FUNDAMENTALS OF OPERATING SYSTEM

Unit 2

SLOs

- Define OS
- Develop the understanding about different functions of OS
- Distinguish among various types of interfaces of OS

2.1 INTRODUCTION OF OPERATING SYSTEM (OS)

An Operating System is a software which performs all the basic tasks like booting the computer, file management, memory management, process management, and controlling peripheral devices such as hard disk, printer, etc. It manages computer resources efficiently. Most common operating systems are: DOS, Windows, Linux, Android, Mac OS and iOS.

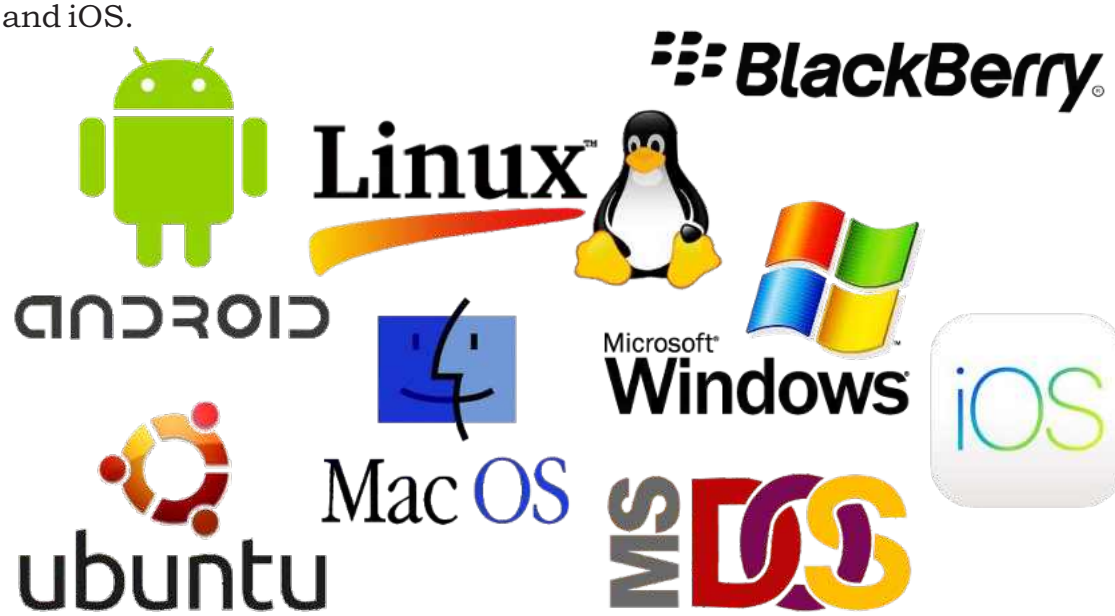

Fig: 2.1 Different Operating Systems

2.1.1 Function Of Operating System

Operating system manages every activity of a computer. It is the master control program that provides an interface for a user to communicate with computer. System software and application software run on operating system as shown in figure 2.2. Operating System performs the following functions.

(i) Booting

Booting is a process of starting the computer operating system. It checks the computer resources and makes it ready to perform different tasks.

(ii) Resource Management

Operating system manages all the hardware and software resources. This includes allocation and de-allocation of processor, memory, access to shared cache memory and access to network resources.

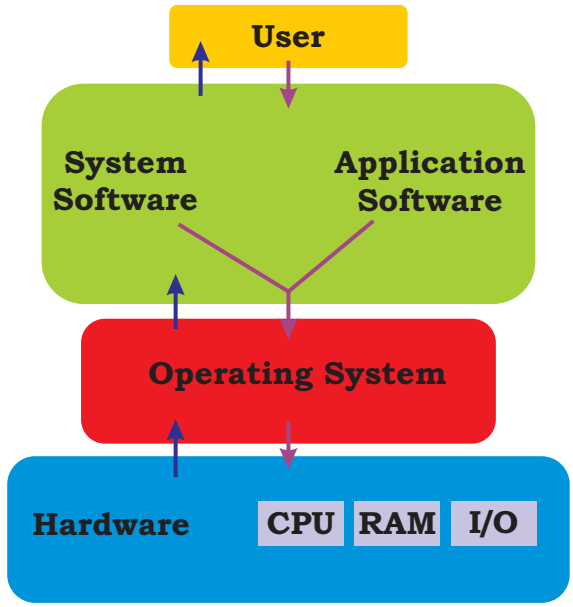

Fig: 2.2 Operations of an OS

(iii) User Interface or Command Interpreter

We interact with operating system through user interface. Command interpreter is one of the parts of operating system which reads the commands from user, interprets them and translates them into machine language instructions that the computer hardware can understand.

(iv) Memory Management

Memory management module performs the task of allocation and de-allocation of memory space to programs and data in need of these resources.

(v) Input / Output (I/O) Management

An Operating System provides the device driver to facilitate I/O functions involving I/O devices. These device drivers are software that control I/O devices through their controllers.

(vi) File Management

It manages all the file-related activities such as organization storage, retrieval, naming, sharing, and protection of files.

(vii) Process Management

A process is a job or activity to be performed by the system. Process management manages creation, deletion, suspension and resumption of processes. The term process refers here to program code that has been loaded into a computer's memory for execution by the central processing unit (CPU). In a multiprogramming system, there will be a number of computing processes. The operating system must ensure that each process gets a fair share of the CPU's time. The OS decides the order in which processes have access to the processor, and how much processing time each process should get. This function of OS is called process scheduling.

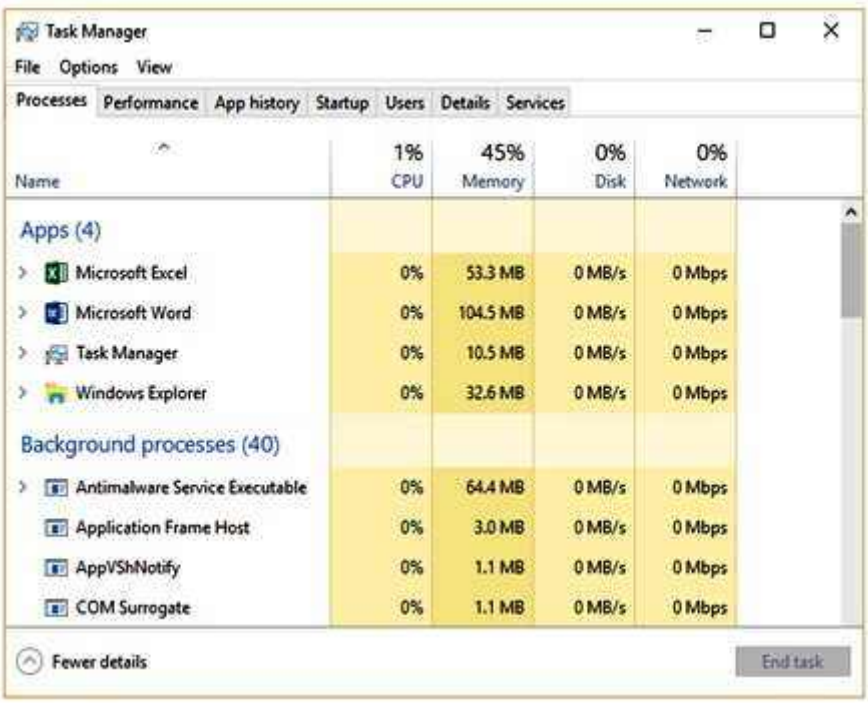

Fig: 2.3 Task Manager

(viii) User Management

In modern operating systems, user management describes the ability of administrators to control user access to various computer resources like software, I/O devices, storage system, networks, etc.

2.1.2 Types Of Interface

An interface is a program that allows a user to interact with the computer or another computer over a network.
A User Interface (UI) is the part of operating system, program, or devices that allows a user to enter and receive information. There are many types of User Interfaces. Two most common user interfaces are discussed below:

(i) Command Line Interface

```
C:\DOS>chkdsk
Volume Serial Number is 3E76-4B58

2,146,467,840 bytes total disk space
      131,072 bytes in 2 hidden files
       32,768 bytes in 1 directories
    7,405,568 bytes in 124 user files
2,138,898,432 bytes available on disk

       32,768 bytes in each allocation unit
       65,505 total allocation units on disk
       65,274 available allocation units on disk

      655,360 total bytes memory
      602,704 bytes free

Instead of using CHKDSK, try using SCANDISK.  SCANDISK can reliably detect
and fix a much wider range of disk problems.  For more information,
type HELP SCANDISK from the command prompt.


C:\DOS>_
```

Fig: 2.4 Command Line Interface (CLI)

A Command Line Interface (CLI) is a screen or text based representation in which the user types the commands on place called prompt to operate the computer. Command contains string of characters.CLI is difficult to use because the user has to remember the commands and their syntaxes but it is fast in use because text mode takes less resources.It was primarily provided to users by computer terminals onUNIX, and personal computers including MS-DOS and Apple DOS.

(ii) Graphical User Interface (GUI)

A GUI provides a user friendly environment where user can interact with computers through graphical objects such as menus, icons, buttons and other graphical objects. It is easy to use as users are supposed to just click on a picture to run commands without memorizing them. GUI is slower than CLI as graphical mode takes more memory and resources. Windows and IOS are the example of GUI.

Fig: 2.5 Graphical User Interface (GUI)

SLOs

- Discuss different types of OS
- Differentiate among the various types of OS

2.2 TYPES OF OPERATING SYSTEM

The Operating System can be categorized as under:

- Single User and Multi-User OS
- Batch Processing OS
- Time Sharing OS
- Real Time Processing OS

2.2.1 Single User And Multi-user Operating System

In a Single User Operating System, a single user can access the computer system at a time. These types of operating systems are commonly used. DOS for PCs and Windows 98 for PCs are example of single user operating system.

A Multi-User Operating System allows multiple users to access the computer at same time. The operating system manages the memory and resources among the various users according to the requirement. Linux and UNIX are the most common examples of the multi-user operating system.

2.2.2 Batch Processing Operating System

General term of Batch Processing is used for programs that are executed with minimum human interaction. This type of operating system does not interact with the computer directly (Figure 2.5). Each user prepares his job and submits it to the computer operator. To speed up processing; jobs with similar needs are batched together and run as a group by an operator. The main function of a batch processing system is to automatically keep executing the jobs in a batch.
The benefits of batch processing are:

- Batch systems can be shared by multiple users.
- The idle time for batch system is very less.
- Next job starts just after the current one.

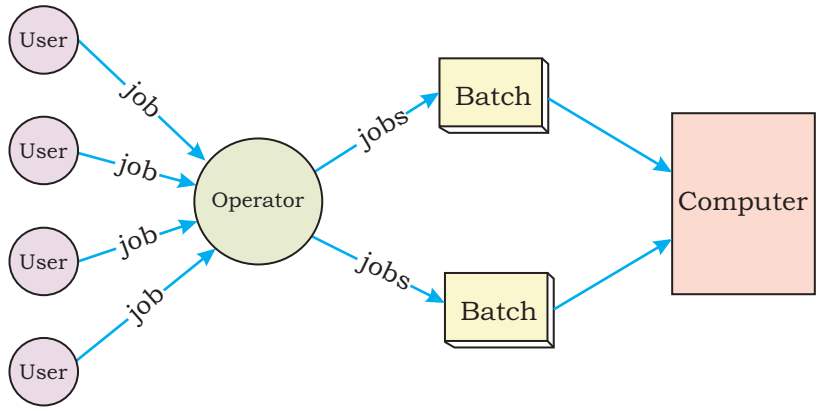

Fig: 2.6 Batch Processing Operating System

2.2.3 Time Sharing Operating System

Time sharing is a method that allows multiple users to share resources simultaneously. Multiple users can use specific computer at the same time in different places. A time sharing operating system is that in which from many tasks each task is given some time to execute so that all processes run smoothly without any problem. Multiple jobs are executed by the CPU by switching between them. As the system switches rapidly from one task or user to the other, a short time slot is given to each task or user for their executions and all feel that system is not shared. Thus, the user can receive an immediate response. For example, in a transaction processing, the processor executes each user program in a short time.These systems are also known as Multitasking Systems. The task can be from single user or from different users also. The time that each task gets to execute is called quantum. After this time interval is over OS switches over to next task.

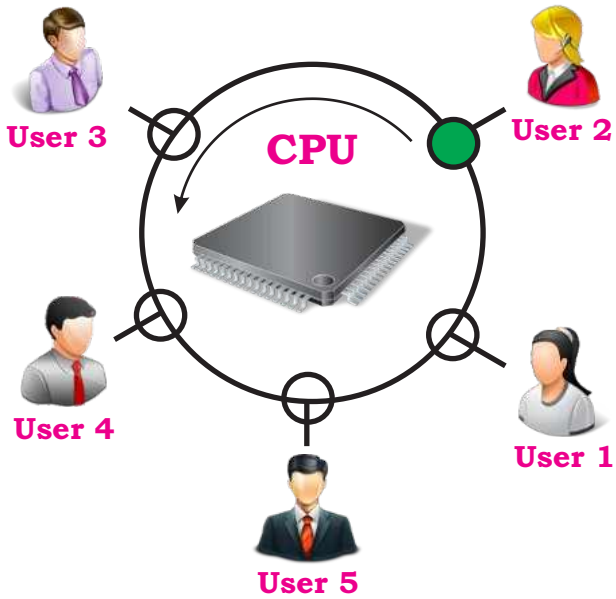

Fig: 2.7 Time Sharing Operating System

2.2.4 Real Time Processing Operating System (RT OS)

A Real Time Processing Operating System is a time bound operating system which has fixed time limit. Processing has to be done within the defined time limit otherwise system will be failed. Real Time Process System classified into two parts:

Hard Real Time System: A Hard Real Time System guarantees that critical tasks complete on time, even the shortest delay or urgency is not acceptable. Here system should meet the deadline. Missile systems and Air Traffic Control System are best examples of Hard Real Time System.

Soft Real Time System: In this time constraint is less strict. The meeting of deadline is not compulsory for each task, every time. A critical real-time task gets priority over other tasks until it completes. It does not guarantee that task will be completed in defined time but before a certain time and according to the priority. Online Transaction System, Airline Ticket Reservation in which reservation could be delayed but should be done after checking available seats and completed before aeroplane flight, etc. are the examples of Soft Real Time System.

SLOs

- Apply and demonstrate the installation process of Windows OS and other software in a computer
- Apply installation process of any antivirus in a computer.

2.3 SOFTWARE INSTALLATION

Software installation is the process of making programs ready for execution. Software installation or installer is a computer program that installs files, such as applications, drivers, or other software, onto a computer. Software is installed onto a computer by various means. They can be downloaded from the internet. They can also be installed from an installation CD or DVD or from a USB flash drive.

2.3.1 Installing Windows Operating System

Operating system is the most essential software and there are many operating systems available. Windows is the most commonly used operating system which is developed by Microsoft. Choosing an operating system depends upon the hardware that we have. To maintain compatibility between hardware and software, the operating system vendor specifies the minimum hardware requirement. For installing Windows 10, we will need at least the following configuration.

Processor	1GHz (speed of CPU should be at least 1 Gigahertz)
Memory	1GB for 32-bit or 2GB for 64-bit (RAM – Random Acces Memory – a type of computer memory, 32 bit and 64 bit are data units)
Storage	32GB (hard disk space should be at least 32 Gigabytes)
Graphics card	DirectX 9 or later with WDDM 1.0 driver (graphics card is computer hardware that produces images seen on monitor screen)
Display	800x600 (computer monitor capability)

Major Steps for Installing Windows

- Insert the Windows Installation DVD/Flash Drive
- Restart your Computer
- Wait for the first startup screen
- Press or hold Del or F2 to enter the BIOS screen
- Locate the Boot order/ Boot sequence
- Select Boot order/ Boot sequence as per your installation source
  a. USB Flash/USB Hard Disk
  b. USB CD/DVD ROM
  c. Internal CD/DVD ROM
- Select any option:
  a. Upgrade
  b. Customize Installation (Advance)
- Select any drive for installing your operating system
- Follow the on screen instructions

Teacher Note

- Teachers should focus and reinforce on important steps of installation like selection of drive, formatting and deleting drive and other setting.
- Ideally, students should be given a chance to install Windows in groups.

2.3.2 Installing Office Automation Software

Windows is an Operating System which needs to install other software to make the best use of our computer. Office Automation software is the most common software package that we install on our computers. Office Automation software is a group of computer programs that help users in their daily work. Generally you will find MS Office in school lab, offices and other places. MS Office contains word processor (MS Word), spreadsheet (MS Excel), multimedia presentation (MS PowerPoint), database management system (MS Access) and email application (MS Outlook). In class 9, we will use MS- Word, MS Excel and MS-Access in coming units.

Fig: 2.8 Common Programs in MS Office

To install MS- Office package we need to take following steps.

- Run the MS- Office setup from USB, DVD or Hard Disk backup.
- Check the box marked 'I accept the terms of this agreement' and click on 'Continue'.
- Enter Product Key
- Click on Install Now or Customize procedure.
- Select the package which you want to install. Click on 'Install Now'.
- Then installation begins.
- MS Office installer will notify automatically after finishing the installation.

Before installing MS- Office, make sure that your hardware and software meet with the minimum requirements for the version of MS-Office that you want to install. The minimum requirements may differ from version to version. (For MS- Office 2013 the minimum requirements are: 1.6 GHz processor, 1 GB RAM, 3 GB hard disk free space, minimum Windows 7 operating system and graphics driver).

2.3.3 Installing Antivirus

To keep our computer secure and free from viruses, we need to install an antivirus software. A number of free antivirus software are available online. AVG, Avast, Avira and Kaspersky are some of the free antivirus software. These days we need to download installation file from respective antivirus software and run it but make sure that computer has the access of internet. After running the installation file, antivirus software will be automatically installed on our computer.

Most important component of an antivirus software is the virus database which antivirus software updates time to time. We must update our virus database for preventing virus threats.

Teacher Note

- There are 5 lab periods allocated to complete the SLOs of this unit. However, teachers can manage more practical for students and help enhancing their skills to use operating system efficiently. Students at this level should be able to manage files and folders and configure simple settings of operating system.
- Teachers are also suggested to demonstrate the installation and configuration process of any hardware driver e.g. printer.

SUMMARY

- An Operating System is a software which performs all the basic tasks like booting the computer, file management, memory management, process management, and controlling peripheral devices such as hard disk, printer, etc.
- Operating System performs the following functions like Booting, Resource Management, User Interface or Command Interpreter, Memory Management, Input / Output Management, File Management, Process Management, User Management.
- An interface is a program that allows a user to interact with the computer or another computer over a network like Command Line Interface, Graphical User Interface (GUI).
- The Operating Systems have been evolved as Single User and Multi-User OS, Batch Processing OS, Time Sharing OS, Real Time Processing OS.
- A single user operating system allows only one user to operate computer at a time.
- A Multi-User Operating System allows multiple users to access the computer at same time.
- In fact the real time operating system consists of Windows, Linux, etc.
- In batch processing operating system each user prepares his job and submits it to the computer operator.
- Time sharing is a method that allows multiple users to share resources simultaneously.
- A Real Time Processing operating system is a time bound operating system which has fixed time limit.
- A Hard Real Time System guarantees that critical tasks complete on time. Missile systems and Air Traffic Control System are best examples of Hard Real Time System.
- Soft Real Time System does not guarantee that task will be completed in defined time. Online Transaction systems, Airline Ticket Reservation, etc. are the examples of Soft Real Time System.
- Software Installation means to put something in a new place, ready to be used.

