

① Operating System:-

An operating system controls use of a computer's system resources such as CPUs, memory, and I/O devices to meet computational requirements of its users. Functions of OS are -

- (1) Booting the computer
- (2) Performs basic computer tasks
- (3) Provides a user interface
- (4) Handles system resources
- (5) File Management
- (6) Process Management
- (7) Memory Management
- (8) Storage Management

OR

The operating system is the one program running at all times on the computer, usually called the kernel. Along with the kernel, there are two other types of programs :-

System Programs which are associated with the operating system but are not part of the kernel.

Application Programs which include all programs not associated with the operation of the system.

② Evolution of operating system:-

→ Mainframe OS:-

They are heavily oriented toward processing many jobs at once, most of which need prodigious amounts of I/O. They typically offer three kinds of services: batch, transaction processing and timesharing.

For example → OS/390, OS/360, LINUX.

→ Desktop OS -

It supports multiprogramming. Their job is to provide good support to a single user. They are widely used for word processing, spreadsheets, and Internet access. Eg:- Windows, FreeBSD, Macintosh OS.

→ Multiprocessor OS

Multiple CPUs connected into a single system known as multiprocessors. Eg:- Windows, Linux.

→ Distributed OS

A distributed computer system consists of several computer systems, each with its own memory, connected through networking hardware and software. Each computer system in it is called a node.
Eg:- Windows, Linux and Unix.

→ Network OS

They run on servers. They serve multiple users at once over a network and allow the users to share hardware and software resources. Eg:- Solaris, FreeBSD, Linux, Windows Server 200x.

→ Handheld OS

A handheld computer or PDA (Personal Digital Assistant) is a small computer that fits in a shirt pocket and performs a small number of functions. Eg:- Windows, Android etc., symbian, Palm etc.

→ Clustering OS

Two or more systems share same storage. Eg:- Solaris MC, Alpha Kernel, Angel, CbLinux, Gnu/k etc.

③ Operating System Services

→ User Interface

→ Program Execution

→ I/O operations

→ File system Manipulation

→ Communications

→ Error detections

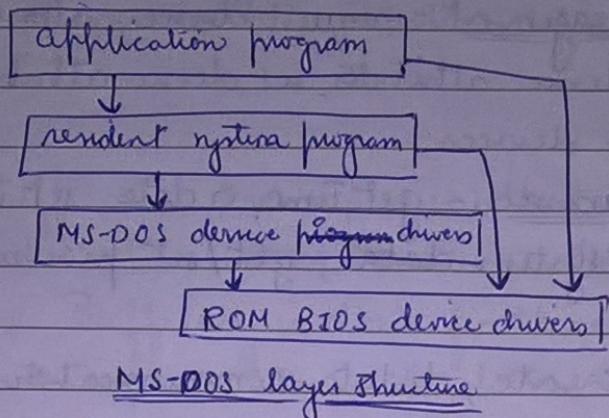
→ Resource allocation

→ Accounting

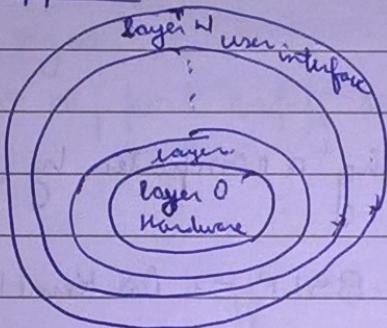
→ Protection and Security.

④ Operating System Structures

→ Simple Structure - (Monolithic)



→ layered approach

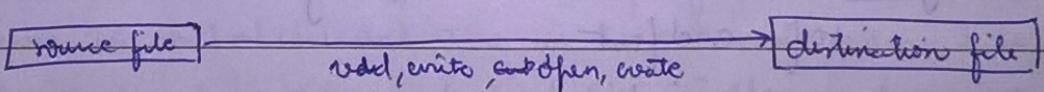


→ microkernel approach.

→ Modules

⑤ System Call -

System calls provide an interface to the services made available by an operating system. These calls are generally available as routines written in C and C++.



Types of system calls -

→ Process Control:- exec, abort, load, unload, execute, create process, terminate process, get process attributes, set process attributes, wait for time, wait event, signal event, allocate and free memory.

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- File Management - create file, delete file, open, close, read, write, reposition, get file attributes, set file attributes
 - Device Management - request device, release device, read, write, reposition, get device attributes, set device attributes, logically attach or detach devices
 - Information Maintenance - get time or date, set time or date, get system data, set system data, get/set power, file or device attributes
 - Communication - create, delete communication connections, send receive messages, transfer status information, attach or detach remote devices.

⑥ System boot -

The procedure of starting a computer by loading the kernel known as booting the system

Power → BIOS → POST → BSIP → OS Kernel

BIOS → Basic Input Output System

POST → Power on self-test

BSIP → Bootstrap loader program

OS Kernel → Operating system ^{Kernel} starts its execution

⑦ OS design & implementation

→ Design goals -

User goals - convenient to use, easy to learn and to use, reliable, safe and fast

System goals - efficient, high performance, resource utilization

→ Implementation -

Written in high-level languages such as C or C++.

Advantage - code can be written faster, is more compact and is easier to understand and debug.

Disadvantage - Reduced speed and increased storage requirements

⑧ System Protection -

Protection is any mechanism for controlling the access of processes or users to the resources defined by a computer system.

⑨ Buffering -

A buffer is a memory area that stores data while they are transferred between two devices or between a device and an application. Buffering is done for three reasons -

- (1) It is to cope with a speed mismatch between the producer and consumer of a data stream.
- (2) It is to adapt between devices that have different data transfer sizes.
- (3) It is to support copy semantics for application I/O.

⑩ Spooling -

A spool is a buffer that holds output for a device, such as a printer, that cannot accept interleaved data streams.

⑪ Types of OS -

→ Batch processing -

A batch is a sequence of user jobs formed for processing by the operating system.

→ Bare machine - A computer without OS

→ Real time - A computer that performs some actions in a timely manner to control the activities in an external system, or to participate in them.

→ Mutitasking & multiprogramming - Many user programs in the memory of the computer at any time.

→ Time sharing - It ~~shares~~ shares the CPU time among processes in such a way that each process to which a subrequest has been made would get a turn on the CPU without much delay.