What is an Operating System?

• A program which controls the execution of all other programs (applications).

• Acts as an intermediary between the user(s) and the computer.

• Objectives: – convenience, – efficiency, – extensibility.

• Similar to a government

Types of Operating System:

1) Batch Processing Operating System:

The interaction between a user and the computer does not occur in this system. The user is required to prepare jobs on punch cards in the form of batches and submit them to the computer operator. The computer operator sorts the jobs or programs and keeps similar programs or jobs in the same batch and run as a group to speed up processing. It is designed to execute one job at a time. Jobs are processed on a first-come, first-serve basis, i.e., in the order of their submission without any human intervention.

2) Time Sharing Operating System:

As the name suggests, it enables multiple users located at different terminals to use a computer system and to share the processor's time simultaneously. In other words, each task gets time to get executed, and thus all tasks are executed smoothly.

Each user gets the processor's time as they get while using a single system. The duration of time allocated to a task is called quantum or time slice; when this duration is over, OS starts the next task.

3) Distributed Operating System:

It uses or runs on multiple independent processors (CPUs) to serve multiple users and multiple real-time applications. The communication between processors is established through many communication lines such as telephone lines and high-speed buses. The processors may differ from each other in terms of size and function.

The availability of powerful microprocessor and advanced communication technology have made it possible to design, develop, and use the distributed operating system. Besides this, it is an extension of a network operating system that supports a high level of communication and integration of machines on the network.

4)Network Operating System:

As the name suggests, this OS connects computers and devices to a local area network and manages network resources. The software in a NOS enables the devices of the network to share resources and communicate with each other. It runs on a server and allows shared access to printers, files, applications, files, and other networking resources and functions over a LAN. Besides this, all users in the network are aware of each other's underlying configuration and individual connections. Examples: Ms Windows Server 2003 and 2008, Linux, UNIX, Novell NetWare, Mac OS X, etc.

5) Real-Time Operating System:

It is developed for real-time applications where data should be processed in a fixed, small duration of time. It is used in an environment where multiple processes are supposed to be accepted and processed in a short time. RTOS requires quick input and immediate response, e.g., in a petroleum refinery, if the temperate gets too high and crosses the threshold value, there should be an immediate response to this situation to avoid the explosion. Similarly, this system is used to control scientific instruments, missile launch systems, traffic lights control systems, air traffic control systems, etc.
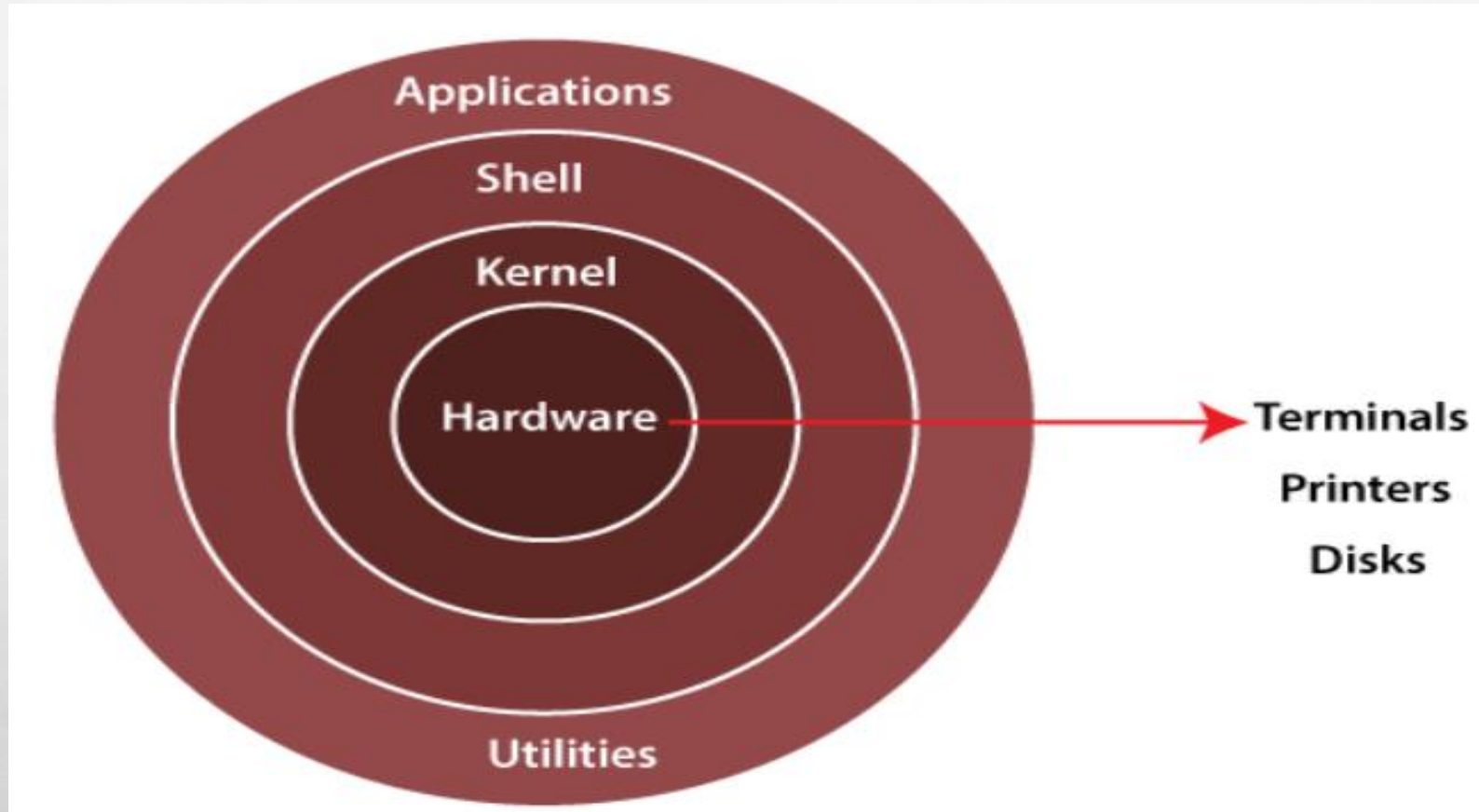
Linux operating system

An operating system can be described as an interface among the computer hardware and the user of any computer. It is a group of software that handles the resources of the computer hardware and facilitates basic services for computer programs.

An operating system is an essential component of system software within a computer system. The primary aim of an operating system is to provide a platform where a user can run any program conveniently or efficiently.

On the other hand, <u>Linux</u> OS is one of the famous versions of the UNIX OS. It is developed to provide a low-cost or free OS for several personal computer system users. Remarkably, it is a complete OS Including an **X Window System, Emacs editor, <u>IP/TCP</u>, GUI** (graphical user interface), etc.

Architecture of Linux system

The Linux operating system's architecture mainly contains some of the components: **the Kernel, System Library, Hardware layer, System,** and **Shell utility**.

1. Kernel:- The kernel is one of the core section of an operating system. It is responsible for each of the major actions of the Linux OS. This operating system contains distinct types of modules and cooperates with underlying hardware directly. The kernel facilitates required abstraction for hiding details of low-level hardware or application programs to the system. There are some of the important kernel types which are mentioned below:

•Monolithic Kernel

•Micro kernels

•Exo kernels

•Hybrid kernels

2. System Libraries:- These libraries can be specified as some special functions. These are applied for implementing the operating system's functionality and don't need code access rights of the modules of kernel.

3. System Utility Programs:- It is responsible for doing specialized level and individual activities.

4. Hardware layer:- Linux operating system contains a hardware layer that consists of several peripheral devices like CPU, HDD, and RAM.

5. Shell:- It is an interface among the kernel and user. It can afford the services of kernel. It can take commands through the user and runs the functions of the kernel. The shell is available in distinct types of OSes. These operating systems are categorized into two different types, which are the **graphical shells** and **command-line shells**.

The graphical line shells facilitate the graphical user interface, while the command line shells facilitate the command line interface. Thus, both of these shells implement operations. However, the graphical user interface shells work slower as compared to the command-line interface shells.

There are a few types of these shells which are categorized as follows:
- Korn shell
- Bourne shell
- C shell
- POSIX shell

Linux Operating System Features

Some of the primary features of Linux OS are as follows:
- **Portable:** Linux OS can perform different types of hardware and the kernel of Linux supports the installation of any type of hardware environment.
- **Open source:** Linux operating system source code is available freely and for enhancing the capability of the Linux OS, several teams are performing in collaboration.
- **Multiprogramming:** Linux OS can be defined as a multiprogramming system. It means more than one application can be executed at the same time.
- **Multi-user:** Linux OS can also be defined as a multi-user system. It means more than one user can use the resources of the system such as **application programs, memory,** or **RAM** at the same time.

•**Hierarchical file system:** Linux OS affords a typical file structure where user files or system files are arranged.

•**Security:** Linux OS facilitates user security systems with the help of various features of authentication such as controlled access to specific files, password protection, or data encryption.

•**Shell:** Linux operating system facilitates a unique interpreter program. This type of program can be applied for executing commands of the operating system. It can be applied to perform various types of tasks such as call application programs and others.

What is computer system BIOS?

As your PC's most important startup program, BIOS, or Basic Input/Output System, is **the built-in core processor software responsible for booting up your system**. Typically embedded into your computer as a motherboard chip, the BIOS functions as a catalyst for PC functionality action.

Difference between 13-bit o.s and 64-bit o.s

32 Bit

It is the percentage of information transferred or the number of bits that make up a data element. A 32-bit register can hold 232 values. The range is represented using a binary integer. One important implication is that an operating system with 32-bit memory addresses can only access up to 4 GiB of binary memory at a time. The IBM System/360 and IBM System/370, the System/370-XA, and the Intel x86 framework are all 32-bit editions. The 68000 series and Cold Fire, etc., are 32-bit assembly language architectures used in embedded Linux.

32-bit is used to describe the condition in which information is stored, received, and interpreted. When it comes to hardware and software, this refers to how many 1s and 0s are handled to represent your data. The more bits the computer can compute, the more information it can handle at the same time.

64 Bits

The number 64 corresponds to the number of bits that may be processed or sent. The number utilized for individual components in structured data. It also refers to the term sizes used to define a computer design, storage, and CPU. The width of registration in a microcontroller is 64 bits. A 64-bit microprocessor can handle memory locations as well as data encoded by 64 bits.

The term can also represent the dimension of low-level data formats, such as float-point figures of 64-bit.

Microsoft produced a Windows XP 64-bit version for usage on 64-bit CPU systems. In a laptop format, the 64-bit shows 64-bit integer, ram address. Sixty-four bits tell the length of a register in microprocessors. The 64-bit device came from the IBM Super Processor IBM 7030 in 1961. Also available in 64-bit editions are Windows Vista, Microsoft 7, and Windows 8.

What is difference between Core i3 i5 and i7

Core i3 processors have two cores,
Core i5 CPUs have four and Core i7 models also have four.
Some Core i7 Extreme processors have six or eight cores. Generally speaking, we find that most applications can't take full advantage of six or eight cores, so the performance boost from extra cores isn't as great

