Module - 1

Interaction of OS

An OS is an interface b/w a computer user and computer hardware. It is a software which perform all the basic task like file management, memory management etc. OS manages and control the entire set of resource and efficiently utilizes every part of a computer

Some popular OS are,

1) Linux OS
2) Windows OS
3) z OS
4) Android
5) Mac OS

Structure of an OS

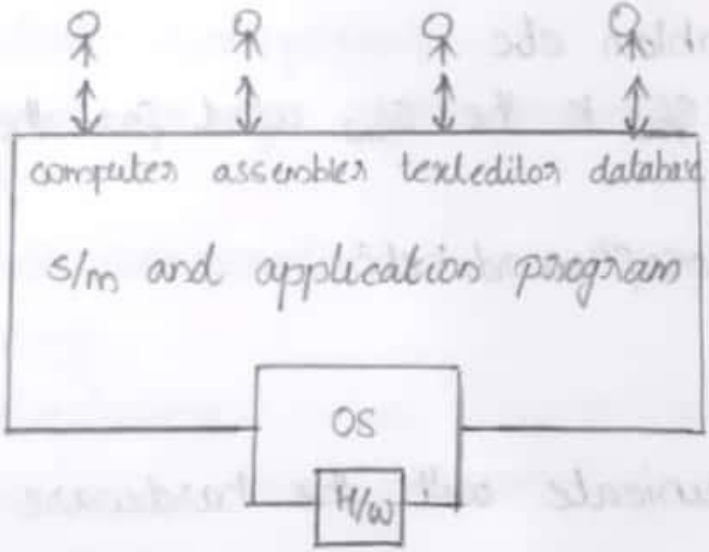


fig 1) Structure of OS

A computer system consists of 4 components.

1) Hardware
2) Operating system.

3) system & application program.
4) user.

1) Hardware :-

Any peripheral device connected to the computer.
eg: keyboard, mouse, printer etc.

2) operating system :-

It is an interface b/w hardware and the user.

3) System and application software :-

There are 2 types of software,
a) system s/w
b) Application s/w

System s/w is the s/w used for the essential working of the computer.
eg: compiler, assembler etc.

Application s/w is the s/w used for the additional functionality.
eg: Photoshop, microsoftword etc

4) user :-

user communicate with the hardware using OS.

Feature of OS

* Allows disk access and file system.
* Protected and supervisor mode.

* Memory management.
* Handling i/o operations.
* Manipulation of file system.
* Error detection and handling.
* Resource allocation.
* Information and resource protection.
* Network security.
* Multi-tasking fascility.

Functions of OS

An OS has the following functions.

1) Process management.
2) Memory management
3) File management
4) Device management
5) i/o system management.
6) secondary storage management
7) Security.
8) Command interpretation.
9) Networking.
10) Job scheduling.
11) Communication management.

1) Process management

Helps OS to create and delete process. It also provides mechanism for synchronization and communication among

process.

2) Memory management

Perform allocation and de-allocation of m/y space to programs.

3) File management

It manages all the file related activities such as organisation, storage, sharing etc.

4) Device management

keep track of all devices. It also performs the task of allocation and de-allocation of the devices.

5) i/o system management

It hide the peculiarities of h/w devices from the user

6) Secondary storage management

M/y include primary, secondary m/y etc. Instructions and data must be stored in primary storage or cache so that a running program can reference it.

7) Security

Protect data and information against malware threat and un-authorised access.

8) Command interpretation

Interpret commands given by users and resources.

9) Networking

In a network, each processor communicate with one another through the network.

10) Job Scheduling

Keeping track of time and resource used by various job and users.

11) Communication management

Co-ordination of compiler, interpreter, resources etc.

Advantages of OS

1) Allows you to hide details of h/w by creating an abstraction.

2) Easy to use with GUI.

3) Offers an envisonment in which a user may execute programs or application.
4) It make sure that the computer system convinient to use.
5) Act as a intermediately among applications and the h/w components.
6) It provides computer s/m resources with easy to use format.
7) Act as an intermediator b/w all the hardware and s/w of the system.

Disadvantages of OS

* It is never entirely secure as a threat can occur at any time.
* OS s/w is quite expensive (eg: windows)
* If any ~~secure~~ issue occurs in OS, sometimes it may lose all the contents in our s/m.

Process Management

A process can be defined as "a program in execution". A program is a passive entity such as a "c" program stored on disk. where as process is an active entity. There are 2 types of process.
1) System process.
2) User process.

system process : Process that execute s/m code.
User process : Process that execute user code.

