

# (Chapter 1) (1Q)

classmate

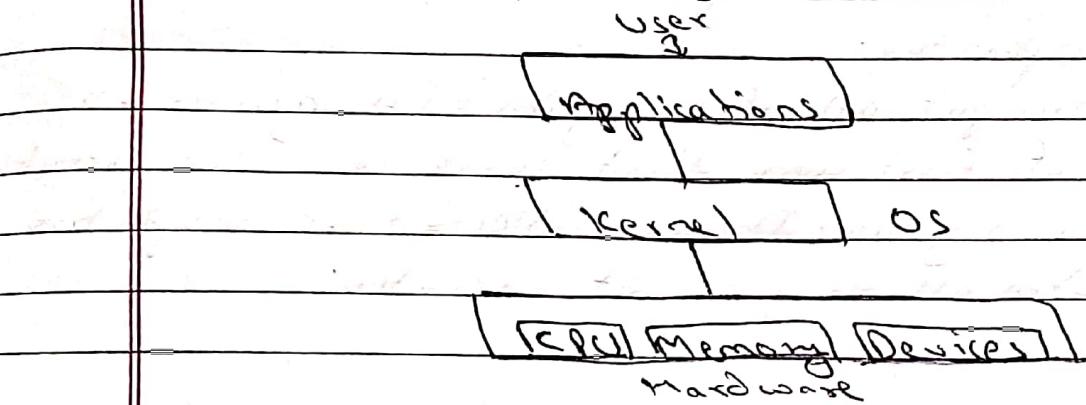
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Q) Explain OS with suitable diagram  
or

III) What is an operating system? (interface)

Ans: An operating system acts as an intermediary between the user of a computer and the computer hardware. The purpose of an operating system is to provide an environment in which a user can execute programs in a convenient and efficient manner.

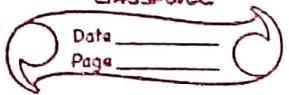


→ Some popular OS are Linux, Windows, Mac

→ ~~Types of OS~~ Important function of OS are:-

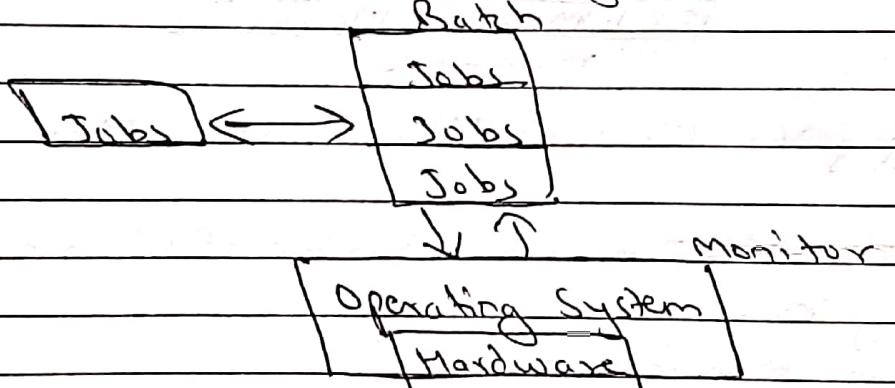
- i) Memory Management
- ii) Processor Management
- iii) File Management
- iv) Security.

Multiprogramming - non preemptive  
Multi-tasking (Time sharing) - preemptive



## ① Types of Operating System

- 1) Batch Operating system. Discuss its characteristics
- In this technique, similar types of jobs were batched together and executed in time.
  - Each user prepares his job and submits it to the computer operator.
  - The system put all of the jobs in a queue on the basis of first come first serve and then executes the jobs one by one. The users collect their respective output when all the jobs get executed.

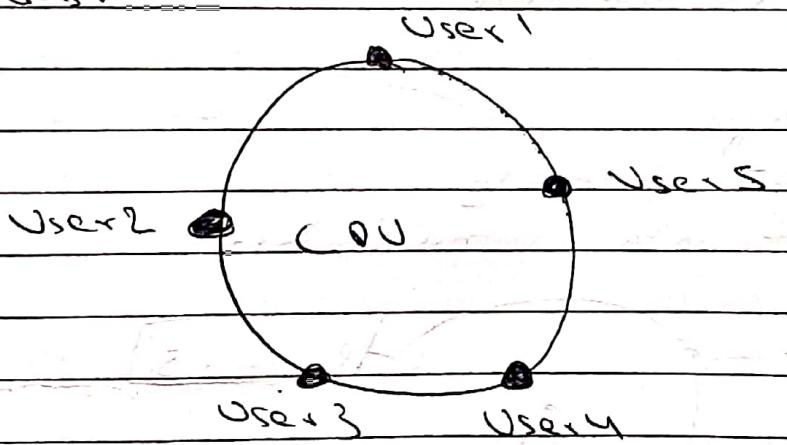


### Disadvantages

- 1) Lack of interaction between the user and job
- 2) Difficult to provide the desired priority.

## 11.2) Time Sharing Operating System (Multi-Tasking)

- ⇒ Time sharing is a technique which enables many people, located at various terminals, to use a particular computer system at the same time.
- ⇒ Time-sharing is sharing a computing resources among many users by multitasking.
- ⇒ Multiple jobs are executed by the CPU by switching between them, but the switches occur so frequently. Thus, the user can receive an immediate response.
- ⇒ The OS uses CPU scheduling and multiprogramming to provide each user with a small portion of a time.
- ⇒ Computer systems that were designed primarily as batch systems have been modified to time-sharing systems.



Adv & Dis, same as multi-tasking in next page

## 2) Time sharing Operating system (multi-Tasking)

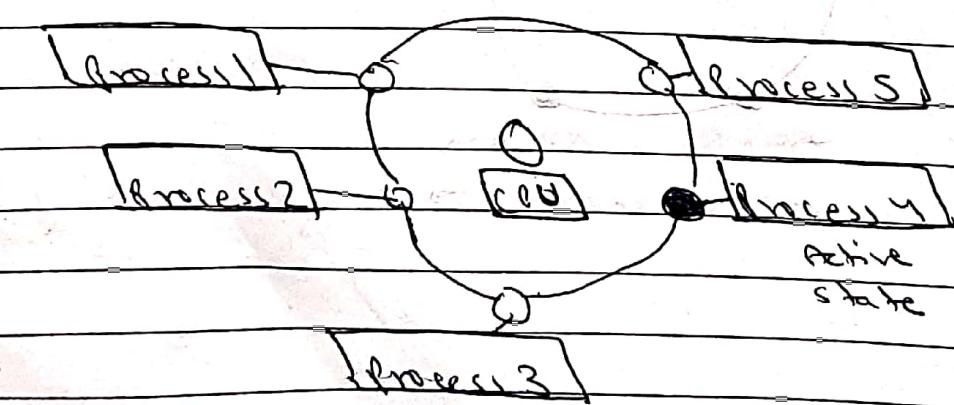
- It allows users to perform more than one computer task at the same time.
- Multiple jobs are executed by by switching the CPU between them.
- In this, the CPU time is shared by different processes, so it is called "Time sharing system".
- Computer systems that were designed primarily as batch systems have been modified to time-sharing systems.

### Advantages

- provides the advantage of quick response
- reduces CPU idle time

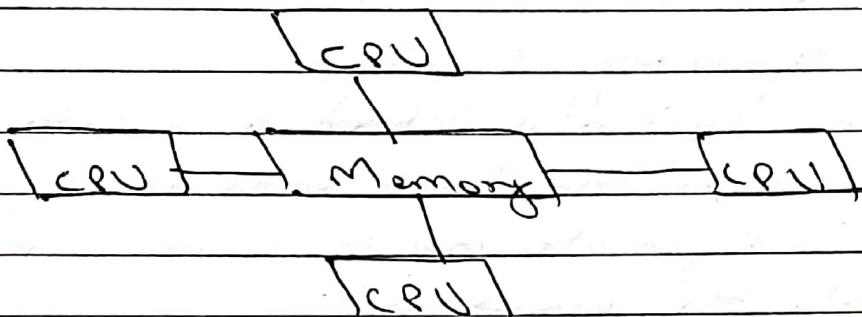
### Disadvantages

- Problem of reliability
- Problem of data communication



### III) Parallel Operating System

- A operating system is said to be parallel system in which multiple processor have direct access to shared memory connected to single server.



- It is a tightly coupled system
- It is designed to speed up the execution of program.
- It is simultaneous use of multiple computer resources to solve the computational problem.
  - ↳ to be run using multiple CPU
  - ↳ a problem is broken down into discrete parts that can be solved concurrently.
  - ↳ each part is further broken down into series of instruction.
  - ↳ Instruction from each part executes simultaneously on different CPU
- Supercomputers are usually placed in parallel system architecture.

#### Advantages

- Do multiple things at same time

→ cost savings/time saving

Disadvantage

→ Inflexible scalability between memory & CPU.

### III) Real-time operating system

- A real-time system is defined as a data processing system in which the time interval required to process and respond to inputs is so small that it controls the environment.
- The time taken by the system to respond to an input and display of required updated information is termed as the response time. So in this method, the response time is very less as compared to online processing.
- In realtime system, each job carries a certain deadline within which the job is supposed to be completed, otherwise, huge loss will be there, or even if the result is produced, it will be completely useless.
- Eg: scientific experiments, weapon system, robots, air traffic control system etc.
- The application of a real-time system exists in the case of military applications if you want to drop a missile, then the missile is supposed to be dropped within a certain precision.

### Advantage

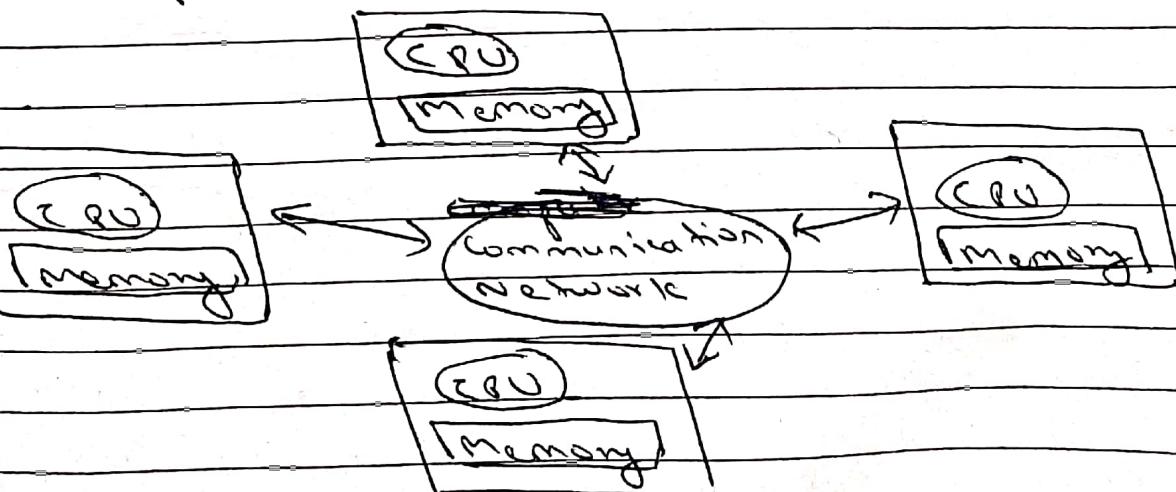
- can be used to execute real time application

### Disadvantages

- very costly & complex to develop.

## 11.5) distributed Operating System

- It is collection of independent computer, interconnected via network, capable of collaborating on a task.
- This system distributes computation among several physical processors.
- The processors do not share memory. Instead, each processor has its own local memory.
- They communicate with each other through various communication lines, such as high-speed bus or telephone line.
- It is also called loosely coupled system. Because in each processor has its own local memory and processing unit.



Examples:-

→ Telephone network, Internet etc.

Advantages

- With resource sharing facility, a user at one site may be able to use the resources available at another.
- If one site fails in a distributed system, the remaining sites can potentially continue operating.
- Reduction of the load on the host computer.

Disadvantages

- Protocol overhead can dominate computation cost.

### 6) Personal Computer System.

- Ans: Personal computer system is a single user system.
- Personal Computer Operating System provides a good interface to a single user.
  - They are widely used for word processing, spreadsheets and internet access.
  - They are only made for a single user.
  - We can say that our laptops, tablets, etc are personal computers and the operating system like windows 7, windows 10, And mid, etc are personal computer operating system.
  - Advantages
    - 1) Portable
    - 2) User convenience
    - 3) Responsiveness
  - Input/Output devices
    - (1) keyboards, mouse, display screen, printers, etc.

11) List the services provided by an Operating System

→ An operating system provides services to both the users and to the programs.

→ It provides programs an environment to execute.

→ It provides users the services to execute the programs in a convenient manner.

→ Some of the services provided by an operating system are:-

i) program execution

→ system capability to load a program into memory and run it.

ii) I/O Operations

→ Since user programs cannot execute I/O operations directly, the operating system must provide some means to perform I/O.

iii) file-system manipulation

→ program capability to read, write, create and delete files.

iv) Communications

→ exchange of information between processes executing either on the same computer or on different systems tied together by a network. Implemented via shared memory or message passing.

- Error detecting
- ensure correct compilation by detecting errors in the CPU and memory hardware, in I/O devices, or in user.

### iQ) Different categories of system call

#### iii) System call: It's type or categories

- It is a method or interface by which the application program request kernel for hardware resources.
- The interface between the OS and the user programs is defined by the set of system's calls that ~~are~~ the operating system provides.
- In general, system calls are available as assembly language instructions.
- System calls are usually made when a process in user mode requires access to a resource. Then it requests the kernel to provide the resource via a system call.

#### Types of system call

##### i) Process control

- it is the system call that is used to direct the processes
- Eg:- creating, loading, execute, terminate etc.

##### ii) File Management

- it is used to handle the files.
- Eg:- creating files, delete files, open, close, read, write etc.

