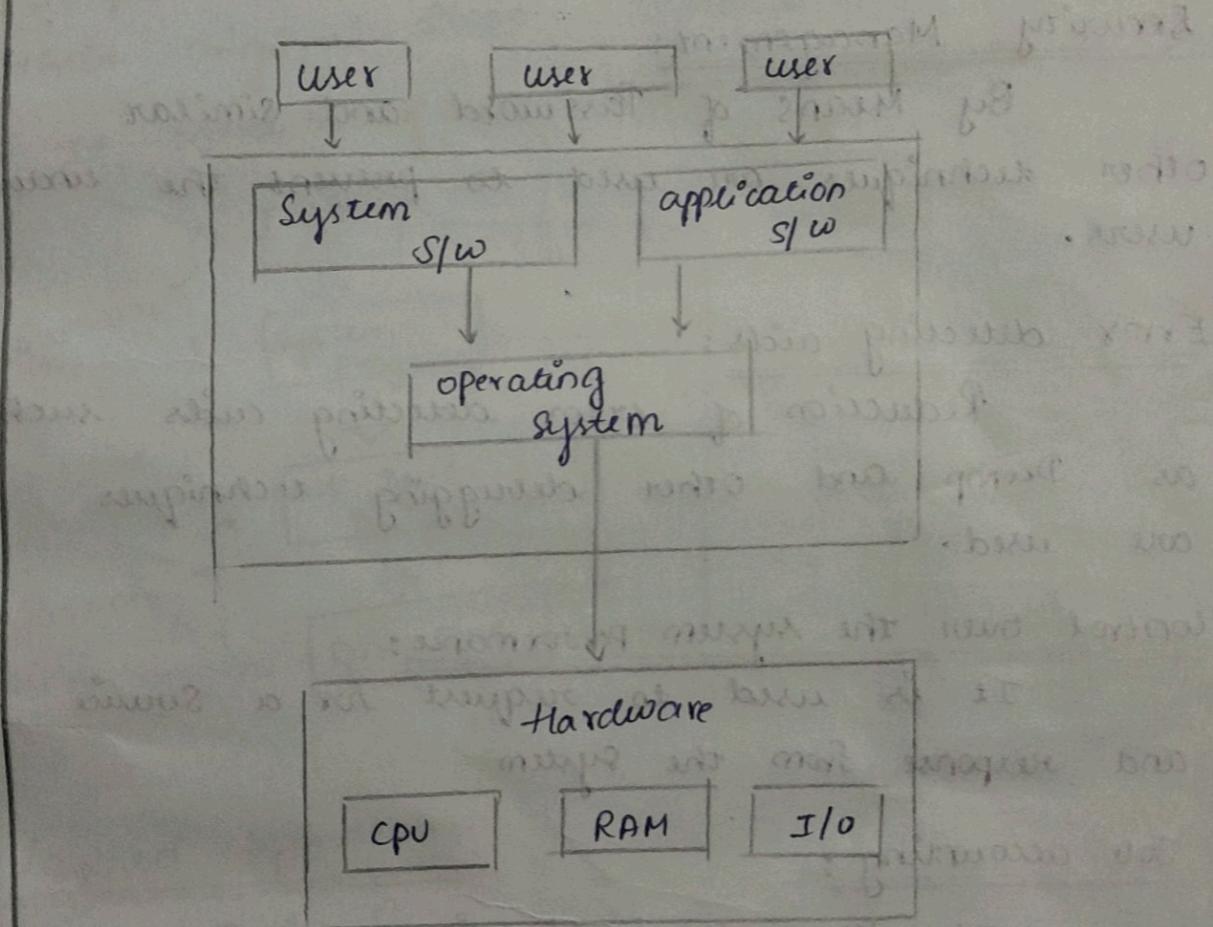


Introduction to OS

Operating System is an interface between user and the computer hardware

An Operating System is a software which performs all the basic tasks such as Memory Management, Processor Management, File Management, Device Management, Security Management, Error detecting aids, control over System Performance, Job accounting coordination between Software and users



Memory Management: Memory Management refers to a

Primary Memory or Main Memory. Main Memory provides a fast storage that can be accessed directly by the CPU. OS decides which process will access the memory and how much.

