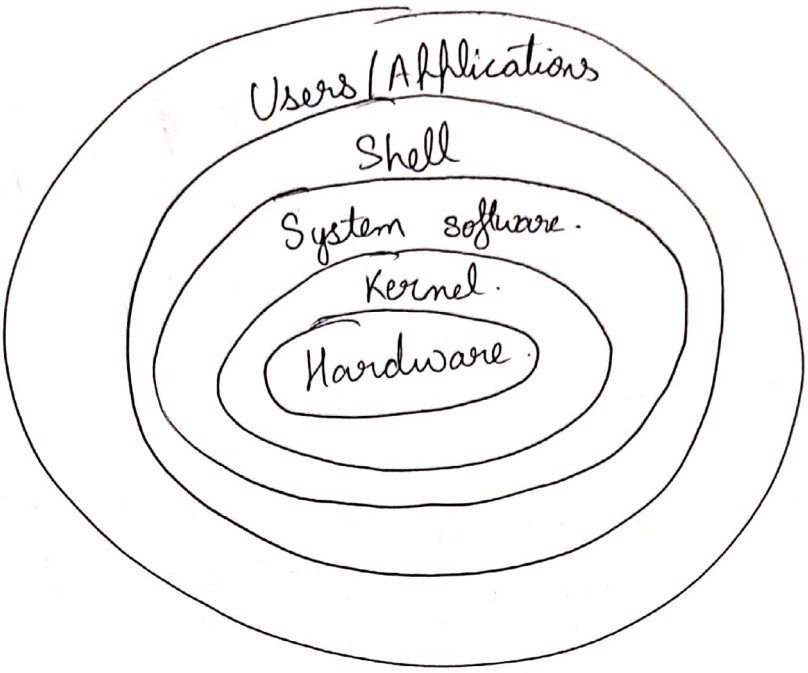
Structure of a Linux Based Operating System



→ An Operating System (O.S) is the low-level software that manages resources controls. peripherals and provides basic services to other software

→ In linux, there are 6 distinct stage in the booting Process.

BIOS	Basic Input/Output System executes MBR.
MBR	Master Boot Record executes GRUB.
GRUB	Grand Unified Bootloader executes Kernel.
Kernel	Kernel executes /sbin/init
Init	init executes runlevel programs.
Runlevel	Runlevel Programs are executed from /etc/rc.d/rc*.d/

1) BIOS

- BIOS stands for Basic Input/output System
- Performs some system integrity checks.

- Searches, loader & executes the bootloader Program.
- It looks for boot loader in floppy cd-rom or hard drive. you can press a key ~~f12 or f2~~ during the BIOS startup to change the Boot sequence.
- Once the Boot loader program is detected and loaded into the memory. BIOS gives the control to it.
- So, in simple terme BIOS loads and executes the MBR Bootloader.

2) MBR

- MBR stands for master boot Record.
- It is ~~boot~~ located in the 1st sector of the bootable disk. Typically /dev/hda or /dfu/sda.
- MBR is less than 512 bytes in size. This has 3 components
  1) Primary boot loader info in first 446 bytes.
  2) Partition table into in next 64 bytes.
  3) mbr. validation check in 1 as 2 bytes.

- It Contains information about GRUB (or LILO in old system)
- So, in Simple terms MBR loads and executes the GRUB boot loader.

3) GRUB

- GRUB stands for Grand Unified Boot loader.
- If you have multiple kernel images installed on our system. we can choose which one to be executed.
- GRUB display a splash screen waits for a few seconds if we don't enter anything
- GRUB has the knowledge of the system
- GRUB config file is /boot/grub/grub.conf, it contains both kernel & inited image.
- So, in simple terms GRUB just loads & executes kernel & initrd images.

4) Kernel

→ Mounts the root file system as specified in the "root=" in grub.conf.

→ Kernel executes the /sbin/init program, which is always the first program to be executed.

→ Then Kernel establishes a temp. root file system using initial RAM Disk (initrd) Until the real file system is mounted.

→ "initrd" also contains necessary drives compiled inside,

which helps it to access the hard drive partitions and other hardware.

→ The Kernel is often referred to as the core of any O.S. it has complete control over everything in our system.

5) Init.

→ At this point, our system executes run level, programs. At one point it would look for init file; usually found at /etc/inittab. to decide the linux runlevel.

→ Modern linux systems use systemd to choose a run level instead.

- Run level 0. → matched by poweroff target (runlevel0.target is a symbolic link to poweroff target)
- Run level 1 → matched by rescue.target, single user mode.
- Run level 2 → multi user mode, without NFS.
- Run level 3 → Full multiUser mode.
- Run level 4 → Unused, not Used/ user-definable (for special purpose)
- Run level 5 → Full mode (same as run level 3 + display manger)
- Run level 6 → Reboot (Reboot the device).

6) Run level Programs

- When the linux system is booting up, we see various services getting started. Ex → "starting send mail... Ok". These are run level programs, executed from the run level directory as defined by our run level.
- each of run level has its own directory.

⇒ Run level 0 → /etc/rc.d/rc0.d/
⇒ Run level 1 → /etc/rc.d/rc1.d/
⇒ Run level 2 → /etc/rc.d/rc2.d/
⇒ Run level 3 → /etc/rc.d/rc3.d/
⇒ Run level 4 → /etc/rc.d/rc4.d/
⇒ Run level 5 → /etc/rc.d/rc5.d/
⇒ Run level 6 → /etc/rc.d/rc6.d/

- Note that the exact location of these directories Various from distribution to distribution.

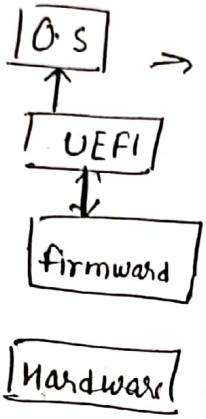
~~Under~~

2) → start up programs are executed during system startup.
→ Kill programs executed during shutdown.

4) Discuss on UEFI, Legacy BIOS

① UEFI :- United Extensible Firmware Interface (UEFI) is a specification for a software program that connects a computer's firmware to its O.S.

→ UEFI is expected to eventually replace BIOS but it is compatible with it.



→ EFI (extensible firmware Interface)

→ Intel develop the original EFI

→ UEFI function via the firmware installed on a computer's motherboard. LIKE BIOS UEFI is installed at the time of manufacturing and is first program that runs of manufacturing booting a computer.

→ It checks to see which hardware components are attached, wake up the components and hands them ours to the O.S.

→ Most of Modern computer system are equipped to support the both traditional BIOS and UEFI although Intel Corp. has stated its intention to phase out BIOS support in newer password computers PC's.

(2) Legacy:- A Legacy system is an old or out-dated system, technology or software application that continues to be used by organization because it still performs the function it was initially intended to do.

→ Generally legacy systems no longer have support and maintenance and they are limited in terms of growth however they cannot be easily replaced.

→ Legacy systems are often essential with in an organisation.

(3) BIOS:- The Basic Input output system is a very small piece of code contained on a chip on our system board. When we start our computer, BIOS is the first that runs. It identifies our computers hard work configuration it test it and converts it to O.S for further Instruction.

→ UEFI is a successor to the legacy PC BIOS, aiming to address its technical limitations.

(5) Discuss on Linux Windows MacOs.

Basic difference and History.

Windows	MAC	Linux
→ Windows was first released in 1985.	→This O.S from Apple Stands older than windows.	→ It was initially dueloped by Finnish University, released in 1991 and designed for GNU developere. later Integrated it into Linux.
→ It was supposed to be graphical user interface on topoid M-Dos.	→ It was 1st released in 1984.	→ It is Open to consomed and every one. Can use as per the specifications.
→ All features of Ms-Dos were later Integrated ph windows 95. release.	→ It began as a GUI right from its inception.	
It was huge success tion and led to windows transition	→ In 2005 the design and structure of MAC. was changed to Intel x86 based architecture.	

File Structure

→Windows follows a directory structure to store the different kinds of files of the user.	→ the file structure of MAC OS is Commonly known as MAC-OS X.	Linux has Completly different file structure form. Windows and MAC.
→ It has Logical drives and cabinet drawers. It also has folders.	→ If you dig into MAC's hard disk through finder you will see many.	

6. List the steps to check desk partitions in window.

① Open file Explor

② Right click on 'This PC'

③ Choose 'manage' from the pop-up menu.

④ Negative to storage → DISK Management in Nevigation Panel.

⑦ List the Steps to start or Stop Services. in windows.

① Hit the windows key + R to open the 'run' window.

② ~~Ser~~ Type Services.msc in the open: box

③ Services dialog box/ window will open.

④ Select the services to start / Stop.

⑤ Choose the relevant option to operate on Those services.

(8) Commands to check disk partitions.

(1) Open a Command Prompt.
Start > Run > Cmd.

(2) Start up the DISKPART Utility:
C:\Users\Administrators > diskpart.

(3) Select the disk : we wish to view Carry Valid disk number.
DISKPART > Select desk 1

(4) View the details of selected disk.
DISKPART > detail disk.