- Office Automation Software is a group of computer programs that help office workers in their daily work.
- MS Office 2010 contains MS Word, MS Excel, MS PowerPoint and MS Outlook.
- For MS- Office 2013 the minimum requirements are: 1.6 GHz processor, 1 GB RAM, 3 GB hard disk, minimum Windows 7 operating system and graphics driver.

EXERCISE

A. Choose the right answer:

1. The software which performs all basic tasks is:
   a) antivirus b) start menu
   c) operating system d) office automation

2. A program that enables user to interact with computer is called:
   a) my document b) start menu
   c) desktop d) interface

3. The process of checking computer, starting operating system and making it ready to work is referred to as:
   a) resource management b) booting
   c) error checking d) file management

4. The number of user(s) that can access the resources simultaneously on a Multiuser OS is /are:
   a) one b) two
   c) many d) only administrators

5. Which management controls the dynamic allocation and de-allocation of processor, memory, etc?
   a) Resource b) File
   c) I/O d) User

6. In which operating system jobs are executed in groups?
   a) Batch Processing b) Time Sharing
   c) Single User d) Real Time

7. The system that guarantees that critical tasks should be completed without shortest delay is:
   a) Batch Processing b) Hard Real Time
   c) Soft Real Time d) Time Sharing

8. DOS is an example of:
   a) Real Time Processing OS b) Multi Processing OS
   c) Single User OS d) Multi User OS

9. The group of programs that helps office workers to do a number of routine tasks easily and efficiently is called:
   a) operating system b) e-mail
   c) anti-virus d) office automation

10. The operating system that allows frequent switching from one task to another is:
   a) Batch Processing b) Real Time Processing
   c) Single User d) Time Sharing

B. Respond the following:

1. Define Operating System. Give three examples of operating systems.
2. List the functions of an OS? Write briefly about any two.
3. Differentiate between CLI and GUI. Write any two benefits of each.
4. Which resources are managed by Resource Management function of OS?
5. What is the difference between single user and multi user OS? If you are a manager of a large organization which type of OS will you prefer? Justify your answer with any two reasons.
6. What is the purpose of office automation software? With examples, explain how can office automation help employees to be productive and efficient?
7. List the programs available in MS Office and write why each program is used?
8. What is the major difference between Soft Real Time and Hard Real Time systems?
9. Why it is important to install an antivirus?

C. Match the columns:

S.NO.	A	S.NO.	B	C
(i)	CLI	(a)	Time bond operating system	
(ii)	Windows	(b)	Office automation	
(iii)	Process	(c)	Function of operating system	
(iv)	Ms Excel	(d)	Operating system	
(v)	Real time processing operating system	(e)	A job to be performed by the system	
(vi)	Input / Output Management	(f)	Interface	

ACTIVITIES

1. Teacher should demonstrate installation process of
   - Windows Operating System (feasible version)
   - Microsoft Office (feasible version)
   - Any free antivirus software
2. Students should be given task to make use of antivirus software.
3. Student should observe and work with different
   - icons on Windows Desktop
   - Start Menu
   - Utility Programs available
4. Student should also practice creating, copying, moving and deleting files and folders.
5. Teacher should also demonstrate the Task Manager for explaining Task Management concept.
6. Teacher should also demonstrate the BIOS screen.