Unit-2

Difference between Single User and Multi-User Operating System

Single User Operating System:

A single user operating system has been designed for only one user can access the computer system at a time. However, it may support more than one profiles. Single keyboard and single monitor are used for the purpose of interaction. The most common example of a single user operating system is a system that is found in a typical home computer.

Multiuser Operating System:

A multi-user operating system has been designed for more than one user to access the computer at one time. Generally, a network is laid down, so that a computer can be remotely used. Mainframes and minicomputers work on multi-user operating systems. These operating systems are complex in comparison to single user operating systems. Each user is provided with a terminal and all these terminals are connected to the main computer. In a multi-user environment, it is very important to balance the requirements of the users, as the resources of the main computer are shared among the users.

Comparison between Single User and Multi-User Operating System:

	Single User	**Multi-User**
Definition	A single user operating system provides facilities to be used on one computer by only one user.	A multi-user operating system has been designed for more than one user to access the computer at the same or different time.
Types	Single user, single task: A single task is performed by one user at a time. Example- The Palm OS for Palm handheld computers. Single user, multi-task: Several programs are run at the same time by a single user. For example- Microsoft Windows.	Time-sharing systems: These systems are multi-user systems in which CPU time is divided among the users. The division is made on the basis of a schedule. Most batch processing systems for the mainframe computers can also be considered as ‘multi-user.’
Attributes	Simple	Complex
Examples	Windows 95, Windows NT Workstation and Windows 2000 professional.	Unix, Linux, and mainframes such as the IBM AS400.

GUI and CUI Operating System

GUI :

GUI stands for Graphical User Interface. An operating system that presents an interface comprising graphics and icons is called a **GUI OS**. GUI OS is very easy to navigate and use as users need not remember commands to be given to accomplish each task.
Windows is an example of GUI.

CUI:

CUI stands for Character User Interface or command-line User Interface. An operating system that presents an interface using commands like text is called a **CUI OS**. CUI OS is very difficult to navigate and use as users need remember commands to be given to accomplish each task.
DOS is an example of CUI.

Difference between GUI and CUI

Following are the important differences between GUI and CUI.

Sr. No.	Key	GUI	CUI
1	Interaction	User interacts with computer using Graphics like images, icons.	User interacts with computer using commands like text.
2	Navigation	Navigation is easy.	Navigation is difficult.
3	Peripherals used	Keyboard, mouse or any other pointing device.	Only keyboard.
4	Precision	GUI has low precision.	CUI has high precision.
5	Speed	GUI is of low speed.	CUI is of high speed.
6	Usage	Usage is easy.	Usage is difficult, requires expertise.
7	Memory requirement	High memory requirement.	Low memory requirement.
8	Flexibility	Highly flexibile user interface.	Little flexibile user interface.
9	Customize	GUI is highly customizable.	CUI appearance is not easily changable.

File and Folders

File: A file is the common storage unit in a computer. All programs and data are contained in a file, and the computer reads and writes files. Files are identified by a short "extension" following a period at the end of their name.
For example, ABC.JPG is a JPEG image, ABC.DOC is a Microsoft Word document file, and ABC.EXE is an executable application in Windows

Folder: A folder is a container for storing programs and files, similar to a folder in a file cabinet. A folder holds one or more files, and a folder can be empty until it is filled. A folder can

also contain other folders, and there can be many levels of folders within folders. Folders within a folder are technically known as "subfolders.
Folders provide a method for organizing files .folder contains paper documents in a file cabinet. So, files that contain text are often called documents.
Folders are also called "directories," and they are created on the hard drive (HD) when the operating system and applications are installed. Files are always stored in folders. In fact, even the computer's desktop is a special kind of folder that displays its contents across the screen
Just as a file cabinet contains several folders, each containing related documents with dividers grouping related folders together, so the Windows file hierarchy allows you to organize your files in folders, and then place folders in other folders.
Windows 7 comes with four libraries: Documents, Pictures, Music, and Videos. Libraries are special folders that catalog folders and files in a central location. A library includes and displays folders that are stored in different locations on your computer, Homegroup, or network

Creating,Copying,Moving and Delete files:

You can create,copy,move and delete any type of file provided the concerned application program is installed on your computer,in a second.

To create a file,do this-

- Right click anywhere in a blank space like desktop.Point to New and select a file like Microsoft Word Document.
- A word document is displayed with the default name,New Microsoft Word Document,selected
- Type a name for the new word file,and then press ENTER.

To copy a file, do this-

- Select one or more files.
- Click Copy option from the Organize menu.
- Now, select the folder location where you want to copy the file.
- Click the Paste option from Organize menu.You see the file pasted at the desired location.

To move a file, do this-

- Select one or more files.
- Click Cut option from the Organize menu.
- Now, select the folder location where you want to move the file.
- Click the Paste option from Organize menu.You see the file pasted at the desired location

To delete a file, do this-

- Select one or more files.
- Click Delete option from the Organize menu.A Delete Folder dialog box appears.
- Now, Yes to delete.The file gets deleted and moved to the Recycle Bin

Window Explorer

The windowsexplorer are powerful easy-to-use tools for working with files consistently across Windows 7. Explorers give you more information and control while simplifying how you work with your files. Each Explorer window includes the following elements:

- **Back and Forward buttons.** Use to navigate between previously viewed folders.
- **Address bar.** Use to navigate directly to a different location, including local and network disks, folders, and web locations.
- **Search box.** Use to perform instant searches, which show only those files that match what you typed in the Search box for the current folder and any of its subfolders.
- **Toolbar/Command bar.** Use to perform file related commands. Toolbar/Command bars display only the task buttons that are appropriate for the files being displayed. There are two consistent buttons on every Toolbar/Command bar: Organize and Views.
- **Navigation pane.** Use to display common folders, such as Favorites, Libraries, HomeGroup (a shared network), Computer, and Network, using a Folder list tree structure.
- **Libraries.** Use to access common folders, such as Documents, Music, Pictures, and Videos. A library is a collection of files and folders linked from different locations, including your computer, HomeGroup, or network, into a central place. A file or folder can be stored in one location, yet linked to a library for easy access. For example, your My Documents folder located in your personal folder (the one with your account name) is linked to the Documents library.

Windows

Windows is a collection of programs known as an *operating system* (OS) that controls a PC (personal computer). First produced by Microsoft in November 1985, it has been frequently updated since, as computer memory has got bigger, as processing chips have got faster

Features of Windows

- Allows the user to interact with the computer (through the keyboard, mouse, microphone, etc.).
- Controls the storage of data (images, files, music).
- Controls hardware attached to the computer such as webcams, scanners and printers.
- Helps to open and close programs (word processors, games, photo editors, etc.), and gives them part of the computer's memory to allow them to work.
- Controls what access to a computer different users have and the computer's security.
- Deals with errors and user instructions, and issues simple error messages.
- Promotes multitasking by allowing the user to do several things on the computer at once – for example, watch a video while writing a letter.

Main Components of Windows

. The main components of the Windows Operating System are the following:

Desktop It is the very first screen that you will see once the windows start. Here you will see "My Computer", "My Documents", "Start Menu", "Recycle Bin", and the shortcuts of any applications that you might have created.

TaskbarAt the bottom, you will see a row which is known as the taskbar. It has the currently running applications".

Start Menu This is located in the bottom left corner of Windows OS GUI. This is the place where the user can search for any setting and for any application for their use. Users can uninstall or repair applications from the control panel. The user can do a lot of activities just by searching through the start menu.

My Computer When you double click on "My Computer" menu, it will let you navigate between your different computer drives and the control panel tools. You can see and manage the contents that are inside your drive.

Recycle Bin When you delete an item from any of your drives by making use of "delete" button or even by simply clicking right clicking and selecting "delete" option, it is not deleted completely, instead, it is moved to "Recycle Bin" folder of Windows. You can recover your content if you have deleted it by mistake from here or if you choose to delete the items from here, it will get deleted permanently. Should you wish to delete the item in first go itself without moving it to recycle bin, you can use the key "Shift+Del"

Paint,Notepad

Paint

Paint is a simple image editor that you can use to create, view, and edit digital images. It provides basic functionality to draw and paint pictures, resize and rotate photographs, and save pictures as different file types.

To start Paint,do this-

- Click Start,point to All Programs,point to Accessories and select Paint.
  After that Paint window appears.

Notepad

Notepad is a simple text editor. You can use it to create, view, and edit text files. It *i*s easy to use and fast, allowing quick and convenient editing. For instance, you can use Notepad to write a batch file, or a web page written in HTML.

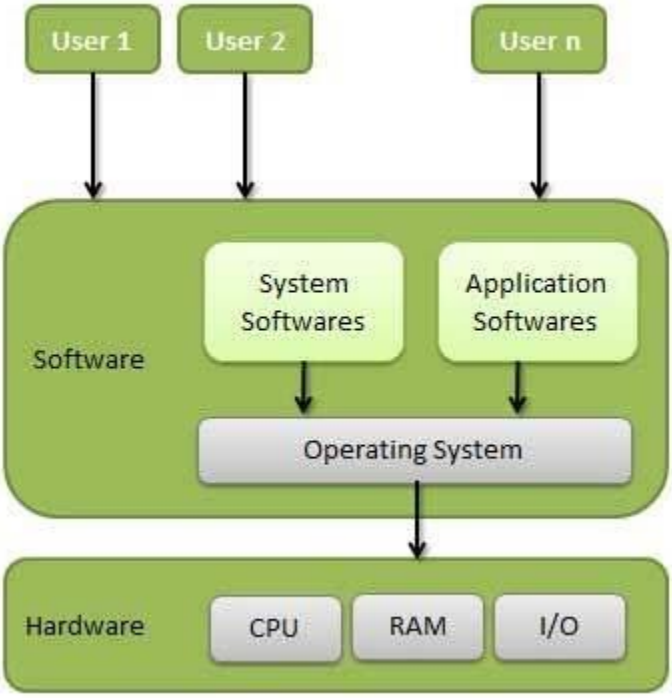
To start Notepad,do this-

- Click Start,point to All Programs,point to Accessories and select Notepad.
  After that Notapad window appears.

Unit-2

Operating System

An operating system is a program that acts as an interface between the user and the computer hardware. It is referred to as the underlying software that helps in carrying out basic functions like running programs, managing resources, manipulating files, controlling the keyboard and screen, etc.



Function of operating system: Following are some of important functions of an operating system.

- Memory Management
- Processor Management
- Device Management
- File Management

Memory Management: Memory management refers to management of Primary Memory or Main Memory.Main memory provides a fast storage that can be accessed directly by the CPU. For a program to be executed, it must in the main memory. An Operating System does the following activities for memory management −

- Keeps tracks of primary memory, i.e., what part of it are in use by whom, what part are not in use.
- In multiprogramming, the OS decides which process will get memory when and how much.
- Allocates the memory when a process requests it to do so.
- De-allocates the memory when a process no longer needs it or has been terminated.

Processor Management : In multiprogramming environment, the OS 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 −

- Keeps tracks of processor and status of process. The program responsible for this task is known as **traffic controller**.
- Allocates the processor (CPU) to a process.
- De-allocates 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 −

- Keeps tracks of all devices. Program responsible for this task is known as the **I/O controller**.
- Decides which process gets the device when and for how much time.
- Allocates the device in the efficient way.
- De-allocates devices.

File Management:A file system is normally organized into directories for easy navigation and usage. These directories may contain files and other directions.
An Operating System does the following activities for file management −

- Keeps track of information, location, uses, status etc. The collective facilities are often known as **file system**.
- Decides who gets the resources.
- Allocates the resources.
- De-allocates the resources.

Types of operating system: Some of the most popular OS are

Batch operating system-

The users of a batch operating system do not interact with the computer directly. Each user prepares his job on an off-line device like punch cards and submits it to the computer operator. To speed up processing, jobs with similar needs are batched together and run as a group. The programmers leave their programs with the operator and the operator then sorts the programs with similar requirements into batches.

The problems with Batch Systems are as follows −

- Lack of interaction between the user and the job.
- CPU is often idle, because the speed of the mechanical I/O devices is slower than the CPU.
- Difficult to provide the desired priority.

Time-sharing operating systems-

Time-sharing is a technique which enables many people, located at various terminals, to use a particular computer system at the same time. Time-sharing is a logical extension of multiprogramming. Processor's time which is shared among multiple users simultaneously is termed as time-sharing.

Multiple jobs are executed by the CPU by switching between them, but the switches occur so frequently. Thus, the user can receive an immediate response. For example, in a transaction processing, the processor executes each user program in a short burst or quantum of computation. That is, if **n** users are present, then each user can get a time quantum. When the user submits the command, the response time is in few seconds at most.
The operating system uses CPU scheduling and multiprogramming to provide each user with a small portion of a time. Computer systems that were designed primarily as batch systems have been modified to time-sharing systems.

Advantages of Timesharing operating systems are as follows –

- Provides the advantage of quick response.
- Avoids duplication of software.
- Reduces CPU idle time.

Disadvantages of Time-sharing operating systems are as follows –

- Problem of reliability.
- Question of security and integrity of user programs and data.
- Problem of data communication.

Distributed operating System-

Distributed systems use multiple central processors to serve multiple real-time applications and multiple users. Data processing jobs are distributed among the processors accordingly.

The processors communicate with one another through various communication lines (such as high-speed buses or telephone lines). These are referred as **loosely coupled systems** or distributed systems. Processors in a distributed system may vary in size and function. These processors are referred as sites, nodes, computers, and so on.

The advantages of distributed systems are as follows –

- With resource sharing facility, a user at one site may be able to use the resources available at another.
- Speedup the exchange of data with one another via electronic mail.
- If one site fails in a distributed system, the remaining sites can potentially continue operating.
- Better service to the customers.
- Reduction of the load on the host computer.
- Reduction of delays in data processing.

Real Time operating System

A real-time system is defined as a data processing system in which the time interval required to process and respond to inputs is so small that it controls the environment. The time taken by the system to respond to an input and display of required updated information is termed as the **response time**. So in this method, the response time is very less as compared to online processing.

Real-time systems are used when there are rigid time requirements on the operation of a processor or the flow of data and real-time systems can be used as a control device in a dedicated application. A real-time operating system must have well-defined, fixed time constraints, otherwise the system will fail. For example, Scientific experiments, medical imaging systems, industrial control systems, weapon systems, robots, air traffic control systems, etc.

There are two types of real-time operating systems.

Hard real-time systems-

Hard real-time systems guarantee that critical tasks complete on time. In hard real-time systems, secondary storage is limited or missing and the data is stored in ROM. In these systems, virtual memory is almost never found.

Soft real-time systems-

Soft real-time systems are less restrictive. A critical real-time task gets priority over other tasks and retains the priority until it completes. Soft real-time systems have limited utility than hard real-time systems. For example, multimedia, virtual reality, Advanced Scientific Projects like undersea exploration and planetary rovers, etc.

Difference between Multiprogramming,Multiprocessing and Multiprocessing

1. **Multiprogramming –** A computer running more than one program at a time (like running Excel and Firefox simultaneously).
2. **Multiprocessing –** A computer using more than one CPU at a time.
3. **Multitasking –** Tasks sharing a common resource (like 1 CPU).

1. Multi programming –

In a multiprogramming system there are one or more programs loaded in main memory which are ready to execute. Only one program at a time is able to get the CPU for executing its instructions (i.e., there is at most one process running on the system) while all the others are waiting their turn.

The main idea of multiprogramming is to maximize the use of CPU time. suppose the currently running process is performing an I/O task (which, by definition, does not need the CPU to be accomplished). Then, the OS may interrupt that process and give the control to one of the other in-main-memory programs that are ready to execute (i.e. *process context switching*). In this way, no CPU time is wasted by the system waiting for the I/O task to be completed, and a running process keeps executing until either it voluntarily releases the CPU or when it blocks for an I/O operation. Therefore, the ultimate goal of multiprogramming is to keep the CPU busy as long as there are processes ready to execute.

2. Multiprocessing –

In a uni-processor system, only one process executes at a time.

Multiprocessing is the use of two or more CPUs (processors) within a single Computer system. The term also refers to the ability of a system to support more than one processor within a single computer system. Now since there are multiple processors available, multiple processes can be executed at a time. These multi processors share the computer bus, sometimes the clock, memory and peripheral devices also.

- With the help of multiprocessing, many processes can be executed simultaneously. Say processes P1, P2, P3 and P4 are waiting for execution. Now in a single processor system, firstly one process will execute, then the other, then the other and so on.
- But with multiprocessing, each process can be assigned to a different processor for its execution. If its a dual-core processor (2 processors), two processes can be executed simultaneously and thus will be two times faster, similarly a quad core processor will be four times as fast as a single processor.

Difference between Multiprogramming and Multiprocessing –

- A System can be both multi programmed by having multiple programs running at the same time and multiprocessing by having more than one physical processor. The difference between multiprocessing and multi programming is that Multiprocessing is basically executing multiple processes at the same time on multiple processors, whereas multi programming is keeping several programs in main memory and executing them concurrently using a single CPU only.
- Multiprocessing occurs by means of parallel processing whereas Multi programming occurs by switching from one process to other (phenomenon called as context switching).

3. Multitasking –

As the name itself suggests, multi tasking refers to execution of multiple tasks (say processes, programs, etc.) at a time. In the modern operating systems, we are able to play MP3 music, edit documents in Microsoft Word, surf the Google Chrome all simultaneously, this is accomplished by means of multi tasking.

Multitasking is a logical extension of multi programming. The major way in which multitasking differs from multi programming is that multi programming works solely on the concept of context switching whereas multitasking is based on time sharing alongside the concept of context switching.