Operating System

1) What are OS Components?

- **File Management**

  File management is one of the most visible components of an operating system. Computers can store information on several different types of physical media. Magnetic tape, magnetic disk and optical disk are the most common media.

  The operating system maps file onto physical media and accesses these files via the storage devices.

- **Main-Memory Management**

  Main Memory is a large array of storage or bytes, which has an address. The memory management process is conducted by using a sequence of reads or writes of specific memory addresses.

  For a program to be executed, it must be mapped to absolute addresses and loaded into memory

- **Process Management**

  The process management component is a procedure for managing the many processes that are running simultaneously on the operating system.

  Every software application program has one or more processes associated with them when they are running.

- **I/O Device Management**

  One of the important use of an operating system that helps you to hide the variations of specific hardware devices from the user.

  It provides drivers for particular hardware devices.

- **Secondary-Storage Management**

  The main purpose of a computer system is to execute programs. These programs, with the data they access, must be in main memory during execution. Because main memory is too small and volatile, the computer system must provide a secondary storage to back up main memory.

  Today modern computers use hard drives/SSD as the primary storage of both programs and data.

- **Network Management**

  Network management is the process of administering and managing computer networks. A distributed system is a collection of computers/processors that never share their own memory or a clock. In this type of system, all the processors have their local Memory, and the processors communicate with each other using different communication lines, like fibre optics or telephone lines.

- **Security Management**

  The various processes in an operating system need to be secured from each other's activities. For that purpose, various mechanisms can be used to ensure that those processes which want to operate files, memory CPU, and other hardware resources should have proper authorization from the operating system.

2) Define System Calls

A system call is a mechanism that provides the interface between a process and the operating system.

It is a programmatic method in which a computer program requests a service from the kernel of the OS.

System call offers the services of the operating system to the user programs via API (Application Programming Interface).

Types of System calls

- Process Control
- File Management
- Device Management
- Information Maintenance
- Communications

a. Process Control

This system calls perform the task of process creation, process termination, etc.

Functions:

End and Abort

Load and Execute

b. File Management

File management system calls handle file manipulation jobs

Functions:

Create a file

Delete file

c. Device Management

Device management does the job of device manipulation.

Functions:

Request and release device

logically attach/ detach devices

d. Information Maintenance

It handles information and its transfer between the OS and the user program.

Functions:

Get or set time and date

Get process and device attributes

e. Communication:

These types of system calls are specially used for inter-process communications.

Functions:

Send, receive message

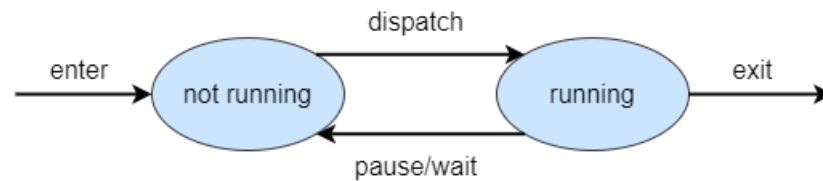Attach or detach remote devices

3) Process States

When a process executes, it goes through a number of states. The current state of the process tells us about the current activity of the process.

Two State Process Model

Two State Process Model consists of two states:

Not-running State: Process waiting for execution.
Running State: Process currently executing.

Five-state Process model:

- **New:** A process that has just been created but has not yet been admitted to the pool of executable processes by the OS. A new process has not yet been loaded into main memory, although its process control block has been created.

- **Ready**: This state indicate process is waiting to be assigned to a processor for execution

- **Running**: The process that is currently being executed.

- **Blocked/Waiting**: A process that cannot execute until some event occurs, such as the completion of an I/O operation.

- **Exit/Terminated**: A process that has been released from the pool of executable processes by the OS, either because it halted or because it aborted for some reason.