

Ch-1 - Introduction

1 Explain Operating System with its types and Generations

=> An Operating system is an interface between a computer user and computer hardware.

An Operating system is software which performs all the basic tasks.

The Operating system provides the programming environment in which a programmer works on a computer system.

=> Generations of Operating System:

There are Four Generations of Operating System.

① The First Generations:

Duration of First Generation is 1945 to 1955.

In First Generation, computer are work on Vacuum Tubes and Plugboards.

These early computers were designed, built and maintained by a single group of people.

② The Second Generation:

Duration of Second Generation computer is between 1955 to 1965.

In Second Generation, computer are work on Transistors and Batch system.

The Batch system was introduced to reduce the wasted time in the computer.

③ The Third Generation:

Duration of third Generation computer is between 1965 to 1980.

In third Generation, computer are work on Integrated circuit and Multiprogramming.

In multiprogramming operating system processor was not idle while a job was complete.

④ The Fourth Generation :

Duration of Fourth Generation computer is between 1980 to present time.

In Fourth Generation, computer are work on Personal Computer.

Personal computer were easy to create with the development of large-scale Integrated circuits.

=> Types of Operating System :

This are the basic types of operating system.

① Batch Operating System:

In this system, similar types of jobs were batched together and executed in time.

In Batch Operating System, access is given to more than one person.

The system puts all jobs in queue on the basis of the First come First serve.

② Multiprogramming Operating System:

In this system, CPU is always kept $\&$ busy.

In this system, each process needs two types of system times: CPU time and IO time.

In Multiprogramming Operating system, when Process gets IO time than CPU start the execution of Process.

③ Multiprocessing Operating System:

In multiprocessing Operating system ~~on~~ more than one process execute same time.

This Operating System increase the throughput of the system.

Multiprocessing Operating System is more complex.

④ Multitasking Operating System:

In multitasking Operating system, multiple programs perform simultaneously.

It allows a user to perform more than one computer task at a same time.

This Operating System have well-defined memory management.

The operating system more suited to supporting multiple user.

⑤ Time - Sharing Operating System :

In this Operating System, Computer resources are allocated in a time-dependent fashion.

In this Operating System, the CPU is switched among multiple programs.

Time-sharing Operating Systems are very difficult and expensive to build.

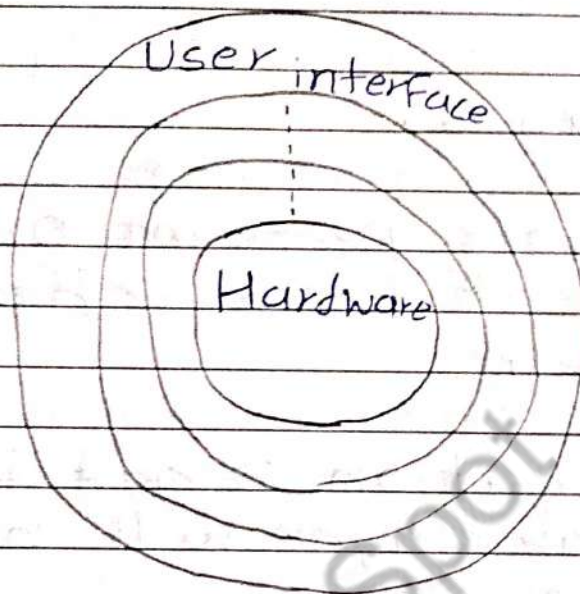
2 Explain Layered OS Structure.

=> The layered structure approach breaks up the operating system into different levels.

The Bottom layer is the hardware and the topmost layer is the user interface.

These layers are so designed that each layer uses the function of lower-level layers only.

Layered OS structure simplifies the debugging process.



The whole operating system is separated into several layers.

In this structure, each of the layers must have its own specific function to be performed.

In Layered OS structure, outermost layer must be the User Interface layer.

In Layered OS structure, innermost layer must be the Hardware layer.

Layer $n-1$ can access the all layers from $n-2$ to 0 but it cannot access the n^{th} layer.

=> Advantages:

- 1 Each layers perform only the tasks if it have scheduled to perform.
- 2 A modification made in a particular layer will not affect the other layer.

=> Disadvantages:

- 1 Arrangement of all the layer is very complex.
- 2 Slower execution.

=> Application:

Layered Operating System is use in UNIX.

3 Concept of Virtual Machines:

=> When we run different processes on an OS, each processes having its own virtual memory.

The virtual memory help CPU scheduling and virtual-memory techniques.

The virtual machine approach does not provide additional functionalities.

Virtual machine approach provides an interface that is same as basic hardware.

Each process is provided with a virtual copy of the underlying computer system.

We can create a virtual machines for several reasons.

