Bachelor of Commerce

Semester – Il

Paper Code –

BASICS OF COMPUTER - II

B.Com-I (Second Semester)
Basics of Computer-II
PAPER CODE:

Theory Paper Max Marks: 80
Time: 3 Hrs   **Internal marks: 20**

Note: - The Examiner shall set nine questions in all covering the whole syllabus. Question No.1 will be compulsory covering all the units and shall carry 8 small questions of 2 marks each. The rest of the eight questions will be set from all the four units. The examiner will set two questions from each unit out of which the candidate shall attempt four questions selecting one question from each unit. All the questions shall carry 16 marks each.

Unit-I

Types of software; Application and system software, multi programme, operating-system and its functions, Time sharing, multiprocessing.

Unit-II

Computer Applications: Computer application in Education, Commerce & Marketing and Management.

Unit-III

Introduction to windows: Types of windows, Windows as an operating system, Windows explorer, using clipboard, using paint brush, control panel installing a printer.

Unit-IV

Ms-Excel: Worksheet overview : Rows, Columns, Cell, Menus Creating worksheet, opening and saving worksheets,Formatting printing. Establishing Worksheet Links, Tables Creating and printing graphs. Macros, using V built-infunctions.

Suggested Readings:
1. Introduction of Information System ALEXISLEON
2. Introduction to essential tools. Sushila Madan.

CONTENTS

CHAPTER - 1

SOFTWARE AND OPERATING SYSTEM CONCEPTS

OBJECTIVES OF THIS LESSON

This lesson is aimed to make you understand the basic concepts of software and operating systems. Readers will be able to understand the following:

- Software and its different types such as programming software, system software, application software and other software types
- Application software and its various types such as general-purpose application packages, application-specific packages and customised application packages
- Operating system and its characteristics, desirable features of operating system
- Classification of operating systems and their families
- Functions of operating system, main functions, basic roles of operating system, OS as an extended machine and as a Resource Manager

STRUCTURE OF THIS LESSON

1.1   INTRODUCTION

The hardware alone can't perform any particular calculation, computation or manipulation without being instructed exactly what to do, when to do and how to do it. These instructions are very important and are called software.

The software acts as an interface between the user and the computer or a software can be defined as a complete set of instructions written by the programmer which enables the computer to obtain the solution to a problem.

Software may be viewed as a general term that is used to describe any single program or a group of programs.

In its most general form, software is a term used in contrast to hardware to refer to all programs which can be used on a particular computer system i.e. the term software is used to describe program sets needed to operate an information processing system.

1.2   SOFTWARE TYPES

Software is the means by which computer systems speak with computer users. Software forms the heart of computer systems.

Figure 1.1

Software, by definition, is the collection of computer programs, procedures and documentation that performs different tasks on a computer system. The term 'software' was first used by John Tukey in 1958. Briefly, computer software is the language in which a computer speaks. There are different types of computer software.

1.2.1   Programming Software

This is one of the most commonly known and popularly used forms of computer software. These software come in forms of tools that assist a programmer in writing computer programs. Computer programs are sets of logical instructions that make a computer system perform certain tasks. The tools that help the programmers in instructing a computer system include text editors, compilers and interpreters.

1.2.2   System Software

It helps in running the computer hardware and the computer system. System software is a collection of system programs; device drivers, servers, windowing systems and utilities. System software helps an application programmer in abstracting away from hardware, memory and other internal complexities of a computer.

1.2.3   Application Software

It enables the end users to accomplish certain specific tasks. Business software, databases and educational software are some forms of application software. Different word processors, which are dedicated for specialized tasks to be performed by the user, are other examples of application software.

1.2.4   Other Software Types

Apart from these three basic types of software, there are some other well-known forms of computer software like inventory management software, ERP, utility software, accounting software and others.

1.3   APPLICATION SOFTWARE

An application package or application program is the software that has been written to process or perform specific job. The term application indicates that the software is applied to the job at hand. application packages are available for all types of tasks. These programs are called Application Packages because they accomplish the processing required for a particular application. They may be for business applications, engineering designs, home applications, teaching aids etc.

An end-user wishing to use an application package has to define his own requirements by means of parameters, which are employed by the programs in the system to produce the specific results required. These are usually written in high-level languages. Of course, the application packages run under the control of the operating system.

Application software is developed to aid in any task that benefits from computation. It is a broad category, and encompasses software of many kinds, including the internet browser being used to display this page. This category includes:

- Business software
- Computer-aided design
- Databases
- Decision making software
- Educational software
- Image editing
- Industrial automation
- Mathematical software
- Medical software
- Molecular modelling software
- Quantum chemistry and solid state physics software
- Simulation software
- Spreadsheets
- Telecommunications (i.e., the Internet and everything that flows on it)
- Video editing software
- Video games
- Word processing
  and so on.

Application packages can be classified as:
- *General-purpose Application Packages*
- *Application-specific Packages*
- *Customised Application Packages*

1.3.1   General-purpose Application Packages

It is that class of application packages that perform quite commonly used day-to-day tasks and also increase the productivity very significantly and that's why these are also known as productivity packages.

Some important examples of this category include:

- *Word processing packages for processing and manipulating text*
- *Spreadsheet packages for calculating finances and data analysis*
- *CAD for designing or drafting*
- *Database packages for management of files, database, storage and retrieval of information*
- *Engineering design packages*
- *Communication packages*
- *Integrated packages, etc.*

Some integrated packages have been developed which combine the functions of word processing, spreadsheets, graphics, database management and communication into a single software. MS-Office, Framework and Symphony are good examples of Integrated Packages.

1.3.2   Application-specific Packages

It is the type of application packages specifically meant for accomplishing a uncommon application. Few important examples include :

* **General Application Packages**
   * *Payroll*
   * *Personnel Management*
   * *Attendance Management*
   and so on.
* **Business Application Packages**
   * *Inventory Control*
   * *Finance and Accounting*
   * *Marketing Analysis*
   * *MRP (Material Requirements Planning)*
   * *Human-resource Management*
   and so on
* **Scientific Application Packages**
   * *Computer-Aided Designing and Drafting (CADD)*
   * *SPSS (Statistical Package For Social Sciences)*
   * *Computer-Aided Manufacturing (CAM)*
   * *Statistical Analysis Software (SAS)*
   and so on.
* **Miscellaneous Application Packages**
   * *Computer-Based Learning (CBL)*
   * *MIDI (Musical Instrument Digital Interface) Package*
   * *Computer-Based Training (CBT)*
   and so on

1.3.3 Customised Application Packages

It is a kind of application packages developed by the professional programmers. It has become the trend of the present day Software Industry to develop such kind of packages. Natural Language Processing (NLP) is getting world-wide attention because these are non-procedural and are more closer to human conversation. This is trend has been geared up probably due to the development of the non-procedural 4GLs (4th Generation Languages). This trend will continue to grow as the development in multimedia, graphics, artificial intelligence, networking solutions enhance.

1.4 OPERATING SYSTEM

"Operating System (OS) is a collection of software written to provide the fundamental instructions that a computer needs to manage resources, such as memory, the file system, and processes".

In other words, OS is a master program that controls a computer's basic functions and allows other programs to access the computer's resources such as disk drive, printer, keyboard, and screen.

There are several definitions of operating system. Few of these are:

"Operating system is a set of system programs which controls all the computer's resources and provides the base upon which application programs can be written".
OR
"An operating system may be viewed as an organised collection of software extensions of hardware, consisting of control routines for operating a computer and for providing an environment for execution of programs".
OR
"An operating system is a set of procedures (manual and/or automatic) that enables people or group of people to share a computer installation efficiently".
OR
"An operating system is a program that act as an intermediary between a user of a computer and the computer hardware. The primary goals of an operating system are:
- *To make the computer system convenient to use and*
- *To use the computer hardware in an efficient manner"*
OR
"An operating system is an integrated collection of subsystems and further each subsystem consists of programs that perform specific duties. Just as the processor is the nucleus of the computer system, the operating system is the nucleus of all types software activities".

Examples of operating systems: *Linux, MS Windows 95, MS Windows NT, Windows XP, UNIX, DOS and OS/2.*
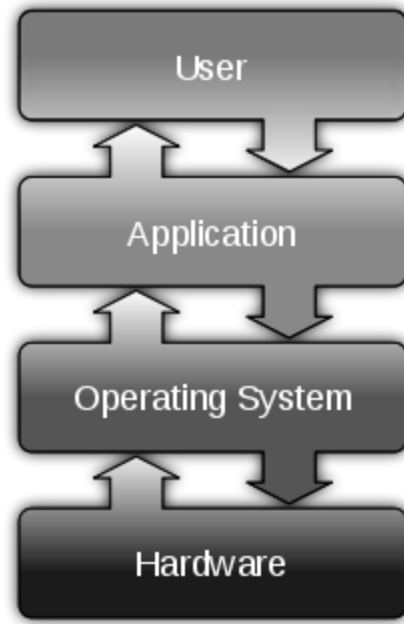
Fig. 1.2: Layers of Computer System

It co-ordinates all the hardware and software components of a computer

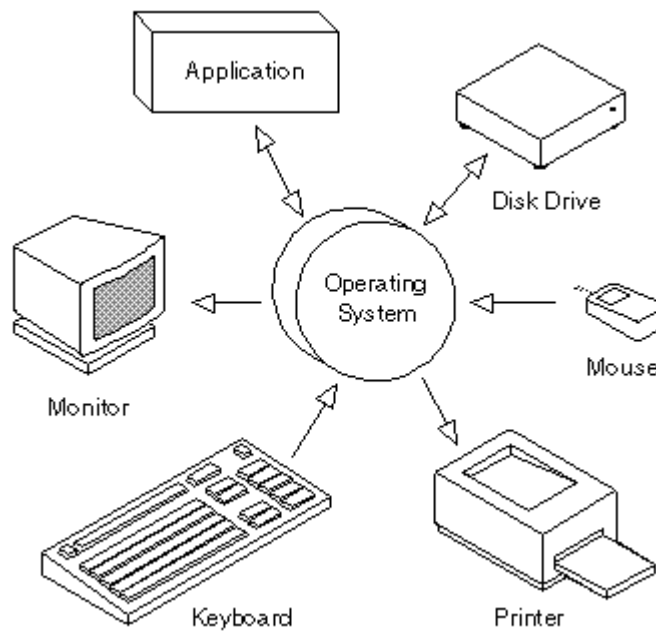**Fig. 1.3: OS as Co-ordinator**

The following two types of programs make up the operating system:

    i)   Control programs and
    ii) Processing programs

1.4.1   Control Programs

These programs oversee system operations and performs tasks such as input/output, scheduling, handling interrupts, and communication with computer operator or programmer. The control programs consist of the following :

a) Supervisor Programs
b) Job Control Programs
c) Input/Output Management Program

1.4.2   Processing Programs

These are executed under the supervision of control programs and are used by the programmer to simplify program operation for the computer system. They include language translator programs, link editors, library programs and a set of utility programs. These programs collectively automate the management of all the computing resources available in a computer system including CPU, all peripherals, and software. This integrated collection of programs provides more efficient computer operation. Improved operating convenience is another benefit of an operating system.

Typically, operating systems (OSs) are used in microcomputer systems. They require mass storage media such as magnetic tape or floppy disk. most microcomputers systems use operating systems only with floppy disk mass storage. For this reason, these operating systems are referred to as disk operating systems (DOS). The most commonly used operating systems on personal computers are MS-DOS and PC-DOS.

1.5   CHARACTERISTICS OF OPERATING SYSTEM

- *Sharing*
- *Concurrency*
- *Long-term Storage*
- *Non-determinacy*

1.6   DESIRABLE FEATURES OF OPERATING SYSTEM

- *Efficiency*
- *Reliability*
- *Small-Size*
- *Maintainability*

Thus the operating system is responsible for directing a given computer into a batch mono-programming system, a multi-programmed system, a time-sharing system or a real-time system. Many operating systems can handle both batch and real-time applications simultaneously.

1.7   BOOTING (OR BOOTSTRAPPING)

The process of loading the operating system into memory is known as booting. When a computer is turned on the operating system must be brought into the memory of computer from the hard-disk storage. The process is normally started by a small program called bootstrap loader. This program resides in a ROM as a firmware. A computer is designed to fetch its very first instruction from the ROM when power is turned on. The first instruction is bootstrap loader. It is very simple program sufficient only to direct the CPU to look for specific file on the disk memory, and executes the instructions stored in the file. The file contains machine codes to direct the CPU to continue loading the rest of the operating system into the memory. When the operating system is fully loaded into the memory, the computer is ready to accept user's commands.

1.8   FAMILY OF OPERATING SYSTEMS

The family of operating systems have evolved over the years:
a) Windows family of OS:

Windows 1.0
Windows 2.0
Windows 3.0 (the first version to make substantial commercial impact)
Windows 3.1x
Windows 95 (aka Windows 4.0)
Windows 98 (aka Windows 4.1)
Windows Me (aka Windows 4.2)
OS/2 (developed jointly with IBM)

Windows NT
Windows 2000 (aka Windows NT 5.0)
Windows XP (aka Windows NT 5.1)
Windows Server 2003 (aka Windows NT 5.2)
Windows Vista (to be released August 2006)
Windows Longhorn Server (to be released shortly after Windows Vista)
Microsoft Codename Blackcomb (to follow Vista)

b) Apple/Macintosh
Apple DOS
ProDOS
GS/OS
Lisa OS
A/UX
Mac OS
System 6
System 7 (code-named "Big Bang")
Mac OS 8
Mac OS 9
Mac OS X
Mac OS X v10.0 (aka Mac OS X 10.0 "Cheetah")
Mac OS X v10.1 (aka Mac OS X 10.1 "Puma")
Mac OS X v10.2 (aka Mac OS X 10.2 "Jaguar")
Mac OS X v10.3 (aka Mac OS X 10.3 "Panther")
Mac OS X v10.4 (aka Mac OS X 10.4 "Tiger")
Mac OS X v10.5 (aka Mac OS X 10.5 "Leopard")
Mac OS X Server
Darwin
c) Unix
d) Linux
e) Solaris.

1.9 FUNCTIONS OF OPERATING SYSTEM

The main functions of OS are:
1. It manages the hardware and software resources of the system. In a desktop computer, these resources include such things as the processor, memory, disk, etc.
2. It provides a stable, consistent way for applications to deal with the hardware without having to know all the details of the hardware.

1.9.1 Main Functions

OS acts as an interface between hardware and users. It controls overall operations of computers. It is mainly used for job management, data management, virtual memory management, input/output management, process management, security etc.

a) *Job Management:* OS manages the job waiting to be processed. It recognizes the jobs, identifies their priorities, allocates the memory for the job, schedules and finally runs each job at the appropriate moment.

b) *Data Management:* Data management keeps track of the data on disk, tape and optical storage devices. The operating system's file system knows where that data are physically stored.

c) *Virtual Storage Management:* OS is used for virtual memory management. OS makes possible to increase the capacity of main memory with out actually increasing its size.

d) *Input/output Management:* OS manages the input and output operation of computer. This applies to the flow of data among the different devices of computer and application programs.

e) *Process Management:* The main activities of process management are job queuing, job scheduling, keeping track of the status of each process etc.

f) *Protection and Security:* OS job is to secure data inside the memory of computer. Operating systems provide password protection to keep unauthorized users out of the system.

g) *User Interface:* OS acts as an interface between a user of a computer and the computer hardware.

1.9.2   Basic Roles of Operating System

a)   Easy interaction between human and computer.
b)   Starting computer operation automatically.
c)   Loading and scheduling users' programs/processes.
d)   Controlling I/O devices
e)   Managing various types of memories such as primary, secondary, cache etc.
f)   Providing security to users' jobs and files.
g)   Accounting hardware resources and handling network communication.
h)   Allowing users to share data and software among themselves.
i)   Preventing the system from unauthorized user, programs etc.

1.9.3   OS as an Extended Machine

The OS effectively isolates the hardware from the user. The user communicates only with the OS and it links the various languages and the systems and applications programs available. The OS fields all requests for services and totally eliminates the need for the user to deal with the hardware or related problems. Thus the operating system allows the user to concentrate on his application and prevents him for having to spend a lot of time determining how things are to be specifically accomplished by the hardware.

In this view, the function of an operating system is to prevent the user with the equivalent of an Extended Machine or Virtual Machine that is easier to program than the underlying hardware.

1.9.4   OS a Resource Manager

An operating system's major function is to manage the resources of the computer system. It allocates the resources on the basis of the user need and system capability. The four major functions of an operating system are:

i)   *File and Software Management*
ii)   *Input/Output and Peripheral Management*

iii) *Memory Management*

iv) *Processor (or CPU) Management*

As a Resource Manager, the operating system must perform the following functions for each resource viz. processor, memory, I/O, files :

a) *Keep track of status of each resource*

b) *Decide which job should get the resource and for how much time, according to some policy*

c) *Allocate the resource to the job decided*

d) *After the resource is used by the job for the allocated time, make the resource free*

1.10   CLASSIFICATION OF OPERATING SYSTEMS

Within the broad family of operating systems, these may be categorized based on the types of computers they control and the sort of applications they support. These may be classified in the following categories:

- *Single-user, Single-task Operating System*
- *Single-user, Multi-task Operating System*
- *Multi-user (or time-sharing) Operating System*
- *Multi-access Operating System*
- *Multi-processing Operating System*
- *Multi-tasking and Multi-threading Operating System*
- *Real-time Operating System*
- *Distributed Operating System*
- *Embedded Operating System*

Single-user, single task Operating System

As the name implies, this operating system is designed to manage the computer so that one user can effectively do one thing at a time. The Palm OS for Palm handheld computers is a good example of a modern single-user, single-task operating system. Other examples of such operating systems include MS-DOS, PC-DOS, etc.

Single-user, multi tasking Operating System

This operating system allows a computer to perform more than one task at a time. Microsoft's Windows and Apple's Mac OS (Leopard) platforms are both examples of operating systems that will let a single user have several programs in operation at the same time.

Multi-user (or time-sharing) Operating System

A multi-user operating system allows many different users to take advantage of the computer's resources simultaneously. UNIX, VMS and mainframe operating systems, such as *MVS*, are examples of multi-user operating systems.

These operating systems allow two or more users to run their respective programs at the same time by making all these programs resident in the memory of computer. Such operating systems are normally made to work on minicomputers and mainframe computers.

Examples : **VMS (on DEC Mainframes), UNIX, XENIX, MVS, etc.**
Multi-access Operating System

In a multi-access operating system, a user may submit a job by typing on a terminal and may use the terminal to monitor and control the job as it runs. These operating systems allow simultaneous access of a single application onto a computer system through two or more terminals.

The operating system shares the computing resources among the different jobs so that it appears to each user that he has entire machine to himself.

An example is provided by some dedicated transaction-processing systems, such as Airline Ticket Reservation Systems, that supports hundreds of active terminals under control of a single program.

Multiprocessing Operating System

It is that class of operating systems that have the ability to support more than one process at the same time i.e. allowing more than one programs to run concurrently on the multiple CPUs in a single computer system. These operating systems differ from the time-sharing (or multi-user) operating systems in the manner that these refer to utilisation of multiple CPUs.

In such operating system, the resources are allocated comfortably to the competing processes in a reasonable manner which results in a high throughput.

Examples : **OS/2 for high-end PCs, UNIX, MVS, etc.**

Multitasking and Multithreading Operating System

These operating systems have the capability to execute more than one task concurrently on a computer system having a single CPU. In these operating systems, CPU switches from one task to another so quickly that it gives the illusion to the user of executing all the programs (or tasks) at the same time.

Multithreading permits different portions of a single program to run concurrently and this it is having the ability of an operating system to execute different parts of a program (called threads) simultaneously. It requires the programmer to design the program so carefully that all the threads can run at the same time without interfering with each other.

Examples : **Windows 95/98, Windows NT, OS/2, etc.**

Real-time Operating Systems (RTOS)

Real-time operating systems are used to control machinery, scientific instruments and industrial systems.

These operating systems have the following peculiar characteristics:
- *Fast response time*
- *Feedback mechanism*
- *Reliability*

A primary objective of real-time operating systems is to provide quick response-times, and thus meet the scheduling deadlines. In the design of these operating systems, user-convenience and resource utilisation are of secondary concern.

These operating systems must be designed in such a manner that response-time to the external-stimulus is very immediate as the same are designed for the purpose of controlling and monitoring of external activities with timing constraints.

Such applications include :

- *Industrial Control*
- *Telephone Switching Equipments*
- *Flight-Control*
- *Real-time Simulators*
- *Few Military Applications*
  etc.

Examples:

Some examples of real time operating systems are:

- BLMX (Board-Level Multitasking eXecutive)
- BSO/RTOS (Boston Systems Office/ Real-time Operating System)
- CCP (Communication Control Program) Operating System for IBM System/3
- iRMX (Intel's 8086 family Real-time Multitasking Executive) Operating System
- DMERT (Duplex Multiple Environment Real-time) Operating System
  etc.