A program need certain resources such as CPU time, memory, i/o devices etc to performs its task. These resources are either given to the process when it is created or allocated while it is running.

The OS is responsible for the following activities in connection with process management.

* creating and deleting both user process and system process
* Suspending and running process.
* Providing mechanism for process communication.
* Providing mechanism for process synchronization.
* Providing mechanism for deadclock handling.

Main memory management

It is the control part of a computer system. Main memory is a large array of words or bytes. Each word has its own m/y address. Main m/y is a storage for quickly accessible data shared by the CPU and i/o devices.

For a program, to be executed. It must be mapped to absolute address and loaded into m/y. During the execution of program each instructions & data are accessed from the m/y. When the program terminates its m/y space is available and next program can be loaded and executed.

The OS is responsible for following management activities.

* keeping track of each m/y location that are currently

used by some users
* Deciding which process to be loading into m/y when m/y space become available
* Allocating and de-allocating only space as needed.

File management

File is a allocation of related information commonly file represent programs and data. The OS maps files into physical media and access these files using storage devices. The os is responsible for following file management activities,
* Creating and deleting files.
* Creating and deleting directories.
* supporting the manipulation of files such as read, write, execute.
* Mapping files to ~~exe~~ secondary storage devices.
* Backing up files on a storage medium.
* keeping track of each files in m/y.

i/o system management

one of the main purpose of os is to hide the peculiarities of specific h/w device from the users.

The os is responsible for following i/o management activities.
* Provide a general device driver interface.
* Responsible for buffering and caching.
* Provide separate drivers for each h/w devices

* Only the device drivers knows, the functionalities of the specific device to which it is assigned.

Secondary storage management

Secondary storage is a large enough m/y to back up main m/y data. Most programs including compilers, assemblers, editors etc. are stored on disc until it is loaded into m/y and then use the disc as both the source and distribution of their processing. Hence, a proper management of disc storage is important to a computer system. Since the secondary storage is used frequently, it must used efficiently. The entire speed of operation of the computer depends on the speed of secondary storage device.

The OS is responsible for the following disc management activities,

* free space management.
* storage allocation.
* Disc scheduling.

Types of OS

Different types of OS are,

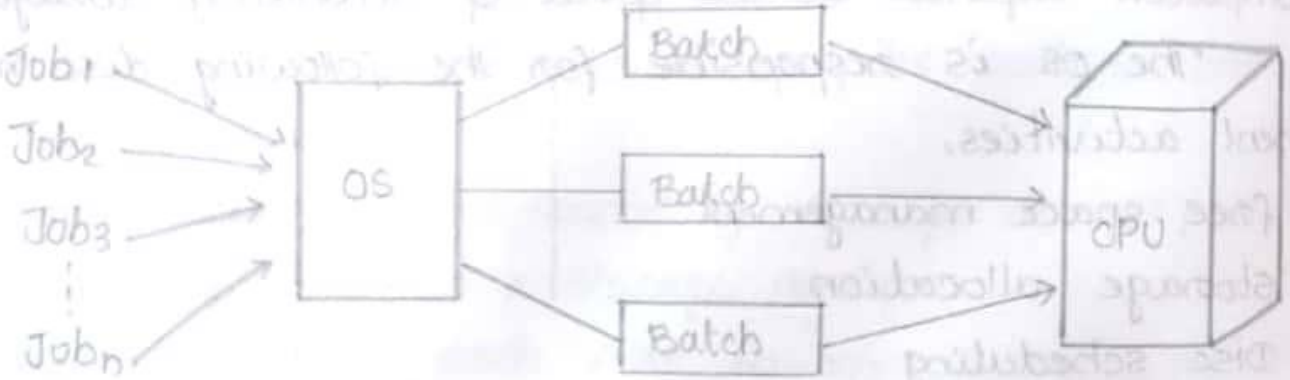
1. Batch OS.
2. Multi tasking or time sharing OS
3. Multi processing OS.
4. Real time OS.
5. Distributed OS.
6. N/w OS.

7. Mobile OS.

Batch OS

Some computer process are very lengthy and time consuming. To speed up the some process, a job with similar type of needs are batched together and run as a group.

The user of a batch as never directly interact with the computer. In this type of OS, every user prepares his ocon job on a device and submit it to a computer operator. It is the responsibility of operator to sort the jobs with similar needs and to create a batch



Advantages of batch OS

* It is very difficult to know the time required by any job to complete. But the processors of batch S/m know how long the job would be active when it is in unique
* Multiple users can share the batch S/m.
* The idle time of batch S/m is very less.
* It is easy to manage large work repeatedly in batch S/m.

