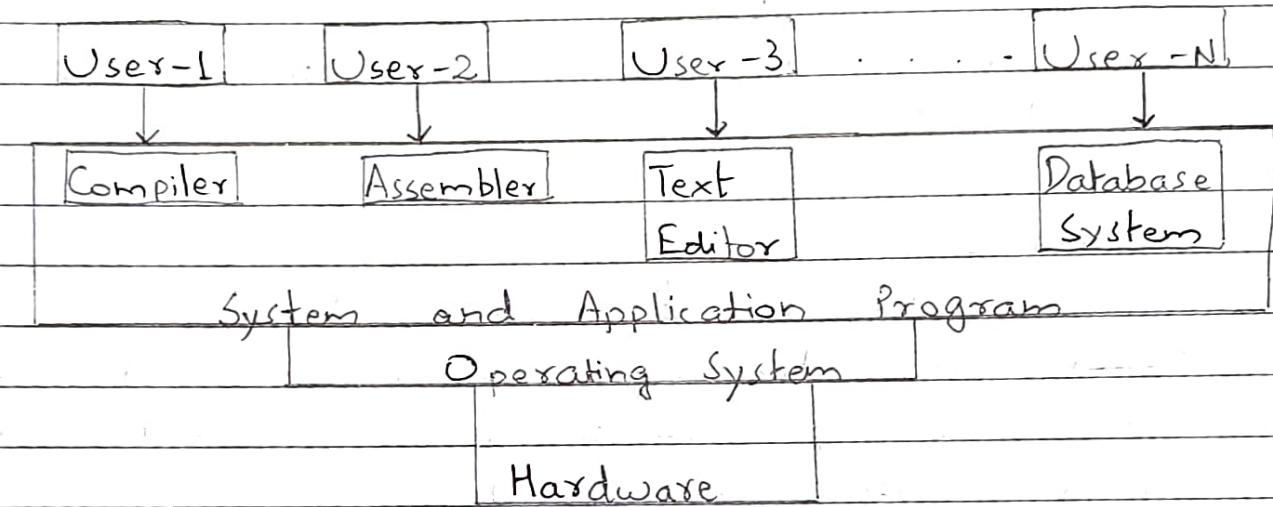


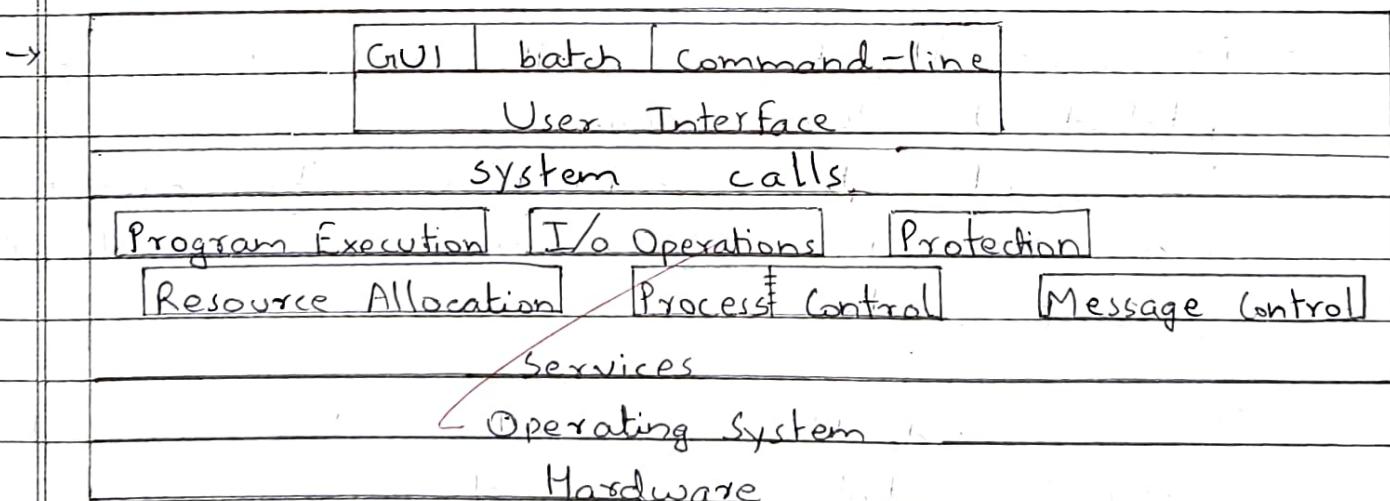
# 1<sup>st</sup> Internals:

## Module - 1.

1.a) Operating system is the intermediary the user and the hardware components of a computer system. The operating system continuously runs on the system and is used to lead interrupts from the user to perform various events.



- The user can access the operating system through application programs run on compiler, text editor, etc.
- Operating system runs on kernel mode with mode bit = 0.