The main drawback with the virtual-machine approach involves disk systems.

=> Advantages:

- 1 Virtual machine is completely isolated from other virtual machine.
- 2 Easy maintenance.

=> Disadvantages:

- 1 One virtual machine can be affected by other virtual machine.
- 2 Virtual machine are not efficient as real one when accessing the hardware.

1 What is System call? Explain types of System call.

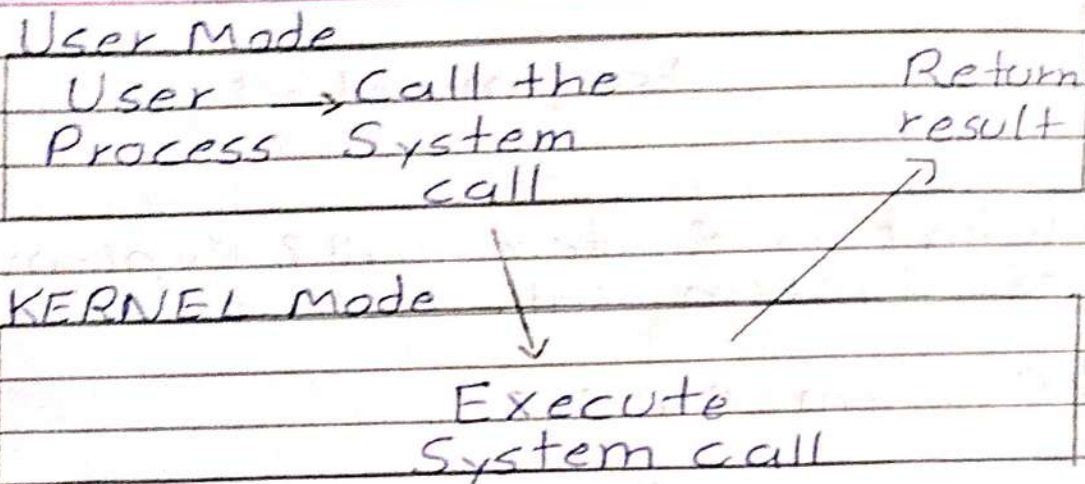
→ System call:

System calls provide the interface between a process and the operating system.

A System call is a way for a user program to interface with the operating system.

A System call can be written in assembly language or high-level language.

A System call is a method of a computer system to request a service from the kernel of the operating system.



Example:

IF User wants to Execute any type of Process than System call is call.

When a Process create a System call, than it must obtain the Permission of the Kernel.

IF Kernel's Permission is permitted than Kernel perform the requested process operation.

When the operation is finished then kernel move data from kernel space to user space memory.

-> Types of System call:

There are Five types of System call.

- 1) File Management
- 2) Process Management
- 3) Device Management
- 4) Inter-Process Communication
- 5) Information Maintenance,

1 File Management:

File Management System call is used to handle the File related Process.

Ex. Create File Process, Read File Process, Write File Process, Delete File Process, etc.

2 Process Management:

Process Management System call perform Process related operation.

Ex. Create Process, Load Process, abort Process etc.

3 Device Management:

Device Management system call handle input and output devices operation.

Ex. write devices, get devices, release devices etc.

4 Information Maintenance:

Information Maintenance System call used to maintain information.

Ex. set time, set date, set system data etc.

5 Inter-Process Communication:

Inter-Process Communication System call used for handle communication between two Process.

Ex. create communication, shared memory, get messages etc.

2 What is Kernel? Explain types of Kernel.

Kernel:

Kernel is central important component of operating system that manages operations of computer and hardware.

Kernel loads first into memory when an OS is loaded and remain in memory until OS is shut down.

Kernel of an OS is responsible for performing various type of function.

Kernel is establish communication between user level application and hardware.

Kernel is control various process like task management, disk management.

→ Types of Kernel:

There are two types of Kernel.

1) Monolithic Kernel

2) Micro Kernel.

1 Monolithic Kernel:

In monolithic kernel complete operating system runs at kernel speed.

Monolithic Kernel is bigger than Micro Kernel.

Monolithic Kernel implements both user and kernel services at a same address.

Monolithic kernel require more kernel space.

Monolithic Kernel use in Linux, Dos, BSDs etc operating system.

User Space	Application Libraries
Kernel Space	File System
	Inter-Process Communication
	Devices Management
	Hardware

2 Micro Kernel :

In Micro Kernel, implements an Operating System by providing low-level address space.

Micro Kernel is smaller than Monolithic Kernel.

		Application Libraries			
User Space	Process	File System	Device Driven	Virtual Memory	
Kernel Space		Micro Kernel			
		Hardware			

Micro Kernel implements kernel and user services in different address spaces.

Micro Kernel require less Kernel Space.