Computer systems has many resources (hardware & software) which may be required to complete a task.

The operating system acts as a manager of this resources then allocates to specific programs and users whenever necessary to perform a particular task. Therefore OS is the resource manager as it can manage the resource of a computer system internally.

* It is a suite of programs that manages the computer resources such as input, output transfers, memory & cpu time.
* The OS monitors the hardware and controls or ensures the computer operate in the way intended in a systematic, liable and efficient manner.
* It is the interface between the computer user and the computer. It renders services to the user who communicates his intentions to the operating system through use of special instruction set known as commands.

COMPILER ASSEMBLER DB SYSTEM

**SYSTEM AND APPLICATION**

COMPUTER HARDWARE

OPERATING SYSTEM

1. USER’S VIEW
2. SYSTEM VIEW

**USER’S VIEW**

* The user view of the computer refers to the interface been used.
* Such systems are designed for one user to monopolize its resources, to maximize the work that the user its performing.
* In this case the OS is designed mostly for ease of use, with some attention paid to performance and non-paid to utilization.

**SYSTEM VIEW**

* **OS** can be viewed as a resource allocator, as the computer system consist of many resources like software and hardware’s that most can be managed efficiently.
* The OS acts as manager of resources, decides btwn conflicting request ,controls, execution of programs

**FUNCTIONS OF AN OPERATING SYSTEM**

1. Memory allocation and loading of programs

Before processing commences the OS ensures the programs are transferred to available memory allocation from the backing store eg hard disk

The OS handles data files that are to be used by programs being executed by the CPU

1. **JOB SCHEDULING**

The OS transfers control from one job to another from the program maintained in the computer awaiting execution to ensure that the CPU time is not tied up by one job. This ensures that the CPU doesn’t remain idle at any time as in multiprogramming where several users programme shares the computer resources such as CPU time, memory and the peripherous jobs processing is interrupted depending on priorities allocated to ensure that it is continuous processing until jobs in ques waiting memory awaiting processing are executed.

1. **PERIPHERAL CONTROL**

The OS controls the input output devices transfers by regulating the speed imbalance btwn the input/output devices and the CPU.

1. **ERROR REPORTING**

During the programme execution if there occurs an error of any sort, the OS gives diagnostic message to the user through e.g. screen and the programme execution is stopped for the user program.

1. **INTERFACES THE USER OR OPERATOR TO SYSTEM HARDWARE**

The operator invokes the services of the OS by the use of commands and the OS communicates the message regarding the processing to the operator through eg screen or printer.

1. **LOGGING & ACCOUNTING**

The OS keeps the records of the computers resources use. A log of the tasks carried by the computer are kept.

The OS also keeps internal logs on the time, memory usage, peripherals used & the appropriate changes usually in time sharing systems.

**EVOLUTION OF OPERATING SYSTEM**

It is directly dependent on/to the development of computer system and how users use them.

The following are the evolutions:

1. **Early Evolution (1945 - 1957)** – This is when we had the 1st evolution system known as ENIAC that was later improved and enhanced with the development of FOTRAN btwn 1954-1957
2. **LATE 1950s** –OS in this time were well improved and started supporting the following ;

a)Was able to single stream batch processing

b)Could use common starndardised input output routine for device access.

c)program transition capabilities to reduce the overhead of starting a new job was added.

d) Error recovery to clean up after a job terminated abnormally was added

e) Job control languages that allowed user to specify the job definition and resource requirement were made possible .

3.**OS IN 1960s-**This was the dawn of microcomputer andcompatible timesharing systems and also discs became main stream making many computers get cheaper and more powerful and useful. Some of the systems developed included; IBM system/360(1964)

UNIX time sharing system from bail telephone labs (1969)

4. **SYSTEMS IN 1970s**

The following features were supported by the OS ;

* Multiuser and multi-tasking was introduced.
* Dynamic address translation hardware and virtual machines came into pictures.
* Personal interactive systems came into existence.

5. AFTER 1970s

* There has been a lot of development during this period such as;

-Intel announces the micro process (1971)

-Development of personal computers and the virtual machine OS. In 1993 Microsoft begins work on Microsoft windows and by 1993 windows and NT apple MACINTOSH were in operation.

-2007 & 2008 IOS and Android OS were developed. The research and development work still goes on with new OS being developed and existing ones getting improved and modified to enhance the overall users’ experience, Making OS fast and efficient.

**TYPES OF OS**

1. **Batch OS** –The users of batch OS do not interact with the computer directly. Each user prepares his job on or off device like punch cards and submits it to the computer operator.

-To speed up processing jobs with similar needs are brought together and run together as a group.

-The operator then are burged with similar requirements.The problems with batch systems are :

1. Lack of interaction betwn the user and Job.

2. CPU is often idle because of speed of the mechanical I/O are slower than the CPU.

3.Difficult to provide the desired priority.

2. **Time sharing O/S.**

**-**Time sharing is a technic which enables various people located at various time to use a particular system at the same time.

**-**Time sharing & multitasking is a logical extension of multiprogramming processors time which is shared among multiple users simultaneously is termed as time sharing.The main difference btween multiprogrammed batch systems & Time sharing systems is tha in multiprogrammed batch systems the objective is to maximize processor usewhereas in time sharing system is to maximize response time.

Multi jobs are executed by the CPU by switching them but the switches occur very frequently thus the user can receive an immediate response eg. In transaction processes.

**Advantage of time sharing systems**

1. Provide advantage of quick response.
2. Avoids duplication of software.
3. Reduces CPU idle time.

**Disadvantages**

1. Problem of reliability.
2. The quiz of security & integrity of user programs and Data.
3. Problem of Data communication.

**3. DISTRIBUTED O/S**

* **Distributed systems use** multiple central processors to serve multiple real time fabrications and multiple users.
* Data processing jobs Are distributed among the processors according to which one can perform each job most efficiently.
* The processors communicate with one another through various communication lines :

1. High speed buses- This are referred as loosely coupled systems/ distributed systems.

-Processors in a distributed system may vary in size and function and those processors are referred to as sites, nodes & computers.

-There are two types of D/S are:

i).Client – server system

Ii) Peer-to-peer system

**Client – server system**

* Centralized systems today act as server systems to satisfy request generated by client systems.
* The general Structure of a client-server system is as follows:

CLIENT

CLIENT

CLIENT

CLIENT

SERVER

NETWORK

* Server systems can be boldly categorized as computer serversand file servers.
* Computer servers provide an interface to which clients can send request to perform an action in response to which they execute the action and send back results to the client.
* File server systems provide a file system interface where clients can create, update, read and delete files.

**Peer-to-peer system**

* In this kind of a system the computer networks used in this application consist of a collection of processors and computer that take between response of a client and server computer.
* There is no centralized control of the shared resources such as files or programs.
* Any individual computer can share its resource with any other computer within the network.

Advantages

1. With resource sharing facility a user at one site will be able to use the resource available at another.
2. It speeds up the exchange of data with one another via electronic method.
3. If one site fails in a distributed system the remaining site can continue operating
4. Reduction of load on the host computer.
5. Reduction of delays in data processing.

**4. Network operating system.**

* Network O/S runs on a server and provides server the capability to manage data, users, groups, security, applications and other networking functions.
* The primary purpose of the network O/S is to allow shared files and printer access among multiple computers in a network.
* Examples of network O/S are Microsoft window server 208,linux,mac,

**Advantages**

* Centralized servers are highly stable.
* Security is server managed.
* Update to new technology and hardware’s can be easily installed to the systems
* Remote access to servers is possible from different occasions and type of system.

**Disadvantages**

* High cost of buying and running a server
* Dependency on a central location for most operations.
* Regular maintenance & updates are required.

**5. Real Time O/S**

* Real time systems are defined as data processing system which the time interval required to process and respond to inputs is so small.
* The time taken by the system to respond to an input and display of required updated info is termed as **Response Time.**
* Real time OS have well defined, fixed time constrain which makes the system not to fail.
* There are two types of real time O/S;

i) *Hard-real time*- This system guarantees that critical tasks complete on time.

* In hard-real time systems secondary time is or missing with data stored in rom.

ii) *Soft-real time systems-*Soft-real systems are less critical real-time tasks get priority over other tasks and retains the priority until it completes.

* Soft-real time systems have limited utility than hard-real time systems.

**6. Clustered systems**

* Like parallel systems clustered systems gather together multiple CPU to accomplish computation work.
* Clustered systems are however composed of two or more individual systems coupled together and share storage and a closely linked via a local area network (LAN) networking.
* A layer of cluster software runs on the cluster nodes where by each node can monitor one or more of the others.
* If the monitor machine fails, the monitoring machine can take ownership of its storage and restart the application that were running on the failed machine.
* The users and the clients of the application would only see a brief interruption of the service.
* The following arrangement are done clustered systems ;

i) Asymmetric clustering

* In this one, one machine is on standby mode while the other is running the application.
* The hot stand by host (machine) does nothing but monitor the active server and if that server fails the host stand by machine becomes the active server.

ii)Symmetric clustering

* In this,two or more hosts are running application and they are monitoring each other ,this mode is obviously more efficient as it uses all of the available hardware.

iii)parallel clustering

* Its allow multiple host to access the same data on the shared storage .
* This can only be accomplished by special versions of software and special releases of applications.