Processor Management:

It keeps track of Processor and also the status of process.

File Management:

Keep track of information, location, status of information etc.

Device Management:

An OS Manages the device communication that keep track of all the devices.

Security Management:

By Means of Password and similar other techniques are used to prevent the unauthorised users.

Error detecting aids:

Reduction of error detecting aids such as Dump and other debugging techniques are used.

Control over the system performance:

It is used to request for a service and response from the system

Job accounting:

It keep track of time and Resources used by various jobs and users

coordination between Software and users:

Coordination and assignment of compilers, interpreters, assemblers and other software to the various user of the computer system.

Structure of OS:

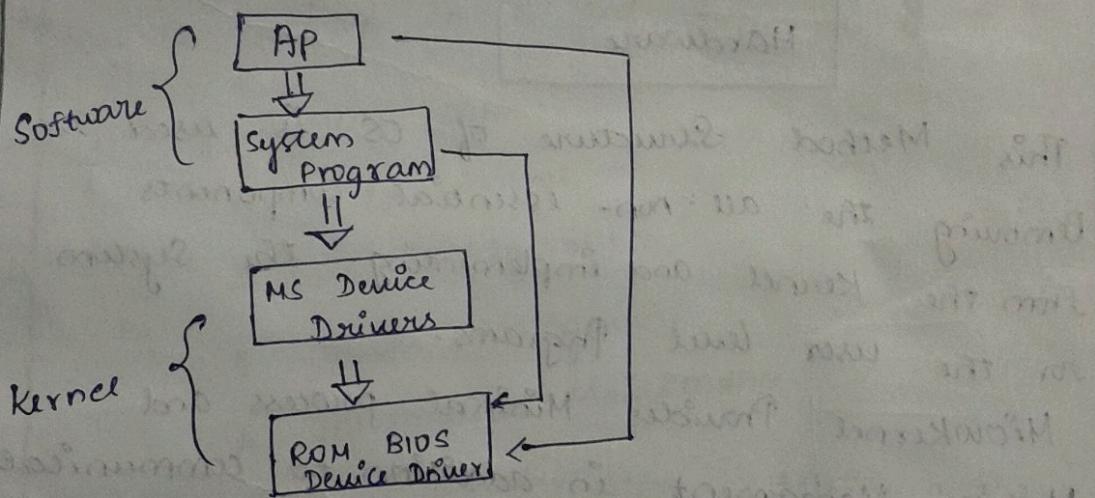
The Structure of OS is a common approach is to partition the task into small components or modules.

The Simple structures are

1. MS DOS
2. Layered
3. Microkernel

MS DOS : Microsoft Disk Operating System is a simple small and limited system grew beyond their original scope.

It consists of interfaces and levels of functionality



Layered approach:

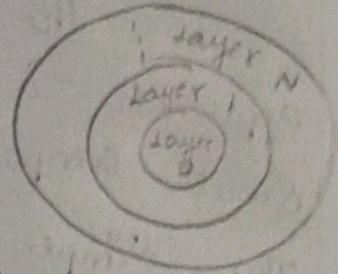
* A System can be made in modularity in many ways.

* The bottom layer is layer 0 in the hardware and upto the layer n is the highest layer of user interface.

* An operating system layer is an implementation of abstract object made up of the data and the operations that can manipulate the data.

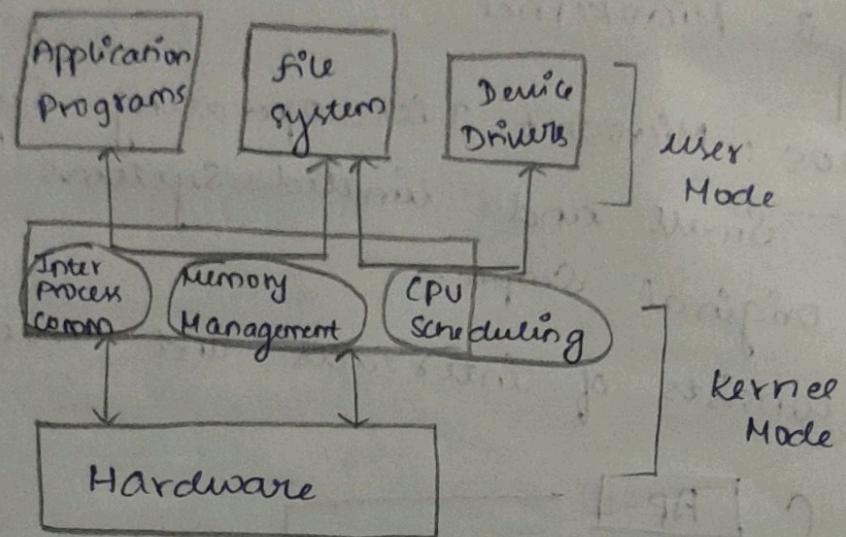
The Main advantage of layered approach is

1. Simplicity of construction
2. Debugging is very easy



Microkernel:

Kernel - interface between
Hardware and software



This Method Structure of OS is used to
Removing the all non-essential components
from the Kernel and implementing the Systems
for the user level Programs.

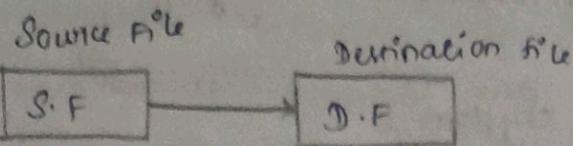
Microkernel Provides Minimal process and
Memory Management in addition to communication
facility.

This type of Design is common in Solaris
and Linux operating System.

System Call Process:

System call structure

Application Programming interface



System call sequence acquire input file name write prompt to screen Accept input Acquire output file name write prompt to screen open input file. If file doesn't exist, abort create output file loop : Read from I/P file write to O/P file until read fails Close the output file.

User - Kernel.

System calls provide an interface to the services available by operating system. The system call developers design the program according to the API. These system calls are available as libraries that can be written in C and C++ language.

Types of System calls:

1. Process control → Create Process() / Exit Process()
2. File Management
3. Device Management
4. Information Maintenance
5. Communication
6. Protection.

Process control: A normal running program needs to be halt its execution either normally or abnormally.

File Management: create(), Delete()
In the file Management it is able to create() and delete() the files.

Device Management:

A system with a user may require, request a device or release a device.

Information Maintenance: Managing informations

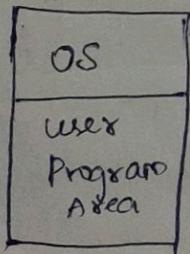
Simple Batch System:

The Main frame Systems were the first computers used to handle the commercial and Scientific applications.

The Main frame computer System from the Simple batch System where the System runs only one application at a time.

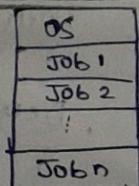
The user Prepared a job which consists of the Program data and Some other control information submitted to the Computer Operator. The job was usually in the form of Punch cards. At sometime later the output is appeared after minutes, hours or days.

Memory layout of Simple batch System



Multiprogrammed System

Memory layout →



The Most important

aspect of Multiprogrammed System is job Scheduling so the Multiprogramming increases the CPU utilization by organizing the jobs. So that the CPU always switches to execute another job and so on.

All the jobs that enter the system that are kept in Main Memory. If the several jobs are ready to brought into Memory and there is not enough room for all of them. Thus decision making is a job scheduling and also CPU Scheduling. After done this job we can delete after completion.

→ It is a technique used in OS to Allocate CPU Processing time among the multiple processes.

Time Sharing System: Extension of Multiprogramming system

It allows multiple user to share same computer resource key components such as CPU time, Memory and IO Resources.

- 1. multiprogramming
- 2. Time slicing
- 3. context switching
- 4. Interrupt drivers

Advantages:

- 1. Increased utilization
- 2. Increased throughput
- 3. Enhanced user experience.

Personal computer:

Personal computer is a general purpose computer and it is compact, affordable and also versatile and it is mostly used to word processing, Internet browsing, gaming and productivity.

key characteristics:

- compact
- user friendly interface

Parallel Systems:

Parallel System is otherwise called

Multiprocessor systems or tightly coupled systems. More than one processor sharing bus or clock sharing, memory and peripheral devices.

Advantages:

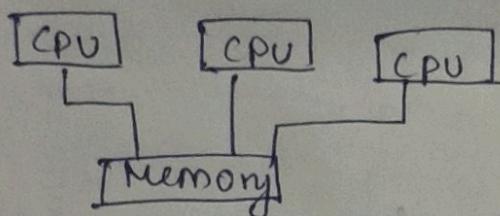
- 1. Increased Reliability, Scalability
- 2. Increased throughput

3. Economy of Scale

It is used in Symmetric Multiprocessor, Asymmetric Multiprocessor.

In Parallel systems most common Multiple processor have SMP architecture in which each Processor runs on identical copy of the OS and this copies communicate with one another and there is no Master Slave relationship between the processor.

SMP Architecture:



In some systems use asymmetric Multiprocessing in which each Processor is assigned a specific task. The master processor schedules and allocates the work to slave processor.

Distributed Systems:

It is also called loosely coupled system. A network in the simplest term is a communication path between two or more systems. Distribution systems are able to share the computational task that provides a set of resources to users. Networks vary by the protocols are used.

TCP/IP and is the most common network protocol and also other protocols such as http, SMTP etc. Networks are typecast based on the distance between their nodes. The Network types are LAN, WAN, MAN.

Advantages:

- 1. Concurrency
- 2. Distribution
- 3. Scalability

Types of Architecture:

- 1. Client Server
- 2. Peer to Peer
- 3. Clustered
- 4. Grid

Client Servers:

A centralized server provides the services to multiple client nodes.

Peer to peer: All nodes act as both client and server that share the resources and services.

clustered: A group of nodes that can work together to achieve a goal.

Grid: A distributed system that coordinates resources from multiple organizations to achieve a common goal.

Real time systems:

A Real time system is a computer system that guarantees a response to events within a specific time.

Characteristics of Realtime Systems:

- 1. Predictability
- 2. Timeliness
- 3. Interruptability
- 4. Fault tolerance

Types:

- 1. Hard
- 2. soft
- 3. Grid

Operating System Services:

An Operating System Provides an environment for the execution of Programs. This operating system services are provided for the convenience of the programmer to make the programming task easier.

Operating systems services are:

- Programming Execution
- IO Operation
- File system Manipulation
- Communication
- Error detection
- Resource allocation
- Accounting
- Protection

Program Execution: The system must be able to load a program into memory and to run the program. The program must be able to end its execution either normally or abnormally.

IO operations: A program running may require IO devices. Therefore the operating system must provide a IO.

File System Manipulation: The file system is used to read and write the files and also the programmers need to create and delete the files. Therefore, the OS must provide a file system manipulation.

communication:

In many circumstances one process needs to exchange the information from another process.

Error detection:

The operating system needs to be constantly aware of possible errors. The errors may occur in CPU and memory hardware and such as memory error or memory failure.

Resource allocation:

Multiple users are logged on the systems or Multiple jobs are running at a same time. The resources must be allocated to each of them.

Accounting:

We want to keep track of how many users used the computer resources.

Protection:

The owners of information that can be stored in Multiuser Systems and control the use of that information.

System components: