

Operating Systems

What is OS?

1. Operating System is a software, which makes a computer to actually work.
2. It is the software that enables all the programs we use.
3. The OS organizes and controls the hardware.
4. OS acts as **an interface between the application programs and the hardware.**

Examples: Windows, Linux, Unix etc.,

Structure of Operating System

1. Application Programs
2. System Programs
3. Software (Operating System)
4. Hardware

Structure of Operating System

The structure of OS consists of 4 layers:

1. **Hardware**

Hardware consists of CPU, Main memory, I/O Devices, etc,

2. **Software (Operating System)**

Software includes process management , memory management, I/O control , file management

(Contd...)

3. System programs

This layer consists of compilers, Assemblers, linker etc. This layer consists of compilers, Assemblers, linker etc.

4. Application programs

This is dependent on users need. Ex. Railway reservation system, Bank database management etc., Railway reservation system, Bank database management etc.,

Operating Systems functions

The main functions of operating systems are:

1. Program creation
2. Program execution
3. Input/Output operations
4. Error detection
5. Resource allocation
6. protection

What is UNIX

- a computer operating system
 - an operating system is the software that provides the interface between the hardware of a computer system and the applications programs running on it

What is UNIX

- UNIX provides a range of tools that can be combined and manipulated to perform such a wide variety of jobs that users of the system can very often carry out sophisticated tasks without writing programs in a programming language
 - Text preparation and printing
 - Document storage and manipulation
 - Programming
 - E-mail

UNIX Features

- written in the high level level language C
 - easy to install on new computing systems
- the UNIX operating system consists of
 - the kernel
 - Performs basic operating system functions such as accessing files, allocating memory, etc.
 - the shell
 - Provides the user interface to the kernel
 - C shell (csh) is the original default shell for interactive work

Features of UNIX

1. **Machine independent** :-

UNIX system does not expose the m/c architecture to the user. So it becomes very easy to write applications that can run.

2. **Multi-user capability** :-

UNIX is a multiuser system. Multiuser system is a system in which the same computer

Resources can be used or accessed by many users simultaneously. Each user is given a terminal. Each terminal is an i/p & o/p device for the user. All the terminals are connected to the main computer.

4. Security :-

UNIX supports a very strong security system. It enforces security at three levels

:-

a) each user is assigned a login name & password. Only the valid users can have a access to the files & directories

b) Each file is bound around permissions(read , write , execute). The file permissions can decide who can read , write or execute. The permissions once decided for a file can also be changed from time to time.

c) It codes your file in a format that cannot be very easily read.

5. **Multitasking capability** :-

It is a multitasking O.S. that allows multiple programs to execute concurrently. It allows you to initiate more than 1 tasks.

6. **Accounting** :- Unix keeps an account of jobs created by the user.

7. **Command structure** :- UNIX commands are easy to understand and simple to use. E.g. “cp” cmd is used to copy a file , “mv” cmd is used to move a file.

8. Portability

The hardware configurations keeps varying from one vendor to another. The positive and strong thing about unix is that it is running successfully on all these computers. The reason behind unix portability is that it is written in High level language which has made it easier to read, understand and change.

3. **Built in networking :-**

UNIX has got a built in networking support. It also offers an excellent media for communication with other users. The users have the liberty of exchanging mail, data etc.

9. Software development tools

Unix offers an excellent environment for developing new software. It provides a variety of tools ranging from editing a program to maintenance of software.

10. Uniqueness

Unix and its variants are the only operating system that are written in high level language. This gives the benefit of machine independence and portability.

It supports both character based and graphical based user interfaces.

It is multi-user, multiprocess operating system.

Types of Operating Systems

1. Time sharing

Time sharing is the mechanism to provide simultaneous interactive use of computer system by many users in such a way that each user is given the impression that he/she has his/her own computer. A time sharing system has many user terminals simultaneously connected to the same computer. Using these terminals, multiple users can simultaneously work on the system

Note :- In time sharing each user is given time to use the CPU. When the time expired the control passes to the next user. The time slot is too small. Each user think that he/she is the sole owner of the CPU. This time is known as **Time Slice.**

2. Multiprogramming O.S.

In multiprogramming, when 1 prgm is waiting for I/O transfer there is another prgm ready to utilize the CPU.