command line

The command line, also called the Windows command line, command screen, or text interface, is **a user interface that's navigated by typing commands at prompts, instead of using a mouse**. For example, the Windows folder in a Windows command line is "C:\Windows>" (as shown in the picture).

```
12/31/2020   05:33 PM              26.284 win98pro.htm
12/31/2020   05:33 PM              32.586 windows-10.htm
12/31/2020   05:33 PM              30.989 windows7.htm
12/31/2020   05:33 PM              30.165 windows8.htm
12/31/2020   05:33 PM              10.927 winipcfg.htm
12/31/2020   05:33 PM              23.545 winmeqa.htm
12/31/2020   05:33 PM              21.640 winntqa.htm
12/31/2020   05:33 PM              32.706 winxpqa.htm
12/31/2020   05:33 PM              62.952 wmic.htm
05/27/2010   03:53 PM                 745 wp.jpg
12/31/2020   05:33 PM              23.328 wqanda.htm
12/31/2020   05:33 PM              22.675 xcopyhlp.htm
12/31/2020   05:33 PM              18.154 xdoseror.htm
12/31/2020   05:33 PM              15.148 xext.htm
12/31/2020   05:33 PM              12.703 yext.htm
12/31/2020   05:33 PM              11.784 youtube.htm
12/31/2020   05:33 PM              12.264 zext.htm
10/12/2020   12:09 PM    <DIR>            _notes
             432 File(s)        7,679,571 bytes
              38 Dir(s)   254,861,524,992 bytes free

C:\ch>echo computerhope.com
computerhope.com

C:\ch>_
```
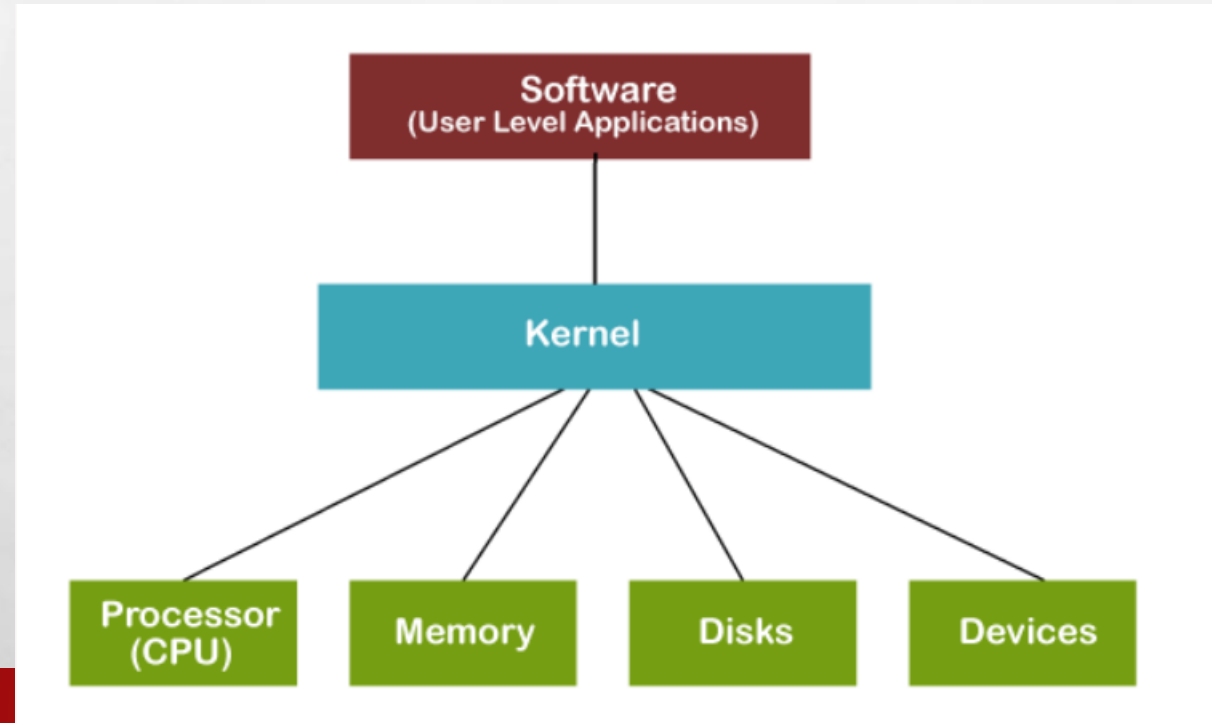
Kernel

