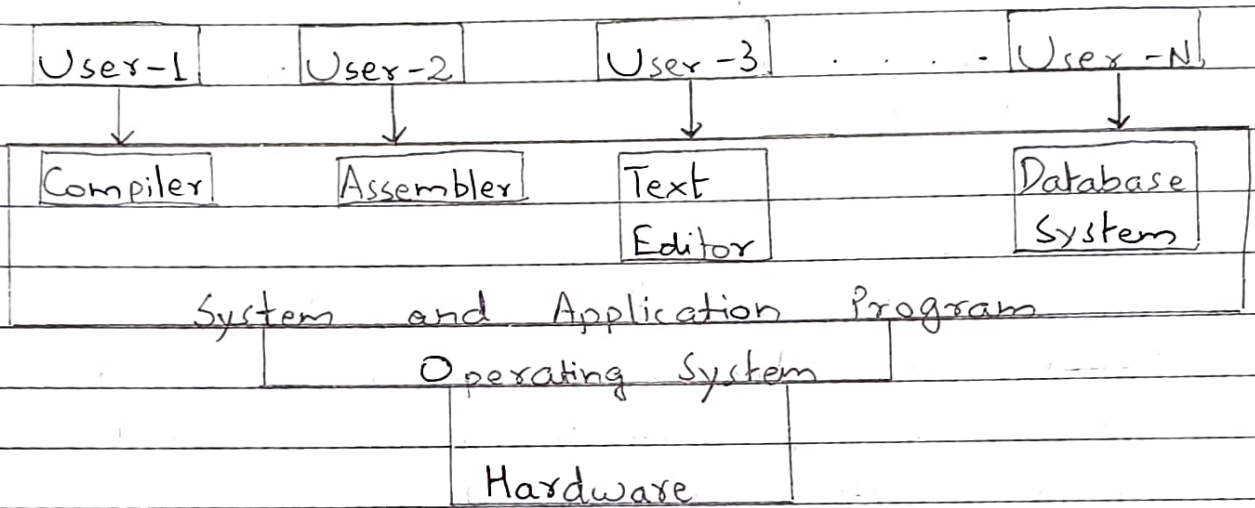


1st Internals:

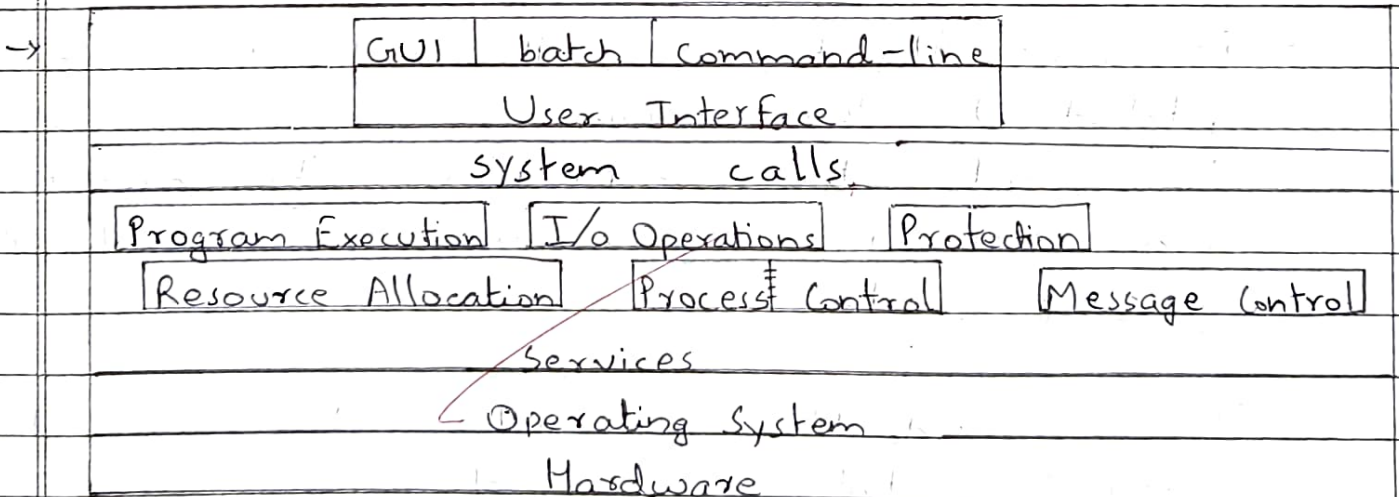
Module - 1.

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 load interrupts from the user to perform various events.



→ The user 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.



- i) 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 ~~can~~ 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 ~~using~~ 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

control the flow of execution of instructions.

→ Protection: When the devices are shared by and multiple ~~used~~ 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-process system:

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

Symmetric \rightarrow Here \swarrow 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.

Two clustered system:

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

There are two types of clustered system:

Asymmetric \rightarrow Uses not standard approach to p where one system monitors the functioning of all other systems.

Symmetric \rightarrow 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 system that share their resources.

ii) Multi-Programming

Multi-programming allows the user to assign multiple jobs # 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 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 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

→ It is light weight process.

→ 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.

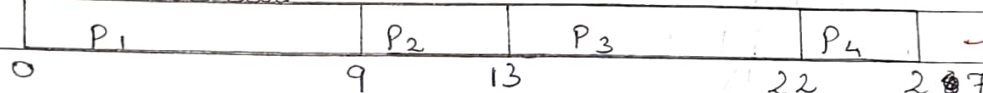
D	D	M	M	Y	Y	Y	Y
1	2	0	1	2	0	2	4

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

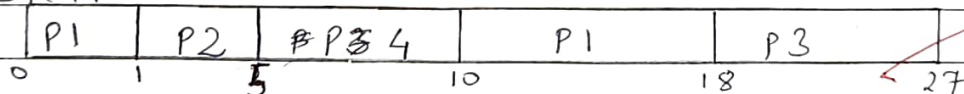


Process	Arrival Time	Burst Time	Waiting Time	Turnaround Time
P1	0	9	0	9
P2	1	4	9	13
P3	2	9	13	22
P4	3	5	22	27

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

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

ii) SRTF:



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

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

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

Quiz

1. $c > \text{new}$ ~~X~~
2. $c >$ ~~X~~
3. $b >$ ~~/~~
4. $b >$ ~~/~~
5. $b >$ ~~/~~

~~4 a)~~ Round Robin:

P1	P2	P4
0	2	4