Booting Process:-

* **BIOS :- [Basic input-output System]**

→ When Computer is turned on, BIOS first perform some System integrity checks of HDD/SSD, Then the BIOS Searches, loads and executes the Boot loader program

→ Once the boot loader Program is detected. and loaded into the memory and BIOS give the Control to it.

→ In Simple terms, the BIOS loads & execute the MBR boot loader.

* **MBR [Master Boot loader)**

→ It Contain information about GRUB

→ MBR loads & executes the GRUB boot loader.

→ It is located in the 1st Sector of the bootable disk. Typically /dev/hda, or /dev/sda.

→ MBR is less than 512 bytes in size.

* GRUB:-

→ GRUB stands for Grand Unified Bootloader.

→ If you have multiple kernel images installed on your system, you can choose which one to be executed.

→ GRUB displays a splash screen, waits for few seconds, if you don't enter anything, it loads the default kernel image as specified in the grub configuration file.

→ GRUB loads and execute kernel and initrd images.

* kernel:

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

→ kernel executes the /sbin/init program.

→ Since init was the 1st program to be executed by Linux kernel, it has the process id (PID) of 1. Do as 'ps -ef | grep init' and check the pid.

→ initrd stands for initial RAM disk.

→ initrd is the temporary root file system until kernel is booted and the real root file system is mounted.

* Init:-

-> Looks at the /etc/inittab file to decide the Linux Run Level.

-> following are available Run Levels.

0 - halt

1 - Single user mode.

2 - multiuser, without NFS

3 - Full multiuser mode

4 - unused.

5 - X11

6 - reboot.

* Run level Programs:-

-> When the Linux System is booting up, you might see various Services getting started.

-> Depending on your default init level setting, the System will execute the programs from one of the following directories.

-> 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/

(02) Functions of OS

* Security:-
-> Protects user data
-> It prevents unauthorized access to programs and user data

* Job accounting:-
-> OS keeps track of time and resources used by various tasks

* Error detecting aids:-
-> Constantly monitors the System to detect errors and avoid malfunctioning tasks.

* Coordination between Software and users:
-> OS Co-ordinates and assign interpreters, Compilers, assembles

* Memory Management:-
-> The OS manages the Primary ~~necessary~~ memory.
-> It keeps track of memory, which bytes are used by which Prog.
-> Allocate memory for the Process, deallocate when the Process has terminated.

* Processor management:-

-> OS decides the order in which the processes have access to the processor.

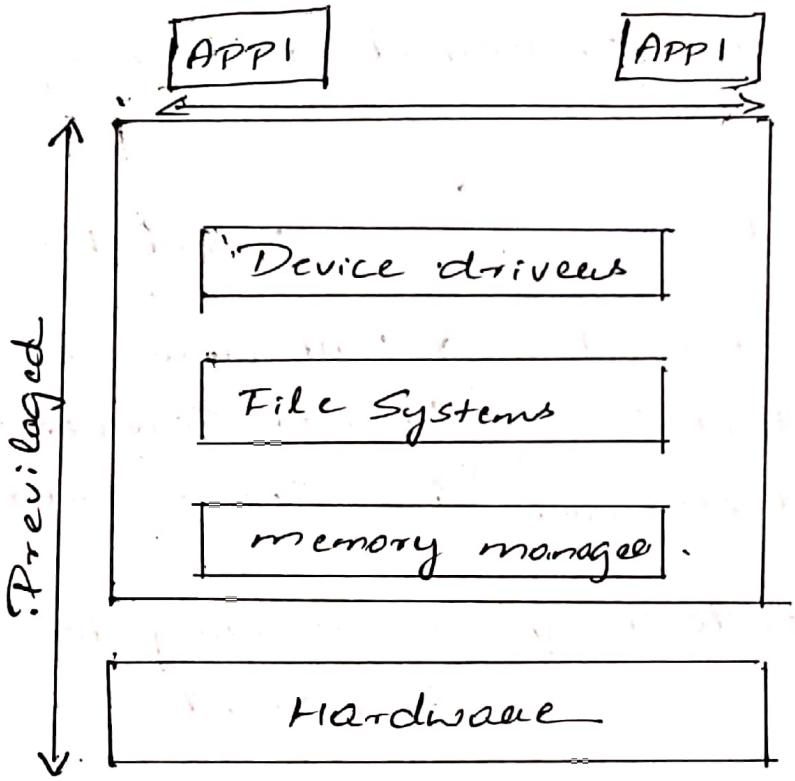
-> Keeps track of the status of processes

* File management:-

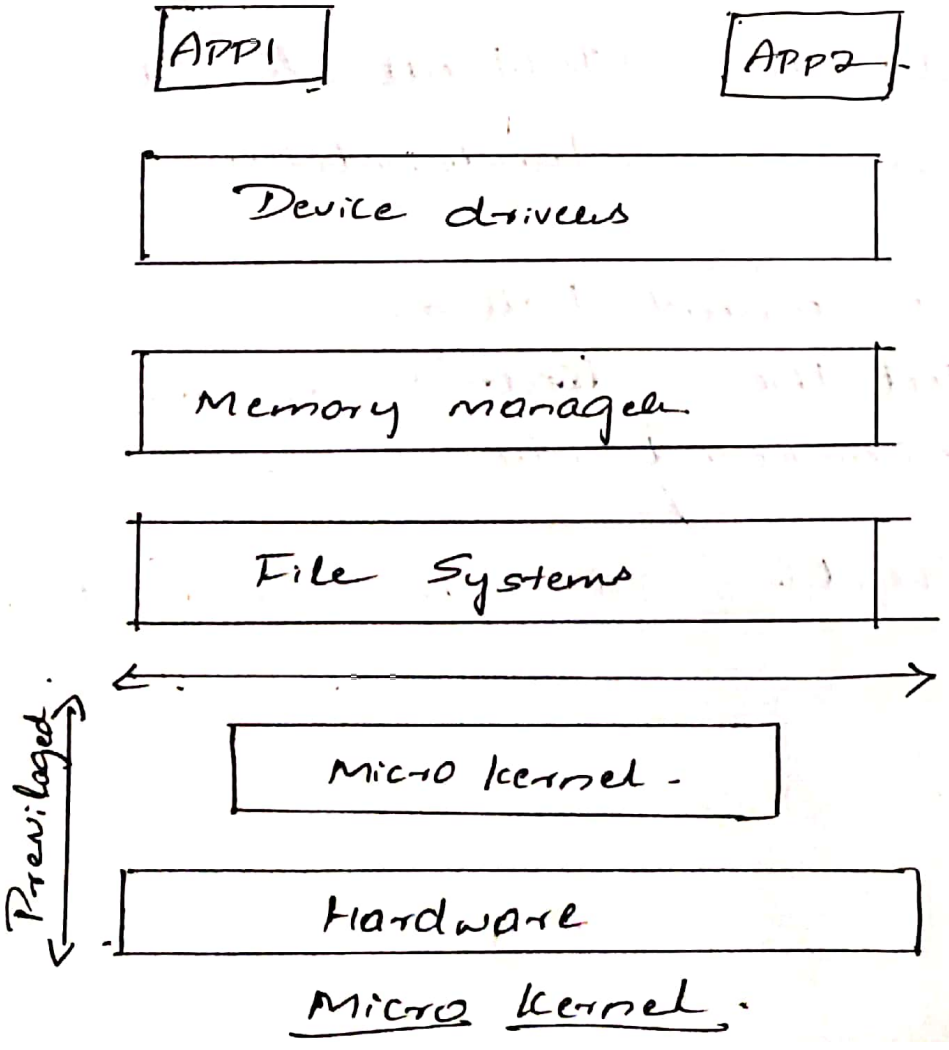
-> A file system is organised into directories for efficient navigation & usage.

(03) Monolithic & Microkernel difference

	Microkernel.	Monolithic kernel.
*	User Services and kernel are kept in Seperate address Space	* Both user Services and kernel Services are kept in same address Space
*	OS is Complex to design	OS is easy to design and implement
*	Micro kernel is Small in Size	Monolithic kernel are larger in Size.
*	Easier to add new functionalities	Difficult to add new functionalities.
*	failure of one Component does not effect the working of micro kernel	Failure of one Component leads to failure of entire System
*	Execution Speed is low.	Execution Speed is high.



Monolithic kernel.



Micro kernel.

04 UEFI and Legacy boot

→ UEFI stands for unified extensible firmware. interface most new motherboards consists of this type. It has more advantage than using BIOS.

Most importantly, it provides user friendly graphical user interface (GUI)

BIOS provides blue screen, BIOS cannot recognise large storage drives, UEFI provides a good alternative.

→ In regular BIOS that uses the keyboard to select the option UEFI allows controls via mouse.

UEFI contains secure boot

→ Legacy BIOS used by BIOS firware It stores a list of installed storage device that are bootable.

BIOS performs POST (power on self-test)

05 Commands on window to check disk Partition

-> open powershell terminal

-> Type diskpart

-> `Diskpart > List disk`.

↳ It will list any detected disks

-> `Diskpart > list volumes`

↳ It will list detected volumes

-> `Diskpart > list partition`

↳ this will list the Current Partitions on the device.

06 Commands to check Services in windows

-> List all Services

SC queryex type = Service state = all.

-> Search for Specific Service

SC queryex type = Service state = all | find /i "Service name" : myService

07 Steps to Start Or Stop Services in windows

Start
~~Stop~~ Service

-> open Start
-> Search Services
-> Click on the Service you want to Start -
-> click start button
-> Apply button

Stop Service

-> open start
-> Search Services
-> Click on the Service you want to Stop
-> Click Stop
-> click apply.