Distributed Operating Systems

A distributed operating system governs the operation of a distributed computer system and provides a virtual machine abstraction to its users. The key objective of a distributed operating system is transparency. Ideally, component and resource distribution should be hidden from users and application programs unless they explicitly demand otherwise.

The added services necessary for pooling of shared system resources include:

- *Global naming*
- *Distributed file system, and*
- *Facilities for distribution of computations, such as inter-node process communication and remote procedure calls.*

Embedded Operating System

Embedded operating systems are mainly executed on computers that control devices. These devices are mobile phones, TV sets etc. These systems consist of circuits and 32-bit microprocessors that control the functioning of various operations.

Apart from the above main criterion for classification of operating systems, there will be other criterion as well, like basing on whether it is open code or not and whether it is available for free and similar.

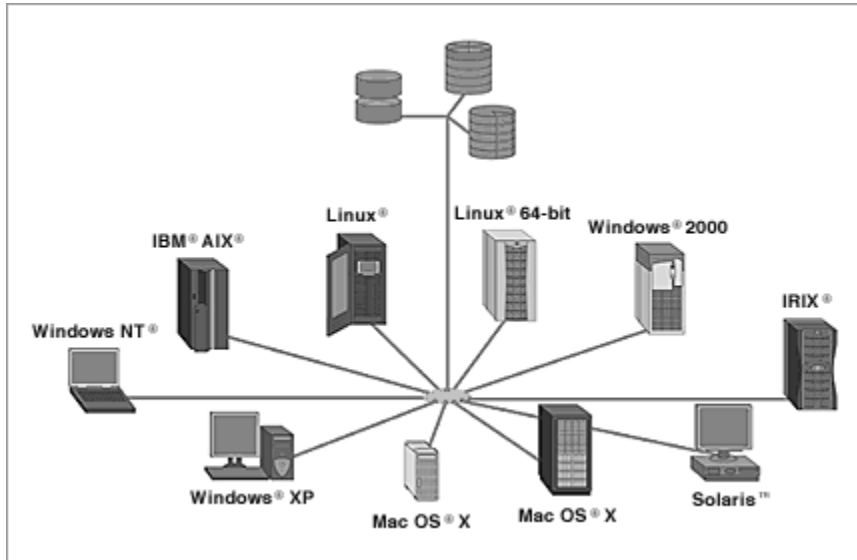Fig. 1.4 shows widely used operating systems in the market.

Fig. 1.4: Widely used OS

SUMMARY OF THE LESSON

You learnt the following in this lesson:

- The software acts as an interface between the user and the computer or a software can be defined as a complete set of instructions written by the programmer which enables the computer to obtain the solution to a problem.
- There are different types of computer software such as Programming Software, System Software and Application Software
- An application package or application program is the software that has been written to process or perform specific job.
- Operating System (OS) is a collection of software written to provide the fundamental instructions that a computer needs to manage resources, such as memory, the file system, and processes.
- The control programs consist of Supervisor Programs, Job Control Programs and Input/Output Management Program

- Windows Explorer displays the hierarchical structure of files, folders, and drives on your computer. It also shows any network drives that have been mapped to drive letters on your computer.
- Both in Windows 7 and Windows 8, the *Print Management* console is part of *Administrative Tools.*
- The Control Panel is a part of the Microsoft Windows graphical user interface which allows users to view and manipulate basic system **settings** and controls via applets, such as adding hardware, adding and removing software, controlling user accounts, and changing accessibility options.

SELF ASSESSMENT QUESTIONS AND EXERCISES

1. Differentiate between application and system software.
2. What is meant by GUI ? What are the important features of GUI ? Explain.
3. What are various components of GUI ? Explain.
4. What is a computer software ?
5. What is an operating system ?
6. Discuss the important functions of an operating system.
7. What is a bootstrap program ?
8. What is a File Manager ? Outline its responsibilities.
9. Is word-processing package a system software ? Justify your answer.
10. Discuss the features of an integrated package.
11. What are advantages of Windows environment ?
12. Enumerate functions of a monitor program.
13. Chart the family of operating system.
14. What are main features of Windows operating system?