It means that job A is executed & is being written to/stored to secondary memory. Job B is in execution & Job C is waiting for its

Turn to utilize CPU. It means Job B is using CPU at present.

3. Batch Processing system

To avoid the problem of more time set up the batches are made. By this, time is reduced in processing the jobs. The processes are linked together into small small batches and run together.

4. Real time O.S.

It requires quick transaction & characterized by supporting immediate response. These are dedicated systems meant for only one specific application e.g. airline reservation , banking, flight control.

5. **Distributed O.S.** :-

in a distributed O.S. user requests are carried out independently in more than one location. A system which consists of multiple parts located in geographically dispersed physical locations is called distributed O.S.

6. **Parallel systems** :-

They are designed to speed up the execution of programs by dividing the program into multiple fragments & processing these fragments simultaneously.

SERVICES OF OPERATING SYSTEM

1. Program execution :-

purpose of computer system is to allow the user to execute prgm in an efficient manner. The O.S. provides an environment where the user can conveniently run these prgm's. to run a prgm, the prgm is required to be loaded into the RAM first and then to assign CPU time for its execution. O.S. performs this function for the convenience of the user.

2. I/O operation :-

each prgm requires an input and after processing the input submitted by user it produces output. This involves the use of I/O devices. The operating system hides the user from all these details of underlying h/w for the I/O . The I/O service cannot be provided by user-level prgm's and it must be provided by the operating system .

3. File system manipulation :-

while working on the computer, generally a user is required to manipulate various types of files like as opening a file, saving a file and deleting a file from the storage disk. This is an important task that is also performed by the operating system .

4. Communication :-

O.S. performs the communication among various types of processes in the form of shared memory. In multitasking environment, the processes need to communicate with each other and to exchange their information. These processes are created under a hierarchical structure where the main process is known as parent process and the sub processes are known as child processes .

5. Error detection :-

to avoid h/w problems the O.S. constantly monitors the system for detecting the errors and fixing these errors. The main function of O.S. is to detect the errors like bad sectors on hard disk, memory overflow and errors related to I/O devices. After detecting these errors, the O.S. takes an appropriate action for consistent computing .

6. Resource allocation :-

in the multitasking environment, when multiple jobs are running at a time, it is the responsibility of an O.S. to allocate the required resources to each process for its better utilization. For this purpose various types of algorithms are implemented such as process scheduling, CPU scheduling , disk scheduling etc.

7. Accounting :-

O.S. keeps an account of all the resources accessed by each process or user. In multitasking, accounting enhances the system performance with the allocation of resources to each process ensuring the satisfaction to each process.

8. Protection system :-

protection refers to a mechanism for controlling the access of prgm's, processes , or users to the resources defined by a computer system. O.S. provides system protection from outside environment authenticating the user by means of passwords. Today's O.S. are based on advanced encryption/decryption techniques to provide data security.

Comparison Unix & Windows

1. Unix O.S. is an open source while windows O.S. is not .

2. Unix O.S. is more stable, more secure and does more with fewer resources whereas windows running multiple program would be unstable with regular crashes.

3. Unix is preferred over windows because of its power , flexibility & stability also .

4. users are not comfortable with UNIX and need to learn UNIX especially. Whereas, in case of windows, the users with little experience of O.S. can work easily.

5. In Unix there is an in-built web mail subroutine known as 'sendmail' , whereas in Windows , a separate s/w package is required to be purchased for email.

6. Unix is case sensitive whereas Windows is not.

7. When items are deleted from the windows desktop , they go into the Recycle Bin , from which you can recover them whereas Unix offers no inherent recovery feature.

8. Both O.S can perform multitasking

9. In Unix there is no distinction b/w files on a local hard drive partition, CD-ROM, floppy disk. All of the files appear in one tree under the same root. But in windows file system can have many Hierarchies.

10. In Unix virtual memory is handled by the “Kernel” but in windows the virtual memory is handled by an executive service .

11. In both Operating systems , the asterisk means every character , and a question mark means one character .