

Operating System

DATE

- An operating system act as intermediate b/w the user of the computer and computer hardware. The purpose of an operating system is to provide an environment in which an user can execute programs conveniently and efficiently.
- An operating system is a software that manages computer hardware.
- The hardware must provide appropriate mechanism to ensure the correct operation of the computer system and to prevent user programs from interfering with the proper operation of the system.

Definition of Operating System

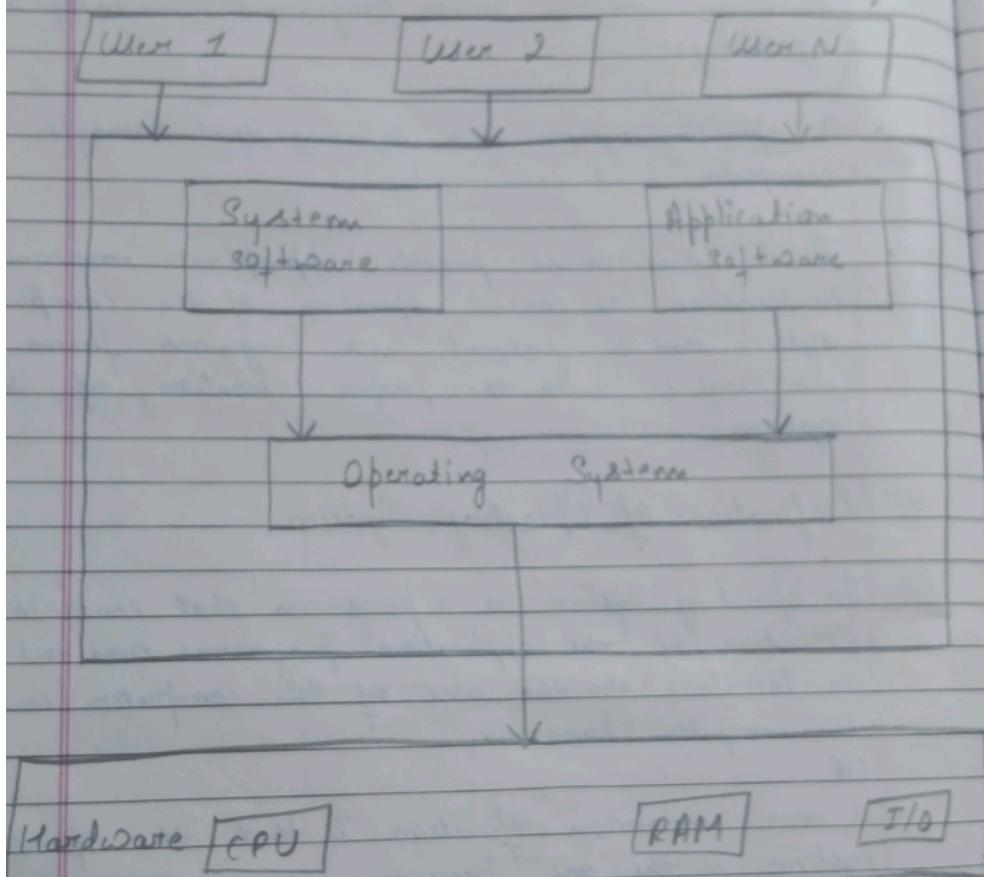
An operating system is a program that controls the execution of the application programs and act as an interface b/w the user of the computer and the computer hardware.

OR

A more common definition is that the operating system is the one program running at all times on the computer (usually called the Kernel), with all else being applications programs.

DATE

An operating system is a software which performs all the basic tasks like file management, memory management, process management, handle input and output and controlling peripheral devices such as disk drivers and printers.



DATE

* Examples of operating system with the latest market share :-

Name of operating system	Share
Windows	40.34%
Android	37.95%
iOS	15.44%
Mac	4.34%
Linux	0.95%
Chrome	0.14%

Features / role of Operating System :-

- (1.) Convenience :- An operating system makes a computer more convenient to use.
- (2.) Efficiency :- An operating system allows the computer system resources to be utilised efficiently.
- (3.) Ability to evolve :- An operating system should be constructed in such a way as to permit the effective development testing the new system function at the same time without interfering with the services.
- (4.) Throughput :- An operating system should be constructed so that it can give maximum throughput.

DATE

History of Operating System :-

- (i) Operating System were first developed in the late 1950's to manage tape storage.
- (ii) The General motors, Research lab implemented, the first operating system in the early 1950's for there IBM 701.
- (iii) In the Mid 1960's operating system started to utilise disk's.
- (iv) In the late 1960's the first version of the Unix operating system was developed.
- (v) The first operating system built by minicsoft was DOS it was built in 1981 by purchasing the \$6000 software from Seattle company.
- (vi) The present day popular operating system, windows first came into the existence when a GUI (Graphical user interface) was created and paired with MS DOS' (Microsoft Disk operating System).

DATE

Generation	Year	Electronic devices used	Types of operating system devices
1st and 2nd	1945-1955 1955-1965	Vacuum tubes Transistor	Plug boards Batch system
3rd	1965-1980	Integrated Circuit (IC)	Multi programming
4th	Since 1980	Large scale integrated circuit (LSI)	Personal Computer (PC)

Advantages of Operating System :-

- (i) Operating System allows you to hide the details of hardware by creating an abstraction.
- (ii) Easy to use with a graphical user interface.
- (iii) It offers an environment in which a user may execute programs/applications.
- (iv) The operating system must make sure that a computer system convenient to use.
- (v) An operating system act as an intermediate among the application's and the hardware components.
- (vi) It provides the computer system resources with ease to use orbit.

DATE

Disadvantage of Operating System :-

If any issue occur in operating system you may loss all the contents which have been stored in your system.

Operating system is quite expensive for small size organization which end barrier on them. e.g. windows.

Kernel :- Kernel is the central component of a computer's OS. The only job performed by the kernel is to manage the communication b/w the software & the hardware. A kernel is at nucleus of the computer. It makes the communication b/w the hardware and software possible. The kernel is the inner most part of the OS while a shell is the outermost one. The kernel forms the part of the building block of the part of OS. It helps in managing the hardware devices in the approach of determining hardware resources that will get access to different program. Doing this kernel ensure that the CPU is operating optimally at all times.

Uses of Kernel :-

1. Process Communication
2. Synchronization

(iii) Content writing

DATE

Types of Kernel :-

There are many types of Kernel that exist but among them two most popular Kernel are as follows:-

- (i) Monolithic Kernel
- (ii) Micro kernel

Monolithic Kernel :- It is a single code for all the services offered by the operating system. It is a simplistic design which creates a distinct communication layer b/w the hardware and software.

Micro kernel :- It manages all the system resources. In this type of Kernel services are implemented in different add space. The user services are stored in user address space and Kernel Services are stored under Kernel address space. So, it helps to reduce the size of both the kernel and the operating system.

Components / Functions of Operating System :-

- (i) Memory management
- (ii) Processor management
- (iii) Device management
- (iv) File management

DATE

- (v) Security
- (vi) Control over system performance
- (vii) Job accounting
- (viii) Coordination b/w user & other software
- (ix) Error detecting add.

• Memory management :- There are several types of memory in modern computer. They include RAM, CPU cache and disk storage. The operating system has a memory management that tracks the amount of each memory that is available and manage the movement of the data b/w them. This involves that the highest amount of available memory for each process. To, as to increase speed of execution. The operating system also ensures that whenever two or more processes are in memory at the same time, virtual memory addresses are allocated to each process to ensure that no process interferes with another's memory.

Memory management refers to main

Memory management refers to management of primary memory or main memory. Main memory is a large array of words or bytes where each word or byte has its own address. Main memory provides a fast storage that can be accessed directly by the CPU. Per a program to

DATE

be executed, it must be in the main memory.

* An operating system performs the following activities for memory management:-

- It keep track of primary memory that is what part of it are in use by whom, what part are not in use.
- In multiprogramming the operating system decides which process will get memory when and how much.

• Operating System allocates the memory when a process request it to do so.

• Operating System deallocate the memory when a process no longer needs it or has been terminated.

: -

Processor Management :- In multiprogramming environment the operating system decides which process gets the processor when and for how much time this function is called process scheduling. An operating system does the following activities for processor management :-

i) It keeps track of processor & status of the processor. The program supervisor for this task is known as traffic controller.

ii) Operating system allocates the processor to the process.

iii) Operating system deallocates the processor when a process is no longer required.

- Device Management :- An operating system manages device communication via their respective drivers. It does the following activities for device management :-

1) It keeps track of all the devices, programs responsible all this task is known as I/O controller.

2) It decides which process gets the device when and for how much time.

3) It allocates & deallocates the devices in an efficient way.

i:- Process Management :-

There are many programs running on a computer at one time. From user's point of view, it is the programmer who's are actively interacting with the computer during normal use. Since all modern operating systems allow multi-tasking, it is the OS's duty to distribute the available resources among all the active processes.

ii:- File management :-

A file system is normally organized into directories for easy navigation.

And usage these directories may contain files. An operating system does the following activities for file management :-

- i) It keeps track of information, location, user, status and etc.
 - ii) The collective facilities are known as file system.
 - iii) Operating system who get's the resources.
- } It allocates and deallocate the resources.
- Security :- By means of password and similar other facilities which prevents unauthorised access to the program and data.

DATE

- :- Control over system performance :- Operating system record the delay b/w request for a service and response on the system.
- :- Job accounting :- Operating Systems keeping track of time and resources used by various job's and users.
- :- Coordination b/w user and other software :- Coordination and assignments of compilers and interpreters and assemblers and other software to the various users of the computer system.

* Types of Operating System :-

- (i) Batch operating System
- (ii) Multi-programming operating system
- (iii) Time sharing operating system
- (iv) Distributed operating System
- (v) Real-time operating System

• Process :-

- (i) A process is a set of sequential steps that are required to do a particular task.
- (ii) A process is an instant of a program is executing.

e.g:- In windows if we add to text files simultaneously in notepad that it means we are implementing two different instances

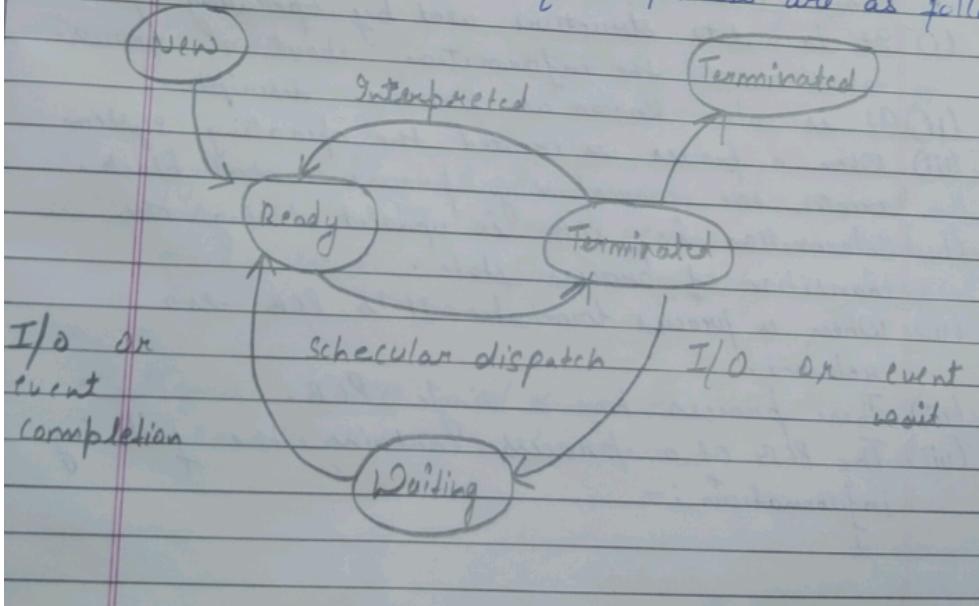
DATE

of the same program. But an operating system
these two instances are separate processes
of the same application.

- (iii) A process need certain resources such as
(CPU type, Memory files & I/O devices to
complete its task.
- (iv) These resources are allocated to the process
either when it is created or while it is
executed.

• Process States :-

- (i) A process goes through a series of process states
for performing its task.
- (ii) As a process executes it changes state
- (iii) Various events can cause a
process to change the speed.
- (iv) The various states of a process are as follows



IMAX

Unit No. 3
Western Express
T : 08331292901
E : imax_100

DATE

It means a process that has been created.
Ready :- The process is ready to be executed.

Running :- The process is running state whose instruction's are being executed.

Waiting :- The process will be in waiting state if it is waiting for some event to occur such as completion I/O operation.

Terminated :- The process will be in terminated state if it has finished it's execution only one process can be running for any processor at any instate. However there can be many processor in waiting and terminating state.

- Process Control Block :-

- (i) It is a data structure used by operating system to store all the information about a process.
- (ii) It is also known as process descriptor.
- (iii) When a process is created the operating system creates the corresponding process control block.
- (iv) Information in PCB is updated during the transition of process state.
- (v) When a process terminates it's PCB also released.
- (vi) There process has a single PCB.
- (vii) The PCB of a process contains the following information :-

DATE

Process state
Process Number
Program counter
Registers
Memory limits
List of open files

PCB

Process state :- A PCB process state specify current state of a process.

Process number :- Each process is allocated a unique number for the purpose of identification.

Program counter :- It indicates the address of next instruction to be executed.

Registers :- These hold the data or result of calculations. The content of these registers is saved. So, that a process can be resume later on.

Memory limits :- It stores the amt. of memory units allocated to a process.

DATE

- List of Open files :- It stores the list of open files and their access rights.