Kernel is a computer program that is a core or heart of an operating system. Before discussing kernel in detail, let's first understand its basic, i.e., Operating system in a computer

What is Kernel in Operating System

Linux and windows

Key	Linux	Windows
Open Source	Linux is Open Source and is free to use.	Windows is not open source and is not free to use.
Case sensitivity	Linux file system is case sensitive.	Windows file system is case insensitive.
kernel type	Linux uses monolithic kernel.	Windows uses micro kernel.
Efficiency	Linux is more efficient in operations as compared to Windows.	Windows is less efficient in operations.
Path Seperator	Linux uses forward slash as path seperator between directorioes.	Windows uses backward slash as a path seperator.
Security	Linux is highly secure as compared to Windows.	Windows provides less security as compared to Linux.

Shell AND Bash

shells like bash and korn support programming construct which are saved as scripts. These scripts become shell commands and hence many Linux commands are script.

A system administrator should have a little knowledge about scripting to understand how their servers and applications are started, upgraded, maintained or removed and to understand how a user environment is built.

Syntax:
1.echo $SHELL

BASH is an acronym for Bourne Again Shell, a punning name, which is a tribute to Bourne Shell (i.e., invented by Steven Bourne).

Bash is a shell program written by Brian Fox as an upgraded version of Bourne Shell program '**sh**'. It is an open source GNU project.

Bash can read and execute the commands from a Shell Script

Linux directory

What are Commands

A command is an instruction given to our computer by us to do whatever we want. In Mac OS, and Linux it is called terminal, whereas, in windows it is called command prompt. Commands are always case sensitive.

Directory	Description
/bin/	Essential User Command Binaries
/boot/	Static Files of the boot loader
/dev/	Device Files
/etc/	Host specific system configuration
/home/	User home Directories
/lib/	Shared Libraries
/media/	Removable Madia
/mnt/	Mounted Filesystem
/opt/	Add-on Application software package
/sbin/	System Binaries
/srv/	Data for service from system
/tmp/	Temporary Files
/usr/	User Utilities and Applications
/proc/	Process Information

Root Directory: /

Linux Directory Commands

1. pwd Command

The pwd command is used to display the location of the current working directory.

Syntax:

 pwd

2. mkdir Command

The mkdir command is used to create a new directory under any directory.

Syntax:

mkdir **<directory** name**>**

3. rmdir Command

The rmdir command is used to delete a directory.

Syntax:

rmdir **<directory** name**>**

4. ls Command

The ls command is used to display a list of content of a directory.

Syntax:

ls

5. cd Command

The cd command is used to change the current directory.

Syntax:

cd **<directory** name**>**

6. touch Command

The touch command is used to create empty files. We can create multiple empty files by executing it once.

Syntax:

1.touch **<file** name**>**

2.touch **<file1> <file2>** ....

7. cat Command

The cat command is a multi-purpose utility in the Linux system. It can be used to create a file, display content of the file, copy the content of one file to another file, and more.

Syntax:

1.cat [OPTION]... [FILE]..

8. rm Command

The rm command is used to remove a file.

Syntax:

rm <file name>

9. cp Command

The cp command is used to copy a file or directory.

Syntax:

To copy in the same directory:

To copy in a different directory:

10. mv Command

The mv command is used to move a file or a directory form one location to another location.

Syntax:

mv **\<file** name**> \<directory** path**>**

11. rename Command

The rename command is used to rename files. It is useful for renaming a large group of files.

Syntax:

rename 's/old-name/new-name/' files

Linux file permissions

1.Read (r) : The read permission allows you to open and read the content of a file. But you can't do any editing or modification in the file.

2.Write (w) : The write permission allows you to edit, remove or rename a file. For instance, if a file is present in a directory, and write permission is set on the file but not on the directory, then you can edit the content of the file but can't remove, or rename it.

3.Execute (x): In Unix type system, you can't run or execute a program unless execute permission is set.But in Windows, there is no such permission available.

Thank you