### iii) Device Management

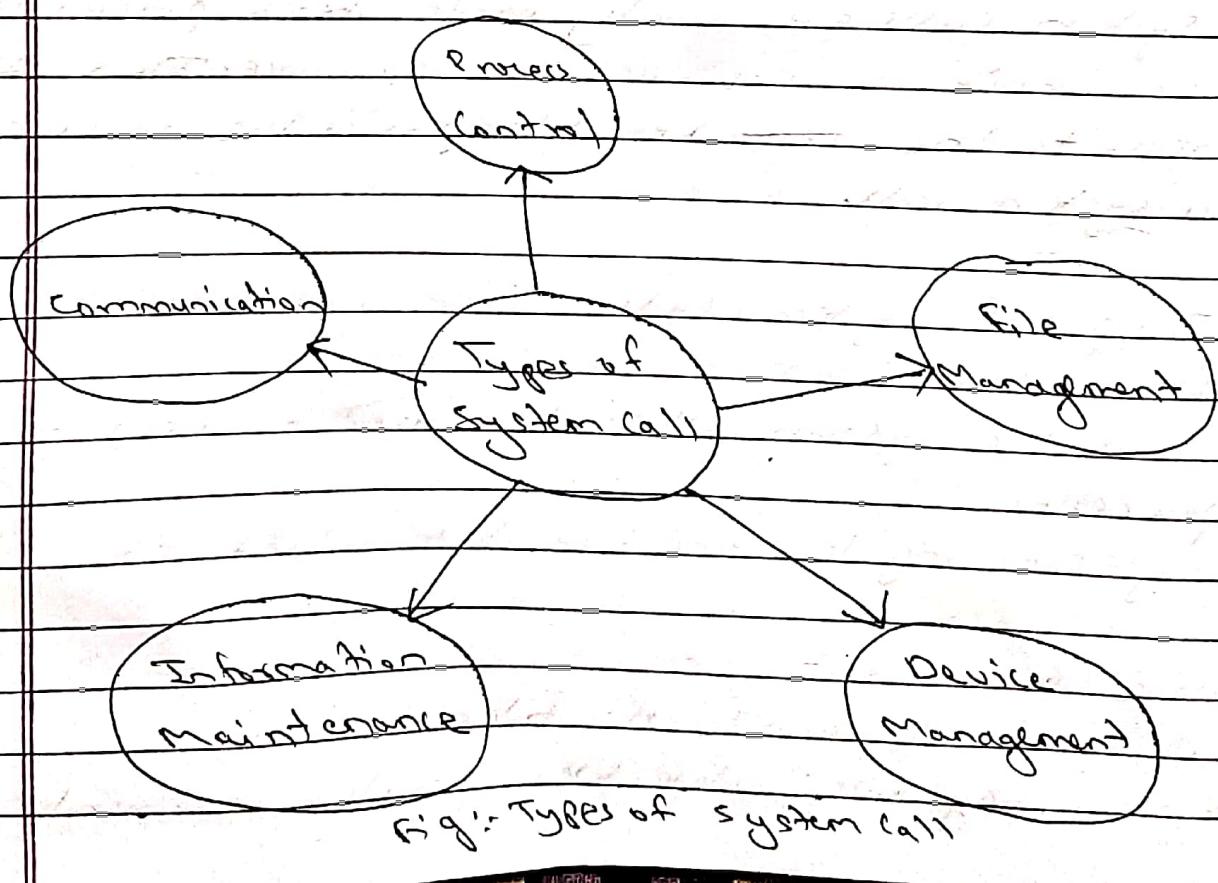
- it is used to deal with devices.
- Eg: read device, write, release device, get device attributes.

### iv) Communication

- it is used for communication.
- Eg: create / delete communication connection, send, receive messages etc.

### v) Information Maintenance

- it is used to maintain information.
- Eg: getting system data, set time or date, get time or date, set system data etc.



### Q) Interactive Operating Systems? Discuss Their characteristics

Ans: In an interactive operating system, there is a direct interaction between the user and the computer.

- This is an operating system that provides a Graphical User Interface (GUI) through which the user can easily navigate and interact.
- Mostly all personal computers use interactive operating system.
- In this kind of operating system, the user enters some command in the system and the system works according to it:
  - (1) The computer responds almost immediately after an instruction has been entered and the user can enter new instructions after seeing the results of the previous instructions.)

### Q) Define spooling

- Spooling is a process in which data is temporarily held to be used and executed by a device, program or system.
- Data is sent to and stored in memory or other volatile storage until the program or computer requests it for execution.

### Q) Define multiprogramming

- In multiprogramming, multiple programs execute at a same time on a single device.

## Extra info

### 1) Multiprogramming

- In this, multiple program executes at a same time on a single device.
- It uses batch os. The CPU is utilized completely while execution.

### 2) Multitasking

- In this, a single process or resource is used to process multiple task.
- It is time sharing as the task assigned switches regularly.
- It follows the concept of context switching.

### 3) Multi-threading

- It is an extended form of multitasking.
- The tasks are always further divided into sub tasks.

### 4) Multiprocessing

- In this, multiple processing units are used by a single device.
- The process switches from one to another CPU as multiple processing units are used.
- A large amount of work can be done in a short period of time.