Disadvantages of batch OS

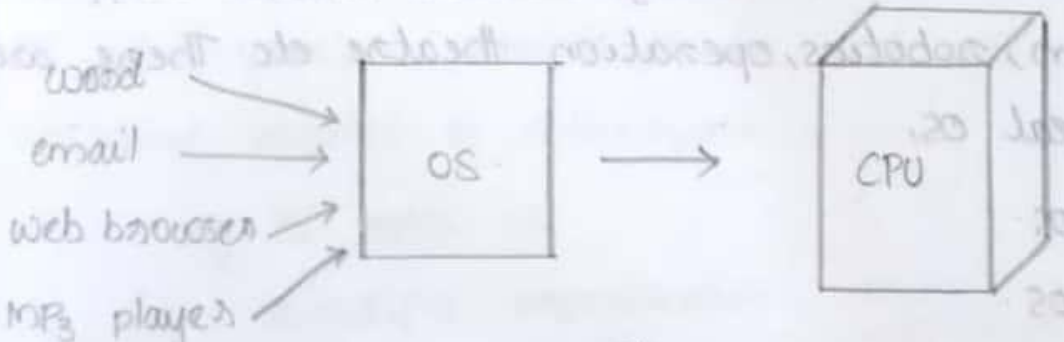
* The computer operator should be well known with batch s/m
* Batch s/m's are hard to debug
* It is some time costly.
* The other job will have to wait for an unknown time of any job fails.

Eg: Bank statement processing.

deposite	batch 1
withdraw	batch 2
Transaction	batch 3.

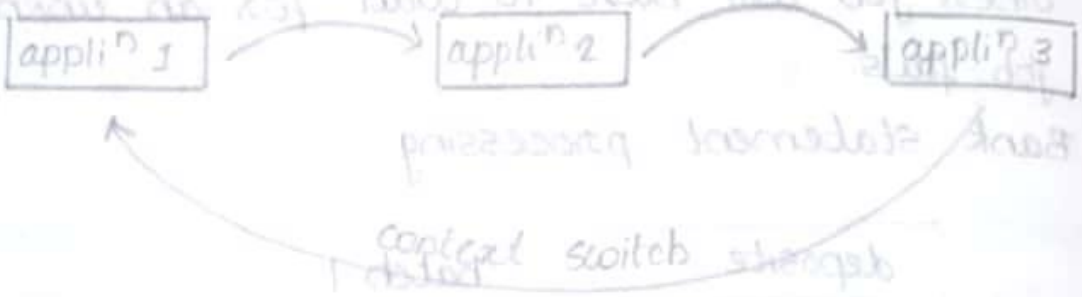
Time sharing OS

Each task is given some time to execute so that all the task work smoothly. Each user gets time of CPU as they are single system. These s/m's are also known as multi-tasking system. The task can be from single user or multiple users. The small time interval that task gets to execute is called a 'time slice' or 'time quantum'. After this time interval is over, the OS switches over to the next task.



Advantages

* Each task gets an equal priority.
* Less chances of duplication of s/w.
* CPU idle time is reduced.



Disadvantage

* Reliability problem.
* One must have to take care of security & integrity of user programs and data.
* Data communication problem.

Real time OS

These type of OS serves the real time system. The time interval required to process and respond to i/p is very small. This time interval is called response time. Real time systems are used when there are time requirements are very strict like missile system, air traffic control system, robotics, operation theatre etc. There are 2 types of real OS,

1. Hard real OS.
2. Soft real OS.

Hard real os are meant for the application where time constraints are very strict and even the shortest possible delay is not acceptable. These systems are built for saving life like automatic parachute or air bags which are required to be rapidly available in case of any accident, soft real os are for applications where the time constraint is less strict.

Advantages

* Maximum utilization of devices and s/m thus more o/p from all resources.
* Focus on running application and less importance to application that are in a queue.
* These type of os are error free.
* Memory allocation is best managed in these type of os.
* Since size of program are small, it can be used in embedded system like in transport and others.

Disadvantages

* Very few task run at same time.
* Resources used in real os are expensive.
* Complex algorithms are used.
* It need specific device drivers and interrupt signal to response earliest to interrupt.

eg of real os

scientific experiment.

Air traffic control system

~~Software~~ Medical imagical S/m