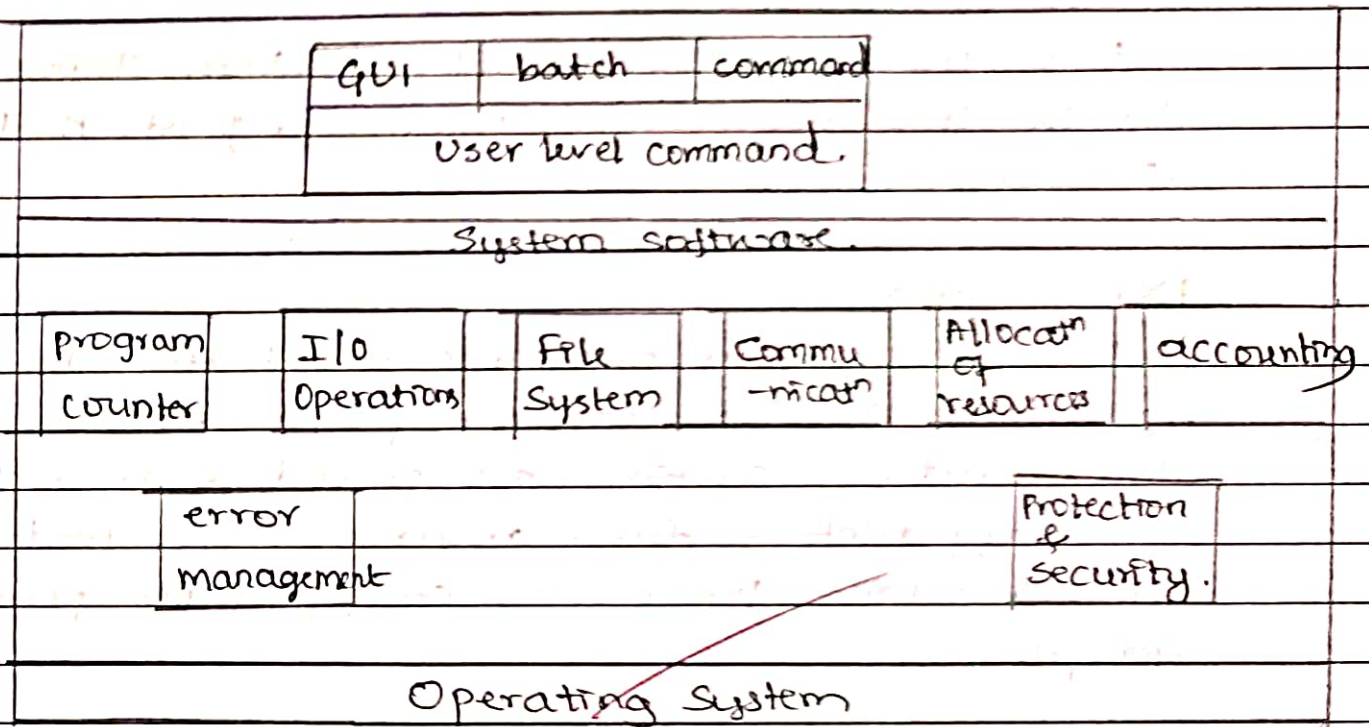


Module - 1

1) An Operating System is a System software that allows interaction between the user and computer hardware.



Operating System provides services to the process and to the user who performs the process.

Services of Operating System are:-

1) User level arguments.

By means of this a user can pass commands to the process. -the commands can be user level commands such as sh, csh, ksh etc. Or graphic level commands like windows, X-windows etc.

GUI → It refers the windows and pointer for input and keyboard for typing.

2) Program counter.

The Operating System must be capable of loading

the data in Random Access Memory (RAM). RAM is a temporary memory. The operating system must be able to load the program and execute the program.

3) I/O Operations

Here, the data is transferred from Input/Output devices like Keyboard, mouse, joystick to the system.

4) File System

There are certain programs which use file operations like reading the file, writing the file. The operating system will provide services like creating/deleting file, reading the contents of the file, searching for a file, changing the permissions for file.

5) Communication

Communication refers to inter-process communication [IPC]. There might be communication between the processes located in same processor or different processor or even different system itself.

6) Allocation of resources

Operating system provides services such as allocation of resources like, ~~CPU time~~, memory, storage space etc.

7) Accounting

Accounting refers to tracking of all system processes and utilization of resources. Accounting is done either for billing or for to obtain statistical graph.

8) Error management

Error may be from hardware or software. Error might be from CPU, I/O devices or from the user code as well. The operating system provides error management services.

9) Protection & Security

Protection & Security is one of the important part. Operation system provides protection and security services by means of passwords.

1) b) Multiprocessor System

⊗ Here, multiple processors are used and same hardware such as clock, memory and peripheral devices are shared.

⊗ It is cost effective when compared to clustered system.

⊗ Here, a single process is shared by multiple processors and are executed.

Clustered System

⊗ Here, different hardware systems are connected by means of network, say LAN (local area network).

⊗ It is less cost effective when compared to multiprocessor system.

⊗ Here, single task is shared by different hardware systems and are executed.

D D M M Y Y Y Y
□ □ □ □ □ □ □ □

④ Here, a single hardware system is used.

④ Since, there is use of multiple processors, different programs can be executed simultaneously.

④ Here, there is no interaction b/w user and the process.

④ Here, multiple hardware systems are used.

④ Here the work to be done is shared b/w all the hardware systems.

④ Here, ~~there is~~ there is ~~user~~ interaction b/w user and process.

1) b) Multiprogramming

④ Here, multiple programs are processed by the processor.

④ Here the main criteria is switching.

④ Here, sometimes the process needs to wait for I/P and O/P operations during that time the execution of next process starts.

④ Only one CPU is used

④ It is time consuming when compared to multitasking

④ Here, the ~~main criteria~~ ^{logic} is CPU should not sit idle.

Multitasking

④ Here, multiple tasks are done by different CPU's.

④ Here the main criteria is time saving.

④ Here multiple tasks are carried out simultaneously by different central processing units.

④ Multiple CPU ^{are} used.

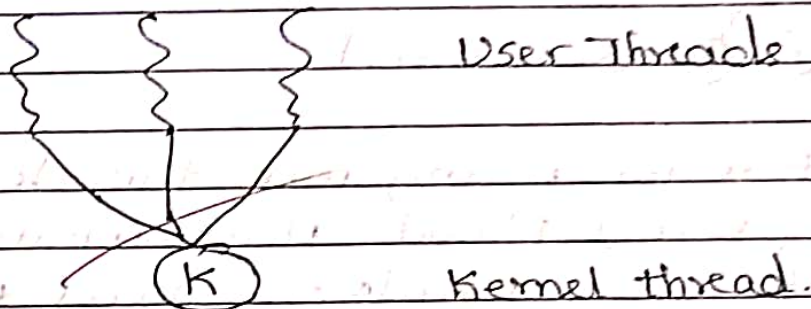
④ It is time saving when compared to multiprogramming

④ Here the main logic is time saving.

Module-2,

3b) There are 3 different types of multithreading models.

1) Many to One multithreading model.

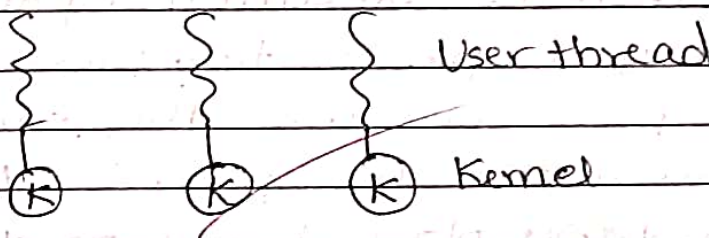


Here, as the name itself suggests, many user threads are connected to a single kernel thread.

Disadvantages of this model:

- ⊗ All 3 user threads in the above diagram cannot access the kernel thread simultaneously.
- ⊗ If one user thread gives block signal then whole system will be blocked.

2) One to One.



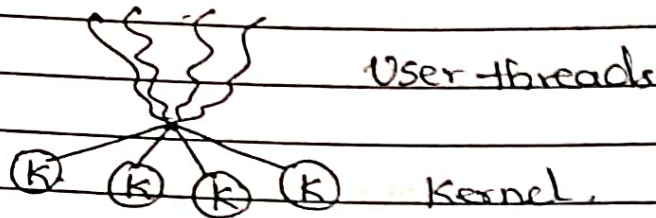
Here, ~~one~~ each user thread has its own kernel thread.

Disadvantage:-

It is very much time consuming. It's hard to

construct kernel thread for every user thread

3) Many to many



Here for many user threads, there will be many kernel thread. Here, advantage is that all the user threads can access the kernel threads simultaneously.

3) a) Inter process communication or the IPC refers to communication between the two processes. The two processes may be located on the same processor or the different processor. The two processes might be located in ~~any~~ two different systems itself.

The Inter process communication refers to transfer of messages or the instructions ~~are~~ between the two process. then the execution of the process takes place. If the ~~process~~ two process belongs to the same processor, then the same memory is shared between the two process. Execution of the process takes place based on the instructions ~~which~~ The address of the instructions which is being currently executed is stored in information registers. and the address of the next instruction to be executed is stored in the program counter.

The data of the program counter will be updated regularly.

Ques 2:-

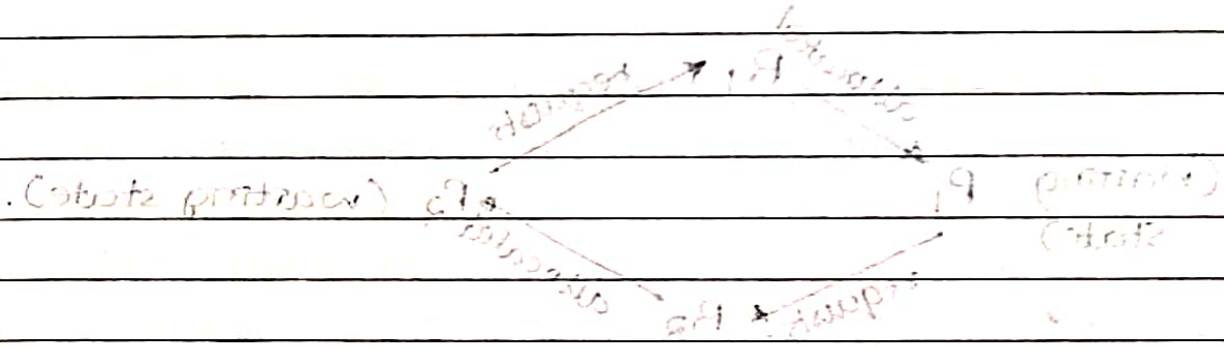
1) ~~a) fork~~ a) fork

2) ~~b) a)~~ b) a)

3) b)

4) b)

5) b)



(Instructions for the program to be executed)

Program execution

Program execution is a process of executing a program.

Program execution is a process of executing a program.

Program execution is a process of executing a program.

Program execution is a process of executing a program.

Program execution is a process of executing a program.

Program execution is a process of executing a program.

Program execution is a process of executing a program.