D	D	M	M	Y	Y	Y	Y
1	2	0	1	2	0	2	4

- ii) User Interface → These interfaces provides the user to write the set of desired instructions.
- GUI → Graphic user interface like UNIX provides the applications to perform tasks.
- batch → It enable the user to write the control statements.
- command-line interrupts → are the statements provided to the operating system to interrupt the normal flow of execution to perform special events.

### Services:

- Program Execution: It executes the desired programs by allocating memory spaces to commands and storing them in internal registers to perform specified operations.
- I/O operations: Input output operations are used take inputs from user in the form of keystrokes, etc. using the specific device controllers and provide output for the same.
- Resource Allocation: Once the instructions are fetched to the memory, resource are needed to execute the instructions. The allocation and deallocation of memory is done by the operating system.
- Process and Message Control → These are the control statements that are used to

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D	D	M	M	Y	Y	Y	Y
1	2	0	1	2	0	2	4

control the flow of execution of instructions.

→ Protection: When the devices are shared by multiple users certain files or resources must not be accessible to every source user. Thus, protection service is provided.

1.b) i) Multi-processor system

→ The system uses two or more processors to perform the tasks more efficiently.

→ There are two types of multi-processor system:

Asymmetric → It uses master-slave approach where one processor acts as master assigning the tasks to other processor.

Symmetric → Here all processors combine together to perform the task.

→ It uses master-slave approach where one processor assigns the tasks to various processors.

→ A device can possess multiple processor at the same time which are assigned various tasks.

ii) Clustered system

→ Multiple systems form a cluster to share resources for efficient task performance.

There are two types of clustered system:

Asymmetric → Uses hot standby approach to where one system monitors the functioning of all other systems.

Symmetric → The systems monitor each other while performing the task.

→ No master-slave approach is used rather only monitoring of systems is done.

→ A clustered system consists of multiple systems that share their resources.

D	D	M	M	Y	Y	Y
1	2	0	1	2	0	2

### iii) Multi - Programming

Multi - programming allows the user to assign multiple jobs #1 to the main memory.

OS

Job 1

Job 2

Job 3

:

Job n

### Multi - Tasking

Multi - Tasking is a feature that allows multi-tasks to be processed at the memory. The user remains under the impression that the tasks are executed simultaneously; however the memory performs a part of the task ~~and~~ and waits put it in waiting state to take up another tasks for execution.

→ The jobs are provided by the user

→ Multi - tasking is a feature of the operating system.

### 4. b) Process

→ It is heavyweight process → It is light weight process.

→ It refers to the instructions provided by the user.

→ A process can be assigned to a single thread

→ A process is the job assigned by the user.

### Thread

→ A thread is assigned to a process by the operating system.

→ A thread can have ~~multiple~~ processes simultaneously.

→ A thread is the basic unit of CPU utilization.

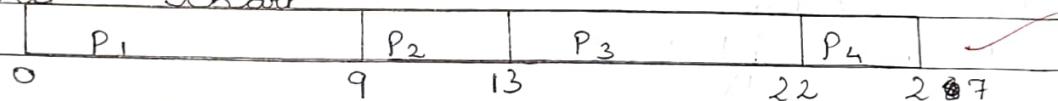
D	D	M	M	Y	Y	Y	Y
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4 a)

Process	Arrival Time	Burst Time	Priority
P1	0	9	3
P2	1	4	2
P3	2	9	1
P4	3	5	4

i) FCFS

Gantt chart

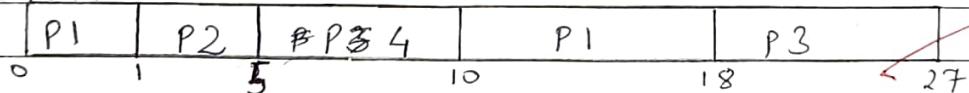


Process	Arrival Time	Burst Time	Waiting Time	Turnaround Time
P1	0	9	0	9
P2	1	4	9	13
P3	2	9	13	22
P4	3	5	22	27

$$\text{Average waiting time} = (9+13+22)/4 = 11$$

$$\text{Average turnaround time} = (9+13+22+27)/4 = 17.75$$

ii) SJFT:



Process	Arrival Time	Burst Time	Waiting Time	Turnaround Time
P1	0	9	0	9
P2	1	4	1	5
P4	3	5	5	10
P3	2	9	18	27

$$\text{Average waiting time} = 24/4 = 6$$

$$\text{Average Turnaround time} = 51/4 = 12.75$$

D	D	M	M	Y	Y	Y	Y
1	2	0	1	2	0	2	4

## Quiz

1. c) ~~—~~ X
2. c) X
3. b) /
4. b) //
5. b) /

~~Q1~~ Round Robin:

