

MP-104



Vardhaman Mahaveer Open University, Kota

Fundamentals of Information Technology

MP-104



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Fundamentals of Information Technology

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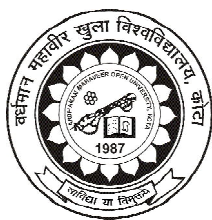
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Introduction

The course aims to develop an understanding of the learners for computer literacy, application, usage and application of Information Technology for their day to day activities.

Block I : Introduction will give a background knowledge to know the components of computers, systems and application softwares. A theoretical framework of computer languages and generations of computer will be discussed in the relevant units. **Block II : Operating Systems** highlights the desk operating system, windows and unix operating systems for operating the computers. **Block III: Application Softwares** will discuss important application softwares such as MS-Office, Mail Merge and Macro, MS Excel, MS Power Point and MS Access. These applications softwares will facilitate the learners to use computers for their business activities. **Block IV : Internet** consists of two units which will develop skills to use internet facility. **Block V: Information Technology** gives an overview of IT and application for advanced operations in computers. It consists of Fourth Generation Language, Virtual Reality, Video Conferencing, Artificial Intelligence, Super High ways and E-Commerce.



Vardhaman Mahaveer Open University, Kota

Fundamentals of Information Technology

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UNIT - 1 : INTRODUCTION TO COMPUTERS

Unit Structure

- 1.0 Objectives
- 1.1 Introduction
- 1.2 Evolution of Computers
- 1.3 Components of a Computer
- 1.4 Hardware V/S Software
- 1.5 Systems V/S Applications Software
- 1.6 Bits and Bytes
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- 1.8 RAM and ROM
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- 1.10 Summary
- 1.11 Key Words
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1.0 Objectives

After studying this unit you should be able to

- Understand the basic characteristics of computers,
- Understand how the computers evolved,
- Understand the components that make up a computer,
- Differentiate between hardware and software,
- Differentiate between system and application software,
- Understand the difference between bits and bytes,
- Classify devices as input and output devices,
- Differentiate between ROM and RAM, and
- Appreciate the use of various secondary storage devices.

1.1 Introduction

This unit aims at introducing you to today's most commonly used electronic device – the **computer**. The study of this unit will highlight the characteristics and evolution of computers. It will also help you to understand the basic terminology associated with computers. The word 'Computer' literally means to 'Compute' or to 'Calculate'. Stated simply, it is an electronic device which processes information based on the instructions provided, to generate the desired output. It, therefore, requires two types of input – raw data, and the set of instructions to process or act upon the data.

This can schematically be shown in Figure 1.1.

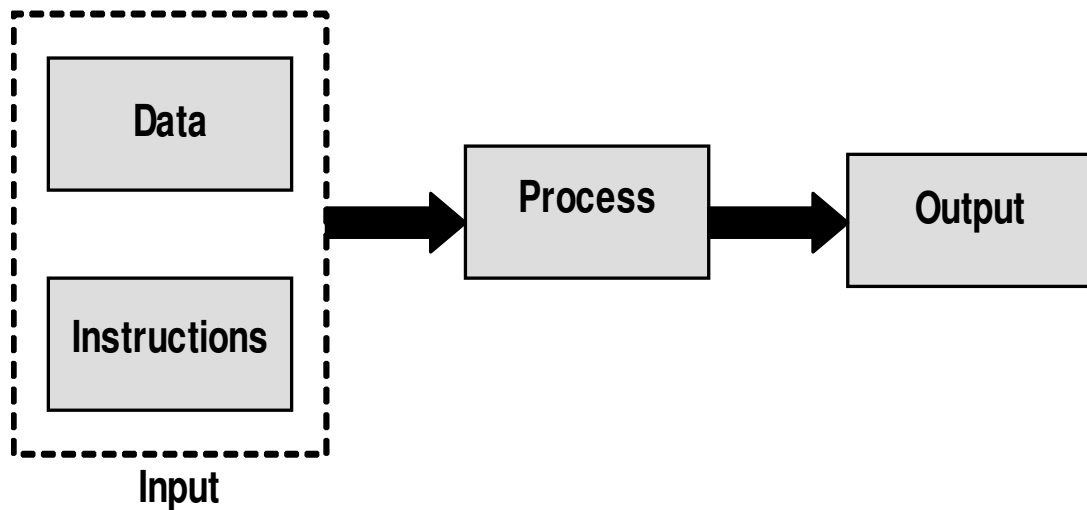


Figure 1.1 : Processing of Information

Data can be of any type – text, numeric, alpha-numeric, image, picture, sound etc. The instructions that act upon this data are also called the **program** or **software** in computer terminology. The characteristics of computers that have made them so powerful and universally useful are speed, accuracy, diligence, versatility and storage capacity as discussed below:

Speed

Computers work at an incredible speed. The speed with which it performs is way beyond human capabilities. As a comparison, it can do in one minute what a human being would probably take a lifetime!

When we refer to the speed of computers, we now talk in terms of milliseconds (hundredth of a second), microseconds (millionth of a second), nanoseconds (billionth of a second), and even picoseconds (trillionth of a second). A powerful computer is capable of performing about 3-4 million simple instructions per second.

Accuracy

In addition to being fast, computers are also accurate. Errors that may occur can almost always be attributed to human error (inaccurate data, poorly designed system or faulty instructions/programs written by the programmer) rather than technological weaknesses. In fact, a special term GIGO (Garbage In Garbage Out) has been coined to represent a scenario where faulty results are got due to inaccurate instructions or faulty data.

Diligence

Unlike human beings, computers are highly consistent. They do not suffer from human traits of boredom and tiredness resulting in lack of concentration. Computers, therefore, score high over human beings in performing voluminous and repetitive jobs.

Versatility

Computers are versatile machines and are capable of performing any task as long as it can be broken down into a series of logical steps. This means that their capability is, once again, limited only by

human intelligence. As is evident, in today's fast developing technology-world, it is almost impossible to find an area where computers are not being used. The presence of computers can be seen in every sphere – Railway/Air reservation, Banks, Hotels, Weather forecasting and many more.

Storage Capacity

Today's computers can store volumes of data. Unlike human memory where unimportant information is relegated to the back of the mind and forgotten as time progresses, a piece of information once recorded (or stored) in the computer, can never be forgotten and can be retrieved almost instantaneously! Information can, therefore, be retained as long as desired (using secondary storage – a type of detachable memory).

1.2 Evolution of Computers

The history of computers can be traced back to almost 2000 years ago, with the advent of **abacus**, a wooden rack holding two horizontal wires with beads strung on them. Numbers are represented using the position of beads on the rack. Fast and simple calculations can be carried out by appropriately placing the beads. In 1620, an English mathematician by the name **William Oughtred** invented the slide rule – a calculating device based on the principle of logarithms. It consisted of two graduated scales devised in such a manner that suitable alignment of one scale against the other, made it possible to perform additions, compute products etc. just by inspection.

Blaise Pascal, a French mathematician, is usually credited for building the first digital computer in 1642. He invented the mechanical calculating machine. Numbers were entered in this machine by dialing a series of numbered wheels. Another series of toothed wheels transferred the movements to a dial, which showed the results.

In 1671, **Gottfried von Leibnitz**, a German mathematician, invented a calculating machine which was able to add and perform multiplications. He invented a special **stepped gear** mechanism for introducing the addend digits, which is still being used.

The prototypes made by **Pascal** and **Leibnitz** were not used in many places. It was only about a century later that **Thomas of Colmar** created the first successful mechanical calculator which could add, subtract, multiply, and divide. A lot of improved desktop calculators by various inventors followed, such that by 1890 a range of improvements like accumulation of partial results, storage of past results, and printing of results were not uncommon.

1.2.1 The First Computer

Charles Babbage, a professor of mathematics at Cambridge University, England, realized that many long calculations usually consisted of a series of actions that were constantly repeated and hence could possibly be automated. By 1822, he designed an automatic calculating machine that he called the '**Difference Engine**'. It was intended to be steam powered and fully automatic (including printing of result tables), commanded by a fixed instruction program. In short, he developed a prototype of a computer which was 100 years ahead of time and is, therefore, considered as the **father of modern day computers**.

A step towards automated computing was the development of punched cards which were first successfully used by **Herman Hollerith**, who worked in the US Census Bureau in 1890. He along with

James Powers developed devices that could read information that had been punched into cards, without any human help. This resulted in reduced reading errors, increased workflow and availability of unlimited memory (punched cards could be used as easily accessible memory of unlimited size). These advantages were seen by various commercial companies and soon led to the development of improved punch-card using computers by companies like International Business Machines (IBM) and Remington.

1.2.2 Some Well Known Early Computers

Mark I

After World War II there was a need felt for advanced calculations. By that time, many reliable mechanical desk calculators had been developed. **Howard A. Aiken** of Harvard University, while working on his doctorate in physics, in the year 1937, designed a machine that could automatically perform a sequence of arithmetic operations. He completed this in 1944 and named it **Mark I**. This machine performed a multiplication and division at an average of about four and eleven seconds respectively. The results were printed at a rate of one result per five seconds.

ENIAC

The World War II also produced a large need for computer capacity especially for the military. New weapons were made for which trajectory tables and other essential data were needed. In 1942, Professors. **John P. Eckert** and **John W. Mauchly** at the Moore School of Engineering of the University of Pennsylvania, USA, decided to build a high speed computer to do the job. This was called the Electronic Numeric Integrator and Calculator (ENIAC). It used 18,000 vacuum tubes, about 1,800 square feet of floor space, and consumed about 180,000 watts of electrical power. It had punched cards I/O and its programs were wired on boards. ENIAC is accepted as the first successful high-speed electronic digital computer and was used from 1946 to 1955.

EDVAC

Fascinated by the success of ENIAC, **John Von Neumann**, a mathematician, undertook an abstract study of computation in 1945. In this he aimed to show that a computer should be able to execute any kind of computation by means of a proper programmed control. His ideas, referred to as '**stored program technique**', became essential for future generations of high-speed digital computers and were universally accepted. The basic idea behind the stored program concept was that data as well as instructions can be stored in the computer's memory to enable automatic flow of operations. Between 1947 and 1950, the Moore School personnel and the Ballistics Research Laboratory of the US army built a computer named Electronic Discrete Variable Automatic Computer (EDVAC), which was based on Von Neumann's concept of stored program.

UNIVAC

The Universal Automatic Computer (UNIVAC), developed in 1951, was the first digital computer to be produced and was installed in the Census Bureau. The first-generation stored-program computers needed a lot of maintenance, reached 70% to 80% reliability of operations and were used for almost 10 years. EDVAC and UNIVAC fell into this group of computers and were the first commercially available computers.

1.3 Components of a Computer

The computer system essentially comprises of three important parts – input device, central processing unit (CPU) and the output device. The CPU itself is made of three components namely, the arithmetic logic unit (ALU), memory unit, and the control unit. In addition to these, auxiliary storage/secondary storage devices are used to store data and instructions on a long-term basis.(Figure - 1.2)

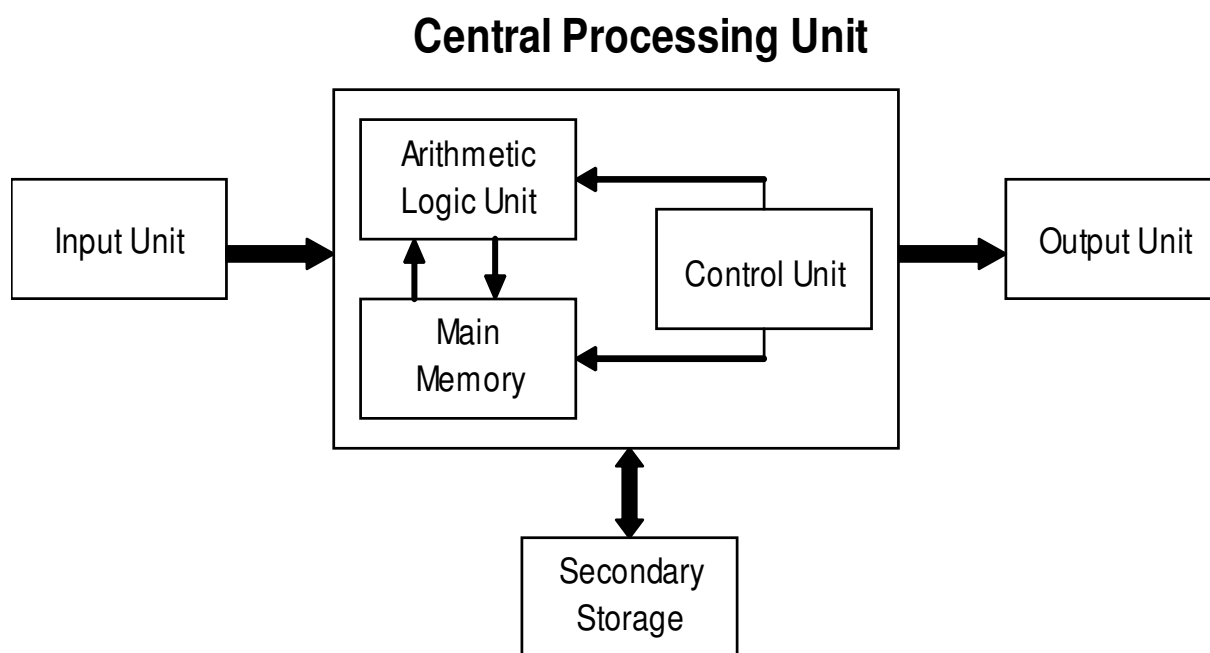


Figure 1.2 : Schematic Representation of a Computer

Input Unit

Data and instructions must be entered into the computer system for processing, and results obtained from computations must be displayed or recorded for the user. The input device serves the purpose of receiving data and instructions in a form that can be understood by the computer.

Central Processing Unit

Data and instructions (programs) are stored in the computer's memory after which all the major calculations and computations are carried out within the CPU. The CPU is also responsible for controlling the operations of various units of the computer system.

Arithmetic Logic Unit (ALU)

All calculations and comparisons, based on the instructions provided, are carried out within the ALU. It performs arithmetic functions like addition, subtraction, multiplication, division and also logical operations like greater than, less than and equal to.

Main Memory

The main memory holds data and instructions after input, till they are needed. It also holds the processed results that are awaiting output.

Control

The function of the control unit is to execute the instructions of a program, one by one, in the desired sequence. It interprets each instruction and then prompts its execution by one of the units like input, output, ALU, storage. For example, a comparison of two numbers (a logical operation) to be performed by the ALU may require loading the two numbers into the main memory which is a function performed by the control unit. It will then pass on the execution of the 'compare' function to the ALU.

Output Unit

The processed data, stored in the memory of the computer is sent to the output unit, which then converts it into a form that can be understood by the user. The output is usually produced in one of the two ways – on the display device, or on paper (hard copy)

Secondary Storage

Also termed as 'auxiliary' or 'backup' storage, it is typically used as a supplement to main storage. It is much cheaper than the main storage and stores large amount of data and instructions permanently. Hardware devices like magnetic tapes and disks fall under this category.

1.4 Hardware V/S Software

The electrical, electronic, mechanical and magnetic components that make up the computer system are together termed as '**hardware**'. These include components that are responsible for user input, display and mathematical processing. The CPU, disk drives, internal chips and wiring, modem, peripheral devices like the monitor, keyboard, mouse, printer, speakers etc. are together termed as computer hardware.

Computer hardware cannot perform any manipulation or calculation without being instructed as to what to do and how to do it. Programs (or instructions) are required to tell the computer what to do. The generic term for computer programs is '**software**'. Software comes in two main types – system software and application programs.

1.5 System V/S Application Softwares

System software consists of programs that control the operations of the computer system itself. It consists of a group of programs that control the operations of a computer equipment including functions like managing memory, managing peripherals, loading, storing, and is an interface between the application programs and the computer. MS DOS (Microsoft's Disk Operating System), UNIX are examples of system software.

Software that can perform a specific task for the user, such as word processing, accounting, budgeting or payroll, fall under the category of application software. Such programs run on top of an operating system (like Windows, UNIX, Linux, Macintosh) and are used to carry out specific functions. Word processors, spreadsheets, database management systems are all examples of general purpose application programs. We will study system software and application software in details in coming units.

1.6 Bits and Bytes

All information in the computer is handled using electrical components like the integrated circuits, semiconductors, all of which can recognize only two states – presence or absence of an electrical signal. Two symbols used to represent these two states are **0** and **1**, and are known as BITS (an abbreviation for **B**inary **D**igi**T**S). **0** represents the absence of a signal, **1** represents the presence of a signal. A BIT is, therefore, the smallest unit of data in a computer and can either store a **0** or **1**. Since a single bit can store only one of the two values, there can possibly be only four unique combinations:

00 01 10 11

Bits are, therefore, combined together into larger units in order to hold greater range of values.

BYTES are typically a sequence of eight bits put together to create a single computer alphabetical or numerical character. More often referred to in larger multiples, bytes may appear as Kilobytes (1,024 bytes), Megabytes (1,048,576 bytes), GigaBytes (1,073,741,824), TeraBytes (approx. 1,099,511,000,000 bytes), or PetaBytes (approx. 1,125,899,900,000,000 bytes).

Bytes are used to quantify the amount of data digitally stored (on disks, tapes) or transmitted (over the internet), and are also used to measure the memory and document size.

1.7 Input and Output Devices

The computer will be of no use unless it is able to communicate with the outside world. Input/Output devices are required by the users to communicate with the computer. In simple terms, input devices bring information INTO the computer and output devices bring OUT information from computer system. These input/output devices are also known as **peripherals** since they surround the CPU and memory of a computer system.

Some commonly used Input/Output devices are listed in table below.

Input Devices	Output Devices
Keyboard	Monitor
Mouse	LCD
Joystick	Printer
Scanner	Plotter
Light Pen	
Touch Screen	

1.7.1 Input Devices

Keyboard :

It is a text base input device that allows the user to input alphabets, numbers and other characters. It consists of a set of keys mounted on a board.

Alphanumeric Keypad :

It consists of keys for English alphabets, 0 to 9 numbers, and special characters like + - / * () etc.

Function Keys :

There are twelve function keys labeled F1, F2, F3, ... , F12. The functions assigned to these keys differ from one software package to another. These keys are also user programmable keys.

Special-function Keys :

These keys have special functions assigned to them and can be used only for those specific purposes. Functions of some of the important keys are defined below.

Enter :

It is similar to the 'return' key of the typewriter and is used to execute a command or program.

Spacebar : It is used to enter a space at the current cursor location.

Backspace :

This key is used to move the cursor one position to the left and also delete the character in that position.

Delete :

It is used to delete the character at the cursor position.

Insert :

Insert key is used to toggle between insert and overwrite mode during data entry.

Shift :

This key is used to type capital letters when pressed along with an alphabet key. Also used to type the special characters located on the upper-side of a key that has two characters defined on the same key.

Caps Lock :

Cap Lock is used to toggle between the capital lock feature. When 'on', it locks the alphanumeric keypad for capital letters input only.

Tab :

Tab is used to move the cursor to the next tab position defined in the document. Also, it is used to insert indentation into a document.

Ctrl :

Control key is used in conjunction with other keys to provide additional functionality on the keyboard.

Alt :

Also like the control key, Alt key is always used in combination with other keys to perform specific tasks.

Esc :

This key is usually used to negate a command. Also used to cancel or abort executing programs.

Numeric Keypad :

Numeric keypad is located on the right side of the keyboard and consists of keys having numbers (0 to 9) and mathematical operators (+ - * /) defined on them. This keypad is provided to support quick entry for numeric data.

Cursor Movement Keys :

These are arrow keys and are used to move the cursor in the direction indicated by the arrow (up, down, left, right).

Mouse :

The mouse is a small device used to point to a particular place on the screen and select in order to perform one or more actions. It can be used to select menu commands, size windows, start programs etc.

The most conventional kind of mouse has two buttons on top: the left one being used most frequently.

Mouse Actions

Left Click :

Used to select an item.

Double Click :

Used to start a program or open a file.

Right Click :

Usually used to display a set of commands.

Drag and Drop :

It allows you to select and move an item from one location to another. To achieve this place the cursor over an item on the screen, click the left mouse button and while holding the button down move the cursor to where you want to place the item, and then release it.

Joystick

The joystick is a vertical stick which moves the graphic cursor in a direction the stick is moved. It typically has a button on top that is used to select the option pointed by the cursor. Joystick is used as an input device primarily used with video games, training simulators and controlling robots.

Scanner

Scanner is an input device used for direct data entry from the source document into the computer system. It converts the document image into digital form so that it can be fed into the computer. Capturing information like this reduces the possibility of errors typically experienced during large data entry. Hand-held scanners are commonly seen in big stores to scan codes and price information for each of the items.

Light Pen

It is a pen shaped device used to select objects on a display screen. It is quite like the mouse (in its

functionality) but uses a light pen to move the pointer and select any object on the screen by pointing to the object.

Users of Computer Aided Design (CAD) applications commonly use the light pens to directly draw on screen.

Touch Screen

It allows the user to operate/make selections by simply touching the display screen. Common examples of touch screen include information kiosks, and bank ATMs.

1.7.2 Output Devices

Monitor

Monitor is an output device that resembles the television screen and uses a Cathode Ray Tube (CRT) to display information. The monitor is associated with a keyboard for manual input of characters and displays the information as it is keyed in. It also displays the program or application output. Like the television, monitors are also available in different sizes. LCD was introduced in the 1970s and is now applied to display terminals also. Its advantages like low energy consumption, smaller and lighter have paved its way for usage in portable computers (laptops).

Printer

Printers are used to produce paper (commonly known as hardcopy) output. Based on the technology used, they can be classified as **Impact** or **Non-impact** printers. **Impact printers** use the typewriting printing mechanism wherein a hammer strikes the paper through a ribbon in order to produce output. Dot-matrix and Character printers fall under this category.

Non-impact printers do not touch the paper while printing. They use chemical, heat or electrical signals to etch the symbols on paper. Inkjet, Deskjet, Laser, Thermal printers fall under this category of printers. When we talk about printers we refer to two basic qualities associated with printers: resolution, and speed. **Print resolution** is measured in terms of number of dots per inch (dpi). **Print speed** is measured in terms of number of characters printed in a unit of time and is represented as characters-per-second (cps), lines-per-minute (lpm), or pages-per-minute (ppm).

Plotter

Plotters are used to print graphical output on paper. It interprets computer commands and makes line drawings on paper using multicoloured automated pens. It is capable of producing graphs, drawings, charts, maps etc. Computer Aided Engineering (CAE) applications like CAD (Computer Aided Design) and CAM (Computer Aided Manufacturing) are typical usage areas for plotters.

1.8 RAM and ROM

Computer's internal memory can be classified into two types – RAM and ROM.

RAM (Random Access Memory) is the central storage unit in a computer system. It is the place in a computer where the operating system, application programs and the data in current use are kept temporarily

so that they can be accessed by the computer's processor during processing. The more RAM a computer has, the more data a computer can manipulate. Random access memory, also called the Read/Write memory, is the temporary memory of a computer. It is said to be 'volatile' since its contents are accessible only as long as the computer power is on. The contents of RAM are cleared once the computer power is turned off.

ROM or Read Only Memory is a special type of memory in which can only be read and contents of memory are not lost even when the computer is switched off. It typically contains manufacturer's instructions. Among other things, ROM also stores an initial program called the 'bootstrap loader' whose function is to start the computer software operation, once the power is turned on.

Read-only memories can be **manufacturer-programmed** or **user-programmed**. While manufacturer-programmed ROMs have data burnt into the circuitry, user-programmed ROMs can have the user load and then store read-only programs. PROM or Programmable ROM is the name given to such ROMs.

Information once stored on the ROM or PROM chip cannot be altered. However, another type of memory called EPROM (Erasable PROM) allows a user to erase the information stored on the chip and reprogram it with new information. EEPROM (Electrically EPROM) and UVEEPROM (Ultra Violet EPROM) are two types of EPROMs.

1.9 Secondary Storage Devices

RAM is volatile memory having a limited storage capacity. Secondary/auxiliary storage is storage other than the RAM. These include devices that are peripheral and are connected and controlled by the computer to enable permanent storage of programs and data. Magnetic medium was found to be fairly inexpensive and long lasting medium and, therefore, became the preferred choice for auxiliary storage. Floppy disks and hard disks fall under this category. The newer forms of storage devices are optical storage devices like CDs, DVDs, Pen drive, Zip drive etc.

Floppy Disk

These are small removable disks that are plastic coated with magnetic recording material. Floppy disks are typically 3.5² in size (diameter) and can hold 1.44 MB of data. This portable storage device is a rewritable media and can be reused a number of times.

Floppy disks are commonly used to move files between different computers. The main disadvantage of floppy disks is that they can be damaged easily and, therefore, are not very reliable.

Hard Disk

Hard disks are made up of rigid material and are usually a stack of metal disks sealed in a box. The hard disk and the hard disk drive exist together as a unit and are a permanent part of the computer where data and programs are saved. These disks have storage capacities ranging from 1GB to 80 GB and more. Hard disks are also rewritable and are more reliable when compared with floppies.

Depending on the way they are packaged, hard disks can be classified as **Disk packs** or **Winchester disks**. Disk packs are removable, in the sense that they can be removed and kept offline when not in use.

They must be mounted on the disk drive before use. Winchester disks on the other hand, consist of disk platters sealed in a contamination-free container and form a permanent component of the computer.

Compact Disk

Compact Disk (CD) is portable disk having data storage capacity between 650-700 MB. It can hold large amount of information such as music, full-motion videos, and text etc. It contains digital information that can be read, but cannot be edited. Separate drives exist for reading and writing CDs. Since it is a very reliable storage media, it is very often used as a medium for distributing large amount of information to large number of users. In fact today most of the software is distributed through CDs.

Digital Versatile Disk

Digital Versatile Disk (DVD) is similar to a CD but has larger storage capacity and enormous clarity. Depending upon the disk type it can store several Gigabytes of data as compared to 650MB of a CD. DVDs are primarily used to store music or movies and can be played back on your television or the computer too. They are not rewritable media.

1.10 Summary

In this unit, you have studied the evolution of a computer from a simple device like the abacus to the more sophisticated ones as seen today, and its characteristics (speed, accuracy, diligence, versatility, and storage capacity) that have contributed towards making it such a popular device. The differences between concepts like hardware/software, system/application software, bits/bytes, ROM/RAM was also explained. Various types of input, output and secondary storage devices along with their usages, were also studied.

1.11 Key Words

- **Computer:** A computer is an electronic device which receive inputs from user process inputs as per instruction and produce output,
- **RAM:** Random Access memory is internal memory of computer which is volatile in nature.
- **ROM:** Read Only Memory is also internal memory which is non-volatile in nature.
- **Floppy:** Secondary storage device used to store data based on magnetic properties.
- **Hard Disk:** Secondary Storage used to store every thing that we do on a computer.
- **CD:** Compact Disk is also secondary storage device based on optical properties.

1.12 Self Assessment Test

1. Identify the characteristics of a computer that have contributed towards making it such a popular device.
2. What unique features classify computers into different generations?
3. What are the basic components of a computer system?
4. Differentiate between RAM and ROM.

5. State TRUE or FALSE
- a. All code or data is stored and processed in computers using two symbols – 0 and 1.
 - b. A 'Byte' is a group of four bits and is often used to store characters.
6. Explain various input and output devices known to you.

1.13 Reference Books

- First course on computers by Sanjay Saxena, Vikash Publishing House.
- Fundamental of IT by Leon and Leon.
- Fundamental of Computers by P.K Sinha
- Fundamental of Computers by B.Ram
- Computer Today

UNIT - 2: SOFTWARE AND COMPUTER LANGUAGES

Unit Structure

- 2.0 Objectives
- 2.1 Introduction of Software
- 2.2 Types of Software
- 2.3. Application Software V/S System Software
- 2.4 Computer Language
- 2.5 History of Computer Languages
- 2.6 Classification of Computer Languages
- 2.7 Compiler
- 2.8 Linker
- 2.9 Interpreter
- 2.10 High Level Languages
- 2.11 Summary
- 2.12 Key Words
- 2.13 Self Assessment Test
- 2.14 Reference Books

2.0 Objectives

After reading this unit you should be able to understand

- Requirement of Software
- Types of Software
- Need of System software
- Need of application software
- Need for computer languages
- Classification of Computer Languages
- Concept and need of assembler, compiler, linker, and interpreter
- Concepts of object-oriented programming languages
- Characteristics of a programming language

2.1 Introduction of Software

Computer software, or just software, is the collection of computer programs and related data that provide the instructions telling a computer what to do. The term was coined to contrast to the old term hardware. In contrast to hardware, software is intangible, meaning it “cannot be touched”.

Software includes all the various forms and roles that digitally stored data may have and play in a computer (or similar system), regardless of whether the data is used as code for a CPU, or other interpreter, or whether it represents other kinds of information. The types of software include web pages developed in languages and frameworks like HTML, PHP, Perl, JSP, ASP.NET, XML, and desktop applications like Open Office, Microsoft Word developed in languages like C, C++, Java, C#, or Smalltalk. Application

software usually runs on an underlying software operating systems such as Linux or Microsoft Windows. Software (or firmware) is also used in video games and for the configurable parts of the logic systems of automobiles, televisions, and other consumer electronics.

At the complete level, executable code consists of machine language instructions specific to an individual processor. A machine language consists of groups of binary values signifying processor instructions that change the state of the computer from its preceding state. Programs are an ordered sequence of instructions for changing the state of the computer in a particular sequence. It is usually written in high-level programming languages that are easier and more efficient for humans to use (closer to natural language) than machine language. High-level languages are compiled or interpreted into machine language object code. Software may also be written in an assembly language, essentially, a mnemonic representation of a machine language using a natural language alphabet. Assembly language must be assembled into object code via an assembler.

2.2 Types Of Software

Practical Computer systems divide software systems into three major classes:-

2.1 System software

2.2 Programming software

2.3 Application software.

2.2.1 System software

System software helps run the computer hardware and computer system. System software is computer software designed to operate the computer hardware and to provide and maintain a platform for running application software. The most important types of system software are:

- The computer BIOS and device firmware, which provide basic functionality to operate and control the hardware connected to or built into the computer.
- The operating system, which allows the parts of a computer to work together by performing tasks like transferring data between memory and disks or rendering output onto a display device. It also provides a platform to run high-level system software and application software.
- Utility software, which helps to analyze, configure, optimize and maintain the computer.

System software is usually not what a user would buy a computer for - instead, it can be seen as the basics of a computer which come built-in or pre-installed. In contrast to system software, software that allows users to do things like create text documents, play games, listen to music, or surf the web is called application software.

Types of system software programs

System software helps use the operating system and computer system. It includes diagnostic tools, compilers, servers, windowing systems, utilities, language translator, data communication programs, data management programs and more. The purpose of system software is to insulate the applications programmer as much as possible from the details of the particular computer complex being used, especially memory and other hardware features, and such accessory devices as communications, printers, readers, displays, keyboards, etc.

Specific kinds of system software include:

- Loaders
- Linkers
- Utility software
- Desktop environment / Graphical user interface
- Shells
- BIOS
- Hypervisors
- Boot loaders

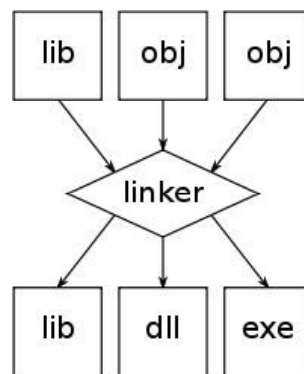
Loader

In computing, a loader is the part of an operating system that is responsible for loading programs, one of the essential stages in the process of starting a program. Loading a program involves reading the contents of executable file, the file containing the program text, into memory, and then carrying out other required preparatory tasks to prepare the executable for running. Once loading is complete, the operating system starts the program by passing control to the loaded program code.

In many operating systems the loader is permanently resident in memories, although some operating systems that support virtual memory may allow the loader to be located in a region of memory that is pageable. In the case of operating systems that support virtual memory, the loader may not actually copy the contents of executable files into memory, but rather may simply declare to the virtual memory subsystem that there is a mapping between a region of memory allocated to contain the running program's code and the contents of the associated executable file. (See memory-mapped file.)

Linker:-

“ld (Unix)” redirects here. For the GNU Project's implementation, see GNU linker.



An illustration of the linking process. Object files and static libraries are assembled into a new library or executable. In computer science, a linker or link editor is a program that takes one or more objects generated by a compiler and combines them into a single executable program. In IBM mainframe environments such as OS/360 this program is known as a linkage editor.

On Unix variants the term loader is often used as a synonym for linker. Because this usage blurs the distinction between the compile-time process and the run-time process, this article will use linking for the

former and loading for the latter. However, in some operating systems the same program handles both the jobs of linking and loading a program.

Utility software

Utility software is a kind of system software designed to help analyze, configure, optimize and maintain the computer. A single piece of utility software is usually called a utility or tool. Utility software should be contrasted with application software, which allows users to do things like creating text documents, playing games, listening to music or surfing the web. Rather than providing these kinds of user-oriented or output-oriented functionality, utility software usually focuses on *how* the computer infrastructure (including the computer hardware, operating system, application software and data storage) operates. Due to this focus, utilities are often rather technical and targeted at people with an advanced level of computer knowledge. Most utilities are highly specialized and designed to perform only a single task or a small range of tasks. However, there are also some utility suites that combine several features in one software. Most major operating systems come with several pre-installed utilities.

Desktop environment

In graphical computing, a desktop environment (DE) commonly refers to a style of graphical user interface (GUI) that is based on the desktop metaphor which can be seen on most modern personal computers today. These graphical interfaces are designed to assist the user in easily accessing and configuring (or modifying) the most important (or frequently accessed) specific Operating System (OS) packed features, yet it is not meant to give access to the whole vast feature set found in an OS, reason for which the traditional, yet less intuitive, command-line interface (CLI) is still in use when full control over the OS is required.

A desktop environment typically consists of icons, windows, toolbars, folders, wallpapers, shortcuts and desktop widgets. Software which provides a desktop environment might also provide drag and drop functionality and other features which make the desktop metaphor more complete. On the whole, a desktop environment is to be an intuitive way for the user to interact with the computer using concepts which are similar to those used when interacting with the physical world, such as buttons and windows.

Shell

A shell is a piece of software that provides an interface for users to an operating system which provides access to the services of a kernel. However, the term is also applied very loosely to applications and may include any software that is “built around” a particular component, such as web browsers and email clients that are “shells” for HTML rendering engines. The name shell originates from shells being an outer layer of interface between the user and the innards of the operating system (the kernel).

Operating system shells generally fall into one of two categories: command-line and graphical. Command-line shells provide a command-line interface (CLI) to the operating system, while graphical shells provide a graphical user interface (GUI). In either category the primary purpose of the shell is to invoke or “launch” another program; however, shells frequently have additional capabilities such as viewing the contents of directories.

BIOS

The BIOS is boot firmware, designed to be the first code run by a PC when powered on. The initial function of the BIOS is to identify, test, and initialize system devices such as the video display card, hard disk, floppy disk and other hardware. The BIOS sets the machine hardware into a known state, so that software stored on compatible media can be loaded, executed, and given control of the PC. This process is known as booting, or booting up, which is short for bootstrapping.

BIOS

BIOS programs are stored on a chip and are built to work with various devices that make up the complementary chipset of the system. They provide a small library of basic input/output functions that can be called to operate and control the peripherals such as the keyboard, text display functions and so forth. In the IBM PC and AT, certain peripheral cards such as hard-drive controllers and video display adapters carried their own BIOS extension ROM, which provided additional functionality. Operating systems and executive software, designed to supersede this basic firmware functionality, will provide replacement software interfaces to applications.

It includes a combination of the following:

- device drivers
- operating systems
- servers
- utilities
- windowing systems

2.2.2 Programming software

Programming software usually provides tools to assist a programmer in writing computer programs, and software using different programming languages in a more convenient way. The tools include:

- * compilers
- * debuggers
- * interpreters
- * linkers
- * text editors

An Integrated development environment (IDE) is a single application that attempts to manage all these functions.

2.2.3 Application Software

Application software allows end users to accomplish one or more specific (not directly computer development related) tasks. Typical applications include:

- * industrial automation
- * business software
- * video games
- * quantum chemistry and solid state physics software
- * telecommunications (i.e., the Internet and everything that flows on it)
- * databases
- * educational software

- * medical software
- * military software
- * molecular modeling software
- * image editing
- * spreadsheet
- * simulation software
- * Word processing
- * Decision making software

Application software, also known as applications or apps, is computer software designed to help the user to perform singular or multiple related specific tasks. Examples include Enterprise software, Accounting software, Office suites, Graphics software and media players.

Application software is contrasted with system software and middleware, which manage and integrate a computer's capabilities, but typically do not directly apply them in the performance of tasks that benefit the user. A simple, if imperfect analogy in the world of hardware would be the relationship of an electric light bulb (an application) to an electric power generation plant (a system). The power plant merely generates electricity, not itself of any real use until harnessed to an application like the electric light that performs a service that benefits the user.

In computer science, an application is a computer program designed to help people perform a certain type of work. An application thus differs from an operating system (which runs a computer), a utility (which performs maintenance or general-purpose chores), and a programming language (with which computer programs are created). Depending on the work for which it was designed, an application can manipulate text, numbers, graphics, or a combination of these elements.

Application software classification

There are many types of application software:

- * An application suite consists of multiple applications bundled together. They usually have related functions, features and user interfaces, and may be able to interact with each other, e.g. open each other's files. Business applications often come in suites, e.g. Microsoft Office, OpenOffice.org, and iWork, which bundle together a word processor, a spreadsheet, etc.; but suites exist for other purposes, e.g. graphics or music.
- * Enterprise software addresses the needs of organization processes and data flow, often in a large distributed environment. (Examples include Financial, Customer Relationship Management, and Supply Chain Management). Note that Departmental Software is a sub-type of Enterprise Software with a focus on smaller organizations or groups within a large organization. (Examples include Travel Expense Management, and IT Helpdesk)
- * Enterprise infrastructure software provides common capabilities needed to support enterprise software systems. (Examples include Databases, Email servers, and Network and Security Management)

- * Information worker software addresses the needs of individuals to create and manage information, often for individual projects within a department, in contrast to enterprise management. Examples include time management, resource management, documentation tools, analytical, and collaborative. Word processors, spreadsheets, email and blog clients, personal information system, and individual media editors may aid in multiple information worker tasks.
- * Content access software is software used primarily to access content without editing, but may include software that allows for content editing. Such software addresses the needs of individuals and groups to consume digital entertainment and published digital content. (Examples include Media Players, Web Browsers, Help browsers, and Games).
- * Educational software is related to content access software, but has the content and/or features adapted for use in by educators or students. For example, it may deliver evaluations (tests), track progress through material, or include collaborative capabilities.
- * Simulation software are computer software for simulation of physical or abstract systems for either research, training or entertainment purposes.
- * Media development software addresses the needs of individuals who generate print and electronic media for others to consume, most often in a commercial or educational setting. This includes Graphic Art software, Desktop Publishing software, Multimedia Development software, HTML editors, Digital Animation editors, Digital Audio and Video composition, and many others.
- * Product engineering software is used in developing hardware and software products. This includes computer aided design (CAD), computer aided engineering (CAE), computer language editing and compiling tools, Integrated Development Environments, and Application Programmer Interfaces.

2.3 Application Software V/S System Software

Actually, a system software is any computer software which manages and controls computer hardware so that application software can perform a task. Operating systems, such as Microsoft Windows, Mac OS X or Linux, are prominent examples of system software. System software contrasts with application software, which are programs that enable the end-user to perform specific, productive tasks, such as word processing or image manipulation.

System software performs tasks like transferring data from memory to disk, or rendering text onto a display device. Specific kinds of system software include loading programs, operating systems, device drivers, programming tools, compilers, assemblers, linkers, and utility software.

Software libraries that perform generic functions also tend to be regarded as system software, although the dividing line is fuzzy; while a C runtime library is generally agreed to be part of the system, an OpenGL or database library is less obviously so.

If system software is stored on non-volatile memory such as integrated circuits, it is usually termed firmware while an application software is a subclass of computer software that employs the capabilities of

a computer directly and thoroughly to a task that the user wishes to perform. This should be contrasted with system software which is involved in integrating a computer's various capabilities, but typically does not directly apply them in the performance of tasks that benefit the user. In this context the term application refers to both the application software and its implementation.

A simple, if imperfect analogy in the world of hardware would be the relationship of an electric light bulb (an application) to an electric power generation plant (a system). The power plant merely generates electricity, not itself of any real use until harnessed to an application like the electric light that performs a service that benefits the user. Typical examples of software applications are word processors, spreadsheets, and media players.

Multiple applications bundled together as a package are sometimes referred to as an application suite. Microsoft Office and OpenOffice.org, which bundle together a word processor, a spreadsheet, and several other discrete applications, are typical examples. The separate applications in a suite usually have a user interface that has some commonality making it easier for the user to learn and use each application. And often they may have some capability to interact with each other in ways beneficial to the user. For example, a spreadsheet might be able to be embedded in a word processor document even though it had been created in the separate spreadsheet application.

User-written software tailors systems to meet the user's specific needs. User-written software include spreadsheet templates, word processor macros, scientific simulations, graphics and animation scripts. Even email filters are a kind of user software. Users create this software themselves and often overlook how important it is.

In some types of embedded systems, the application software and the operating system software may be indistinguishable to the user, as in the case of software used to control a VCR, DVD player or Microwave Oven.

2.4 Computer Language

Computer can perform given task correctly with high speed on the basis of pre-defined instructions called computer programs. To give instruction to the computer some language needed to which computer can follow. Hence, computer languages were developed to give instructions to computer to do some task, to solve mathematical problem or to handle large volume of data with accuracy. Computer languages were developed on evolving basis. Development of computer languages advances with the expansion of uses of computer. In the past initially uses of computer were limited in laboratories and languages used were complicated, more technical expertise needed. As uses of computer reaches commercial field and to common man languages became easier.

2.5 History of Computer Languages

Ever since, the invention of Charles Babbage's difference engine in 1822, computers have required a means of instructing them to perform a specific task. This means is known as programming language. Computer languages were first composed of a series of steps to wire a particular program; these morphed into a series of steps keyed into the computer and then executed; later these languages acquired advanced features such as logical branching and object orientation. The computer languages of the last fifty years

have come in two stages, the first major languages and the second major languages, which are in use today.

In the beginning, Charles Babbage's difference engine could only be made to execute tasks by changing the gears, which executed the calculations. Thus, the earliest form of a computer language was physical motion. Eventually, physical motion was replaced by electrical signals when the US Government built the ENIAC in 1942. It followed many of the same principles of Babbage's engine and hence, could only be "programmed" by presetting switches and rewiring the entire system for each new "program" or calculation. This process proved to be very tedious.

In 1945, John Von Neumann was working at the Institute for Advanced Study. He developed two important concepts that directly affected the path of computer programming languages. The first was known as "shared-program technique". This technique stated that the actual computer hardware should be simple and not need to be hand-wired for each program. Instead, complex instructions should be used to control the simple hardware, allowing it to be reprogrammed much faster.

The second concept was also extremely important to the development of programming languages. Von Neumann called it "conditional control transfer". This idea gave rise to the notion of subroutines, or small blocks of code that could be jumped to in any order, instead of a single set of chronologically ordered steps for the computer to take. The second part of the idea stated that computer code should be able to branch based on logical statements such as IF THEN, and looped such as with a FOR statement. "Conditional control transfer" gave rise to the idea of "libraries", which are blocks of code that can be reused over and over.

In 1949, a few years after Von Neumann's work, the language Short Code appeared. It was the first computer language for electronic devices and it required the programmer to change its statements into 0's and 1's by hand. Still, it was the first step towards the complex languages of today. In 1951, Grace Hopper wrote the first compiler, A-0. A compiler is a program that turns the language's statements into 0's and 1's for the computer to understand. This led to faster programming, as the programmer no longer had to do the work by hand.

In 1957, the first of the major languages appeared in the form of FORTRAN. Its name stands for FORMula TRANSlating system. The language was designed at IBM for scientific computing. The components were very simple, and provided the programmer with low-level access to the computers innards. Today, this language would be considered restrictive as it only included IF, DO, and GOTO statements, but at the time, these commands were a big step forward. The basic types of data in use today got their start in FORTRAN, these included logical variables (TRUE or FALSE), and integer, real and double-precision numbers.

Though FORTRAN was good at handling numbers, it was not so good at handling input and output, which mattered most to business computing. Business computing started to take off in 1959, and because of this, COBOL was developed. It was designed from the ground up as the language for businessmen. Its only data types were numbers and strings of text. It also allowed for these to be grouped into arrays and records, so that data could be tracked and organized better. It is interesting to note that a COBOL program is built in a way similar to an essay, with four or five major sections that build into an elegant whole. COBOL statements also have a very English-like grammar, making it quite easy to learn. All of these features were designed to make it easier for the average business to learn and adopt it.

In 1958, John McCarthy of MIT created the LISP Processing (or LISP) language. It was designed for Artificial Intelligence (AI) research. Because it was designed for such a highly specialized field, its syntax has rarely been seen before or since. The most obvious difference between this language and other languages is at the basic and only type of data is the list, denoted by a sequence of items enclosed by parenthesis. LISP programs themselves are written as a set of lists, so that LISP has the unique ability to modify itself, and hence grow on its own. The LISP syntax was known as “Cambridge Polish,” as it was very different from standard Boolean logic (Wexelblat, 177):

X V y – Cambridge Polish, what was used to describe the LISP program
 OR(x,y) – parenthesized prefix notation, what was used in the LISP program
 x OR y – standard Boolean logic
 LISP- remains in use today because its highly specialized and abstract nature.

The Algol language was created by a committee for scientific use in 1958. its major contribution is being the root of the tree that has led to such languages as Pascal, C, C++, and Java. It was also the first language with a formal grammar, known as Backus-Naar Form or BNF (McGraw-Hill Encyclopedia of Science and Technology, 454). Though Algol implanted some novel concepts, such as recursive calling of functions, the next version of the language, Algol 68, became bloated and difficult to use. This lead to the adoption of smaller and more compact languages, such as Pascal.

Pascal was begun in 1968 by Niklaus Wirth. Its development was mainly out of necessity for a good teaching tool. In the beginning, the language designers had no hope for it to enjoy widespread adoption. Instead, they concentrated on developing good tools for teaching such as debugger and editing system and support for common early microprocessor machines, which were in use in teaching institutions.

Pascal was designed in a very orderly approach; it combined many of the best features of the languages in use at the time, COBOL, FORTRAN, and ALGOL. While doing so, many of the irregularities and oddball statements of these languages were cleaned up, which helped it gain users. The combination of features, input/output and solid mathematical features, made it a highly successful language. Pascal also improved the “pointer” data type, a very powerful feature of any language that implements it. It also added a CASE statement that allowed instructions to branch like a tree in such a manner.:

CASE expression OF
 possible-expression-value-1:
 statements to execute...
 possible-expression-value-2:
 statements to execute...

END

Pascal also helped the development of dynamic variables, which could be created while a program was being run, through the NEW and DISPOSE commands. However, Pascal did not implement dynamic arrays, or groups of variables, which proved to be needed and led to its downfall. Wirth later created a successor to Pascal, Modula-2, but by the time it appeared, C was gaining popularity and users at rapid pace.

C was developed in 1972 by Dennis Ritchie while working at Bell Labs in New Jersey. The transition in usage from the first major languages to the major languages of today occurred with the transition between Pascal and C. its direct ancestors are B and BCPL, but its similarities to Pascal are quite obvious. All of the features of Pascal, including the new ones such as the CASE statement are available in C. C uses pointers extensively and was built to be fast and powerful at the expense of being hard to read. But because it fixed most of the mistakes Pascal had, it won over former-Pascal users quite rapidly.

Ritchie developed C for the new Unix system being created at the same time. Because of this, C and Unix go hand in hand. Unix gives C such advanced features as dynamic variables, multitasking, interrupt handling, forking and strong, low- level, input-output. Because of this, C is very commonly used to program operating systems such as Unix, Windows, the MacOS, and Linux.

In the late 1970's and early 1980's, a new programming method was being developed. It was known as Object Oriented Programming, or OOP. Objects are pieces of data that can be packed and manipulated by the programmer. Bjarne Stroustrup liked this method and developed extensions to C known as "C With Classes." This set of extensions developed into the full-featured language C++, which was released in 1983.

C++ was designed to organize the raw power of C using OOP, but maintain the speed of C and be able to run on many different types of computers. C++ is most often used in simulations, such as games. C++ provides an elegant way to track and manipulate hundreds of instances of people in elevators, or armies filled with different types of soldiers. It is the language of choice in today's AP Computer Science courses.

In the early 1990's, interactive TV was the technology of the future. Sun Microsystems decided that interactive TV needed the special, portable (can run on many types of machines), language. This language eventually became Java. In 1994, the Java project team changed their focus to the web, which was becoming "the cool thing" after interactive TV failed. The next year, Netscape licensed Java for use in their internet browser, Navigator. At this point, Java became the language of the future and several companies announced applications which would be written in Java, none of which came into use.

Though Java has very lofty goals and is a text-book example of a good language, it may be the "language that wasn't". It has serious optimization problems, meaning that programs written in it run very slowly. And Sun has hurt Java's acceptance by engaging in political battles over it with Microsoft. But Java may wind up as the instructional language of tomorrow as it is truly object-oriented and implements advanced techniques such as true portability of code and garbage collection.

Visual Basic is often taught as a first programming language today as it is based on the BASIC language developed in 1964 by John Kemeny and Thomas Kurtz. BASIC is a very limited language and was designed for non-computer science people. Statements are chiefly run sequentially, but program control can change based on IF.. THEN, and GOSUB statements which execute a certain block of code and then return to the original point in the program's flow.

Microsoft has extended BASIC in its Visual Basic (VB) product. The heart of VB is the form, or blank window on which you draw and drop components such as menus, pictures, and slider bars. These items are known as "widgets". Widgets have properties (such as its color) and events (such as clicks and double-clicks) and are central to building any user interface today in any language VB is most often used today to create quick and simple interfaces to other Microsoft products such as Excel and Access without

needing a lot of code, though it is possible to create full applications with it.

Perl has often been described as the “duet tape of the Internet,” because it is most often used as the engine for a web interface or in scripts that modify configuration files. It has very strong text matching functions which make it ideal for these tasks. Perl was developed by Larry Wall in 1987 because the Unix sed and awk tools (used for text manipulation) were no longer strong enough to support his needs. Depending on whom you ask, Perl stands for Practical Extraction and Reporting Language or Pathologically Eclectic Rubbish Lister.

Programming languages have been under development for years and will remain so for many years to come. They got their start with a list of steps to wire a computer to perform a task. These steps eventually found their way into software and began to acquire newer and better features. The first major languages were characterized by the simple fact that they were intended for one purpose and one purpose only, while the languages of today are differentiated by the way they are programmed in, as they can be used for almost any purpose. And perhaps the languages of tomorrow will be more natural with the invention of quantum and biological computers.

2.6 Classification of Computer Languages

Languages are classified according to their rules of writing program. According to their way of forming statements. Languages are placed in three categories are as under :

- Machine language
- Assembly language
- High-level language

2.6.1 Machine Language

Only language of a computer understood by it without using a translation program. Normally written as strings of binary 1s and 0s. Written using decimal digits if the circuitry of the computer being used permits this. Language is called machine because it is written according to machine internal structure i.e. instruction set. Program written in this language for one machine will not run on another machine. Program are machine dependent. Knowledge of internal structure of computer is require to write machine language program. Since program are written as sequence of 1's & 0's, and slight mistake of 1 or 0 lead to error nous program. Machine language program are tough to write due to said reasons.

A Typical Machine Language Instruction Format

OPCODE	OPERAND
(operation code)	(Address/Location)

- OPCODE tells the computer which operation to perform from the instruction set of the computer
- OPERAND tells the address of the data on which the

A Sample Machine Language Program Sample

00100000000001100111001	10001471
001100000000010000100001	14002041
011000000000011100101110	30003456
10100011111011100101110	50773456
000000000000000000000000	00000000
In Binary	In Decimal
(Difficult to read and understand)	(Easier to read and understand)

Above example show the complicity involved in preparing machine language program.

Advantages

- Can be executed very fast, since directly understood & executed by computer without any converter program.

Limitations

- Machine Dependent
- Difficult to program, difficult to remember combination of 1's & 0's.
- Error prone
- Difficult to modify

2.6.2 Assembly/Symbolic Language

Programming language overcomes the limitations of machine language. It uses symbols / mnemonics i.e short forms and they are much similar to English language. Mnemonics are easy to remember , so program writing becomes easier and faster. Features of assembly language are as follows:

- Uses alphanumeric mnemonic codes instead of numeric codes for the instructions in the instruction set e.g. using ADD instead of 1110 (binary) or 14 (decimal) for instruction to add
- Allowing storage locations to be represented in form of alphanumeric addresses instead of numeric addresses e.g. representing memory locations 1000, 1001, and 1002 as FRST, SCND, and ANSR respectively
- Providing pseudo-instructions that are used for instructing the system how we want the program to be assembled inside the computer's memory e.g. START PROGRAM AT 0000; SET ASIDE AN ADDRESS FOR FRST

Assembler

Software that translates as assembly language program into an equivalent machine language program of a computer is called Assembler.

Mnemonic	Opcode	Meaning
HLT	00	Halt, used at the end of program to stop
CLA	10	Clear and add into A register
ADD	14	Add to the contents of A register
SUB	15	Subtract from the contents of A register
STA	30	Store A register

An Example of Assembly Language Program

Symbolic name	Memory location
FRST	1000
SCND	1001
ANSR	1002

Mapping table set up by the assembler for the data items of the assembly language program

Advantages of Assembly Language Over Machine Language

- Easier to understand and use
- Easier to locate and correct errors
- Easier to modify
- No worry about addresses
- Easily relocatable
- Efficiency of machine language

Limitations of Assembly Language

- Machine dependent
- Knowledge of hardware required

Typical Uses of Assembly Language

- Mainly used today to fine-tune important parts of programs written in a high-level language to improve the program's execution efficiency Assembly Languages with Macro Instructions.
- Any assembly language instruction that gets translated into several machine language instructions is called a macro instruction. Several assembly languages support such macro instructions to speed up the coding process
- Assemblers of such assembly languages are designed to produce multiple machine language instructions for each macro instruction of the assembly language

2.6.3 High-Level Languages

High level language program are written in English language. Programs are easy to write. Technical knowledge and hardware information of machine is not required. Learning of high level language is easy due to it's instruction in English. Language is called high because they do not depend on machine's internal structure, But for execution of high level language program we require a intermediate converter software program called compiler. It converts high level language program into machine level language program.

Features of HLL :

- Machine independent
- Do not require programmers to know anything about the internal structure of computer on which high-level language programs will be executed.
- Deal with high-level coding, enabling the programmers to write instructions using English words and familiar mathematical symbols and expressions.

2.7 Compiler

Translator program (software) that translates a high-level language program into its equivalent machine language program. Compiles a set of machine language instructions for every. In addition to doing translation job, compilers also automatically detect and indicate syntax errors

Syntax errors are typically of following types:

- Illegal characters
- Illegal combination of characters
- Improper sequencing of instructions in a program
- Use of undefined variable names

Note : A compiler cannot detect logic errors in a program

2.8 Linker

For a large software, storing all the lines of program code in a single source file will be:

- Difficult to work with
- Difficult to deploy multiple programmers to concurrently work towards its development
- Any change in the source program would require the entire source program to be recompiled

Hence, a modular approach is generally adapted to develop large software where the software consists of multiple source program files. No need to write programs for some modules as it might be available in library offering the same functionality

Each source program file can be independently modified and compiled to create a corresponding object program file. Linker program (software) is used to properly combine all the object program files (modules). Creates the final executable program (load module)

2.9 Interpreter

Interpreter is a high-level language translator. Takes one statement of a high-level language program, translates it into machine language instructions. Immediately executes the resulting machine language instructions. Compiler simply translates the entire source program into an object program and is not involved in its execution

2.9.1 Intermediate Language Compiler & Interpreter

New type of compiler and interpreter combines the speed, ease, and control of both compiler and interpreter. Compiler first compiles the source program to an intermediate object program. Intermediate object program is not a machine language code but written in an intermediate language that is virtually machine independent. Interpreter takes intermediate object program, converts it into machine language program and executes it

2.9.2 Benefits of Intermediate Language Compiler & Interpreter

Intermediate object program is in compiled form and thus is not original source code, so safer and easier to share. Intermediate object program is based on a standard Intermediate Definition Language (IDL). Interpreter can be written for any computer architecture and operating system providing virtual machine environment to the executing program. Newer Interpreter compiles intermediate program, in memory, into final host machine language program and executes it. This technique is called Just-In-Time (JIT) Compilation

Advantages of High-Level Languages

- Machine independent.
- Easier to learn and use.
- Fewer errors during program development.
- Lower program preparation cost.
- Better documentation.
- Easier to maintain.

Limitations of High-Level Languages

- Lower execution efficiency.
- Less flexibility to control the computer's CPU, memory and registers .

2.10 High Level Languages

2.10.1 FORTRAN

- Stands for **FORmula TRANslation**
- Originally developed by John Backus and his team at IBM followed by several revisions
- Standardized by ANSI as FORTRAN-77 and FORTRAN-90
- Designed for solving scientific & engineering problems
- Oriented towards solving problems of a mathematical nature
- Popular language amongst scientists and engineers

2.10.2 COBOL

- Stands for **COmmon Business Oriented Language**
- Originally developed started under Grace Hopper followed by **CO**nference on **DA**ta **SY**stems Languages (**CODASYL**)
- Standardized by ANSI as COBOL-74, COBOL-85, and COBOL-2002
- Designed for programming business data processing applications
- Designed to have the appearance and structure of a business report written in English, hence often referred to as a self-documenting language

2.10.3 BASIC

- Stands for **B**eginners **A**ll-**p**urpose **S**ymbolic **I**nstruction **C**ode
- Developed by Professor John Kemeny and Thomas Kurtz at Darmouth College in the United States
- Standardized by ANSI as BASIC-78
- Designed to be an interactive language and to use an interpreter instead of a compiler

- Simple to implement, learn and use language. Hence, it is a widely used language on personal computers
- Flexible and reasonably powerful language and can be used for both business and scientific applications

2.10.4 Pascal

Named after the famous seventeenth-century French mathematician Blaise Pascal Developed by Professor Nicklaus Wirth of Federal Institute of Technology in Zurich Encourages programmers to write well-structured, modular programs, instills good program practices Recognized as an educational language and is used to teach programming to beginners Suitable for both scientific & business applications. Has features to manipulate numbers, vectors, matrices, strings, sets, records, files, and lists

2.10.5 C

- Developed in 1972 at AT&T's Bell laboratories, USA by Dennis Ritchie and Brian Kernighan
- Standardized by ANSI and ISO as C89, C90, C99
- High-level programming languages (mainly machine independence) with the efficiency of an assembly language
- Language of choice of programmers for portable systems software and commercial software packages like OS, compiler, spreadsheet, word processor, and database management systems

2.10.6 Object-Oriented Programming Languages

- Programming languages are used for simulating real-world problems on computers
- Much of the real world is made up of objects
- Essence of OOP is to solve a problem by:
- Identifying the real-world objects of the problem
- Identifying processing required of them
- Creating simulations of objects, processes, and their communications
- Named C++ as ++ is increment operator and C language is incremented to its next level with C++

(a) C++

- Developed by Bjarne Stroustrup at Bell Labs in the early 1980s
- Contains all elements of the basic C language
- Expanded to include numerous object-oriented programming features
- Provides a collection of predefined classes, along with the capability of user-defined classes

(b) Java

- Development started at Sun Microsystems in 1991 by a team led by James Gosling
- Developed to be similar to C++ with fewer features to keep it simple and easy to use
- Compiled code is machine-independent and developed programs are simple to implement and use

- Uses just-in-time compilation
- Used in embedded systems such as hand-held devices, telephones and VCRs
- Comes in two variants – Java Runtime Engine (JRE) and Java Software Development Kit (SDK)
- Some of the JAVA features are used for developing Web Application

Characteristics of Programming Language

- Simplicity
- Naturalness
- Abstraction
- Efficiency
- Structured Programming Support
- Compactness
- Locality
- Extensibility

Factors for Selecting a Language for Coding an Application

- Nature of the application
- Familiarity with the language
- Ease of learning the language
- Availability of program development tools
- Execution efficiency
- Features of a good programming language

2.11 Summary

Software is one of the essential element of computer system. All the function of the computer are performed by with the help of software. Software are interaction set written to perform desired task using any computer language -software is intangible part of computer which can not be seen as touched. There are variety software used in computer system software, programming software, application software etc. system software is designed to operate computer hardware in order to provide and maintain a platform that runs application software. Application software is that software which is designed to perform some activity in particular area eg Accounting software.

The language of computer consists of 0 and 1, i.e. machine level language. Whatever instruction that we give to computer it is converted into 0 and 1 to be understood and processed according to instruction. The difficulty in programming in machine level language is eliminated by development of assembly language and higher level language. The programmes in Assembly and Higher level language are converted into machine level language with the help of Assembler, Interpreter / Compiler respectively. Computer language has undergone various development phases by developing specialized language for various domains like Basic, FORTRAN, Pascal, C, C++, JAVA etc.

2.12 Key Words

- **Computer Programme:** Set of instruction is called computer programme.
- **System Software:** Computer programme that is designed to operate and maintain computer basic operation
- **Application Language:** A language is language which is used to write computer programme
- **Machine Level Language :** A language which is understand by computer consist of 0 and 1.
- **Assembly Language :** A language of Symbols and Pre-define subroutine which can be used to write computer program.
- **Higher Level Language :** A human understandable language like english used to write computer programme
- **Syntax :** Is format of instruction to write a program in a computer language.
- **Sementix :** Restricted word or reserve word of a computer language.

2.13 Self Assessment Test

1. Define software and give various functions of the software.
2. How will you classify software. Briefly describe the claissfication.
3. What is application software? Explain with example.
4. What is system software? Explain with example.
5. Give the various reasons for requirement of Higher Level Languages.
6. Compare Machine level language and Higher level languages.
7. What are the quailties of Good Computer Languages.
8. Briefly describe functions of Interpreter, Assembler and Compiler.
9. Write Characterstics of any two Higher level languages known to you.
10. Write characterstics of a computer language use for Web Application.

2.14 Reference Books

- First course on computers by Sanjay Saxena, Vikash Publishing House.
- Fundamental of IT by Leon and Leon.
- Fundamental of Computers by P.K Sinha
- Fundamental of Computers by B.Ram
- Computer Today

UNIT - 3 : GENERATIONS OF COMPUTER

Unit Structure

- 3.0 Objectives
- 3.1 Introduction
- 3.2 First Generation - 1940-1956: Vacuum Tubes
- 3.3 Second Generation - 1956-1963: Transistors
- 3.4 Third Generation - 1964-1971: Integrated Circuits
- 3.5 Fourth Generation - 1971-Present: Microprocessors
- 3.6 Fifth Generation - Present and Beyond: Artificial Intelligence
- 3.7 Summary
- 3.8 Key Words
- 3.9 Self Assessment Test
- 3.10 Reference Books

3.0 Objectives

After going through this unit we will be in a position to

- Various generation of computers.
- All the developments in various type of computer generation.
- Difference between all types of computers.
- Microprocessor, Voice reorganization and Robotics.

3.1 Introduction

Computer means ‘a programmable electronic device that can state and process data. A computer is an electrical machine that can both process and store information.

The history of computer development is often referred to in reference to the different generations of computing devices. A generation refers to the state of improvement in the product development process. This term is also used in the different advancements of new computer technology. With each new generation, the circuitry has gotten smaller and more advanced than the previous generation. As a result of the miniaturization, speed, and power, computer memory has proportionally increased.

Each generation of computers is characterized by major technological development that fundamentally changed the way computers operate, resulting in increasingly smaller, cheaper, more powerful, more efficient and reliable devices. Let us discuss each generation and the developments that led to the current generation of computer we use today.

3.2 First Generation - 1940-1956: Vacuum Tubes

The first computers used vacuum tubes for circuitry and magnetic drums for memory, and were often enormous, taking up entire rooms. A magnetic drum, also referred to as drum, is a metal cylinder

coated with magnetic iron-oxide material on which data and programs can be stored. Magnetic drums were once used as a primary storage device but have since been implemented as auxiliary storage devices.

The tracks on a magnetic drum are assigned to channels located around the circumference of the drum, forming adjacent circular bands that wind around the drum. A single drum can have up to 200 tracks. As the drum rotates at a speed of up to 3,000 rpm, the device's read/write heads deposit magnetized spots on the drum during the write operation and sense these spots during a read operation. This action is similar to that of a magnetic tape or disk drive.

They were very expensive to operate and in addition to using a great deal of electricity, generated a lot of heat, which was often the cause of malfunctions. First generation computers relied on machine language to perform operations, and they could only solve one problem at a time. Machine languages are the only languages understood by computers. While easily understood by computers, machine languages are almost impossible for humans to use because they consist entirely of numbers. Computer Programmers, therefore, use either high level programming languages or an assembly language programming. An assembly language contains the same instructions as a machine language, but the instructions and variables have names instead of being just numbers.

Programs written in high level programming languages retranslated into assembly language or machine language by a compiler. Assembly language program retranslated into machine language by a program called an assembler (assembly language compiler).

Every CPU has its own unique machine language. Programs must be rewritten or recompiled, therefore, to run on different types of computers. Input was based on punch card and paper tapes, and output was displayed on printouts. The UNIVAC and ENIAC computers are examples of first-generation computing devices. The UNIVAC was the first commercial computer delivered to a business client, the U.S. Census Bureau in 1951.

Acronym for Electronic Numerical Integrator And Computer, the world's first operational electronic digital computer, developed by Army Ordnance to compute World War II ballistic firing tables. The ENIAC, weighing 30 tons, using 200 kilowatts of electric power and consisting of 18,000 vacuum tubes, 1,500 relays, and hundreds of thousands of resistors, capacitors, and inductors, was completed in 1945. In addition to ballistics, the ENIAC's field of application included weather prediction, atomic-energy calculations, cosmic-ray studies, thermal ignition, random-number studies, wind-tunnel design, and other scientific uses. The ENIAC soon became obsolete as the need arose for faster computing speeds.

3.3 Second Generation - 1956-1963: Transistors

Transistors replaced vacuum tubes and ushered in the second generation computer. Transistor is a device composed of semiconductor material that amplifies a signal or opens or closes a circuit. Invented in 1947 at Bell Labs, transistors have become the key ingredient of all digital circuits, including computers.

Prior to the invention of transistors, digital circuits were composed of vacuum tubes, which had many disadvantages. They were much larger, required more energy, dissipated more heat, and were more prone to failures. It's safe to say that without the invention of transistors, computing as we know it today would not be possible.

The transistor was far superior to the vacuum tube, allowing computers to become smaller, faster, cheaper, more energy-efficient and more reliable than their first-generation predecessors. Though the transistor still generated a great deal of heat that subjected the computer to damage, it was a vast improvement over the vacuum tube. Second-generation computers still relied on punched cards for input and printouts for output.

Second-generation computers moved from cryptic binary machine language to symbolic, or assembly, languages, which allowed programmers to specify instructions in words. High-level programming languages were also being developed at this time, such as early versions of COBOL and FORTRAN. These were also the first computers that stored their instructions in their memory, which moved from a magnetic drum to magnetic core technology.

The first computers of this generation were developed for the atomic energy industry.

3.4 Third Generation - 1964-1971: Integrated Circuits

The development of the integrated circuit was the hallmark of the third generation of computers. Transistors were miniaturized and placed on silicon chips, called semiconductors, which drastically increased the speed and efficiency of computers.

A nonmetallic chemical element in the carbon family of elements. Silicon - atomic symbol "Si" - is the second most abundant element in the earth's crust, surpassed only by oxygen. Silicon does not occur uncombined in nature. Sand and almost all rocks contain silicon combined with oxygen, forming silica. When silicon combines with other elements, such as iron, aluminum or potassium, a silicate is formed. Compounds of silicon also occur in the atmosphere, natural waters, many plants and in the bodies of some animals.

Silicon is the basic material used to make computer chips, transistors, silicon diodes and other electronic circuits and switching devices because its atomic structure makes the element an ideal semiconductor. Silicon is commonly doped, or mixed, with other elements, such as boron, phosphorous and arsenic, to alter its conductive properties.

A chip is a small piece of semi conducting material (usually silicon) on which an integrated circuit is embedded. A typical chip is less than ¼-square inches and can contain millions of electronic components (transistors). Computers consist of many chips placed on electronic boards called printed circuit boards. There are different types of chips. For example, CPU chips (also called microprocessors) contain an entire processing unit, whereas memory chips contain blank memory.

Semiconductor is a material that is neither a good conductor of electricity (like copper) nor a good insulator (like rubber). The most common semiconductor materials are silicon and germanium. These materials are then doped to create an excess or lack of electrons.

Computer chips, both for CPU and memory, are composed of semiconductor materials. Semiconductors make it possible to miniaturize electronic components, such as transistors. Not only does miniaturization mean that the components take up less space, it also means that they are faster and require less energy.

Instead of punched cards and printouts, users interacted with third generation computers through keyboards and monitors and interfaced with an operating system, which allowed the device to run many different applications at one time with a central program that monitored the memory. Computers for the first time became accessible to a mass audience because they were smaller and cheaper than their predecessors.

3.5 Fourth Generation - 1971-Present: Microprocessors

The microprocessor brought the fourth generation of computers, as thousands of integrated circuits we rebuilt onto a single silicon chip. A silicon chip that contains a CPU. In the world of personal computers, the terms microprocessor and CPU are used interchangeably. At the heart of all personal computers and most workstations sits a microprocessor. Microprocessors also control the logic of almost all digital devices, from clock radios to fuel-injection systems for automobiles.

Three basic characteristics differentiate microprocessors:

Instruction Set: The set of instructions that the microprocessor can execute.

Bandwidth: The number of bits processed in a single instruction.

Clock Speed: Given in megahertz (MHz), the clock speed determines how many instructions per second the processor can execute.

In both cases, the higher the value, the more powerful the CPU. For example, a 32-bit microprocessor that runs at 50MHz is more powerful than a 16-bit microprocessor that runs at 25MHz.

What in the first generation filled an entire room could now fit in the palm of the hand. The Intel 4004 chip, developed in 1971, located all the components of the computer - from the central processing unit and memory to input/output controls - on a single chip.

Abbreviation of central processing unit, and pronounced as separate letters. The CPU is the brains of the computer. Sometimes referred to simply as the processor or central processor, the CPU is where most calculations take place. In terms of computing power, the CPU is the most important element of a computer system. On large machines, CPUs require one or more printed circuit boards. On personal computers and small workstations, the CPU is housed in a single chip called a microprocessor.

Two typical components of a CPU are:

The arithmetic logic unit (ALU), which performs arithmetic and logical operations. The control unit, which extracts instructions from memory and decodes and executes them, calling on the ALU when necessary.

In 1981 IBM introduced its first computer for the home user, and in 1984 Apple introduced the Macintosh. Microprocessors also moved out of the realm of desktop computers and into many areas of life as more and more everyday products began to use microprocessors.

As these small computers became more powerful, they could be linked together to form networks, which eventually led to the development of the Internet. Fourth generation computers also saw the development of GUI's, the mouse and handheld devices.

3.6 Fifth Generation-Present and Beyond: Artificial Intelligence

Fifth generation computing devices, based on artificial intelligence, are still in development, though there are some applications, such as voice recognition, that are being used today.

3.6.1 Artificial Intelligence is the branch of computer science concerned with making computers behave like humans. The term was coined in 1956 by John McCarthy at the Massachusetts Institute of Technology. Artificial intelligence includes:

3.6.2 Games Playing: Programming computers to play games such as chess and checkers.

3.6.3 Expert Systems: Programming computers to make decisions in real-life situations (for example, some expert systems help doctors diagnose diseases based on symptoms)

4.6.4 Natural Language: Programming computers to understand natural human languages
Neural Networks: Systems that simulate intelligence by attempting to reproduce the types of physical connections that occur in animal brains

3.6.5 Robotics: Programming computers to see and hear and react to other sensory stimuli
Currently, no computers exhibit full artificial intelligence (that is, are able to simulate human behavior). The greatest advances have occurred in the field of games playing. The best computer chess programs are now capable of beating humans. In May, 1997, an IBM super-computer called Deep Blue defeated world chess champion Gary Kasparov in a chess match.

In the area of robotics, computers are now widely used in assembly plants, but they are capable only of very limited tasks. Robots have great difficulty identifying objects based on appearance or feel, and they still move and handle objects clumsily. Natural-language processing offers the greatest potential rewards because it would allow people to interact with computers without needing any specialized knowledge. You could simply walk up to a computer and talk to it. Unfortunately, programming computers to understand natural languages has proved to be more difficult than originally thought. Some rudimentary translation systems that translate from one human language to another are in existence, but they are not nearly as good as human translators.

There are also voice recognition systems that can convert spoken sounds into written words, but they do not understand what they are writing; they simply take dictation. Even these systems are quite limited — you must speak slowly and distinctly. In the early 1980s, expert systems were believed to represent the future of artificial intelligence and of computers in general. To date, however, they have not lived up to expectations. Many expert systems help human experts in such fields as medicine and engineering, but they are very expensive to produce and are helpful only in special situations. Today, the hottest area of artificial intelligence is neural networks, which are proving successful in a number of disciplines such as voice recognition and natural-language processing. There are several programming languages that are known as AI languages because they are used almost exclusively for AI applications. The two most common are LISP and Prolog.

3.6.6 Voice Recognition: The field of computer science that deals with designing computer systems that can recognize spoken words. Note that voice recognition implies only that the computer can take dictation, not that it understands what is being said. Comprehending human languages falls under a different field of computer science called natural language processing. A number of voice recognition systems are available on the market. The most powerful can recognize thousands of words. However, they generally require an extended training session during which the computer system becomes accustomed to a particular voice and accent. Such systems are said to be speaker dependent.

Many systems also require that the speaker speak slowly and distinctly and separate each word with a short pause. These systems are called discrete speech systems. Recently, great strides have been made in continuous speech systems — voice recognition systems that allow you to speak naturally. There are now several continuous-speech systems available for personal computers.

Because of their limitations and high cost, voice recognition systems have traditionally been used only in a few specialized situations. For example, such systems are useful in instances when the user is unable to use a keyboard to enter data because his or her hands are occupied or disabled. Instead of typing commands, the user can simply speak into a headset. Increasingly, however, as the cost decreases and performance improves, speech recognition systems are entering the mainstream and are being used as an alternative to keyboards.

The use of parallel processing and superconductors is helping to make artificial intelligence a reality. Parallel processing is the simultaneous use of more than one CPU to execute a program. Ideally, parallel processing makes a program run faster because there are more engines (CPUs) running it. In practice, it is often difficult to divide a program in such a way that separate CPUs can execute different portions without interfering with each other. Most computers have just one CPU, but some models have several. There are even computers with thousands of CPUs. With single-CPU computers, it is possible to perform parallel processing by connecting the computers in a network. However, this type of parallel processing requires very sophisticated software called distributed processing software. Note that parallel processing differs from multitasking, in which a single CPU executes several programs at once.

3.6.7 Quantum Computation

Quantum computation and molecular and nano-technology will radically change the face of computers in years to come. First proposed in the 1970s, quantum computing relies on quantum physics by taking advantage of certain quantum physics properties of atoms or nuclei that allow them to work together as quantum bits, or qubits, to be the computer's processor and memory. By interacting with each other while being isolated from the external environment, qubits can perform certain calculations exponentially faster than conventional computers.

Qubits do not rely on the traditional binary nature of computing. While traditional computers encode information into bits using binary numbers, either a 0 or 1, and can only do calculations on one set of numbers at once, quantum computers encode information as a series of quantum-mechanical states such as spin directions of electrons or polarization orientations of a photon that might represent a 1 or a 0, might represent a combination of the two or might represent a number expressing that the state of the qubit is somewhere between 1 and 0, or a superposition of many different numbers at once. A quantum computer can do an arbitrary reversible classical computation on all the numbers simultaneously, which a binary system cannot do, and also has some ability to produce interference between various different numbers. By doing a computation on many different numbers at once, then interfering the results to get a single answer, a quantum computer has the potential to be much more powerful than a classical computer of the same size. In using only a single processing unit, a quantum computer can naturally perform myriad operations in parallel. Quantum computing is not well suited for tasks such as word processing and email, but it is ideal for tasks such as cryptography and modeling and indexing very large databases.

Nanotechnology is a field of science whose goal is to control individual atoms and molecules to create computer chips and other devices that are thousands of times smaller than current technologies permit. Current manufacturing processes use lithography to imprint circuits on semiconductor materials. While lithography has improved dramatically over the last two decades — to the point where some manufacturing plants can produce circuits smaller than one micron (1,000 nanometers) — it still deals with

aggregates of millions of atoms. It is widely believed that lithography is quickly approaching its physical limits. To continue reducing the size of semiconductors, new technologies that juggle individual atoms will be necessary. This is the realm of nanotechnology.

Although research in this field dates back to Richard P. Feynman's classic talk in 1959, the term nanotechnology was first coined by K. Eric Drexler in 1986 in the book *Engines of Creation*. In the popular press, the term nanotechnology is sometimes used to refer to any sub-micron process, including lithography. Because of this, many scientists are beginning to use the term molecular nanotechnology when talking about true nanotechnology at the molecular level.

The goal of fifth-generation computing is to develop devices that respond to natural language input and are capable of learning and self-organization. Here natural language means a human language. For example, English, French, and Chinese are natural languages. Computer languages, such as FORTRAN and C, are not. Probably the single most challenging problem in computer science is to develop computers that can understand natural languages. So far, the complete solution to this problem has proved elusive, although great deal of progress has been made. Fourth-generation languages are the programming languages closest to natural languages.

3.7 Summary

Generation of computers is characterized by major technological development that fundamentally changed the way computers operate, resulting in increasingly smaller, cheaper, more powerful and more efficient and reliable devices. The first computers used vacuum tubes for circuitry and magnetic drums for memory, and were often enormous, taking up entire rooms. The UNIVAC and ENIAC computers are examples of first-generation computing devices. Transistors replaced vacuum tubes and ushered in the second generation computer. Transistor is a device composed of semiconductor material that amplifies a signal or opens or closes a circuit. Second-generation computers moved from cryptic binary machine language to symbolic, or assembly, languages, which allowed programmers to specify instructions in words. High-level programming languages were also being developed at this time, such as early versions of COBOL and FORTRAN. In third generation Transistors were miniaturized and placed on silicon chips, called semiconductors, which drastically increased the speed and efficiency of computers. The microprocessor brought the fourth generation of computers, as thousands of integrated circuits were rebuilt onto a single silicon chip. A silicon chip that contains a CPU. In the world of personal computers, the terms microprocessor and CPU are used interchangeably.

3.8 Key Words

- **Computer Generation:** Various stages of development is the area of computer.
- **Vacuum Tube:** Electrical device used in early computer. It is bulb like structure you might have seen in old big Radio.
- **Transistor:** Same conduction device acts as a compact variant of vacuum tube
- **Instruction Set:** Set of information that a microprocessor executes.
- **Clock Speed:** is the speed by which information is processed.

3.9 Self Assessment Test

1. What is meant by generation in computer technology? How many computer generations are there till now? Explain.
2. What characteristics made the transistors better than the vacuum tube?
3. What is the difference between first generation and second generation computers? Explain.
4. What are the five generation of computer and how are they classified? Discuss.
5. What is Artificial Intelligence? Discuss.
6. What is Robotics? Explain.
7. What do you mean by expert system?
8. What did the microprocessor allow the computers to do? What was the microprocessor's original purpose? Describe.
9. What is Nanotechnology? Explain.

3.10 Reference Books

- First course on computers by Sanjay Saxena, Vikash Publishing House.
- Fundamental of IT by Leon and Leon.
- Fundamental of Computers by P.K Sinha
- Fundamental of Computers by B.Ram
- Computer Today

UNIT - 4 : DOS OPERATING SYSTEM

Unit Structure

- 4.0 Objectives
- 4.1 Introduction
- 4.2 Versions of MS-DOS
- 4.3 Physical Structure of Disk
- 4.4 DOS Files System
- 4.5 File Allocation Table (FAT)
- 4.6 Booting Process
- 4.7 The Command Prompt
- 4.8 Typing a Command
- 4.9 Drive Name
- 4.10 File
- 4.11 Directory
- 4.12 Files and File Name
- 4.13 DOS Commands
- 4.14 File Management Commands
- 4.15 General Commands
- 4.16 Disk Management Commands
- 4.17 DOS Utility Commands
- 4.18 Using Copycon to Build a File
- 4.19 Summary
- 4.20 Self Assessment Test
- 4.21 Reference Books

4.0 Objectives

After going through this unit, you will be able to :

- Describe DOS Operating System, History and Version of DOS.
- Describe Booting Sequence, DOS System File, File, Directories etc.
- Describe Structure of Disk, FAT, internal and external DOS commands.
- Describe File management commands. DOS utility commands, etc.

4.1 Introduction

DOS is a collection of programs that permits a computer to supervise its own operations automatically. DOS was invented by Microsoft Company. That is why it is also known as MS-DOS. There are many operating systems (OS) for the PC but MS DOS was one of the most popular OS. Nowadays, it has become part of Windows OS.

MS-DOS performs the following tasks :

1. Makes the computer easy to use with the help of this. A user can access peripheral devices such as printers, diskette drives, and fixed disk drives etc. with the computer.
2. Makes it easy for you to use application and create and manages files on your computer.

3. Controls the way the computer uses its resources like the memory, printer, disk and CPU etc.
4. Controls the movement of information on the computer
5. Provide protection to program and data from being accidentally changed.
6. Works as interface between user and hard disk.

4.2 Versions of MS-DOS

DOS is an acronym for Disk Operating System. When IBM released the Personal Computer in 1981. Microsoft created MS DOS, the Microsoft Disk Operating System for the IBM personal computers. It controls different parts of the personal computer i.e. the Input / Output devices like monitors, printers, disk drives etc.

DOS is a single user and single tasking system. The first software was called as DOS Version 1.0 which had all the basic features. Since then, several new features have been incorporated. The latest version of DOS is Ver 7.0. The basic hardware requirement for Version 7.0 is a 16 - bit Personal Computer with 640 KB RAM and a hard disk and Floppy drives. The basic software which makes the user to interact with the machine is the Operating System.

Various commonly used versions of DOS are :

- | | |
|-----------------|----------------|
| 1. MS-DOS 1.25 | 2. MS-DOS 2.11 |
| 3. MS-DOS 2.25 | 4. MS-DOS 3.0 |
| 5. MS-DOS 3.1 | 6. MS-DOS 3.2 |
| 7. MS-DOS 3.3 | 8. MS-DOS 4.0 |
| 9. MS-DOS 6.0 | 10. MS-DOS 6.2 |
| 11. MS-DOS 6.22 | 12. MS-DOS 7.0 |

4.3 Physical Structure of Disk

The Figure below shows physical structure of a floppy disk that is used to store files of the system. Hard disk contains a number of disk platters similar to the one shown in figure. The platter rotates continuously. The head of disk is a small coil that reads or writes on the position of the disk rotating below it. The data is stored in concentric set of rings. These are called tracks. The width of a track is equal to the width of the head. To minimize the interference of magnetic fields and to minimize the errors of misalignment of head, the adjacent tracks are separated by inter track gaps. As we go towards the outer tracks the size of a track increase but to simplify electronics same numbers of bits are stored on each track.

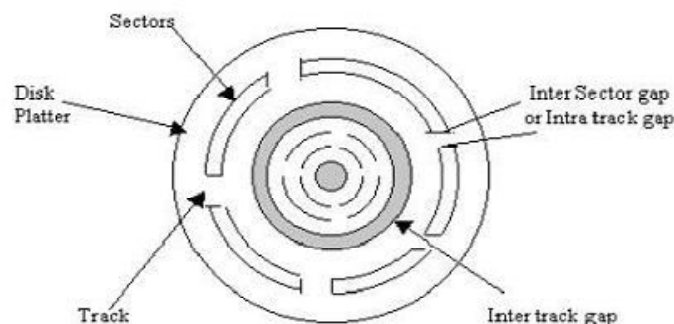


Figure 1 : Floppy Disc

The capacity of the disk is measured in BYTES (8 bits). The data is transferred from and to the disks in blocks. Block is a section of disk data and is normally equal to a sector (512 bytes). A track is divided into 10-100 sectors and these sectors should be either fixed or variable length sectors. Two adjacent sectors are separated by intra-track gaps. This helps in reducing the precision requirements of sectors. To identify the sector position normally there may be a starting point on a track or a starting and end point of each sector.

4.4 DOS System Files

The DOS operating system was available in 3-5 high density floppy disks. It contains backup utilities and disk compression drivers. However, all the stuff that goes into C:\DOS and its subdirectories are programs and utilities. The core DOS operating system consists of six files:

- The boot sector is a 512 byte record placed at the beginning of the C: drive when DOS was installed, or placed there subsequently using the "sys c:" command.
- Two "hidden" files are stored in the root directory of the C: drive. They do not show up in a DIR listing unless the /A switch is used. On IBM PC DOS systems, they are IBMBIO.SYS and IBMDOS.SYS. On MS DOS systems, they are called IO.SYS and MSDOS.SYS. These files form the kernel of the DOS system.
- COMMAND.COM is the "shell" or command interpreter. It prints out the "C:\>" prompt and reads user commands. It also supports BAT files.
- The user configuration files are CONFIG.SYS and AUTOEXEC.BAT. The reader is assumed to be familiar with these files.

COMMAND.COM is initially stored in the C:\ root directory. The problem is that OS/2 and Windows NT have their own versions of COMMAND.COM. To avoid confusion, each COMMAND.COM should be stored in the subdirectory that belongs to its particular operating system. In normal use, this means that the DOS version should be in C:\DOS. To relocate it, two statements must be added to the user configuration files:

"SHELL=C:\DOS\COMMAND.COM" is added to CONFIG.SYS.

"SET COMSPEC=C:\DOS\COMMAND.COM" is added to AUTOEXEC.BAT.

The hidden files IBMBIO, IBMDOS, IO, or MSDOS have names that do not conflict with each other or with any system file belonging to any other operating system. They can stay in the C:\ root directory no matter what gets added to the system. This means that the volatile part of the DOS system consists of the boot record, C:\CONFIG.SYS, and C:\AUTOEXEC.BAT.

4.5 File Allocation Table (FAT)

The file allocation table (FAT) is a table of entries describing how each cluster is allocated on the disk. Each cluster on disk has a entry. The FAT is simply a table of numbers. The entry in FAT indicates whether the corresponding cluster is in use or not. It holds a pointer to the next cluster. Thus, FAT is a "reservation clerk" keeping record of the disk space. This is usually stored in the zero sector of the disk.

The FAT of a computer disk tells about filewise usage of sectors. The FAT (also know as FAT, FAT16, and FAT32), is located in the master boot sector (first 63) of a bootable floppy disk or hard disk. You visually cannot see this. The FAT follows the boot sector.

The FAT file system revolves around the File Allocation Table for which it is named. Each logical volume has its own FAT, which serves two important functions: it contains the allocation information for each file on the volume in the form of linked lists of allocation units and it indicates which allocation units are free for assignment to a file that is being created or extended.

The File Allocation Table (FAT) was designed and coded in Feb., 1976 by a kid named Bill Gates during a five day stay at the Hilton Hotel in Albuquerque. He developed it for a version of Basic that could store programs and data on floppy disks. The FAT design was incorporated by Tim Patterson in an early version of an operating system for the Intel 8086 chip. Gates bought the rights to the system, then rewrote it to create the first version of DOS. As a direct result, Gates is the richest man in America.

The FAT file system is simple and reliable. It does not lose data even if computer crashed in the middle of an update. It does not use a lot of memory. It does, however, do a lot of extra administrative I/O to different areas of the partition. The directory is allocated at the start of the partition and it contains the table of free space. To write a new data set, or to add data to an old one, the disk arm must be constantly moved between the location of the directory and the place where the data is being written. Without optimization, a file can end up fragmented into many small pieces.

When the system crashes, no data is lost. However, a FAT system may have removed disk area from the chain of free space, but may not have yet assigned it to any permanent new data set. The CHKDSK or SCANDISK utility examines the FAT table to determine the status of every record on disk. The records which are not part of any data set may be returned to the free space chain.

After CHKDSK finds unallocated sectors, it asks you whether they should be turned into files. If you were in the middle of creating a new file and the system crashed, and the data that was lost is extremely valuable, you might answer Yes. If you do answer Yes you can scan the recovered file scraps for the information you lost. Otherwise, answer No and the unallocated space will be recycled as free space.

4.6 Booting Process

Whenever the computer is switched on the operating system gets loaded. The process of loading DOS is called as booting DOS. Once started up, the computer performs its self-test i.e. power-on hardware diagnostics. At this time, the computer examines most of its critical hardware components. The computer then displays the amount of memory present on the system. It checks the floppy drive (if available on the machine) to see if a floppy has been inserted. If there is no floppy, it checks the hard disk, loads IO.SYS and MS DOS .SYS into the RAM and runs a file called CONFIG.SYS and then loads COMMAND .COM. These files are known as DOS system files. Thereafter, AUTOEXEC.BAT is executed.

Once the system boots up properly it displays the DOS prompt.

C:\ is known as C prompt. This is an indication for the user to know that the computer is ready for executing commands. A user give all the command on this prompt). In case a floppy is present while booting, it must be bootable, i.e., it should have the three main files COMMAND .COM, BIOS .SYS and MS DOS .SYS.

The Booting process begins when the power supply is switched on . booting process performs following steps:

1. The power supply performs a self-test.
2. The microprocessor timer chip receives the "Power Good" signal.

3. The CPU starts executing the ROM BIOS code.
4. The BIOS searches for adapters (usually video adapters) that may need to load their own ROM BIOS routines.
5. The ROM BIOS checks to see if this is a 'cold boot' or a 'warm boot'.
6. POST (Power-On Self-Test): The POST is a series of diagnostic tests that run automatically when you turn your computer on.
7. The BIOS locates and reads the configuration information stored in CMOS.
8. Shadow RAM: (Optional, you can turn it off/on using the CMOS settings) Shadow RAM is where a copy of BIOS routines from ROM is stored a special area of RAM, so that the BIOS routines can be accessed more quickly.
9. Loading the OS (Operating System): The BIOS will attempt booting using the boot sequence determined by the CMOS settings, and examine the MBR (Master Boot Record) of the bootable disk.

The MBR is the information in the first sector (512 bytes) of any hard disk or diskette that identifies how and where an operating system is located so that it can be loaded into the RAM (booted). The MBR is also sometimes called the "partition sector" or the "master partition table" because it includes a table that locates each partition that the hard disk has been formatted into. In addition to this table, the MBR also includes a program that reads the boot sector record of the partition containing the operating system to be booted into RAM. In turn, that record contains a program that loads the rest of the operating system into RAM.

4.7 The Command Prompt

When you first bring up the MS-DOS prompt, you'll see something that looks similar to the following:

```
C:\WINDOWS>
```

This is called the command prompt or DOS prompt. The flashing underscore next to the command prompt is called the cursor. The cursor shows where the command you type will appear. If your command prompt looks like the sample command prompt above, skip to the following section, 'Typing a Command.'

If your command prompt does not look like the example, type the following at the command prompt, and then press ENTER:

```
cd \
```

4.8 Typing a Command

This section explains how to type a command at the command prompt and demonstrates the 'Bad command or file name' message. To type a command at the command prompt

1. Type nul at the command prompt (you can type the command in either uppercase or lowercase letters i.e. DOS is not case sensitive). If you make a typing mistake, press the BACKSPACE key to erase the mistake, and then try again.
2. You must press ENTER after every command you type. ENTER indicates the start of action/instruction you have entered.

The following message appears on the screen: **Bad command or file name**

The 'Bad command or file name' message appears when you type something that MS-DOS does not recognize. Because nul is not a valid MS-DOS command, MS-DOS displays the 'Bad command or file name' message. Note that you can also get this error if you try to run a program in DOS that doesn't exist or that DOS can't find.

Now, type the following command at the command prompt: ver

The following message (or something similar) appears on the screen:

Windows 98 [Version 4.10.1998]

The ver command displays the operating system version you are running.

Continue to the next section, where you will use the dir command to view the contents of a directory.

4.9 Drive Name

Drive name :- A drive is a device used for storing data for the further use and a computer can have more than one drive also for the ease of the user drive names or device name are given to a device or a drive. Drives are named by an alphabet example A drive , C drive etc

DESCRIPTION

A:	First removable disk drive
B:	Second removable disk drive
C:	First fixed disk drive (hard disk)
D:	Second fixed disk drive (hard disk)
D: to Z:	Additional disk drive

4.10 File

Information is stored on a disk as a collection of character . Each complete collection of related characters is called a file. A disk can have many file that contain either instruction for the computer (program file) or data stored by the user (data file). A program file is loaded the internal memory of the computer whenever the user asks the DOS to load it . ana at time of booting. Once the program is loaded, the instructions are executed one by one by processor. A disk can contain both file and data files.

4.11 Directory

The directory is a table of contents of all the file and directory a disk . It contain the name of files their size , and the dates they were last modified .In windows a directory is referred as Folder . Adirectory can contain a number of subfolders and file .

4.12 Files and File Name

DOS a name is given to file for identification. Watch file name unique so that files don't get configured and indentified easily. The name of a file actually has tow parts separated by a separator (.) called the file name proper and the file name extension.

The file name must be at least one character and it can be as long as eight characters, but no longer. Alphabets digits and some special characters. &<+, %, (,), _ , -, @, # (- are allowed in the file name. The extension of the file name is a short appendage added on after the file name.The extension consist three characters at mart, and is optional.

4.13 DOS Commands

All the DOS COMMANDS fall into two categories.

1. Internal DOS Commands
2. External DOS Commands

4.13.1 Internal DOS Commands

Internal DOS COMMANDS are those commands, which stay in the computer's memory as loaded at the time of booting. Until you switch it off or until you load DOS again. Because they are loaded in memory, you do not need not any other file to use these command.

4.13.2 External DOS Commands

These command are not loaded on computer at the time of booting.

4.13.3 Wildcard Characters

A wildcard character is a keyboard character such as an asterisk (*) or a question mark (?) that you can use to represent one or more real characters when you are searching for files or folders. Wildcard characters are often used in place of one or more characters when you don't know what the real character is or you don't want to type the entire name.

Asterisk (*) : You can use the asterisk as a substitute for one or more characters. If you're looking for a file that you know starts with gloss but you can't remember the rest of the file name, type the following:

gloss* : The Find dialog box will locate all files of any file type that begin with gloss including Glossary.txt, Glossary.doc, and Glossy.doc. To narrow the search to a specific type of file, type:

gloss*.doc : In this case, the Find dialog box will find all files that begin with gloss but have the file extension .doc, such as Glossary.doc and Glossy.doc.

Question Mark (?) : You can use the question mark as a substitute for a single character in a name. For example, if you typed gloss?.doc, the Find dialog box would locate the file Glossy.doc or Gloss1.doc but not Glossary.doc.

DIRECTORY COMMANDS

DIR Command -

If you wish to see the contents of an directory, or disk you may use the following commands It displays a list any of all the files and subdirectories in a directory. The drive, path, switches and wildcards can be used.

Syntax: DIR (<drive> (<path name>) (<file name>) (/P) (/W)

DIR filename options : The options are preceded by a slash (/) which is also called a switch.

/P - Pauses at the end of the screen and waits for a key to be pressed.

/S - Displays files in a specified directory and all subdirectories.

/A - Displays all the files with set attributes like hidden files etc.

C:\>DIR/P

MD Command -

Syntax: MKDIR <DRIVE NAME>\<NEW SUB-DIR NAME>

Syntax: MD <DRIVE NAME>\<NEW SUB-DIR NAME>

The command is used to create directory. Creating a directory is helpful if you want to organize related files into groups to make them easy to find.

To create a directory, you will use the md command. The md command stands for 'make directory'.

- To create and change to a directory named FRUIT

1. Type md fruit at the command prompt.

You have now created a directory named FRUIT. You won't see the new FRUIT directory until you carry out the dir command in the next step.

2. To confirm that you successfully created the FRUIT directory, type the following at the command prompt: dir or dir /p

Look through the directory list. A new entry somewhere in the list should look similar to the following:

```
FRUIT  <DIR>    09-07-00 11:59a fruit (Time and date may vary as per time & date computer)
```

3. To change to the new FRUIT directory, type the following at the command prompt:

```
cd fruit
```

The command prompt should now look like the following : C:\FRUIT>

You will now create a directory within the FRUIT directory, named GRAPES.

- To create and work with a directory named GRAPES

1. Type the following at the command prompt: md grapes

You will not see the new GRAPES directory until you carry out the dir command in the next step.

2. To confirm that you successfully created the GRAPES directory, type the following at the command prompt:

```
dir
```

Note there are three entries in the FRUIT directory. One is the GRAPES directory that you just created. There are two other entries--one looks like a single period (.) and the other looks like a double period (..). These directory entries are important to MS-DOS they are system files. They appear in every directory and contain information relative to the directory structure.

The GRAPES directory is a subdirectory of the FRUIT directory. A subdirectory is a directory within another directory. Subdirectories are useful if you want to provide further subcategories in the organization of your files and data.

3. To change to the GRAPES directory, type the following at the command prompt: cd grapes

The command prompt should now look like the following:

C:\FRUIT\GRAPES>

4. To switch back to the FRUIT directory, type the following: `cd ..`

The command prompt should now look like the following: C:\FRUIT>

When the `cd` command is followed by two periods (`..`), MS-DOS moves up one level in the directory structure. In this case, you moved up one level from the GRAPES directory to the FRUIT directory.

This command gives a clue as to the meaning of the `..` entry in a directory listing. The `..` directory is a special name for the parent directory of the current default directory. That is why when you type `cd ..` you change directories to the parent directory. The single period (`.`) directory refers to the current directory. Try typing `cd .` and see what happens. The command `cd .` changed the current directory to the current directory!

CD Command

Displays the name of the current directory or changes the current folder.

Syntax: `chdir [/d] [drive:][path] [..]`

-or-

Syntax: `cd [/d] [drive:][path] [..]`

Parameters

none

Used without parameters, `chdir` displays the names of the current drive and folder. Used with only a drive letter (for example, `cd C:`), `chdir` displays the current directory on the specified drive.

`[/d]`

Changes the current drive in addition to changing the current directory for a drive. With command extensions enabled, the current directory name is converted to use the same case as the actual directory names on the disk. So, for example, `cd C:\Temp` sets the current directory to `C:\Temp` if that is its name on the disk.

`[drive:][path]`

Specifies the drive (if other than the current drive) and directory to which you want to change.

`[..]`

Specifies that you want to change to the parent folder. (Root directory)

Either of the following commands changes your current directory to the directory named Reports:

`chdir \reports : cd \reports`

Suppose you have a directory named `Specials` containing a directory named `Sponsors`. To change your current directory to `\Specials\Sponsors`, type the following command: `cd \specials\sponsors`

Or, if your current directory is `\Specials`, you can use the following command to change to the `\Specials\Sponsors` directory: `cd sponsors`

To change from a directory back to its parent directory, type the following command: `cd ..`

To display the name of the current directory, you can use `chdir` or `cd` without a parameter. For example, if your current directory is `\Public\Jones` on the disk in drive B, type `chdir` to see the following response: `B:\Public\Jones`

If you are working on drive D and you want to copy all files in the `\Public\Jones` and `\Public\Lewis` directories on drive C to the root directory on drive D, type the following commands:

```
chdir c:\public\jones
```

```
copy c:*. * d:\
```

```
chdir c:\public\lewis
```

```
copy c:*. * d:\
```

If, instead, you want to copy all files in the `\Public\Jones` and `\Public\Lewis` directories to your current location on drive D, type the following commands:

```
chdir c:\public\jones
```

```
copy c:*. * d:
```

```
chdir c:\public\lewis
```

```
copy c:*. * d:
```

Notes : -

1. Using spaces in paths with chdir

With command extensions enabled, you can use the `chdir` command to change to a directory name that contains a space or spaces without surrounding the name with quotation marks. For example:

```
cd \winnt\profiles\username\programs\start menu
```

is the same as:

```
cd "\winnt\profiles\username\programs\start menu"
```

which is what you must type when extensions are disabled.

2. Changing the root directory

The root directory is the top of the directory hierarchy for a drive. To return to the root directory, type the following command: `cd\`

3. Using the current directory from a different drive

If you are working in the `\Public\Jones` directory on drive C and you change to drive D, you can copy files to and from the `\Public\Jones` directory by specifying only the drive letter C.

4. Changing the directory on another drive

You can change the current directory on another drive by specifying the drive name on the command line when you use `chdir`.

RD Command -

Syntax: `RD DIR <drive name> \<sub-dir-name>`

If you no longer use a particular directory, you have want to delete it to simplify your directory structure.

Deleting a directory is also useful if you type the wrong name at thrthimes of creating a directory and you want to delete the incorrect directory before creating a new one.

To delete a directory, use the rd command. The rd command stands for 'remove directory'.

Example : To delete the kamal directory. Type the following at the command prompt: rd kamal

2. To confirm that you have successfully deleted the Kamal directory, type the following at the command prompt: dir

The Kamal directory should no longer appear in the directory list.

Note that you cannot delete a directory if you cantoral are in it, or if thedrecpey contains any files. Before you delete a directory, you must make the directory that is one level higher the current directory (by typing cd ..), and mak it sure that diractory does not contecin any file/

TREE Command -

Syntax: TREE [drive:][path] [/f] [/a]

Tree Command graphically displays the directory structure of a drive or Path in a hierarchical form.

Parameters drive:

Specifies the drive that contains the disk for which you want to display the directory structure. path

Specifies the directory for which you want to display the directory structure. /f

Displays the names of the files in each directory. /a

Specifies that tree is to use text characters instead of graphic characters to show the lines linking subdirectories.

To display the names of all the subdirectories on the disk in your current drive, type: tree \

To display, one screen at a time, the files in all the directories on drive C, type: tree c:\f|more

To print the same list that the previous example displayed, type: tree c:\f prn

Notes:

The structure displayed by tree depends upon the parameters you specify on the command line. If you do not specify a drive or path, tree displays the tree structure beginning with the current directory of the current drive.

PATH Command

FORMAT: PATH { <drive :> } { <path name> } : { <drive :> } { <path name> }:

This command set a command search path. If tells DOS which directories should be searched for external commands after searching the current directory.. the command path\user\notice tells DOS to search the directory \USER\NOTICE

For on external command after searching the current directory. You can specify several path names separated by : DOS Searches the path names in the order specified in the PATH command.

e.g. PATH\USER\DASDIR:\USER\COBDIR:\USER\DBDIR.

To pull up command, you can specify PATH. This cause only the specified directory / directions to be searched for on external command.

The following command specifies that DOS is to search three directories to find external commands. The three paths for these directories are C:\User\Taxes, B:\User\Invest, and B:\Bin:

path c:\user\taxes;b:\user\invest;b:\bin

You will be sent directly into your NES directory within your GAME directory.

4.14 File Management Commands

COPY COMMAND -

COPY Command is used to make copies of disk files. The path that contains the file you want to copy, is called the source diskette. The diskette that will contain the copy of the file when you are done is called the target. There may be path for different uses of copy commands. : This command copies files between disk drives and/or devices, either keeping the same file name or changing it. COPY can concatenate two or more files into another file or append one or more files to another file.

Making duplicates on other disks: Syntax: Copy A: <File name> B:<File Name>

This command consists of three parts. First part is the command COPY, Second part is the name of the file which is to be copied and the third part is a parameter B: Which simply Says" COPY to Drive B"

If different file name is not specified at B: ;file will be copied with the same name as is at a :

Make duplicates on the same disk.

Syntax: COPY A: <File Name> <File Name>

Using the above command a file will be copied with different name on the same diskette.

XCOPY COMMAND

x-copy command copies files and directories, including subdirectories. A DOS COPY command is used extremely to copy file from one disk or directory to another. DOS provides a second file-copy command, called X-COPY which allows you to-

Selectively copy files based on the files creation and modification date.

Selectively copy files based on the files archive attribute flag.

FORMAT: xcopy source [destination] [/w] [/p] [/c] [/v] [/q] [/f] [/l] [/d[:date]] [/u] [/i] [/s [/e]] [/t] [/k] [/r] [/h] [/al/m] [/n] [/exclude:filename] [/y|/y] [/z]

Parameters :-

source

Specifies the location and names of the files you want to copy. This parameter must include either a drive or a path.

destination

Specifies the destination of the files you want to copy. This parameter can include a drive letter and colon, a directory name, a file name, or a combination. : /w

Displays the following message and waits for your response before starting to copy files:

Press any key to begin copying file(s) : /p

Prompts you to confirm whether you want to create each destination file. : /c

Ignores errors. : /v

Verifies each file as it is written to the destination file to make sure that the destination files are identical to the source files. This switch is ignored because the functionality is inherent to the Windows 2000 operating system. The switch is accepted only for compatibility with previous versions of MS-DOS.

: /q

Suppresses display of xcopy messages. : /f

Displays source and destination file names while copying. : /l

Does not copy files, only displays (lists) files that would be copied. : /d[:date]

Copies only source files changed on or after the specified date. If the date value is missing, xcopy copies all source files that are newer than the time of existing destination files. This option allows you to update only files that have changed. If you specify a date, use a hyphen (-) as the separator rather than a forward slash (/) so that the date is not interpreted as another parameter.

/u : Copies (updates) only files from source that exist on destination.

/i : If source is a directory or contains wildcards, and destination does not exist, xcopy assumes destination specifies a directory name and creates a new directory then copies all specified files into the new directory. By default, xcopy will prompt you to specify whether destination is a file or directory.

/s : Copies directories and subdirectories, unless they are empty. If you omit this switch, xcopy works within a single directory.

/e : Copies all subdirectories, even if they are empty. Used with the /s and /t switches.

/t : Copies only subdirectory structure (tree), not files. To copy empty directories, you must include the /e switch.

/k : Copies files and retains the read-only attribute on destination files if present on the source files. By default, the read-only attribute is removed.

/r : Copies over read-only files.

/h : Copies files with the hidden and system file attributes. The xcopy command does not copy hidden or system files by default.

/a : Copies only source files that have their archive file attributes set. This switch does not modify the archive file attribute of the source file. For information about how to set the archive file attribute, see the attrib command.

/m : Copies source files that have their archive file attributes set. Unlike the /a switch, the /m switch turns off archive file attributes in the files specified in source. For information about how to set the archive file attribute, click attrib in the Related Topics list[JG1].

/n : Copies using NTFS short file or directory names. This switch is required when copying files or directories from an NTFS volume to a FAT volume or when the FAT file system naming convention (8.3) is required on the destination volume. The destination file system may be FAT or NTFS.

/exclude:filename : Excludes the files listed in the specified file from the copy operation. The exclusion file can have a list of exclusion patterns (one per line, no wildcard characters are supported). If any exclusion pattern in the file matches any part of the path of a subject file, that file is not copied.

/y : Suppresses prompting to confirm you want to overwrite an existing destination file.

The **/y** switch may be preset in the **COPYCMD** environment variable. This may be overridden with **/-y** on the command line. The default is to prompt on overwrites unless the copy command is being executed from within a batch script.

To append files, specify a single file for destination, but multiple files for source (using wildcards or **file1+file2+file3** format).

/-y : Causes prompting to confirm you want to overwrite an existing destination file.

/z : Copies over a network in restartable mode. If the connection is lost during the copy phase (for example, if the server going offline severs the connection), it will resume after the connection has been re-established. Using this command switch also displays the percentage of the copy operation completed for each file.

Creation of Batch File

You can create a batch program to perform **xcopy** operations and use the **batch if** command to process the exit code in case an error occurs. For example, the following batch program uses replaceable parameters for the **xcopy** source and destination parameters:

```
@echo off
rem COPYIT.BAT transfers all files in all subdirectories of
rem the source drive or directory (%1) to the destination
rem drive or directory (%2)
xcopy %1 %2 /s /e
if errorlevel 4 goto lowmemory
if errorlevel 2 goto abort
if errorlevel 0 goto exit
:lowmemory
echo Insufficient memory to copy files or
echo invalid drive or command-line syntax.
goto exit
:abort
echo You pressed CTRL+C to end the copy operation.
goto exit
:exit
```

To use this batch program to copy all files in the **C:\Prgmcode** directory and its subdirectories to drive **B**, type: **copyit c:\prgmcode b:**

The command interpreter substitutes **C:\Prgmcode** for **%1** and **B:** for **%2**, then uses **xcopy** with the **/e** and **/s** switches. If **xcopy** encounters an error, the batch program reads the exit code and goes to the label indicated in the appropriate **IF ERRORLEVEL** statement. DOS displays the appropriate message and exits from the batch program.

DEL Command -

Syntax: **DEL <drive:> <file name>**

This command is used to remove specified files permanently from the disk. The file name can also be specified with the wild cards:

`del [drive:][path] filename [...] [/p] [/f] [/s] [/q] [/a[:attributes]]`

`erase [drive:][path] filename [...] [/p] [/f] [/s] [/q] [/a[:attributes]]`

Parameters :

`[drive:][path] filename` : Specifies the location and name of the file or set of files you want to delete. Multiple file names can be used. File names can be separated by spaces, commas, or semicolons.

`/p` : Prompts you for confirmation before deleting the specified file.

`/f` : Forces deletion of read-only files.

`/s` : Delete specified files from the current directory and all subdirectories. Displays the names of the files as they are being deleted.

`/q` : Quiet mode; does not prompt for delete confirmation.

`/a` : Deletes files based on specified attributes.

`attributes` : Can be any of the following file attributes:

Attribute	Description
r	Read-only
a	Archive
s	System
h	Hidden
-	Prefix meaning "not"

RENAME COMMAND -

Syntax: `rename [drive:][path] filename1 filename2`

Syntax: `ren [drive:][path] filename1 filename2`

This command is used to Change the name of a file or a set of files. You can rename all files matching the specified file name. You cannot use the rename command to rename files across drives or to move files to a different directory location.

Parameters :

`[drive:][path] filename1` : Specifies the location and name of the file or set of files you want to rename.

`filename2` : Specifies the new name for the file. If you use wildcards (* and ?), filename2 specifies the new names for the files. You cannot specify a new drive or path when renaming files.

Notes -

1. Using wildcards with rename : You can use wildcards (* and ?) in either file name parameter. If you use wildcards in filename2, the characters represented by the wildcards will be identical to the corresponding characters in filename1.

2. Rename will not work if filename2 already exists

If, for filename2, you specify a file name that already exists, rename displays the following message:

Duplicate file name or file not found

ATTRIB COMMAND -

Syntax: [drive:] [path] ATTRIB [+A] [-A] [+R] [-R] file spec.

This command is an external command is used to changed the attribute of a file that is, you can use ATTRIB to make a file "read only" which prevents the file from being written over (or changed), also you can set the archive but, which is set tone when a file is cratad or changed.

Syntax: [drive:] [path] ATTRIB [+A] [-A] [+R] [-R] file spec.

ATTRIB uses +R to set and remove the read only attributes. The +A and - A options let you set and clear the archive attribute of a file.

First you can use ATTRIB to determine the attribute status of a file by typing ATTRIB the file name, and pressing return.

BACKUP COMMAND -

FORMAT: [drive:] [Path] BACK UP SOURCE: [Files pec] Target: [A] [/M] [/S] [/F] [/D:mm_dd_yy] [/T hh:mm:ss] [/L: Log file]

The BACK UP Command is used with fixed disk systems. BACK UP is an external command to copy files automatically from a fixed disk to floppy disk. BACK UP let you copy selected files ,all files in a specified directory path, or every file on the disk. It also allow you copy only those files that have been changed or saved after a specifies date.

It the files being copied exceed the capacity of the target floppy disk. BACK UP prompts you change disks and then to continue the process. Files can be divided between floppy disks. The backup command automatically tags each back up disk in the sequence used. Later, you can used the RESTORE Command to copy the files back to the fixed disk. Having each disk numbered helps you restore the fixed disk in the right order.

e.g. BACK UP C: \PATH A: This command copies all files in the specified directory path to the disk in drive A. There is a number of parameters available with the BACK UP Command.

CLS COMMAND : The CLS commands stand for clear the screen. It wipes the screen of every thing on it and finishes up by displaying the DOS prompt in the top left car nor.

Syntax: CLS

SYS COMMAND

Syntax: C:\>sys a: This command is used to make a boot disk. It copies IO.SYS, MSDOS.SYS, and COMMAND.COM to your disk. With older versions of DOS the diskette needed to be completely empty before you used the SYS command. That was because the system files (MSDOS.SYS and IO.SYS with Microsoft's DOS; IBMBIO.COM and IBMDOS.COM for IBM's DOS) had to be the first 2 files on the disk. Since DOS 5 that isn't necessary anymore. You can also make a boot disk by using the "/S" option with

where a: is the drive you are "sys'ing"

One VERY important note, for SYS to work it must know where to find the system files. By default it looks on the current drive you are on (If you're on the C: drive, it looks to C:\ for the system files.) If the drive you are currently in does not have the system files, SYS may give you "Invalid function" or "Can not find system files". If your current drive doesn't have these files, you can tell SYS where to find them like so:

C:\>sys c:\a: where "c:\" is the location of your system files, and "a:" is the drive you are wanting to make a boot disk in

4.15 General Commands

TYPE COMMAND

Syntax: Type <drive :><path> <file name>

Displays the contents of a text file. Use the type command to view a text file without modifying it.

type [drive:][path] filename

Parameter :

[drive:][path] filename

Specifies the location and name of the file or files that you want to view. Separate multiple file names with spaces.

TIME COMMAND-

TIME commands permits you to enter or change the time known to the system. When ever you create or add to a file, the time is recorded in the directory. This command displays the current system time and asks the user to enter the new time if it is to be modified.

Syntax A:> Time

Example à A:.> Time

Current time 9:35:20.16a

Enter new time :

This command asks the user to enter new time and changes the system time if the user does not enters the new time the time does not changes

A:>Time

Current time 9:35:20.16a

Enter new time :

FORMAT: DATE

The PROMPT command within any parameters cause returned to the normal DOS PROMPT

DIRECTORY ENTRIES

The number of entries that the root directory of a disk can contain depends on the type of disk. The root directory of a single sided 160/180KB diskette can hold 84 entries. Which the root directory of a double sided 320/360KB and 720 KB diskette can hold 112 entries. The root directory of a height capacity. 1.2 MB diskette can hold 224 entries. There can be 512 entries in the root directory of a fixed disk.

Unlike the root directory, sub directory subdirectories can contain any no. of entries limited only by the amount of available space on the disk.

The correct directory is the one you are currently working in or the one you were working in one a different drive DOS Remembers which directory was current on each of your drives, even though you may not be presently averring any of those drives. When DOS starts the root directory is the current directory.

Examples

The following example sets the command prompt to display the current drive and path followed by the greater-than symbol (>): prompt \$p\$g

The following command displays a two-line prompt in which the current time appears on the first line and the current date appears on the second line: prompt time is: \$t\$_date is: \$d

4.16 Disk Management Commands

FORMAT COMMAND

Syntax: FORMAT(<drive:>) (/S) (IV) (14)

Format actually does two important things with a diskette: it puts identification mark on the disk for storage/retrieval that make it possible for DOS to work with the diskette and it checks for any defects in the diskette. It also prepares the disk to accept DOS files by initializing the root directory file allocation table.

The DOS FORMAT command prepares a disk for use. It divides a disk into two areas.

- (i) System area DOS stores information which is of use to itself
- (ii) User area Stores programs or data files

System area consists of the boot area (which is the first sector on the disk), the file allocation table and the root directory.

Syntax : FORMAT drive :[/V[:label]][/Q]/[V]/[S] Where ,

drive :specifies the drive containing the disk you want to format. This command can be used with various switches to perform different functions.

Switches : This command can be used within varison switches perform different function. But these dat floppier are not popular and preformatted disks available in the market.

CHKDSK COMMAMD -

Syntax: chkdsk [drive:][[path] filename] [/f] [/v] [/r] [/l[:size]] [/x]

Creates and displays a status report for a disk, based on the file system used. Chkdsk also lists and corrects errors on the disk. If chkdsk cannot lock the drive it will offer to check it the next time the computer restarts.

DISKCOPY COMMAND -

FORMAT: DiskCopy <source drive:> <destination drives:>

Copies the contents of the floppy disk in the source drive to a formatted or unformatted floppy disk in the destination drive. One essntial cadition for this command is thod you have so use two same copacity disk and you can creat copy of the disk.

Parameters

drive1 : Specifies the drive containing the source disk.

drive2 : Specifies the drive containing the destination disk.

/v : Verifies that the information is copied correctly. Use of this switch slows the copying process.

For information about copying one or more files, click copy in the Related Topics list.

For information about copying directories and subdirectories, click xcopy in the Related Topics list.

LABEL COMMAND -

Syntax LABEL <DRIVE:> (Volume Label)

This command allows you to create, change or delete a volume label on disk.

Volume labels are used to identify disk. They can be up to 11 characters. To change the existing volume label, type the new volume label and press enter.

Notes -

1. Label command messages

If you do not specify a label when you use the label command, DOS displays a message in the following format:

Volume in drive A is xxxxxxxxxxxx

Volume Serial Number is xxxx-xxxx

Volume label (11 characters, ENTER for none)?

The "Volume Serial Number" part of the message is not displayed if the disk has no serial number.

You can type the volume label you want or press ENTER to delete the current label. If a disk has a label and you press ENTER for none, DOS prompts you with the following message:

Delete current volume label (Y/N)?

Press Y to delete the label; press N to keep the label.

2. Limitations on volume label names

A volume label can contain as many as 32 characters for NTFS volumes and as many as 11 characters for FAT volumes and can include spaces but no tabs.

FAT volume labels cannot contain any of the following characters:

* ? / \ | . , ; : + = [] < > "

This limitation does not apply to NTFS volumes.

DOS displays FAT volume labels in uppercase letters. If you enter a volume label in lowercase letters, the label command converts the letters to uppercase. NTFS volume labels retain and display the case used when the label was created.

Example

To label a disk in drive A that contains sales information for July, you might type the following:

label a:sales-july

VOL COMMAND -

FORMAT: VOL <drive>

Displays the disk volume label and serial number, if they exist. A serial number is displayed for a disk formatted with MS-DOS version 4.0 or later.

Parameter :

drive: Specifies the drive that contains the disk for which you want to display the volume label and serial number.

4.17 DOS Utility Commands

MOVE COMMAND -

Syntax: MOVE <SOURCE FILENAME > <TARGET FILENAME>

This command moves one or more files to another directory. It is also used for renaming a directory. The Management of file does not keep copy of the file at source i.e. of original file is moved to destination.

It will move the source file under a new name, i.e., target file name

C:\>MOVE ABC XYZ <RETURN>

Moves ABC to XYZ in the root directory itself. After execution of this command the screen will look like:

C:\>MOVE ABC XYZ <RETURN>

ABC => XYZ

OR

MOVE PATH\SOURCEFILENAME(s) PATH

It will move the source file from its original path to the new directory under a new name, if a new name is mentioned.

Example

To move all files with the .xls extension from the \Data directory to the \Second_Q\Reports directory, type

move \data*.xls \second_q\reports\

DELTREE COMMANDS

This command was unveiled upon the arrival of DOS 5. Unlike its counter part RD it can remove directories even when they still have files and subdirectories in them. Some consider this a very dangerous command, I just say make backups :-). It accepts a sole switch, "/Y". Normally DELTREE will ask you for conformation before it does its magic. The "/Y" switch prevents this.

4.18 Using Copycon to Build a File

Syntax : COPY CON <FILE NAME>

Copycon command is used to create a file in the current directory.

Example: C:\>copy con myfile

Note : to save the file myfile use ^z

4.19 Summary

The head of disk is a small coil and reads or writes on the position of the disk rotating below it, therefore, the data is stored in concentric set of rings. These are called tracks. The width of a track is equal to the width of the head. DOS have three system file (1) COMMAND.COM (2) IO.SYS (3) MSDOS.SYS. In MS Dos The user configuration files are CONFIG.SYS and AUTOEXEC.BAT. The reader is assumed to be familiar with these files. The file allocation table is a table of entries describing how each cluster is allocated on the disk. Each cluster on disk has a entry. The FAT is simply a table of numbers. The entry in FAT indicates whether the corresponding cluster is in use or not. It holds a pointer to the next cluster. Whenever the computer is switched on the operating system gets loaded. The process of loading DOS is called as booting DOS. Once started up, the computer performs its self-test i.e. power-on hardware diagnostics. The directory is a table of contents for a disk . It contain the name of files their size , and the dates they were last modified . In windows a directory is referred as Folder . A directory can contain a number of subfolders and file .

4.20 Self Assessment Test

1. What are the internal and External commands in MS-DOS? Discuss.
2. What do you understand by the term “Booting the System” ? Explain.
3. what is config.sys file in MS-DOS?
4. What is the use of Autoexec.bat file ?
5. What are the wild card characters in MS-DOS?
6. Write the command to print a file in MS-DOS?
7. How will you rename a DOS file?
8. Describe in detail the usage of COPY command. Give the example of combining two or more files into another file using COPY command.
9. Describe with example the purpose and usage of DELTREE command?
10. Describe the DIR command. What are the switches used with DIR command?
11. Describe the purpose of FDISK command.
12. What is the use of LABEL command?
13. What is FAT?
14. What is the use of PATH command?
15. What is the use of FORMAT command?

4.21 Reference Books

- Computer & Information Technology by a Jainwal.

UNIT – 5 : WINDOWS

Unit Structure

- 5.0 Objectives
- 5.1 Introduction
- 5.2 Advantages of Windows
- 5.3 Components of Windows
- 5.4 Types of Windows
- 5.5 Summary
- 5.6 Key Words
- 5.7 Self Assessment Test
- 5.8 Reference Books

5.0 Objectives

After studying this unit, you should be able to understand:

- Need of Windows
- Advantages of Windows
- Components facilities of Windows
- Types of Windows Operating System

5.1 Introduction

Computer can perform given task correctly with high speed on the basis of pre-defined instructions called computer programs. The collection of programs is called operating system, Windows is one of the most popular operating system among the computer user. Windows operating system is easy to understand and user friendly. The feature of windows operating system makes learning of computers easy for non technical persons. New user can start working with computers directly without knowing about the technology.

5.2 Advantages of Windows

1. Graphical User Interface (GUI) :

The Graphical User Interface of the windows help user to perform various tasks easily. Prior to this the Operating Systems consist of character user interface (CUI) in which the user has to remember all the commands and syntax to execute any instruction. In GUI task are performed with the help of icon (Pictorial Representation of Task) and background in instruction and syntax associated with that icon automatically taken by the computer.

2. Multi-User :

In Multiuser operating system more than one user can perform their task simultaneously. You can create various user with different type of permission to perform various task, use of software, access of disks, drives and other resources.

3. Multi-Tasking :

We can perform multiple task on windows at the same time. For example we can listen to the music while typing some text in word document or can play some game. We work in multiple windows when we surf internet and download some material from the internet.

4. Userfriendly Environment :

In windows when some drivers or fonts are installed. This facility is universally available in all the application software of windows. We need not require to install or configure various devices separately.

5. Easy to Understand :

The GUI based systems help us to understand various processes with the help of wizards and allow us to perform complex task.

6. Search :

The dedicated search option available in windows help us to locate required file or folder. If name of the file is not known search command can be executed for type of file or date or on the basis of some of the content of the file. this results in very good tool for users.

7. Click or Menu Driven :

All the tasks in windows can be performed with the help of click of mouse or selecting a command from the menu. Keyboard is use only for typing of some text and this facility makes windows operations very fast and convenient to users.

8. File and Folders :

Files and Directory of other operating system are termed as files and folders and the limitation of number of character in file name and directory name is removed in windows. Some special characters can also be use while naming the file and folders. The pictorial representation of folders help user for proper recording of files and folders.

9. Plug and Play :

Some advance version of windows provide us a facility of plug and play. As the name reflect you can directly use any device with installation of drivers. A common part is used for variety of devices. For example : USB Printer, Pen Drive, External Harddisk, Mouse, Keyboard, Scanner etc.

10. Audio Video Features :

New version of windows has given facility to create audio / video clips. A simple window user can create audio / video application using this facility.

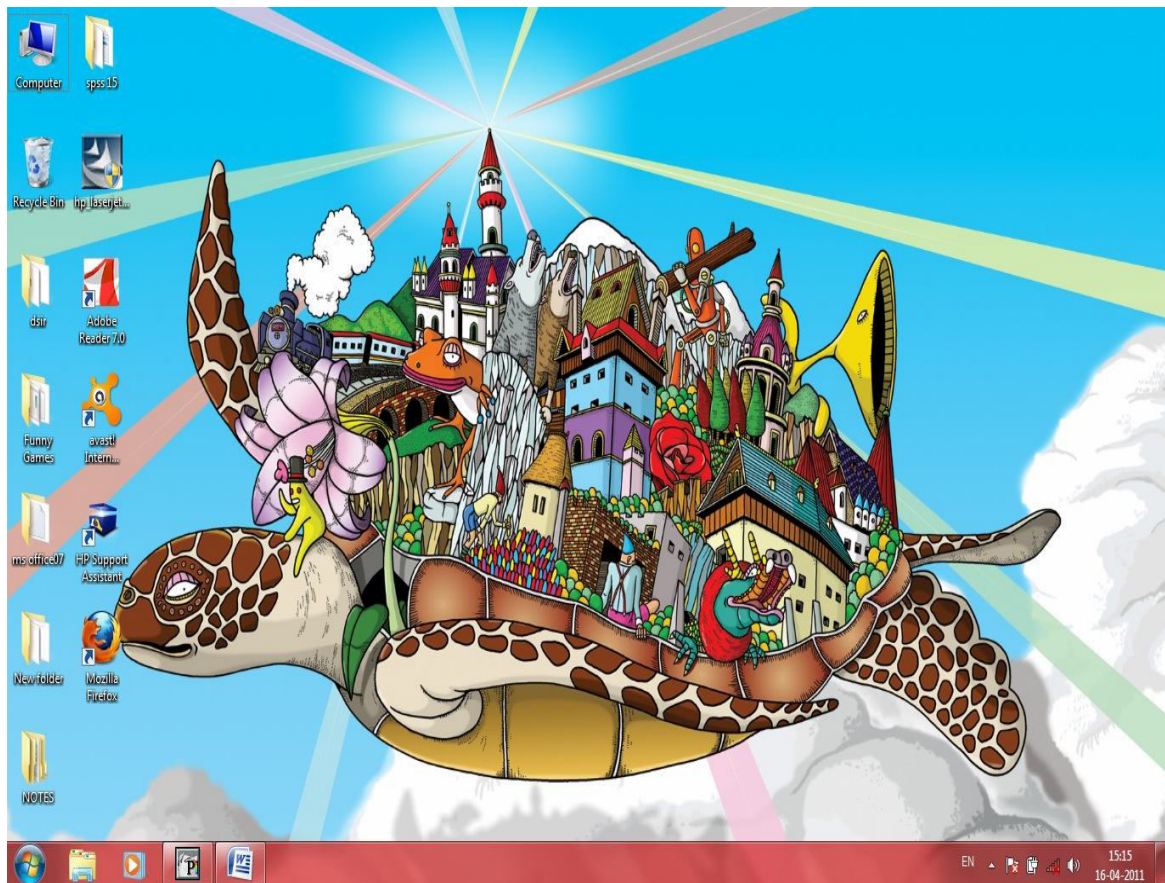
5.3 Components of Windows

Windows has got various components which are applicable to all versions. the facility / command available in windows is universally applicable in all the application software which are compatible with windows. It means basic structure, basic command, layout, title, buttons etc remains same throughout the windows. Let us discuss some of the popular component.

1. Desktop

The first screen which we get after completion of the booting process is called Desktop. This desktop act as a access point to avail all the software installed in the computer. We can customize desktop as per our requirement in terms of colour, Picture, Layout and also create shortcut to the program which we use frequently. The desktop may contain many items like My Computer, Network Neighbourhood, My Documents, Recycle Bin as standard along with the shortcut or file created by the user.

We can set the properties of the desktop by clicking right mouse button. This menu allows us to change background image called wall paper. We can also change property of display area, colour scheme, task bar orientation etc.



2. Task Bar

The lower bar of the desktop is called task bar. It contains start button on the left side of the screen. This button is used to start an application or programs. The other programs which are currently running in windows can also be shown on this task bar in the form of icon. The right hand side of the task bar contains other icons like Date and Time, Sound, Speaker, Network connection etc. You can set property of the task bar by pointing on task bar and clicking right mouse button. The start button opens a menu containing directories and subdirectories of softwares available in the computer.

3. My Computer

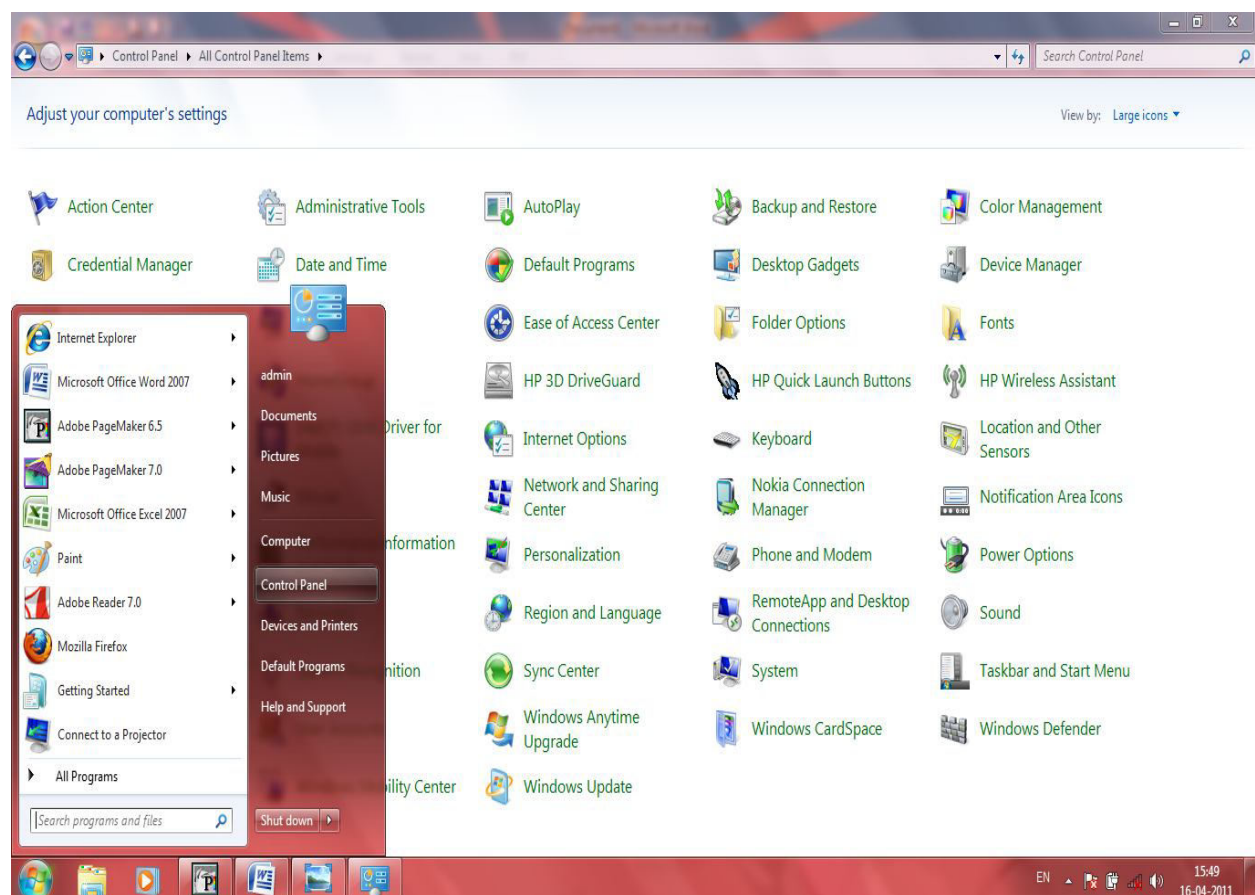
My computers is a facility to know about all the devices, drives and their properties, drivers, computer name etc. By selecting a particular drive details of the files folders available on that drive can be displayed. The various properties of the disks and softwares can be seen from my computers.

4. Recycle Bin

Its a folder which hold a copy of all the documents, files, folders, software which you have deleted. In case if you have deleted a folder accidentally you can restore that folder from recycle bin. To clear the deleted file permanently you have cammand delete all the files from recycle bin also.

5. Control Panel

Control Panel is one of the most important utility of windows. It allow a user to change various parameters and setting of the software, hardwares, applications etc. It contains a large number of utility programs to control various activities of computers. By selecting a particular utility program user can change setting for hardware like, printer, mouse, keyboard etc. and software like screen saver, fonts etc. All the setting of control of various utilities are grouped in control panel.



6. Prgorams and Accessories

This is a group of programs which a user required to perform certain task likes for typing we have note pad, for drawing we have paint brush, for calculation we have calculator etc. For entertainment various games are also present in accessories, Some systems tools like disk cleanup, defragmentation is also available in accessories. All the software required to run audio / video file is also grouped with accessories.

7. Run

A direct command line is available to user to run a command from the desktop. The user has to remember syntax and syntax of the command and know the path of the file and folder before using this facility. But this facility is generally utilised by technical people and network administrator.

5.4 Types of Windows

Windows is an operating system developed by Microsoft. Since the inception of windows in 80's windows has undergone various changes in terms of functions and utilities. Some of the popular versions of windows are given below

1. Windows 3 :

The early version of window came out around in 1985 where windows is mounted over DOS as an additional GUI facility. The windows 1 became a successful operating system with networking capability. In this phase windows can not be considered as separate operating system because it provides only graphical user interface running on the top of DOS.

2. Windows 95 :

After Windows 3.11, Microsoft developed a new consumer oriented version of windows called windows 95. Windows 95 was designed to have support for 32-bit preemptive multitasking, although a 16-bit kernel would remain for the sake of backward compatibility. It was necessary to carry over design decisions from earlier versions of windows for reasons of backwards compatibility, even if these design decisions no longer matched a more modern computing environment. These factors eventually began to impact the operating system's efficiency and stability.

3. Windows 98 :

Microsoft released Windows 98 which includes new hardware drivers and better support for FAT 32 file systems which allow support for disk partition larger than 2 GB. It also integrates the internet explorer browser into windows GUI and windows explorer file manager. A new version of 98 is also released with the feature of internet connection sharing over a local area network (LAN).

4. Windows ME :

Microsoft introduced Windows ME (Millennium Edition) which upgraded windows 98 with enhanced multimedia and internet features. It also introduced the first version of System Restore, which allowed users to revert their system state to a previous "Known-good" point in the case of system failure. System restore was a notable feature that made its way into Windows XP. Windows ME was widely criticised for serious stability issues and for lacking real mode DOS support, to the point of being referred to as the "Mistake Edition" or ME meaning "Many Errors". Windows ME was the last operating system to be based on the Windows 9X (Monolithic) kernel and MS-DOS. It is also the last 32 bit release of Microsoft Windows which does not include Product Activation.

5. Windows XP :

In 2001, Microsoft released Windows XP. The merging of the windows NT / 2000 and Windows 95/98/ME lines was finally achieved with Windows XP. Windows XP uses the Windows NT5.1 kernel, making the entrance of the windows NT core to the consumer market, to replace the aging 16/32-bit branch. The initial release met with considerable criticism, particularly in the area of security, leading to the release of three major Service Packs. The Windows logo, redesigned with the release of Windows XP,

used until 4 December 2006. Windows XP screenshot-showing the Sample Picture folder, Sample Music folder and control panel with the blue Luna scheme and Bliss desktop.

6. Windows Vista:

Windows Vista was released on November 30, 2006 to business customers, consumer versions following on January 30, 2007. Windows Vista intended to have enhanced security by introducing a new restricted user mode called User Account Control, replacing the "administrator by default" philosophy of Windows XP. One Major difference between Vista and earlier versions of Windows, Windows 95 and later, is that the original start button was replaced with just the Windows icon. Vista also features new graphics features, the Windows Aero GUI, new applications such as Windows Calendar, Windows DVD Maker and some new games including Chess, Mahjong and Purble Place, Internet Explorer 7, Windows Media Player 11 and a large number of underlying architectural changes.

7. Windows 2007 :

Windows 7 is the current major release after Windows Vista and was planned for a three-year development timeframe. It was previously known by the code names Avina and Vienna. Some features of Windows 7 are faster booting, Device Stage, Windows PowerShell, less obtrusive User Account Control, Multi-touch and improved window management. Features included with Windows Vista and not in Windows 7 include the sidebar (although gadgets remain) and several programs that were removed in favor of downloading their Windows Live counterparts.

5.5 Summary

Windows is one of the most popular operating system among the computer user. Windows operating system is easy to understand and user friendly. The feature of windows operating system makes learning of computers easy for non technical persons. Windows offer many advantages & features to its user like GUI, Multi User, Multi Tasking, Efficient Search and file folder management option, plug & play feature with user friendly multimedia management facilities etc.

5.7 Key Words

- **Folder :** It is group of files just like directory in DOS
- **Buttons :** A switch which perform certain task in a table manner.
- **Shortcut:** It a quick way to open an application or to access file / folder.
- **Minimize :** It is one of the buttons on the upper right corner of the window. When pressed window get minimized in task bar.
- **Restore / Maximize :** It is one of the button on the upper right corner of the window. When pressed window gets restore or maximize.
- **Close :** It is one of the button on the upper right corner of the window. When pressed window get closed i.e. application is closed.
- **Shut Down :** It is systematic process of closing your computer.

5.6 Self Assessment Test

1. What do you understand by Windows.
2. Define the Advantages of Windows and Compare with DOS.
3. Describe Control Panel, My Computer, My Documents.
4. Explain multiuser and multi tasking.
5. Explain the features of Windows 95

5.8 Reference Books

- Mastering Windows 95, Robert Cowart, BPB Publication, New Delhi
- Foundation of Information Technology, D.S. Yadav, New Age International (P) Ltd. Publishers
- Windows XP Professional Complete, BPB Publication, New Delhi
- Fundamentals of Information Technology, Deepak Bharihoke, Excel Books

UNIT - 6 : UNIX OPERATING SYSTEM

Unit Structure

- 6.0 Objectives
- 6.1. Introduction
- 6.2 Basic Commands
- 6.3 Summary
- 6.4 Self Assessment Questions
- 6.5 Reference Books

6.0 Objectives

After going through you will be able to :

- Describe multiuser operating system
- Explain structure of Unix OS.
- Describe development of Unix OS.
- Understand file structure of Unix
- Understand some command of Unix

In a single user system, resources such as the processor, the printer, hard disc, etc. are kept idling most of the time, since all these resources are at the disposal of a single user. There are many multi-user operating systems in use at that time, normally coded in assembly language, and implemented for specific hardware. To overcome this situation, and to have easy portability of the operating system UNIX was developed.

UNIX in the Enterprise Environment

UNIX was created in the 1970s by AT&T's Bell Laboratories and has gone through design evolutions by both universities and companies. After more than 30 years of use, the UNIX operating system is still regarded as one of the most powerful, versatile, and flexible operating systems in the computer world. Its popularity hinges on its simplicity, open standards design, its ability to run on a wide variety of machines, and its portability.

The bottom line is that UNIX was and is a reliable, secure, multi-user operating system that continues to dominate the enterprise Web- and application-hosting landscape. Many large organizations funded UNIX development platforms, and they remain loyal to the platform to this day. This loyalty is to some extent the result of cost and support. Many experts agree that UNIX is the operating system of choice for Web hosting, with the only real alternative being Linux, which IBM and others now are strongly backing.

6.1 Introduction

UNIX is an operating system which was first developed in the 1960s and has been under constant development ever since. By operating system, we mean the suite of programs which make the computer work. It is a stable, multi-user, multi-tasking system for servers, desktops and laptops.

UNIX systems also have a graphical user interface (GUI) similar to Microsoft Windows which provides an easy to use environment. However, knowledge of UNIX is required for operations which aren't covered by a graphical program, or when there is no windows interface available, for example, in a telnet session. The UNIX operating system is made up of three parts; the kernel, the shell and the programs.

Kernel

The kernel of UNIX is the hub of the operating system. It allocates time and memory to programs and handles the filestore and communications in response to system calls. As an illustration of the way that the shell and the kernel work together, suppose a user types **rm myfile** (which has the effect of removing the file **myfile**). The shell searches the file store for the file containing the program **rm**, and then requests the kernel, through system calls, to execute the program **rm** on **myfile**. When the process **rm myfile** has finished running, the shell then returns the UNIX prompt **%** to the user, indicating that it is waiting for further commands.

Shell

The shell acts as an interface between the user and the kernel. When a user logs in, the login program checks the username and password, and then starts another program called the shell. The shell is a command line interpreter (CLI). It interprets the commands the user types in and arranges for them to be carried out. The commands are themselves programs. When they terminate, the shell gives the user another prompt (**%** on our systems). The adept user can customize his/her own shell, and users can use different shells on the same machine. Staff and students in the school have the **tcsh shell** by default. The tcsh shell has certain features to help the user inputting commands.

Filename Completion - By typing part of the name of a command, filename or directory and pressing the [**Tab**] key, the tcsh shell will complete the rest of the name automatically. If the shell finds more than one name beginning with those letters you have typed, it will beep, prompting you to type a few more letters before pressing the tab key again. The shell keeps a list of the commands you have typed in. If you need to repeat a command, use the cursor keys to scroll up and down the list or type history for a list of previous commands.

6.1.1 History of UNIX

UNIX has a modest beginning at AT & T laboratories in a 1969. That was when AT & T withdrew its team from MULTICS project and some of them began work on development of computing environment to pursue programming research. Ken Thompson & Dennis Ritchie then designed and built a small multi tasking system supporting two users. This new system had an elegant file system, a command interpreter and a set of utilities. Many people who later took part in early development of Unix system participated in the MULTICS work at Bell Laboratories. A primitive version of MULTICS system was running on GE 645 computer by 1969.

A member of team Brain Kernighan presumably having MULTICS in mind suggested the name UNICS then jokingly referred to as uniplexed information and computing system for this operating system. In 1970, UNICS finally become name by which it's known today – UNIX. Even Dennis Ritchie was not on ordinary man. He had research on another christened MULTICS for its unique multi-user capabilities. This was one of the earliest interactive multi-user OS. The name UNIX was at dig at MULTICS and latter exerted strong influence on its conceptions and design. UNIX code was written in assembly language.

The Unix was written in C language with all due respect to English alphabets. Unix became popularly

regarded as an OS of programmers, by programmers & for programmers. Unix had finally arrived in big way and with it began a golden chapter in computer chronics. By present estimates, over a million people use the UNIX OS and it is available on more than 100 diverse hardware platforms from the supercomputers to its ubiquitous micros.

Directory Structure: All the files are grouped together in the directory structure. The file-system is arranged in a hierarchical structure, like an inverted tree. The top of the hierarchy is traditionally called **root** (written as a slash /)

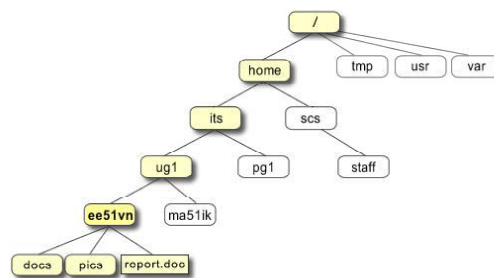


Fig 1 Home directory of the undergraduate student “ee51vn”

In the diagram above, we see that the home directory of the undergraduate student “ee51vn” contains two sub-directories (**docs** and **pics**) and a file called **report.doc**.

6.1.2 Features of UNIX

- It is a multi-user machine in which more than one user can use the machine at a time supported via terminals (serial or network connection).
- Multi-tasking in which more than one program can be run at a time Hierarchical directory structure to support the organization and maintenance of files.
- Portability through which only the kernel (<10%) written in assembler tools for program development
- A wide range of support tools (debuggers, compilers).
- The UNIX system consists of numerous constituents that are usually packaged together which include the growth environment, documents, libraries, portable, modifiable source-code for all of these constituents, along with kernel of an operating system as UNIX was a self-contained software system.
- This was regarded as one of the main reasons it appeared as a significant teaching and learning device and has had such a broad influence.
- The unique V7 UNIX distribution contains copies of all of the compiled binaries including all of the source code and documentation occupied less than 10MB that arrived on a single 9-track magtape.
- In two volumes the printed documentation, typeset from the on-line sources contained.
- Kernel is the source code in system composed of numerous sub-components like:
 1. dev: device drivers for control of hardware and some pseudo-hardware
 2. conf: configuration and machine-dependent parts, along with boot code

3. h: header files, defining key structures within the system and important system-specific invariables
4. sys: operating system “kernel”, process scheduling, handling memory management, system calls
5. Development Environment contains early versions of UNIX contained a growth environment sufficient to reconstruct the complete system from source code:
6. as: machine-language assembler for the machine
7. cc: C language compiler
8. ld: linker, for combining object files
9. lib: object-code for effectively automating the build process
10. include: header files for software development, defining standard interfaces and system invariants
11. Other languages: V7 Unix contained a Fortran-77 compiler, a programmable arbitrary-precision calculator (bc, dc), and the awk “scripting” language.
12. Commands: Unix makes little distinction between commands (user-level programs) for system operation and preservation (e.g. cron), commands of general usefulness (e.g. grep), and more common function applications such as the text formatting and typesetting package.
13. Other tools: an object-code archive manager (ar), symbol-table lister (nm), compiler-development tools (e.g. lex & yacc), and debugging tools.
14. sh: The “shell” programmable command-line interpreter, the primary user interface on Unix before window systems appeared, and even afterward (within a “command window”). Utilities: the central device kit of the UNIX command set, including cp, ls, grep, find and many others.

6.1.3 The UNIX Operating System

Multi-User Operating Systems: A multi-user operating system allows more than one user to share the same computer system at the same time. It does this by time-slicing the computer processor at regular intervals between the various users.

We start off by giving the first user (which we will call Sophia) the processor hardware, and run Sophia’s program for 1/5th of a second. When the time is up, we intervene, save Sophia’s program state (program code and data) and then start running the second users program (for 1/5th of a second). This process continues till we eventually get back to user Sophia. To continue running Sophia’s program, we restore the programs code and data and then run for 1/5th of a second. This switching between user programs is done by part of the kernel. To switch from one program to another requires,

- a regular timed interrupt event (provided by a clock)
- saving the interrupted programs state and data
- restoring the next programs state and data
- running that program till the next timed interrupt occurs

Main system memory is divided into portions for the operating system and user programs.

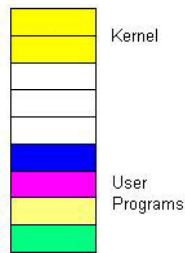


Fig.: 2 Kernel space and User Programs organization in Memory

As you can see in the above diagram, the kernel space is kept separate from user programs.

In UNIX systems, each user is presented with a shell. This is a program which displays the users prompt, handles user input and displays output on the terminal. The shell program provides a mechanism for customizing each user's setup requirements, and storing this information for re-use (in a file called *.profile*). When the UNIX system starts up, it also starts a system process which monitors the state of each terminal input line. Whenever a user logs in and their password is validated the UNIX system associates the shell program with that terminal.

Multi-Tasking Operating Systems

Multi-tasking operating systems permit the use of more than one program to run at once. It does this in the same way as a multi-user system, by rapidly switching the processor between the various programs. OS/2 and Windows 95 are examples of multi-tasking single-user operating system. UNIX is an example of a multi-tasking multi-user operating system. A multi-user system is also a multi-tasking system. This means that a user can run more than one program at once, using key selection to switch between them. Multi-tasking systems support **foreground** and **background** tasks. A foreground task is one that the user interacts directly with using the keyboard and screen. A background task is one that runs in the background (it does not have access to the keyboard). Background tasks are usually used for printing or backups.

The role of the operating system is to keep track of all the programs, allocating resources like disks, and memory and printer queues as required.

6.1.4 UNIX Structure

Various parts and portion of UNIX is arranged around the hardware. The core of UNIX is the kernel, which schedules jobs and manages data storage, and it is very closely interfaced with hardware. The hardware functions according to the machine instructions released ultimately by the kernel, based on the shell's interpretation of user commands. Surrounding the shell are parts of software of the shell relating to:

1. Execution of commands for piping and filtering actions.
2. Tools for carrying out foreground and background processing.
3. Utilities for configuring the hardware.
4. I/O redirection and command execution utilities.
5. Filename substitution.

The shell forms an interface between the user and the kernel. Outside the shell are the different user-

specific utilities of UNIX, numbering around 300, which enhance its capability. Above this, are the user programs and application packages, which can facilitate data entry, data modification, query, report generation, etc. The shell is a program that collects and interprets the user commands, invokes the concerned program file from memory and directs the kernel to execute them. Externally, the UNIX operating system is made up of two parts. One part is large set of system programs, each one corresponding to a command, and another part of the shell, which interprets, manages and coordinates the execution of these programs. The user sees the shell command as one pecculating down the UNIX system, and the kernel, looking up to the user through the shell for the next set of process. separate shell process is apportioned to each user. The separate shell once created provides an environment within which the user operates. The shell environment consists of the following to ensure proper interaction between the user and the system:-The name of the user, and a working directory (a directory allotted to the user by the OS. A list of system directories to be searched to locate the commands given by the user. The file access permission modes. A group of user's identification (user id) and group identification number (group id).

The KERNEL is the heart of UNIX Operating System. Technically speaking the UNIX KERNEL is the Operating System. It provides the full time software connection to the hardware. It is a part of UNIX Operating System, which deals mainly with:

1. Process scheduling
2. Inter process communication
3. Paging
4. Device drivers

6.2 Basic Commands

1. Listing files and directories

ls (list) : When you first login, your current working directory is your home directory. Your home directory has the same name as your user-name, for example, ee91ab, and it is where your personal files and subdirectories are saved.

To find out what is in your home directory, type : `% ls`

The **ls** command (lowercase L and lowercase S) lists the contents of your current working directory.

There may be no files visible in your home directory, in which case, the UNIX prompt will be returned. Alternatively, there may already be some files inserted by the System Administrator when your account was created. **ls** does not, in fact, cause all the files in your home directory to be listed, but only those ones whose name does not begin with a dot (.) Files beginning with a dot (.) are known as hidden files and usually contain important program configuration information. They are hidden because you should not change them unless you are very familiar with UNIX!!!

To list all files in your home directory including those whose names begin with a dot, type

`% ls -a`

As you can see, **ls -a** lists files that are normally hidden.

Is an example of a command which can take options: **-a** is an example of an option. The options change the behavior of the command. There are online manual pages that tell you which option a particular command can take, and how each option modifies the behavior of the command.

2. Making Directories

Mkdir (make directory)

We will now make a subdirectory in your home directory to hold the files you will be creating and using in the course of this unit. To make a subdirectory called `unixstuff` in your current working directory type : `% mkdir unixstuff`

To see the directory you have just created, type : `% ls`

3. Changing to a different directory

cd (change directory)

The command **cd *directory*** means change the current working directory to '*directory*'. The current working directory may be thought of as the directory you are in, i.e. your current position in the file-system tree.

To change to the directory you have just made, type

`% cd unixstuff`

Type **ls** to see the contents (which should be empty)

Exercise 1 : Make another directory inside the `unixstuff` directory called `backups`

4. Directories

Still in the **unixstuff** directory, type : `% ls -a`

As you can see, in the **unixstuff** directory (and in all other directories), there are two special directories called `(.)` and `(..)`

The current directory `(.)`

In UNIX, `(.)` means the current directory, so typing : `% cd .`

NOTE: there is a space between `cd` and the dot

means stay where you are (the **unixstuff** directory).

This may not seem very useful at first, but using `(.)` as the name of the current directory will save a lot of typing, as we shall see later in the tutorial.

The parent directory `(..)`

`(..)` means the parent of the current directory, so typing : `% cd ..`

will take you one directory up the hierarchy (back to your home directory). Try it now.

Note: typing **cd** with no argument always returns you to your home directory. This is very useful if you are lost in the file system.

5. Pathnames

pwd (print working directory)

Pathnames enable you to work out where you are in relation to the whole file-system. For example,

to find out the absolute pathname of your home-directory, type **cd** to get back to your home-directory and then type : % pwd

The full pathname will look something like this –

/home/its/ug1/ee51vn : which means that **ee51vn** (your home directory) is in the sub-directory **ug1** (the group directory), which in turn is located in **its** sub-directory, which is in the **home** sub-directory, which is in the top-level root directory called “/” .

Command Meaning

ls	list files and directories
ls -a	list all files and directories
mkdir	make a directory
cd <i>directory</i>	change to named directory
cd	change to home-directory
cd ~	change to home-directory
cd ..	change to parent directory
pwd	display the path of the current directory

Table 1.1 *Description of some Unix Command*

6 Copying Files

cp (copy)

cp file1 file2 is the command which makes a copy of **file1** in the current working directory and calls it **file2**

What we are going to do now, is to take a file stored in an open access area of the file system, and use the **cp** command to copy it to your **unixstuff** directory.

First, **cd** to your **unixstuff** directory. : % cd ~/unixstuff

Then at the UNIX prompt, type : % cp /vol/examples/tutorial/science.txt .

Note: Don't forget the dot . at the end. Remember, in UNIX, the dot means the current directory.

The above command means copy the file **science.txt** to the current directory, keeping the name the same.

(Note: The directory **/vol/examples/tutorial/** is an area to which everyone in the school has read and copy access. If you are from outside the University, you can grab a copy of the file here. Use 'File/Save As..' from the menu bar to save it into your **unixstuff** directory.)

Exercise 2 : Create a backup of your science.txt file by copying it to a file called science.bak

7 Moving Files

mv (move)

mv file1 file2 moves (or renames) **file1** to **file2**

To move a file from one place to another, use the **mv** command. This has the effect of moving rather than copying the file, so you end up with only one file rather than two.

It can also be used to rename a file, by moving the file to the same directory, but giving it a different name.

We are now going to move the file `science.bak` to your backup directory.

First, change directories to your `unixstuff` directory (can you remember how?). Then, inside the **unixstuff** directory, type

```
% mv science.bak backups/
```

Type `ls` and `ls backups` to see if it has worked.

8 Removing Files and Directories

rm (remove), rmdir (remove directory)

To delete (remove) a file, use the **rm** command. As an example, we are going to create a copy of the **science.txt** file then delete it.

Inside your **unixstuff** directory, type : `% cp science.txt tempfile.txt`

```
% ls
```

```
% rm tempfile.txt
```

```
% ls
```

You can use the **rmdir** command to remove a directory (make sure it is empty first). Try to remove the **backup's** directory. You will not be able to since UNIX will not let you remove a non-empty directory.

Exercise 3 : Create a directory called `tempstuff` using `mkdir`, and then remove it using the `rmdir` command.

9 Displaying the contents of a file on the screen

clear (clear screen)

Before you start the next section, you may like to clear the terminal window of the previous commands so the output of the following commands can be clearly understood.

At the prompt, type : `% clear`

This will clear all text and leave you with the `%` prompt at the top of the window.

cat (concatenate)

The command `cat` can be used to display the contents of a file on the screen. Type: `% cat science.txt`

As you can see, the file is longer than the size of the window, so it scrolls past making it unreadable.

less

The command `less` writes the contents of a file onto the screen a page at a time. Type : `% less science.txt`

Press the **[space-bar]** if you want to see another page, and type **[q]** if you want to quit reading. As you can see, **less** is used in preference to **cat** for long files.

head

The **head** command writes the first ten lines of a file to the screen.

First clear the screen then type : `% head science.txt`

Then type

```
% head -5 science.txt
```

What difference did the -5 do to the head command?

tail

The **tail** command writes the last ten lines of a file to the screen.

Clear the screen and type

```
% tail science.txt
```

10 Searching the contents of a file

Simple searching using less

Using **less**, you can search through a text file for a keyword (pattern). For example, to search through **science.txt** for the word '**science**', type : % less science.txt

then, still in **less**, type a forward slash [/] followed by the word to search : /science

As you can see, **less** finds and highlights the keyword. Type [n] to search for the next occurrence of the word.

grep (don't ask why it is called grep)

grep is one of many standard UNIX utilities. It searches files for specified words or patterns. First clear the screen, then type : % grep science science.txt

As you can see, **grep** has printed out each line containing the word **science**.

Or has it ????

Try typing : % grep Science science.txt

The **grep** command is case sensitive; it distinguishes between Science and science.

To ignore upper/lower case distinctions, use the -i option, i.e. type : % grep -i science science.txt

To search for a phrase or pattern, you must enclose it in single quotes (the apostrophe symbol). For example to search for spinning top, type : % grep -i 'spinning top' science.txt

Some of the other options of grep are:

- v display those lines that do NOT match
- n precede each matching line with the line number
- c print only the total count of matched lines

Try some of them and see the different results. Don't forget, you can use more than one option at a time. For example, the number of lines without the words science or Science is

```
% grep -ivc science science.txt
```

wc (word count)

A handy little utility is the **wc** command, short for word count. To do a word count on **science.txt**, type : % wc -w science.txt

To find out how many lines the file has, type : `% wc -l science.txt`

Command	Meaning
cp <i>file1 file2</i>	copy file1 and call it file2
mv <i>file1 file2</i>	move or rename file1 to file2
rm <i>file</i>	remove a file
rmdir <i>directory</i>	remove a directory
cat <i>file</i>	display a file
less <i>file</i>	display a file a page at a time
head <i>file</i>	display the first few lines of a file
tail <i>file</i>	display the last few lines of a file
grep ' <i>keyword</i> ' <i>file</i>	search a file for keywords
wc <i>file</i>	count number of lines/words/characters in file

Description of some UNIX Command

11 Redirection

Most processes initiated by UNIX commands write to the standard output (that is, they write to the terminal screen), and many take their input from the standard input (that is, they read it from the keyboard). There is also the standard error, where processes write their error messages, by default, to the terminal screen.

We have already seen one use of the **cat** command to write the contents of a file to the screen.

Now type **cat** without specifying a file to read : `% cat`

Then type a few words on the keyboard and press the **[Return]** key.

Finally hold the **[Ctrl]** key down and press **[d]** (written as **^D** for short) to end the input.

What has happened?

If you run the **cat** command without specifying a file to read, it reads the standard input (the keyboard), and on receiving the 'end of file' (**^D**), copies it to the standard output (the screen).

In UNIX, we can redirect both the input and the output of commands.

12 Redirecting the Output

We use the **>** symbol to redirect the output of a command. For example, to create a file called **list1** containing a list of fruit, type : `% cat > list1`

Then type in the names of some fruit. Press **[Return]** after each one.

pear or banana or apple

^D { this means press **[Ctrl]** and **[d]** to stop }

What happens is the **cat** command reads the standard input (the keyboard) and the **>** redirects the output, which normally goes to the screen, into a file called **list1**

To read the contents of the file, type : `% cat list1`

Exercise 4 :

Using the above method, create another file called **list2** containing the following fruit: orange, plum, mango, grapefruit. Read the contents of **list2**

Appending to a file

The form `>>` appends standard output to a file. So to add more items to the file **list1**, type

```
% cat >> list1
```

Then type in the names of more fruit : peach or grape or orange

^D (Control D to stop)

To read the contents of the file, type

```
% cat list1
```

You should now have two files. One contains six fruit, the other contains four fruit.

We will now use the cat command to join (concatenate) **list1** and **list2** into a new file called **biglist**. Type

```
% cat list1 list2 > biglist
```

What this is doing is reading the contents of **list1** and **list2** in turn, then outputting the text to the file **biglist**

To read the contents of the new file, type

```
% cat biglist
```

13 Redirecting the Input

We use the `<` symbol to redirect the input of a command.

The command sort alphabetically or numerically sorts a list. Type

```
% sort
```

Then type in the names of some animals. Press [Return] after each one.

dog, cat, bird, ape,

^D (control d to stop)

The output will be : ape, bird , cat , dog.

Using `<` you can redirect the input to come from a file rather than the keyboard. For example, to sort the list of fruit, type : `% sort < biglist`

and the sorted list will be output to the screen.

To output the sorted list to a file, type : `% sort < biglist > slist`

Use cat to read the contents of the file **slist**

14 Pipes

To see who is on the system with you, type :`% who`

One method to get a sorted list of names is to type : `% who > names.txt`

```
% sort < names.txt
```

This is a bit slow and you have to remember to remove the temporary file called names when you have finished. What you really want to do is connect the output of the who command directly to the input of the sort command. This is exactly what pipes do. The symbol for a pipe is the vertical bar |

For example, typing : % who | sort

will give the same result as above, but quicker and cleaner.

To find out how many users are logged on, type : % who | wc -l

Exercise 5:

Using pipes, display all lines of **list1** and **list2** containing the letter 'p', and sort the result.

Answer available here

Command	Meaning
<i>command > file</i>	redirect standard output to a file
<i>command >> file</i>	append standard output to a file
<i>command < file</i>	redirect standard input from a file
<i>command1 command2</i>	pipe the output of command1 to the input of command2
<i>cat file1 file2 > file0</i>	concatenate file1 and file2 to file0
sort	sort data
who	list users currently logged in

Description of same Unix Command

15 Wildcards

The * wildcard

The character * is called a wildcard and will match against none or more character(s) in a file (or directory) name. For example, in your **unixstuff** directory, type : % ls list*

This will list all files in the current directory starting with **list....**

Try typing : % ls *list

This will list all files in the current directory ending with **....list**

The ? wildcard

The character ? will match exactly one character.

So ?ouse will match files like **house** and **mouse**, but not **grouse**.

16 Filename Conventions

We should note here that a directory is merely a special type of file. So the rules and conventions for naming files apply also to directories. In naming files, characters with special meanings such as / * & % , should be avoided. Also, avoid using spaces within names. The safest way to name a file is to use only alphanumeric characters, that is, letters and numbers, together with _ (underscore) and . (dot).

Good filenames Bad filenames

project.txt	project
my_big_program.c	my big program.c
fred_dave.doc	fred & dave.doc

File names conventionally start with a lower-case letter, and may end with a dot followed by a group of letters indicating the contents of the file. For example, all files consisting of C code may be named with the ending **.c**, for example, prog1.c. Then in order to list all files containing C code in your home directory, you need only type `ls *.c` in that directory.

17 Getting Help

On-line Manuals

There are on-line manuals which gives information about most commands. The manual pages tell you which options a particular command can take, and how each option modifies the behaviour of the command. Type **man command** to read the manual page for a particular command.

For example, to find out more about the **wc** (word count) command, type

```
% man wc
```

Alternatively

```
% whatis wc
```

gives a one-line description of the command, but omits any information about options etc.

Apropos

When you are not sure of the exact name of a command,

```
% apropos keyword
```

will give you the commands with keyword in their manual page header. For example, try typing

```
% apropos copy
```

Command	Meaning
---------	---------

*	match any number of characters
----------	--------------------------------

?	match one character
----------	---------------------

man command	read the online manual page for a command
--------------------	---

whatis command	brief description of a command
-----------------------	--------------------------------

apropos keyword	match commands with keyword in their man pages
------------------------	--

18 Miscellonous Commands

Man, banner, cal, calendar, clear, nohup, tty .

Manual command : This is help command, and will explains you about online manual pages you can also use man in conjunction with any command to learn more about that command for example. Man ls will explain about the ls command and how you can use it. Man -k pattern command will search for the pattern in given command.

Banner command: Banner prints characters in a sort of ascii art poster, for example to print wait in big letters. I will type banner wait at unix command line or in my script. This is how it will look.

```
# # ## # #####
# # # # # #
# # # # # #
# ## # ##### # #
## ## # # # #
# # # # # #
```

Cal command : Cal command will print the calander on current month by default. If you want to print calander of August of 1965. That's eighth month of 1965. Cal 8 1965 will print following results.

```
August 1965
S M Tu W Th F S
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31
```

Clear command : clear command clears the screen and puts cursor at beginning of first line.

Calendar command : Calendar command reads your calendar file and displays only lines with Current day.

For example in your calendar file if you have this

```
12/20 Test new software.
1/15 Test newly developed 3270 product.
1/20 Install memory on HP 9000 machine.
```

On dec 20th the first line will be displayed. you can use this command with your crontab file or in your login files.

Nohup command: Nohup command if added in front of any command will continue running the command or process even if you shut down your terminal or close your session to machine. For exmaple, if I want to run a job that takes lot of time and must be run From Terminal and is called

```
update_entries_tonight.
```

nohup update_entries_tonight will run the job even if terminal is shut down in middle of this job.

Tty command: Tty command will display your terminal. Syntax is *tty options*

Options

- -l will print the synchronous line number.
- -s will return only the codes: 0 (a terminal), 1 (not a terminal), 2 (invalid options) (good for scripts)

File Management commands.

cat, cd, cp, file, head, tail, ln, ls, mkdir, more, mv, pwd, rcp, rm, rmdir, wc.

Pwd command: Pwd command will print your home directory on screen, pwd means print working directory.

/u0/ssb/sandeep

is output for the command when I use pwd in /u0/ssb/sandeep directory.

Ls command: Ls command is most widely used command and it displays the contents of directory.

options

- ls will list all the files in your home directory, this command has many options.
- ls -l will list all the file names, permissions, group, etc in long format.
- ls -a will list all the files including hidden files that start with . .
- ls -lt will list all files names based on the time of creation, newer files bring first.
- ls -Fx will list files and directory names will be followed by slash.
- ls -R will list all the files and files in all the directories, recursively.
- ls -R | more will list all the files and files in all the directories, one page at a time.

Mkdir command: Mkdir sandeep will create new directory, i.e. here sandeep directory is created.

Cd command: Cd sandeep will change directory from current directory to sandeep directory.

Use pwd to check your current directory and ls to see if sandeep directory is there or not.

You can then use cd sandeep to change the directory to this new directory.

Cat command: Cat cal.txt cat command displays the contents of a file here **cal.txt** on screen (or standard out).

Head command: Head filename by default will display the first 10 lines of a file.

If you want first 50 lines you can use head -50 filename or for 37 lines head -37 filename and so forth.

Tail command: Tail filename by default will display the last 10 lines of a file.

If you want last 50 lines then you can use tail -50 filename.

More command: More command will display a page at a time and then wait for input which is spacebar. For example if you have a file which is 500 lines and you want to read it all. So you can use

more filename

Wc command: Wc command counts the characters, words or lines in a file depending upon the option.

Options

- wc -l filename will print total number of lines in a file.
- wc -w filename will print total number of words in a file.
- wc -c filename will print total number of characters in a file.

File command: File command displays about the contents of a given file, whether it is a text (Ascii) or binary file. To use it type file filename. For example I have cal.txt which has ascii characters about calander of current month and I have resume1.doc file which is a binariy file in microsoft word. I will get file resume.doc resume1.doc: data file cal.txtcal.txt: ascii text

Cp command: Cp command copies a file. If I want to copy a file named oldfile in a current directory to a file named newfile in a current directory.

cp oldfile newfile

If I want to copy oldfile to other directory for example /tmp then cp oldfile /tmp/newfile. Useful options available with cp are **-p and -r** . -p options preserves the modification time and permissions, -r recursively copy a directory and its files, duplicating the tree structure.

Rcp command: Rcp command will copy files between two unix systems and works just like cp command (-p and -i options too).

For example you are on a unix system that is called *Cheetah* and want to copy a file which is in current directory to a system that is called *lion* in /usr/john/ directory then you can use

Rcp command rcp Filename lion:/usr/john

You will also need permissions between the two machines. For more infor type man rcp at command line.

Mv command: Mv command is used to move a file from one directory to another directory or to rename a file.

Some examples:

- mv oldfile newfile will rename oldfile to newfile.
- mv -i oldfile newfile for confirmation prompt.
- mv -f oldfile newfile will force the rename even if target file exists.
- mv * /usr/bajwa/ will move all the files in current directory to /usr/bajwa directory.

Ln command: Linstead of copying you can also make links to existing files using Ln command.

If you want to create a link to a file called coolfile in /usr/local/bin directory then you can enter this command.

ln mycoolfile /usr/local/bin/coolfile

Some examples:

- ln -s fileone filetwo will create a symbolic link and can exist across machines.
- ln -n option will not overwrite existing files.
- ln -f will force the link to occur.

Rm command: To delete files use rm command.

Options:

- rm oldfile will delete file named oldfile.
- rm -f option will remove write-protected files without prompting.

- `rm -r` option will delete the entire directory as well as all the subdirectories, very dangerous command.

Rmdir command: Rmdir command will remove directory or directories if a directory is empty.

Options:

- `rm -r directory_name` will remove all files even if directory is not empty.
- `rmdir sandeep` is how you use it to remove sandeep directory.
- `rmdir -p` will remove directories and any parent directories that are empty.
- `rmdir -s` will suppress standard error messages caused by `-p`.

19 Comparison and Searching

diff, dircmp, cmp, grep, find.

Diff command: Diff command will compare the two files and print out the differences between.

Here

I have two Ascii text files fileone and file two.

Contents of fileone are

This is first file

this is second line

this is third line

this is different as;lkdjf

this is not different

filetwo contains

This is first file

this is second line

this is third line

this is different xxxxxxxxas;lkdjf

this is not different

diff fileone filetwo will give following output

4c4

< this is different as;lkdjf —

> this is different xxxxxxxxas;lkdjf

Cmp command: Cmp command compares the two files. For example I have two different files fileone and filetwo. `cmp fileone filetwo` will give me fileone filetwo differ: char 80, line 4

if I run `cmp` command on similar files nothing is returned.

`-s` command can be used to return exit codes. i.e. return 0 if files are identical, 1 if files are different, 2 if

files are inaccessible. This following command prints a message 'no changes' if files are same `cmp -s fileone file1 && echo 'no changes'`.

Dircmp Command: Dircmp command compares two directories. If i have two directories in my home directory named dirone and dirtwo and each has 5-10 files in it.

```
./cal.txt          ./fourth.txt
./dohazaar.txt     ./rmt.txt
./four.txt         ./te.txt
./junk.txt         ./third.txt
./test.txt
```

Grep Command: Grep command is the most useful search command. You can use it to find processes running on system, to find a pattern in a file, etc. It can be used to search one or more files to match an expression.

It can also be used in conjunction with other commands as in this following example, output of ps command is passed to grep command, here it means search all processes in system and find the pattern sleep.

`ps -ef | grep sleep` will display all the sleep processes running in the system as follows.

```
ops 12964 25853 0 16:12:24 ttyAE/AAES 0:00 sleep 60
dxi 12974 15640 0 16:12:25 ttyAH/AAHP 0:00 sleep 60
ops 12941 25688 0 16:12:21 ttyAE/AAEt 0:00 sleep 60
ops 12847 25812 0 16:11:59 ttyAH/AAH6 0:00 sleep 60
ops 12894 25834 0 16:12:12 ttyAE/AAEX 0:00 sleep 60
dxi 13067 27253 2 16:12:48 ttyAE/ABEY 0:00 sleep 1
ops 13046 25761 0 16:12:44 ttyAE/AAE0 0:00 sleep 60
dxi 12956 13078 0 16:12:23 ttyAG/AAG+ 0:00 sleep 60
ops 12965 25737 0 16:12:24 ttyAE/AAEp 0:00 sleep 60
ops 12989 25778 0 16:12:28 ttyAH/AAHv 0:00 sleep 60
ssb 13069 26758 2 16:12:49 ttyAH/AAHs 0:00 grep sleep
pjk 27049 3353 0 15:20:23 ? 0:00 sleep 3600
```

Options:

- -b option will precede each line with its block number.
- -c option will only print the count of matched lines.
- -i ignores uppercase and lowercase distinctions.
- -l lists filenames but not matched lines.

other associated commands with **grep** are **egrep** and **fgrep**. **egrep** typically runs faster. for more information type `man egrep` or `man fgrep` in your system.

Command: Find command is a extremely useful command. you can search for any file anywhere using

this command provided that file and directory you are searching has read write attributes set to you ,your, group or all. Find descends directory tree beginning at each pathname and finds the files that meet the specified conditions. Here are some examples.

Some Examples:

find \$HOME -print will lists all files in your home directory.

find /work -name chapter1 -print will list all files named chapter1 in /work directory.

find / -type d -name 'man*' -print will list all manpage directories.

find / -size 0 -ok rm { } \; will remove all empty files on system.

conditions of find

- **-atime +n | -n** will find files that were last accessed more than n or less than -n days or n days.
- **-ctime +n or -n** will find that were changed +n -n or n days ago.
- **-depth** descend the directory structure, working on actual files first and then directories. You can use it with cpio command.
- **-exec command { } \;** run the Unix command on each file matched by find. Very useful condition.
- **-print** print or list to standard output (screen).
- **-name pattern** find the pattern.
- **-perm nnn** find files whole permission flags match octal number nnn.
- **-size n** find files that contain n blocks.
- **-type c** Find file whole type is c. C could be **b** or block, **c** Character special file, **d** directory, **p** fifo or named pipe, **l** symbolic link, or **f** plain file.

20 Text processing

cut,paste, sort, uniq,awk,sed,vi.

Cut command: Cut command selects a list of columns or fields from one or more files.

Option -c is for columns and -f for fields. It is entered as cut *options* [files] for example if a file named testfile contains

this is firstline

this is secondline

this is thirdline

Examples: cut -c1,4 testfile will print this to standard output (screen)

ts

ts

ts

It is printing columns 1 and 4 of this file which contains t and s (part of *this*).

Options:

- -c *list* cut the column positions identified in list.
- -f *list* will cut the fields identified in list.
- -s could be used with -f to suppress lines without delimiters.

Paste Command: Paste command merges the lines of one or more files into vertical columns separated by a tab.

For example if a file named testfile contains

This is firstline and a file named testfile2 contains

This is testfile2 then running this command paste testfile testfile2 > outputfile will put his into outputfile this is firstline this is testfile2

it contains contents of both files in columns.

who | paste - - will list users in two columns.

Options:

- -d'char' separate columns with char instead of a tab.
- -s merge subsequent lines from one file.

Sort command: Sort command sort the lines of a file or files, in alphabetical order. for example if you have a file named testfile with these contents

zzz

aaa

1234

yuer

wer

qww

wwe

Then running sort testfile will give us output of

1234

aaa

qww

wer

wwe

yuer

zzz

Options:

- -b ignores leading spaces and tabs.
- -c checks whether files are already sorted.
- -d ignores punctuation.
- -i ignores non-printing characters.
- -n sorts in arithmetic order.
- -ofile put output in a file.
- +m[-m] skips n fields before sorting, and sort upto field position m.
- -r reverse the order of sort.
- -u identical lines in input file appear only one time in output.

6.3 Summary

Unix is reliable, security multiuser operating system that dominates networks and web applications. Unix OS consists of 1. kernel-scheduler task manager data./file access and stores enforces security mechanism performs all hardware access. 2. Shell: presents all users with a prompt interprets command type by user executes user commands supports a custom environment for each user.

6.4 Self Assessment Test

1. Which command is used to delete all files in the current directory and all its sub-directories?
2. Using the commands ps, cut, tr and kill, along with pipes, write a command that will find all sleep processes running on the system and kill them?
3. What is the difference between cat and more command?
4. Give difference Between Grep and Find command.
5. Is it possible to count number char, line in a file; if so, How?
6. What difference between cmp and diff commands?
7. What is the significance of the ?tee? command?
8. What does the command ? \$who | sort ? logfile > newfile ? do name?
9. Is it possible to create new a file system in UNIX?
10. Is ?du? a command? If so, what is its use?
11. Explain kill() and its possible return values.
12. What is relative path and absolute path.
13. In UNIX 50 records are there, to retrieve the 20-30 records which commands should be used?
14. How many prompts are available in a UNIX system?
15. Is it possible to restrict incoming message?
16. How does the kernel differentiate device files and ordinary files?

17. Write a command to kill the last background job?
18. How to switch to a super user status to gain privileges?
19. What does the command `?$ls | wc ?l> file1?` do?
20. Which of the following commands is not a filter `man` , (b) `cat` , (c) `pg` , (d) `head`
21. How to terminate a process which is running and the specialty on command `kill 0`?
22. How is the command `?$cat file2 ?` different from `?$cat >file2` and `>>` redirection operators ?
23. What is the use of `?grep?` command?
24. What is the use of the command `"ls -x chapter[1-5]"`
25. What is a pipe and give an example?
26. Write a command to display a file's contents in various formats?

6.5 Reference Books

- Unix Concept and Application by Sumitabha Das. Tata Graw Hill Publication Company. New Delhi

UNIT - 7 : MICROSOFT WORD

Unit Structure

- 7.0 Objectives
- 7.1 Introduction
- 7.2 Word Processor Features
- 7.3 Starting Microsoft Word
- 7.4 Elements of MS-Word Window
- 7.5 Creating a Document
- 7.6 Saving the Document
- 7.7 Formatting Document
- 7.8 Formatting Text
- 7.9 Formatting Paragraph
- 7.10 Tables
- 7.11 Inserting Picture
- 7.12 Printing a File
- 7.13 Key Words
- 7.14 Self Assessment Test
- 7.15 Reference Books

7.0 Objectives

After reading this unit you will be able to understand.

- Word processor and its feature.
- Creation and formatting of a document
- Formatting of the text and paragraph
- Create tables and insert picture

7.1 Introduction

Word processor is a software package that is used to create professional documents like letters, reports, files etc. Micro-soft word 2000 is a word processor which provides various kinds of word processing facilities. It is a popular component of Micorsoft Office 2000. As the term suggests, word processing simply process words like textual information, you can use it to print letters, reports, booklets and other documents in a suitable format. In word processing package you can check the spelling in the documents, you can get help to select appropriate words in a sentence.

You can create modify letters or documents or print copies just by pressing a few keys from the key board. Moreover, you can add page number or change margins. In addition a word processor can be used to send the same letter to several different addresses using the mail - merge facility or using electronic mail facility on the internet.

7.2 Word Processor Features

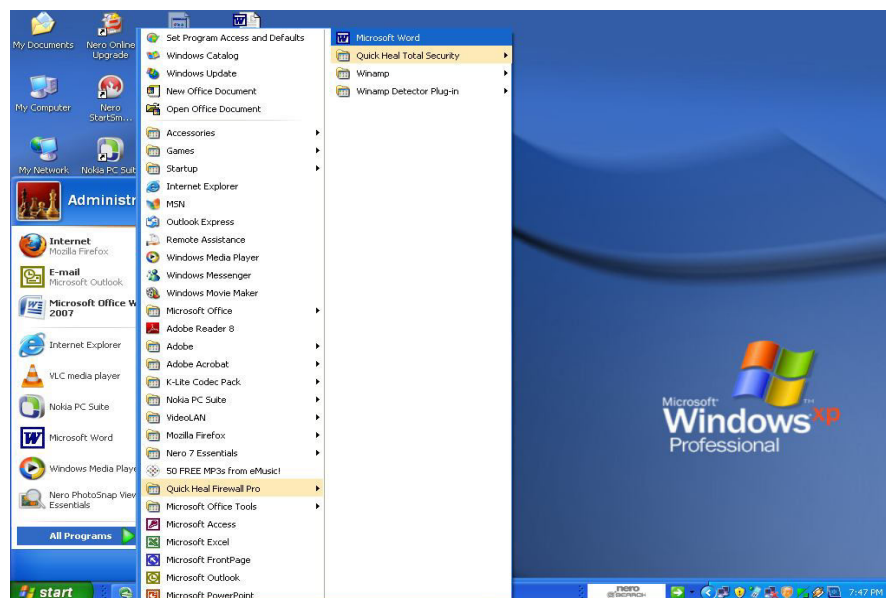
The current word processors are very powerful, you can create any type of document using the powerful features of the word processor. A manager himself can create, edit modify types the document without much technical knowledge and external support. Some of the features available in word proces-
sor are : -

1. Adjustable page size and margins.
2. The selected text can be printed in boldface, italic, or underlined.
3. The font and size of letters of the selected text can be changed.
4. You can adjust line and character spacing.
5. It provides facility to define header and footer.
6. It provides facilities to create foot notes and end notes.
7. You can move selected text to another location within the document or another document.
8. You can check spelling and grammar in your document.
9. Marging text, graphics, picture etc.
10. User friendly interface.

7.3 Starting Microsoft Word

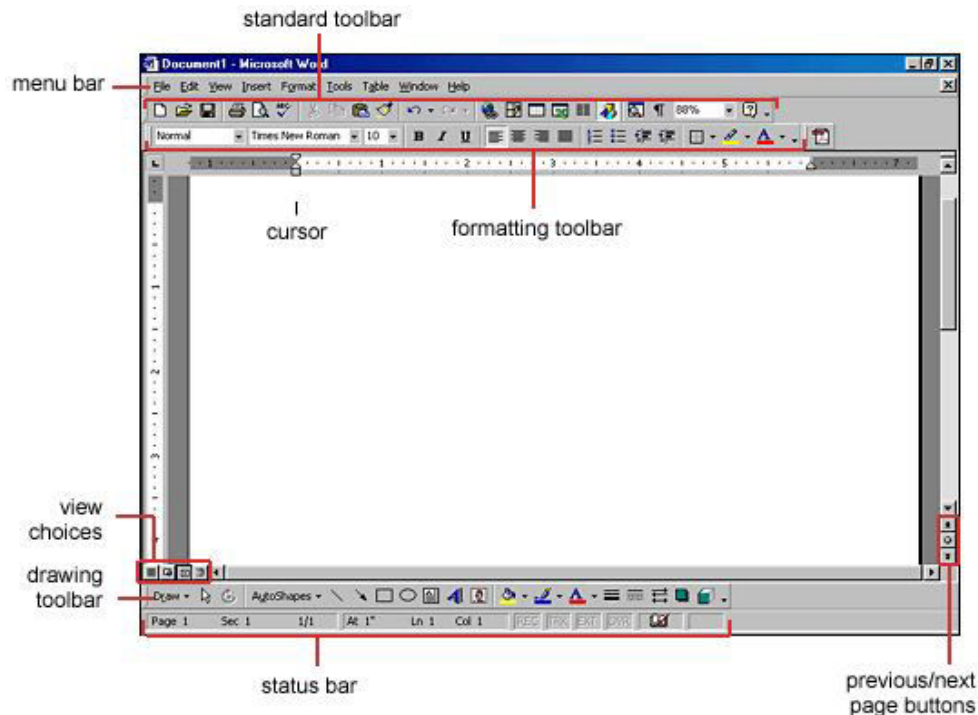
To start up a new MS-word document you have to follow these steps -

1. Click the Start button present on the Task bar.
2. Select the Programs option from the list and then click the Microsoft word option from the sub menu list.
3. Immediately Microsoft word window open on the screen.



7.4 Elements of MS-Word Window

When you Start a word, a new blank document displays on the screen. It has a lot of elements within it which help the user to create - word documents. The elements of MS-word screen are marked in diagram. The basic icons-buttons, procedure (Menu bar, titlebar, Tool box etc.) remain uniform through and the MS office software such MS excel MS Powerpoint, MS accex etc.



The most important elements are:-

7.4.1 Title Bar

The title bar is present at the top of the window. The title bar has the name of document at the left side and right side has the Minimize, Restore / Maximize and Close buttons.

7.4.2 Menu Bar

The menu bar is located just below the title bar. It contains all commands used in word. The list of commands in which one character is underline. This character when Prressed with ALT command menu in a window get opened. The menu includes.

1. **F**ile : This menu has all the file related commands such as new, save, save as, open, close, print etc.
2. **E**dit :This menu has all commands related to editing of documents like cut, copy, paste, clear etc.
3. **V**iew :This menu has all commands related to controlling the view of the documents like zoom-in, zoom-out, print layout, toolbars, ruler, header and footer, full screen etc.
4. **I**nsert: It has commands such as insert objects, picture, symbols, page numbers, footnotes etc.
5. **F**ormat :It has all the commands related to the formatting of document like font, paragraph, bullets and numbering, change case, etc.
6. **T**ools :This menu has all commands related to the word processing tools like spelling and grammar checker, mail merge, macro, etc.
7. **T**able :It has all commands related to table operation like inserting ,deleting, modifying table etc.

8. **Window** : This menu has all the commands related to working in the window.

9. **Help** : This menu has all commands related to getting help for MS-word 2000.



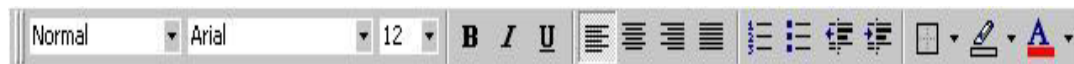
7.4.3 Toolbar

The Toolbar allows users to access the frequently used procedures and commands for that purpose. The Toolbar has buttons to represent commands and procedures. Toolbar can be used directly by a pointing device like mouse. The toolbar is presented in the form of the Standard and Formatting toolbar below the menu bar of the MS-window. The components (command buttons) of Standard and Formatting toolbar are different according to the diagrams.

The word Standard toolbar consists of group of buttons labeled with icons. It is present just below the menu bar. The buttons of Standard toolbar are shortcuts to frequently used commands like, New, Open, Save, Print, Cut, Copy, Paste, Undo, Redo, Print Preview, Spelling check etc.



The Formatting toolbar contains commands in the form of buttons to help you for quickly select formatting features like Font face, Font Style, Font Size, **Bold**, *Italic*, **Underline**, Align left margin, Align center, Align right margin, Justify Align, Bullets and Numbering, font color etc. Any can be selected from the toolbar only by mouse button click.



7.4.4 Rulers

The word Ruler allows Tab stops to be set. The Rulers helps you to control the margins, the paragraph indentation and the tab setting for a document. Rulers are two types.

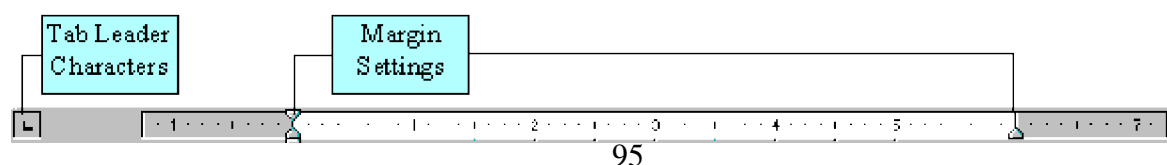
1. Horizontal Ruler - which presents, always at the top of the document window.
2. Vertical Ruler - which displays only in page layout view or print preview.





To set Tabs, follow these steps.

1. Select the paragraphs in which you want to set tab stops.
2. Click the tab character at the far left of the horizontal ruler until it changes to the type of tab you want.
3. Click on the horizontal ruler where you want to set a tab stop.

Or

4. You also set precise measurements for tabs using Format menu then Tab option.



1.  Select tab leader character to set a **left-justify** tab stop.
2.  Select tab leader character to set a **center** tab stop.
3.  Select tab leader character to set a **decimal alignment** tab stop.
4.  Select tab leader character to set a **right-justify** tab stop.
5. To change margins, click and drag the margin settings left or right.

The margin settings are managed by the upward facing pointers at the bottom edge of the ruler. You can adjust the position of the right or left margin by dragging these pointers.

7.5 Creating a Document

To create a New Document in MS word you have to follow these steps.

1. Click Start button of Task bar.
2. Select the programs option from the push-up menu.
3. Then click the Microsoft word by left mouse-button. Immediately a new MS-Word window appears on the screen.

Now you can type any type of document in new document. There is a cursor blinking at top left side of the page. Here are some guidelines for typing a letter in MS-word. For example type a letter.

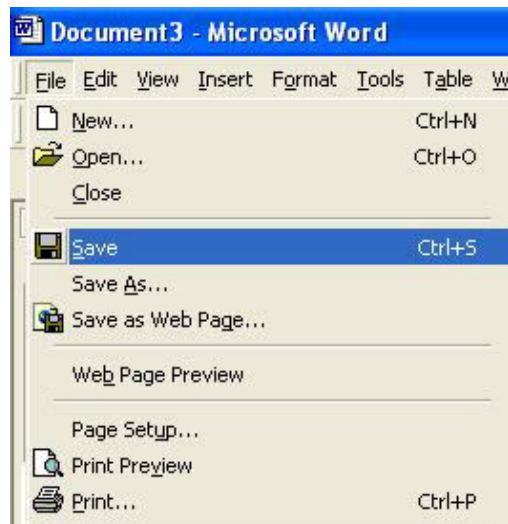
7.5.1 Guidelines for Typing

1. Before typing the first line press the enter key two times to insert some blank lines.
2. Now type the first line of document after completing first line press enter key to go in next (second)line.
3. After pressing the enter key you will observe that cursor blinking now shifts to the next line.
4. For typing the capital letters you have to follow these steps.
 - (A) Press the “ Caps Lock ” key of keyboard once, this sets the Caps Lock ON.
 - (B) Now you can type capital letters.
 - (C) Again press the Caps Lock key once. This will sets the Caps Lock mode OFF.
 - (D) Now you can type normal letters.
5. You just use the space bar key once to create a space between two words such as “LETTER and OF”.
6. Press Enter key for leaving blank lines between paragraphs. For example if you need to leave two blank line then press Enter key two times.
7. If you have entered a wrong letter, or pressed the enter key by mistake than press the back space key from the keyboard to delete the incorrect letter.

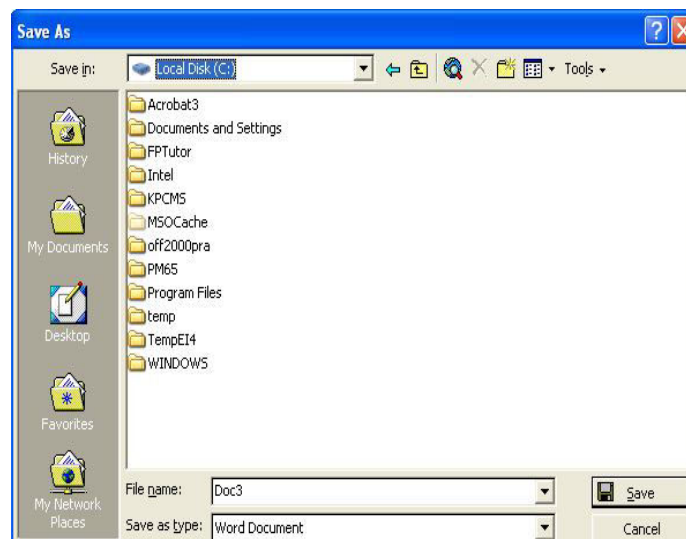
7.6 Saving the Document

The typed document you can save in the computer’s memory. So that you may read or access it in future as required to save a document do this

1. Click at File menu of menu bar option.
2. Then click on Save option of the pull- down menu. Immediately the MS-word display a Save As box.



3. Now type the document name , inside the box beside the File name option .
4. In the save As box, the rectangular box beside the Save as in option displays the folder name My Doc, where you will save your document. It has various sub - folders where you can save your file.
5. To save document in Local Disk [C:] just click at down arrow scroll button present in the box beside the save in option . Select the Local Disk [C:] option from the pull - down menu.
6. Immediately the Local Disk [C:] gets displayed, in the box beside the Save in option.
7. Now click the Save button. Now the Save As box disappears and you return to your document. The title bar will display the name of your document at left side.



7.7 Formatting Document

You can format your existing or new document using formatting features of MS-word like aligning Left, Top, Right and Bottom margin, paper size and orientation, headers and footers etc. Before proceeding to set our document we need first to open the document or create new document.

7.7.1 Opening the Existing Document

To open an existing document you do this :

1. Click at Open button of toolbar option. Immediately the Open box gets displayed.
2. If document is saved in Local Disk [C:] then click at the down arrow scroll button present beside the Look in option .
3. Select the Local Disk [C:] from the pull-down menu option and click.
4. The contents of Local Disk [C:] gets appears on screen, now click the required document from the contents list
5. Finally click over the Open button. Then the Open box will disappears and document get displayed on screen.

7.7.2 Create a New Documents

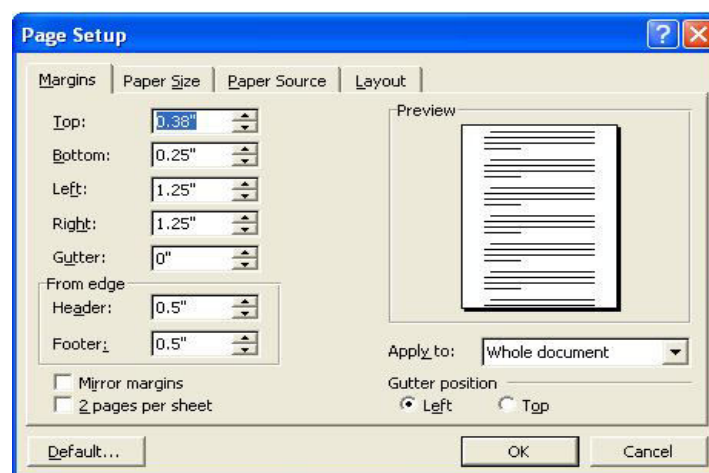
To creating a new documents you follow these steps :

1. Click on New document button on Standard toolbar.
2. Or click on File menu bar and select New option.
3. Then new document will appear to formatting a documents.

7.7.3 Page Margins

For setting the left, right, top, bottom margin you need to follow these steps .

1. Click at the File option of menu bar, and select the Page-Setup option from pull- down menu.
2. Immediately a Page Setup box appears on the screen, which has a number of option.



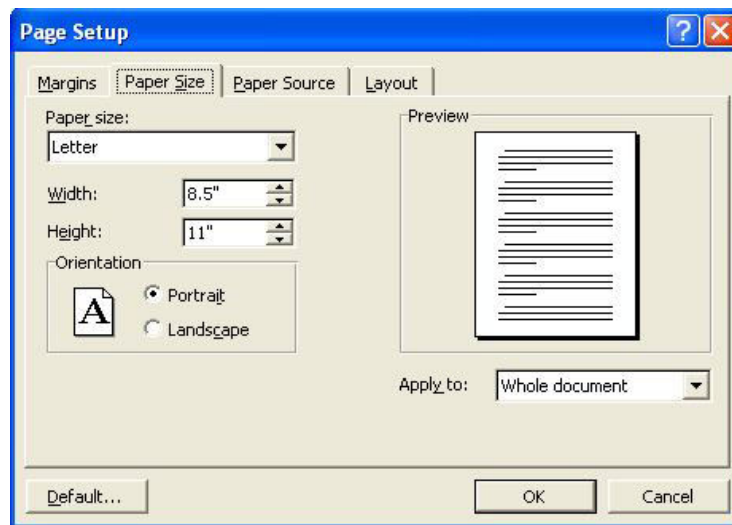
3. There is a rectangular box beside each of the Top , Bottom. Left and Right option. The number represents measure in inches. For increasing/decreasing (changing) number you just click the up/down arrow scroll button present in the rectangular box.
4. Keep on clicking the arrow until you reach the required no.

5. After setting up the Left, Right, Top and Bottom margin. You can see the preview of formatted document by using the Preview option given in the Option box.
6. To confirm the margin setting click on the OK button.

7.7.4 Page Size and Orientation

You can change the page size and orientation of documents by the following steps

1. Click at the File option of menu bar, and select the Page-Setup option from pull-down menu.
2. Page Setup box appears on the screen and choose the Paper Size tab option.



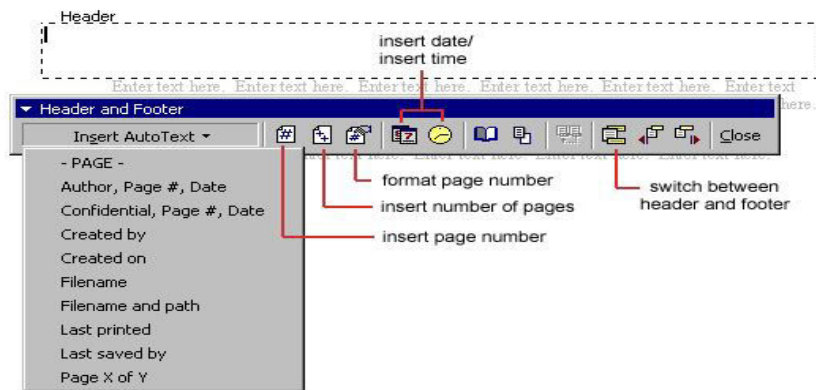
3. Select the paper from drop-down menu.
4. Change the orientation from Portrait and Landscape by clicking on radio button option.
5. Page setting preview will be display then click on OK button.

7.7.5 Headers and Footers

A header is text that is added to the top margin of every page in document such as a document title, page number, insert date and time etc. The footer is text added to the bottom margin of a page.

Headers are text that are normally printed at the top of the page. You can add a header at the top of page, by doing this.

- 1 Click on View option of menu bar and select the Header and Footer option from the pull - down menu option and click.
2. Immediately a dotted line box appears on the screen in which the cursor is blinking where you can enter the header text and click enter.



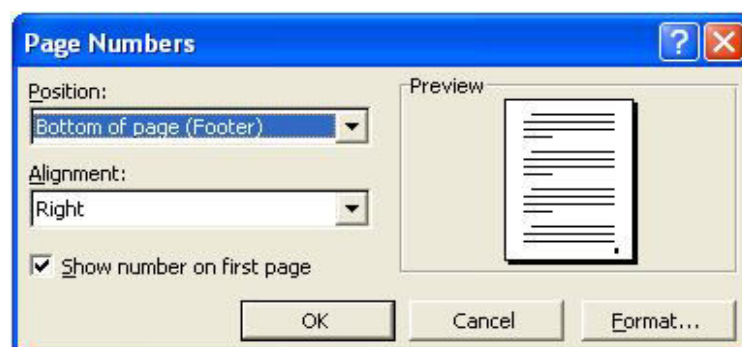
The **footer** is the text that appears at the bottom of every page of document, for this you do the following steps-

3. Move the mouse pointer over the switch Between Header and footer button and click it.
4. Instantly another dotted box appears at the bottom of the page.
5. You can enter the text where the cursor is blinking.
6. Now click on the Close button present on the Header and Footer box.

7.7.6 Page Number

To Insert page numbers using menu command, you do this

1. Select the insertion point in the section for which you want to insert Page Number.
2. Click the Insert option of the menu bar and select the page number option from the pull down menu, immediately a Page Number dialog box appears.
3. In the Position drop down list select the location of the page number.
5. Click Format button to customize the page number.
6. Then click OK button.



7.8 Formatting Text

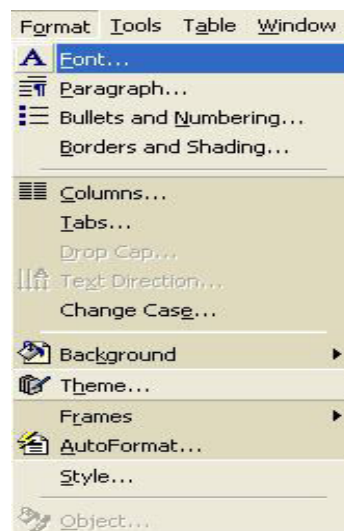
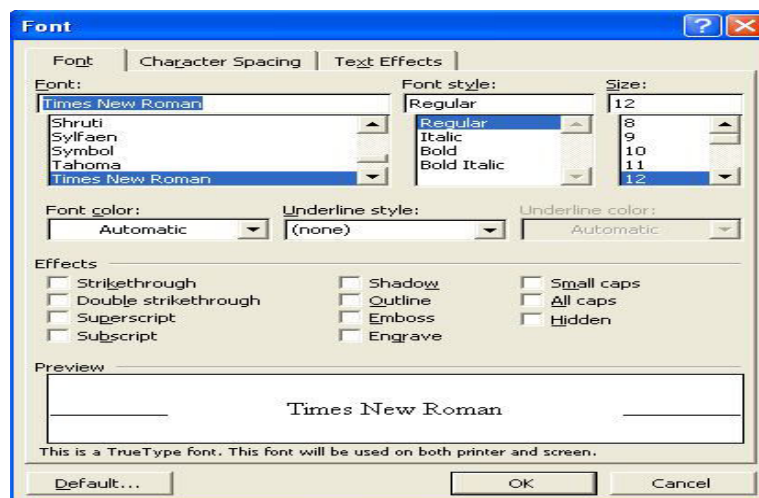
MS-word enables users to formatting their documents character. Formatting is the process of specifying how a documents should appear when document printed. There are a lot of options .You can perform following operations:

1. Font, Font Style and Font Size changes.
2. Underline options and Color applications.
3. Applying font Effects like Italic, Bold etc.
4. Changing Character Spacing.

7.8.1 Formatting Text using Font Option

To change the font of an existing text do this :

1. Select the text, by mouse.
2. Click the Format menu option and choose Font from the pull-down menu a font dialog box appears.



3. Click on the Font Tab of dialog box.
4. The Font tab sheet appears, it offers the options for changing font Style and Size
5. To change the Font , enter the name of the Font in the font text box, or scroll the Font text box and

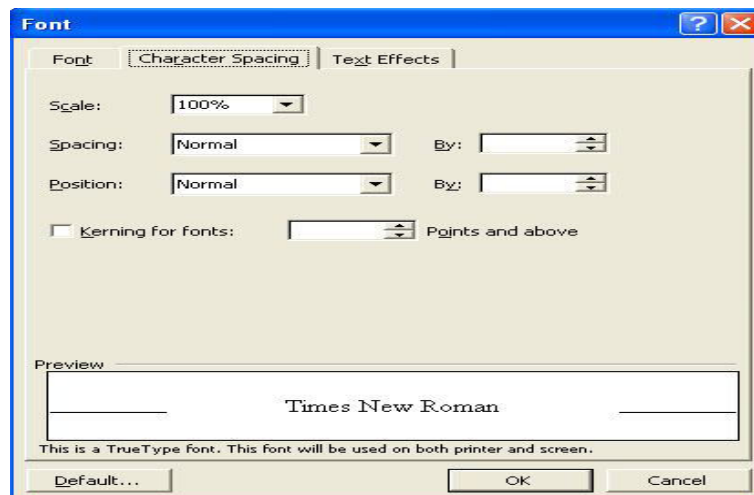
select the font from available font list.

6. You can change the Font Style and Font Size from the regarding option box.
7. You can also made changes in Font color from the color list and underline a text by Underline style list box, as required.
8. The Effect box provides a various font effects like Superscript, Subscript, Shadow, Strike through, Hidden, Outline etc. You may select any effect style from the option list.

7.8.2 Character Spacing Option

To customize character spacing option do this :

1. In the above diagram. The Font dialog box, Click the Character Spacing Tab.
2. A property sheet appears which has different options like. Spacing (Normal, Expanded, Condensed), by, position. Select any this as you required.
3. Then click on OK button.



7.8.3 Formatting Text using Formatting Toolbar

You can apply the formatting tools like **BOLD**, *ITALIC*, UNDERLINE and FONT SIZE on the selected text string or paragraph or whole document.

For this you do the following steps:

1. Just select the required text string (a Line, Paragraph or Page) by using the mouse pointer drag over text keep pressed the left button.
2. The text will get highlighted then move the mouse pointer on the Formatting toolbar.
3. Then click on the required Formatting tools buttons like Bold (for Bold the text), Italic (for italic the text), Underline (for underlining the text) or Font size box (for changing the text font size).
4. Immediately the selected text will get formatted.

7.8.4 Change Case

MS-word provides facilities to change to capital letter of any text by using the change case com-

mand to use this command follow these steps :

1. Select the text box by mouse.
2. Click the Format menu and select the Change Case option form the full-down list
- 3 Immediately a dialog box appears on screen.



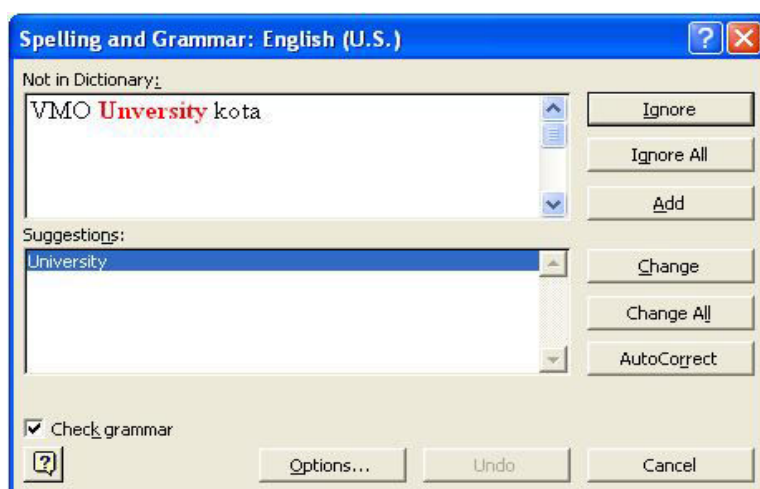
4. The change case dialog box offered many options like Sentence case, lower case, UPPER CASE, Title Case and tOGGLE cASE.
5. To select an option click the radio button. The option is selected when a dot appears in the radio button.
6. Then click on OK button

7.8.5 Spelling And Grammar

Word will automatically check for spelling and grammar errors as you type unless you turn this feature off. The spelling errors are noted in the document with a red underline.

To use the spelling and grammar checker follow these steps :

1. Click on Tools option of menu bar and select the Spelling and Grammar option from pull-down menu.
2. The dialog box appear on screen, which will notify you of the first mistake in the document and misspelled words will be highlighted in red.



3. If the word is spelled correctly click the Ignore button or Ignore All button if the word appears more

than once in the document.

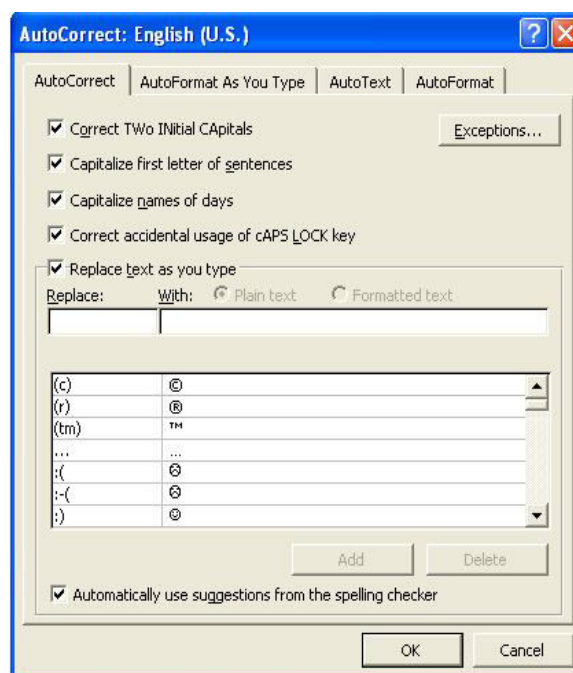
4. If the word is incorrectly spelled then select one of the suggested spelling from the suggestions box and click the Change or Change All button.
5. If the word is correctly spelled, you just click the add button to add the word to the dictionary.

7.8.6 AutoCorrect:

Word automatically corrects many commonly misspelled words and punctuation marks with the AutoCorrect feature. To view the list of words that are automatically corrected.

To use the AutoCorrect feature follow these steps :

1. Click on Tools option of menu bar and AutoCorrect option from pull-down menu.
2. The following dialog box appear on screen.



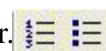
3. You can select many options including the accidental capitalization of the first two letters of a word, capitalization of the first word of the sentence, capitalization of the names of day etc., can be automatically corrected from the page.
4. If there are words you often misspell, enter the wrong and correct spellings in the Replace and With fields.
5. Then click on OK button.

7.8.7 Bullets and Numbering

To create a bulleted or numbered (Auto) list use the list features provided in MS-word.

Using Formatting Toolbar :

1. Click the Bulleted List button or Number List button on the formatting toolbar.

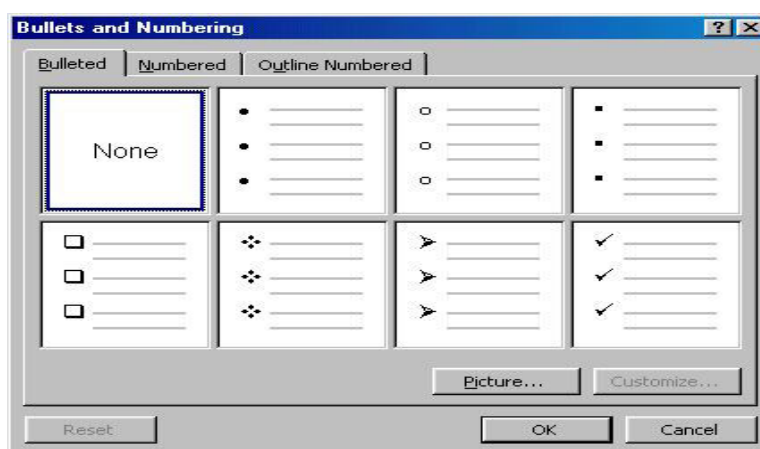


2. Type the first entry and press Enter. This will create a new bullet or number on the next line.
3. If you want to start a new line without adding another bullet or number, hold down the Shift key while pressing Enter.

Using Format Menu Bar :

The bullet image and numbering format can be changed by using the Bullets and Numbering dialog box.

1. Highlight the entire list to change all the bullets or numbers.
2. Click the Format menu bar option.
3. Select the Bullets and Numbering option from sub menu, a dialog box appears.



4. Select the Bulleted list style from the choices given in above dialog box.
5. Or select Numbered list style by click on Numbered tab or click the picture button to choose different Icons.
5. Click on OK button .

7.9 Formatting Paragraph

A Paragraph can have the following characteristics

- * Alignment
- * Indents
- * Line spacing

7.9.1 Alignment

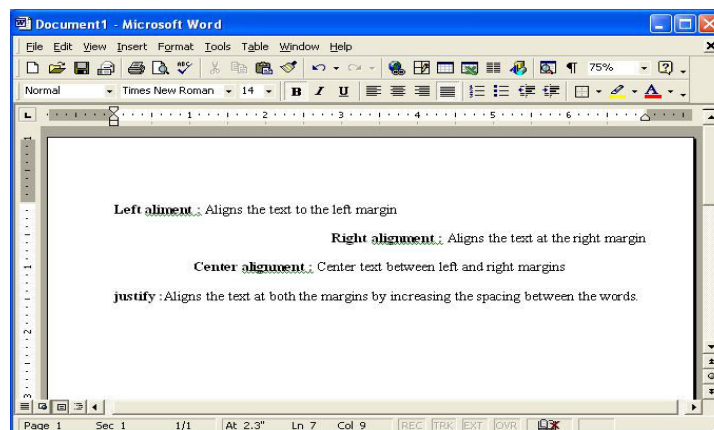
The Alignment of paragraph is refers to the position of the main document text on the page .There are following alignment options in word.

Left alignment : Aligns the text at the left margin and marks a zigzag right margin of page.

Right alignment : Aligns the text at the right margin and marks a zigzag left margin of page.

Center alignment : Center text between left and right margins on the center line.

Justify : Aligns the text at both the margins by increasing the spacing between the words.



7.9.2 Paragraph alignment using formatting toolbar

To aligning the paragraph by formatting toolbar, you select text then click the required alignment on the Formatting Toolbar.



7.9.3 Indents

The indents are the white (blank) space added to the margins and then decreasing the text area for paragraph. The first line of each paragraph can be indented differently from other lines in the paragraph .

Once you changes the indent, each new paragraph will maintain the same indent action after pressing the enter key. To change the Indent using Formatting Toolbar just click the Increase and Decrease indent buttons present on the Formatting Toolbar.



7.9.4 Line Spacing

Line spacing is the amount of spaces between the line in a paragraph. The Word 2000 offers the following line spacing options.

- * **Single spacing :** No blank line space appears between the liens of text.
- * **Double spacing :** A blank line space appears between the liens of text.
- * **1/2 spacing :** Half the height of one line apace of text appears between the liens of text.
- * **Exact line height :** Specify the space that you need between the liens.

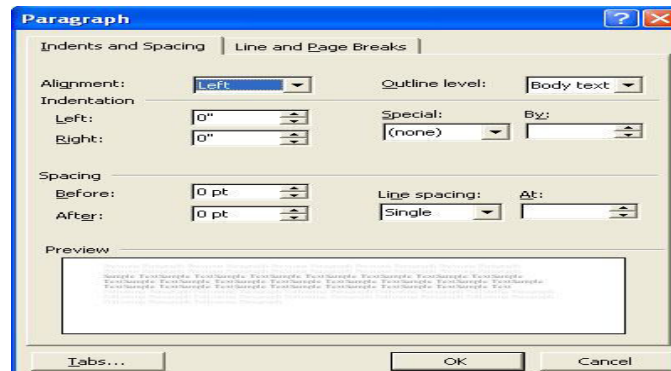
Space before and after Paragraph:-

The space before and after options are provided by the Spacing box, which is present in the Paragraph dialog box. You can define the amount of white space that word must place before and after paragraphs. Space setting can be entered in points (pts), inches(in) or lines(li) etc.

Formatting Paragraph using the Format menu

To formatting paragraph using the format menu, you follow these steps :

1. First of all select the paragraph which you want to format.
2. Click the Format menu option and select the Paragraph option from the pull - down menu and click.
3. A dialog box appear on screen then click the Indents and Spacing tab, for adding white space to the margin and line spaces between the line.



4. It has a list of different option like Alignment option, Paragraph Indent option, Line Spacing and Space Before/After option.
5. Perform the change as you required and then click on OK button.

7.10 Tables


A table is a two dimensional matrix, consisting of rows and columns. MS word enables you to create tables in a document. You should use tables to create documents such as forms, financial reports, catalogs and biodata etc. You type in the areas called cells formatted by intersection of rows and columns. The table cells can contain text, numbers etc. Tables are used to display data and there are various ways to build them in MS - word.

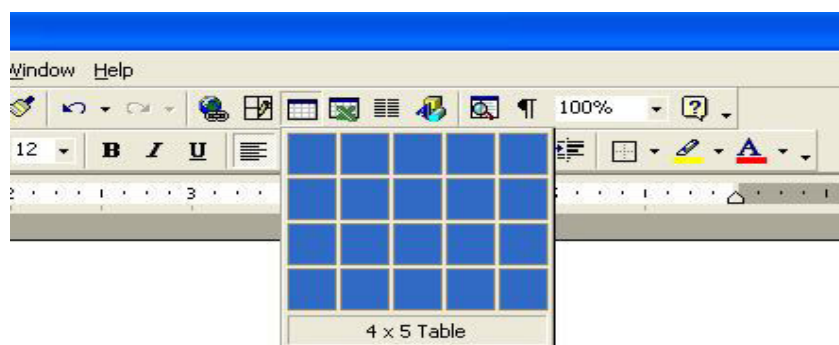
7.10.1 Insert a Table.

There are two ways to create a table in word document .

- Using Insert Table button of Standard Toolbar.
- Using Table menu

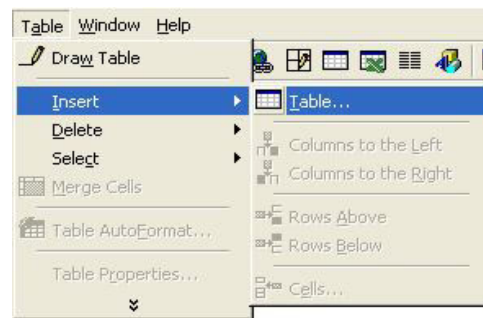
Using the Insert Table Feature :

1. Click the Insert Table button on the standard Toolbar. 
2. Drag the mouse along the grid, highlight the number of Rows and Columns.



3. You can also Insert a Table by clicking at the Table option of menu bar.

4. Select the Insert option, then Table from the sub menu list.



5. Select the number of rows and columns for the table

6. Then click on OK Button.

7.10.2 Inserting Rows and Columns

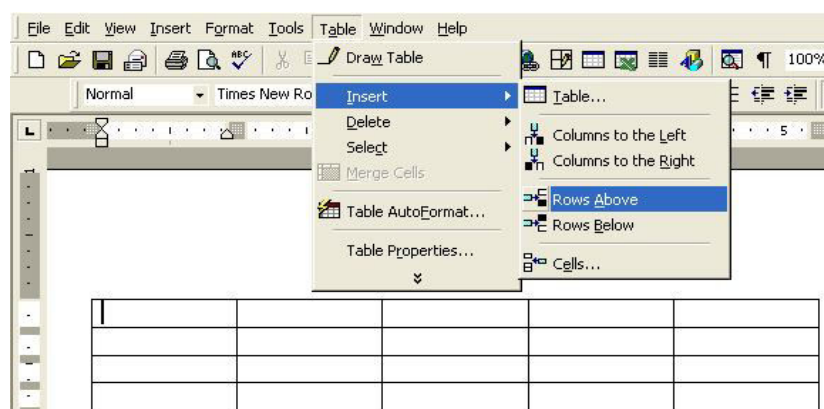
Once the Table is drawn, you can insert additional rows or columns. For doing this you follow these steps:

To Insert Rows

1. Click the Table option of menu bar.

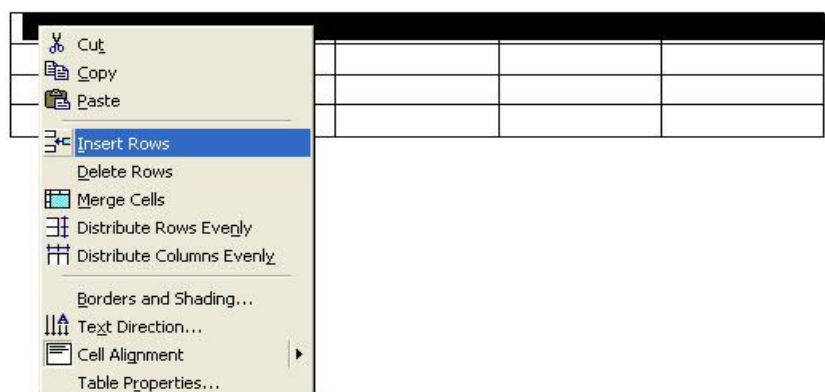
2. Select the Insert submenu option.

2. Click the Rows above or Rows below, from the sub menu options.



Or

3. Select an entire row and right click with the mouse. Select the Insert Rows from the shortcut menu appears.



To Insert Columns

1. Click the Table option of menu bar. And select the Insert option of submenu list
 2. Then click the Columns to the left or Columns to the Right.
- Or
3. Select the Columns right click with mouse and select Insert columns option.

7.10.3 Deleting Rows and Columns

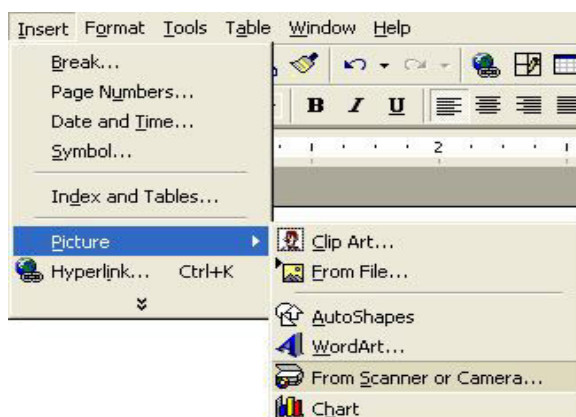
You can delete rows or columns in a table using following steps:

1. In the same way Select an entire row or Column and right click with the mouse.
2. Select the Delete Row or Delete Column option from the popup menu appear as show in above diagram..
3. Row or column will be deleted.

7.11 Inserting Picture

To insert any type of picture in MS word ,you can follow these steps

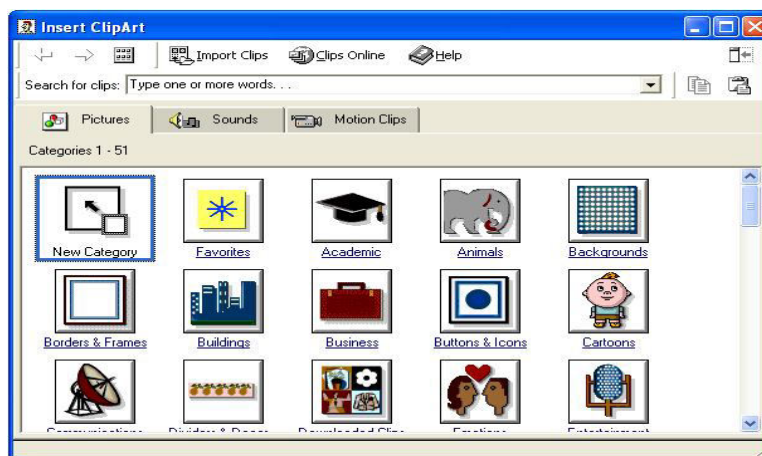
1. Select the insertion point in the section for which you want to insert picture.
2. Click the Insert option of the menu bar and select the Picture option from the pull down menu.



4. The Clip Art, From File, WordArt option will be display. You can select any to insert object.

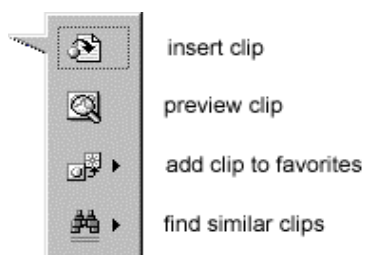
Adding image using Clip Art

1. Select Clip Art option. Immediately a dialog box appear.



2. To find an image, click in the white box following Search for clips or Click one of the category icons.

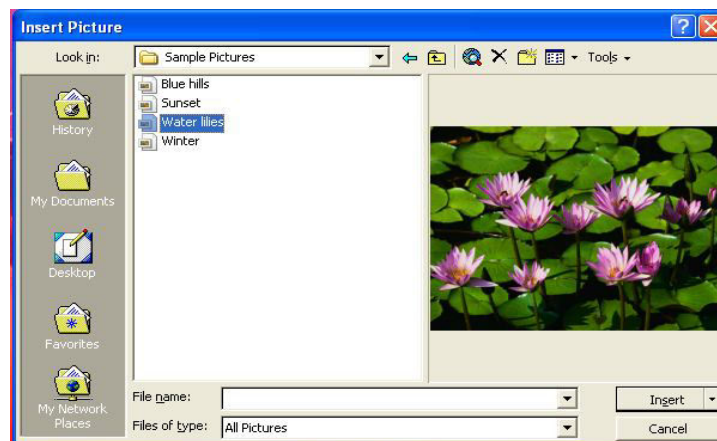
3. Click once on the image you want to add to the document and the following popup menu will appear.



4. Click on Insert Clip option to add the image to the document.

Adding Image using From File

1. Select Clip Art option. Immediately a dialog box appear.

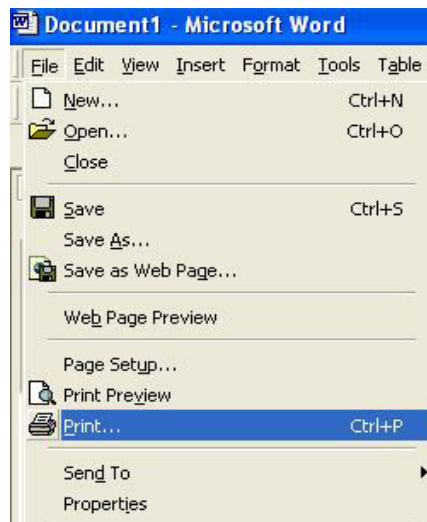


2. Click the down arrow button on the right of the Look in: window to find the image on your computer.
3. Highlight the file name from the list and click the Insert button.

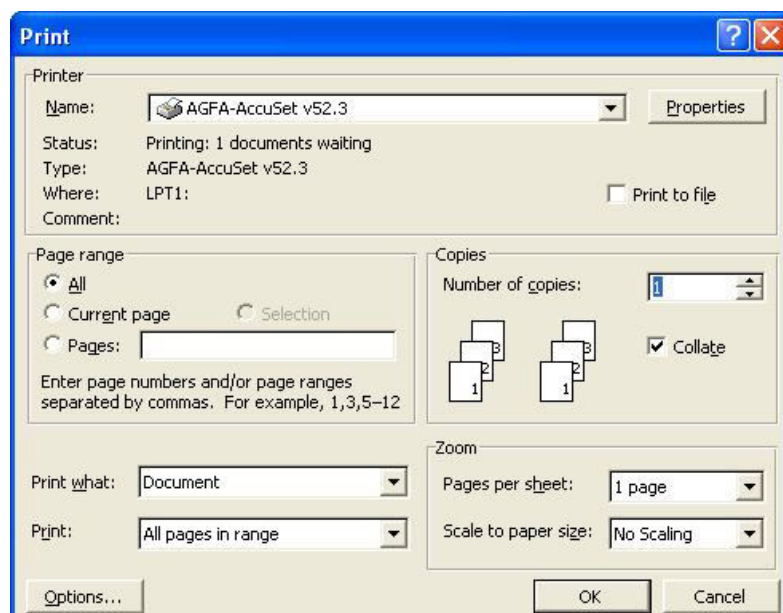
7.12 Printing a File

Now you have done lot of modification on your documents by editing it, let us now try to printing it .For that you do this :

1. Turn your printer ON.
2. Click on File menu option of menu bar.



3. Then click Print option from pull-down menu, immediately a Print dialog box appear on screen



4. Print dialog box have many options like printer, page range, print what, copies, zoom etc.
5. You may choose any option as required then click on OK button.

Or

6. Move your mouse-pointer over the Print button present on the Standard tool bar.



7.13 Key Words

- **AutoCorrect :** AutoCorrect continuously checks your document for misspelled and unrecognized words and for grammar errors. Right-click a word with a wavy red or green line beneath it to see a menu of alternatives.
- **Data Source:** A data source contains the information from which a merged document is created. The data source is merged with a main document, which specifies the kind of output required.
- **Font:** The complete set of characters for one typeface at one particular type size, excluding attributes such as bold or italic.
- **Font Size:** The size of type, measured in points between the bottom of the descender and the top of the ascender (the vertical point size of a font). Sometimes referred to as the Type or Point Size.
- **Font Style:** Refers to the specific characteristics of the font. The four characteristics that can be defined for fonts are italic, bold, bold italic, and roman.
- **Footer:** A footer is the contents of an area located within the bottom margin of a page.
- **Format:** The way you arrange text on screen , using commands for setting margins, centering text etc.
- **Graphics:** Graphics are images such as clip art, word art, graphs, and charts.
- **Header:** A header is the contents of an area located within the top margin of a page.
- **Line Spacing:** Line spacing refers to the number of lines used by each line of text. In single-line spacing, each line of text is followed by another line of text, and there are no blank lines in between. In double-line spacing, each line of text is followed by a blank line.
- **Margin :** The margin is the amount of blank space, usually measured in inches or characters, above and below and to the right and left of the main body of a document.
- **Paragraph Formatting :** Paragraph formatting includes formatting options such as text alignment, indents, tabs, margins, and justification.
- **Print Preview:** Print Preview in Word allows you to see how your document will look on the page before it is printed.
- **Save:** If you want to use a document again, you should save it on a disk. When you save a document, you name it and tell Word where you want to store it.
- **Save As:** Use the Save As command on the File menu to open the Save As dialog box if you want to save the current document under a new name or store it in a different folder or disk while also keeping the original version.
- **Scroll Bar:** The scroll bar is a panel for moving the display horizontally or vertically within a window.

- **Table:** A collection of data arranged in rows and columns. Tables are commonly used in word processing programs. They are also used in spreadsheets and database programs.
- **Toolbar:** A toolbar is a group of tools of usually related functions. Toolbars can contain buttons, menus, or combinations of both that can be used to quickly perform actions in Word.
- **View :** There are four views available in Word: Normal, Page Layout, Online Layout, and Outline. Some show you how the document will look when it is printed, and some make working in Word quick and easy.
- **Word Processing:** The use of computers to create, view, edit, formate, store, retrieve, and print text materials for human communication.

7.14 Self Assessment Test

1. What is word processing? Explain the features of MS-Word 2000?
2. List and brief the contents of formatting toolbar.
3. Explain the following terms :
 - i. Rulers
 - ii. Header and Footer
4. What is Lists in MS-word? Explain the various numbering styles?
5. Write the steps to Save and Open a word document?
6. Create a table with 4 rows and 3 columns. The columns name should be quantity, price, amount. The font size be 14 , bold the heading and center align it.

7.15 Reference Books

- MS-Word 2000, Sanjay Saxena, Vikas Publishing House Pvt. Ltd.
- MS-Office Bible, Edwards James and Derek Suttan II, Comdex Publishing New Delhi

UNIT - 8 : MAIL MERGE AND MACROS

Unit Structure

- 8.0 Objectives
- 8.1 Introduction
- 8.2 Creating a Mail Merge
- 8.3 Macros
- 8.4 Creating a Macro
- 8.5 Assign a Macro to the Keyboard
- 8.6 Deleting Macros
- 8.7 Summary
- 8.8 Key Words
- 8.9 Self Assessment Test
- 8.10 Reference Books

8.0 Objective

After reading this unit you will be able to understand :

- Understand the concept of mail merge
- Create a main document
- Create a data source
- Link the main document with the data source
- Merge print a document
- Also understanding the concept of macro
- Create a MS word Macro
- Assign a macro to keyboard
- Delete a macro

8.1 Introduction

Mail Merge is a very useful and powerful addition to the primary feature of word processing the Mail merge can be used to print personalised form letters (Having the addressee's name and address on the letter), envelopes, mailing labels etc. Form letters are those letters that have the same contents. These letters are sent to several persons.

For example Business letters describing the launch of a product, call letters for interviews, notices for a meeting, invitation to a part etc. these are form letters. In these case letters the text is the same and only the addressee's name address and few other details differ.

In the days of type writers what you did was something like this you typed the main body of the letter on your type writer, leaving out space for the name and address of the recipients. And photostat the letter get many these copies. Then you picked up each of these copies and either manually wrote the recipients name and address. One by one on each copy for letter. This takes much more time and efforts.

Fortunately Mail Merge overcome both of these problem. By providing a facility to create a database of your contacts and automatically merge the main body of letter and this database in such a manner that many personalized letters would be generated. Each of these letters would be addressed individually to different people.

The file that contains the letter is called the main document and the file containing the database (names, addresses, and other informations) is called the data source. The mail merge feature combine these two files at the time of printing. Since it merges two files and produces a document that is usually mailed, it is called Mail Merge.

8.2 Creating a Mail Merge

Let us assume that you have to send an examination notice to three persons. There will be two files. The first file contains the complete text of the letter except the name and address of the person. This file is called main document or the master file. Another file that is called the data file or the data source is used to store data (the names and addresses) of persons to whom the letter are to be sent. The mail Merge uses the same document and picks up the name and address from data file one by one and print letters.

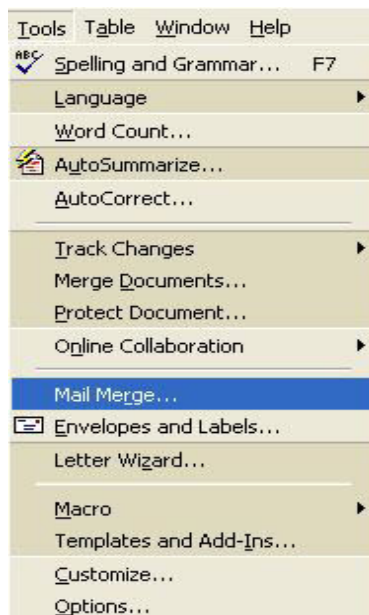
There are three basic steps to use Mail Merge :

1. Create the main document.
2. Create the data source.
3. Merge or combine the main document and data source.

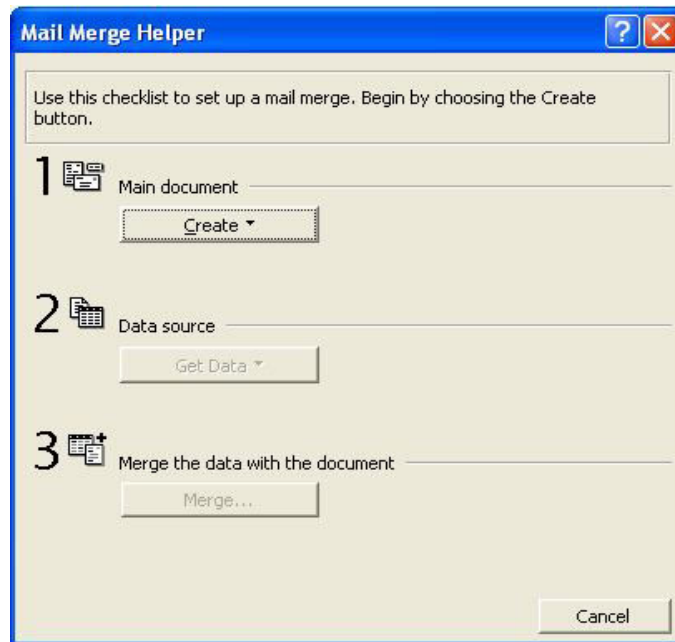
The mail merge is the process of joining a data source such as an address book, with a Microsoft Word document. In Mail Merge process we first of all create a main document that may be a letter, or a label, or a catalog etc. And then insert the data of different persons (names, addresses) in the Main document by mail merge.

To create the Mail Merge just do the following steps :

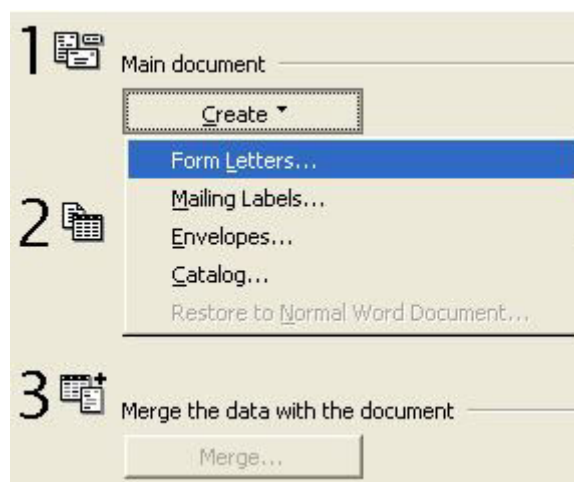
1. Open a new Microsoft word document so that you are looking at a New page.
2. Click on Tools menu from the menu bar.
3. From the drop down menu, select and click “Mail Merge”.



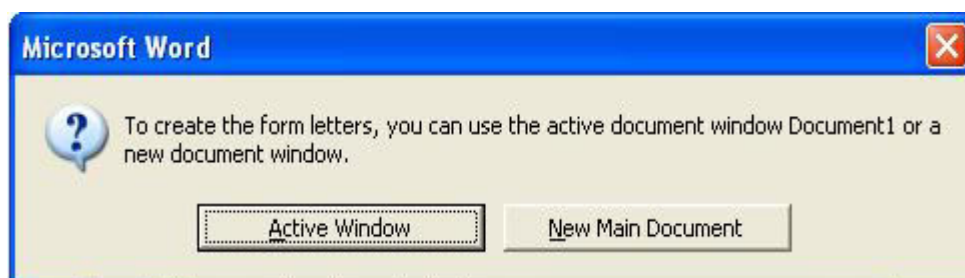
4. After that another dialogue box appears, that is the “Mail Merge Helper” dialogue box.
If you have a menu appears, instead of the dialogue box, then you should get the image below :-



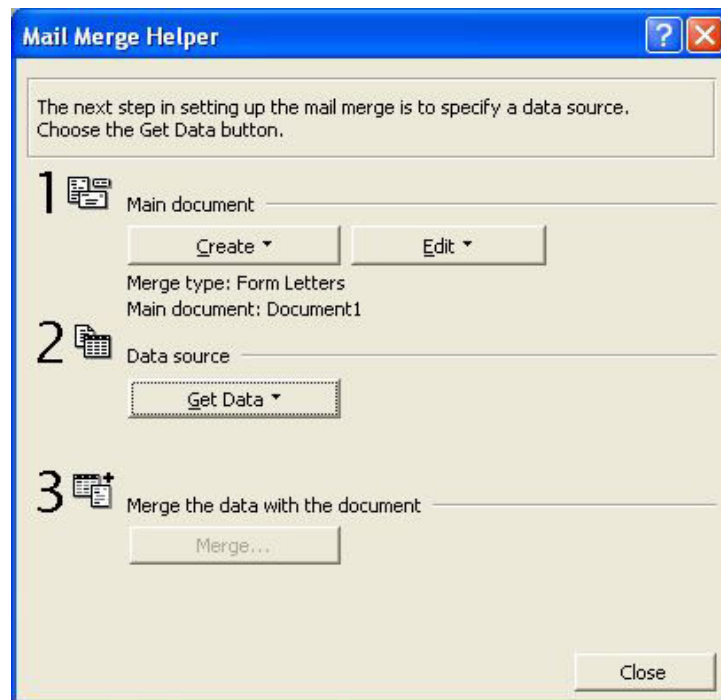
5. There is only two buttons working when the Mail Merge Helper dialogue box appears - Create and cancel. So click on the Create buttons to see the drop down list



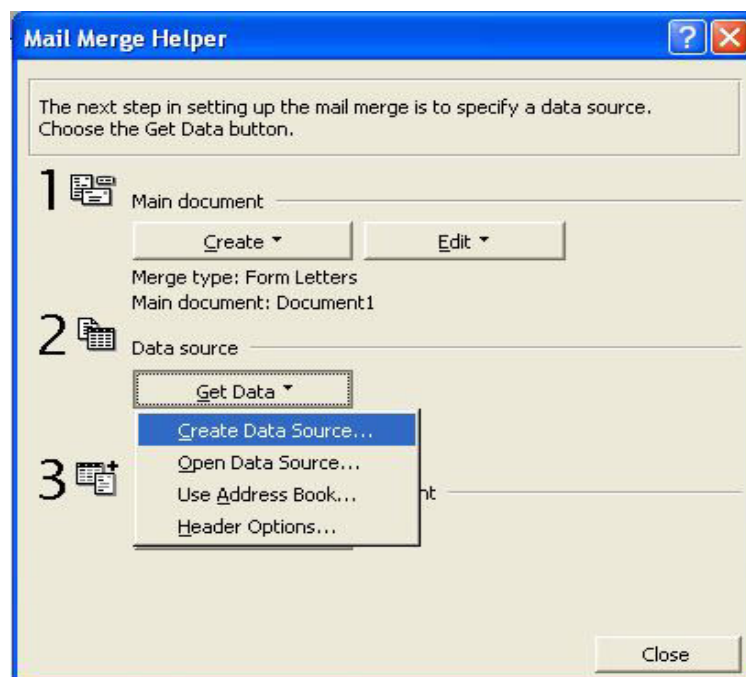
6. Click on Form Letters option by mouse left button. Then another dialogue box appears.



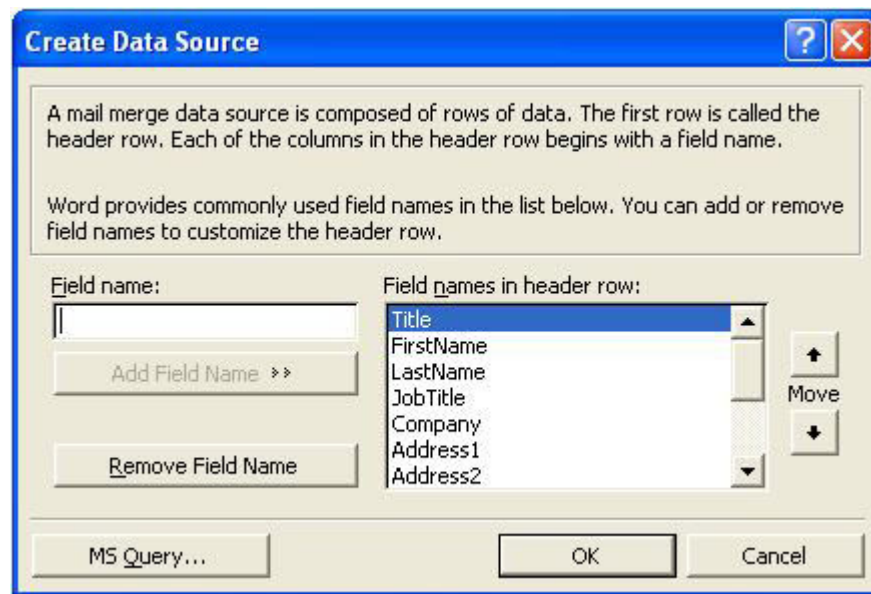
This dialogue box is asking you that where you want your Mail Merge document to appear. Do you want to it in the same document that you have open (Active Window) or a New document (New Main Document) you need to click on Active Window button. It will return you to the Helper dialog box.



7. After that you need to set up Data Source “This means, an address book for us. This address book will be used to create Mail Merge document by the word. So click on the Get Data button, a drop down list will display. From the drop down list click “Create Data Source”.



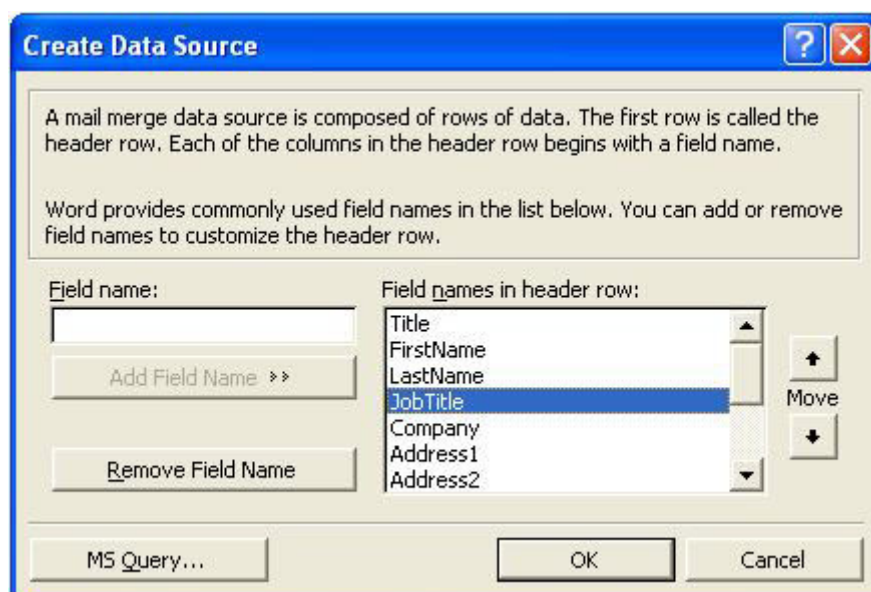
When you click create Data Source you will get the following popping up.



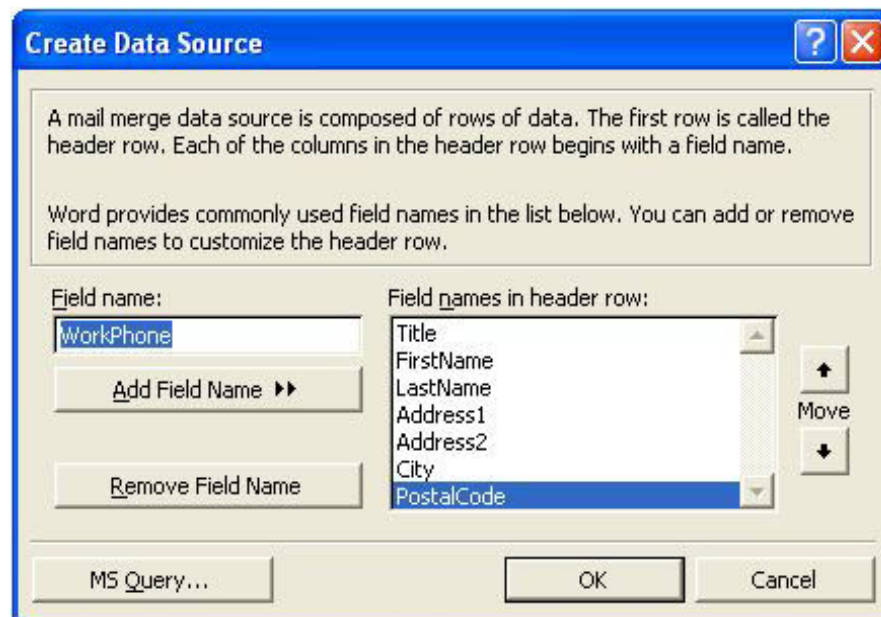
8. This is a complicated dialogue box. But just concentrate on the “Remove Field Name” button, and the list in the “Field names in header row” list box. At this stage you have to decide about what all information you wish to store in the data file. Typically this file contains the names, address details, contact number etc. of people that you wish to send letters to. You may also add any other specific field that you may require like the customer identification no. etc. Word would automatically create a data file with whatever fields you finally select from here.

To add or Remove Field Name you have to follow these two steps :

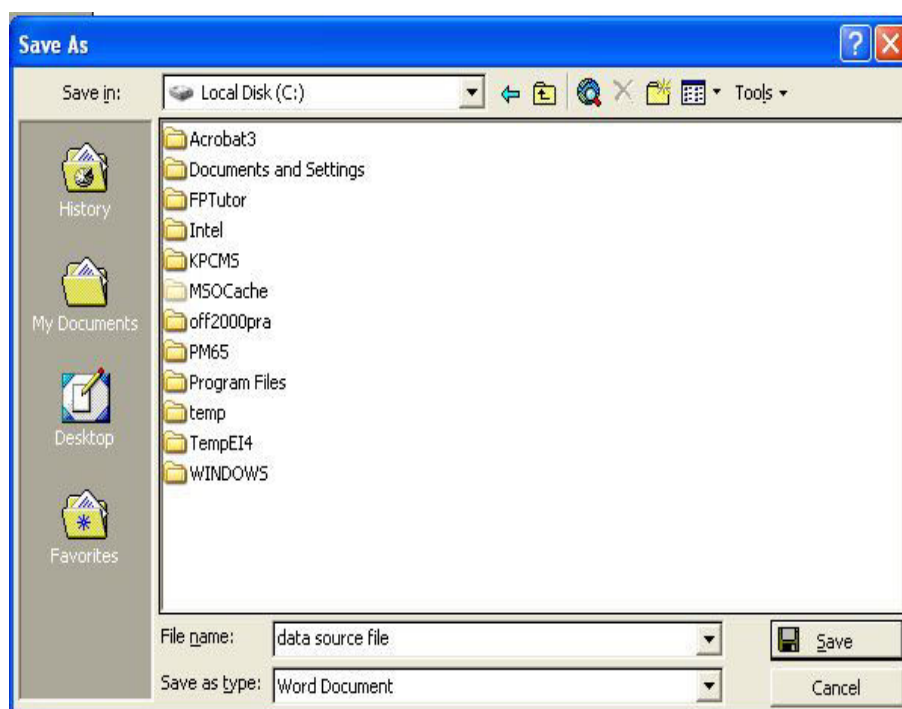
- (i) To add field Name type the desired field name and click on Add Field Name button.
- (ii) To Remove Field Name that you don't want, just select and high light the field name then click the Remove Field Name button.



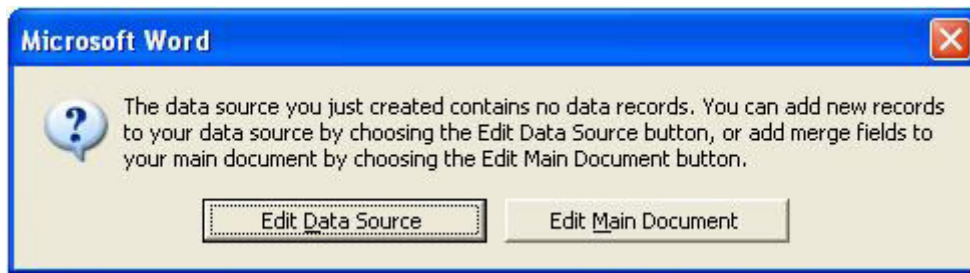
9. Keep clicking the one you don't want then clicking the Remove Field Name button until you end up with the image below.



10. When the dialogue box look like the one above, click the OK button. You get the following dialogue box of data source file name to save.



11. After save data source file, Then a message box appear.



12. To “Edit Data Source” you Just Click on “Edit Data Source” button of the above message box.
13. After that the following data box will be appear on the screen. You can now start filling out your address.

The 'Data Form' dialog box has a blue title bar with a question mark icon and a close button. The main area has a light beige background. On the left, there are labels for 'Title:', 'FirstName:', 'LastName:', 'Address1:', 'Address2:', 'City:', and 'PostalCode:'. To the right of these labels are empty text input fields. On the right side of the dialog, there is a vertical stack of buttons: 'OK', 'Add New', 'Delete', 'Restore', 'Find...', and 'View Source'. At the bottom, there is a 'Record:' label followed by navigation buttons (first, previous, next, last) and a text box containing the number '1'.

14. When you have filled out one address click the “Add New” button as in the image below.

The 'Data Form' dialog box is shown with the same layout as the previous image, but the input fields are now filled with sample data: 'Title:' is 'Mr', 'FirstName:' is 'Praveen', 'LastName:' is 'Sharma', 'Address1:' is '3-F-18 M.N. EXT', 'Address2:' is empty, 'City:' is 'Kota', and 'PostalCode:' is '324009'. The buttons and 'Record:' section at the bottom remain the same.

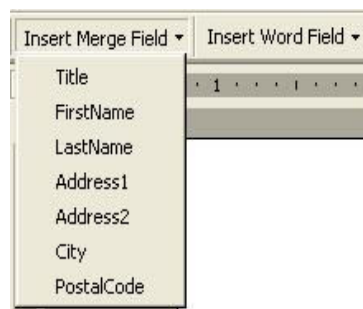
When Add New button is clicked all the text boxes are blanked out, now you can enter your next data.

15. Now Enter your addresses, and then click the OK button when you have enough.
16. If your dialogue boxes all close down, and you are taken back to your word document. Click the Mail Merge Helper icon in the toolbar.

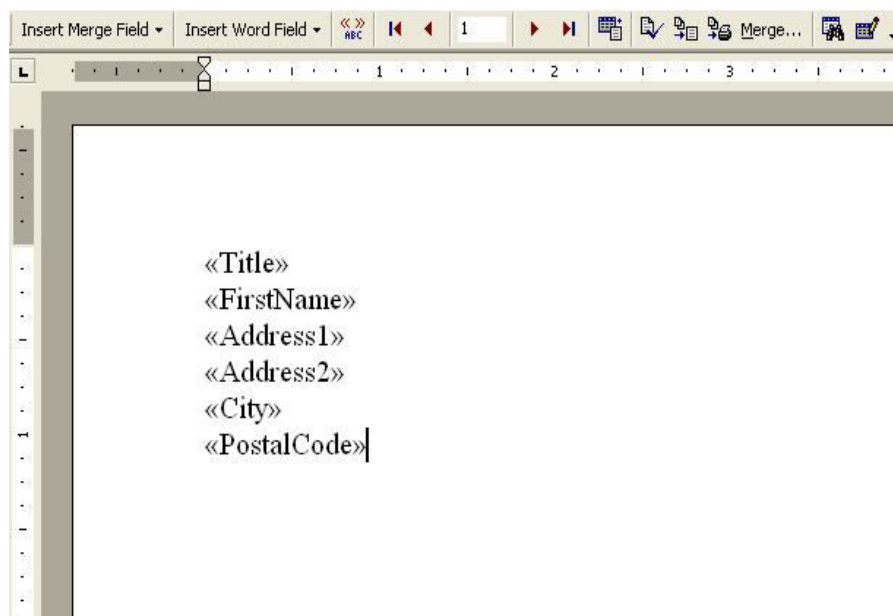


The Mail Merge Helper Dialogue box appears again.

17. When you are returned to your word document. Click the “Insert Word Field” button on the toolbar to see drop down list of your fields.

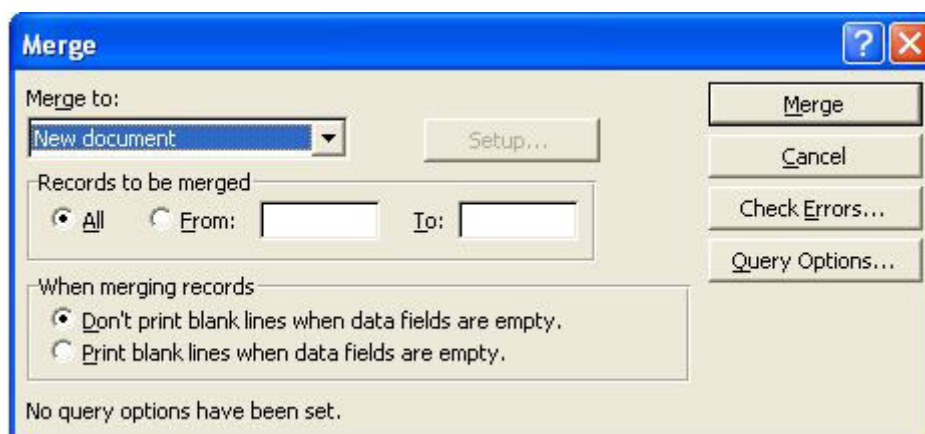


18. Click on each in turn until your document looks like the one below -



- 19 When your document is merged, all those fields will be replaced by real addresses. The real addresses will come from the Data Source that you set up.

20. To create the Mail Merge, just click the Merge button on the toolbar.
21. When you get the dialogue box on your screen. Click the Merge button again.



Now you will get your Merged letter, you need to only print the letter out. Save your original Mail Merge document, with the fields in it. This is the master document. If you don't save it then all your addresses will be lost.

8.3 Macros

Now that you have done a fair bit of work in MS-Word, lets now move on to do something more advanced. If you like to do things the right way, better write down all the steps involved in it. This process of writing down many commands together in a logical and sequential manner is called programming in computer terminology. A program is a series of instructions written in a computer language to execute a specific tasks or tasks. In Microsoft Word you can create your programs which automate any tasks involving several step together at a press of a button or just clicking. These programs are called **Macros**.

A Macro is a small software program. So a Macro is a series of word commands which have been grouped together as a single command. A group of sequential executing steps can be automated by creating a macro for it. As it performed all the task stored in it in a predefined sequence when ever to runtime macros. A Macro can save your considerable time and effort by automating your repetitive task. There two stages in using Macros ;

1. Create Macros and
2. Running Macros.

You can Assign a Macro as follows -

- An option in any menu, or
 - As an icon in a toolbar, or
 - To a button, or
 - To a shortcut key (like function key)
- or
- To a key combination.

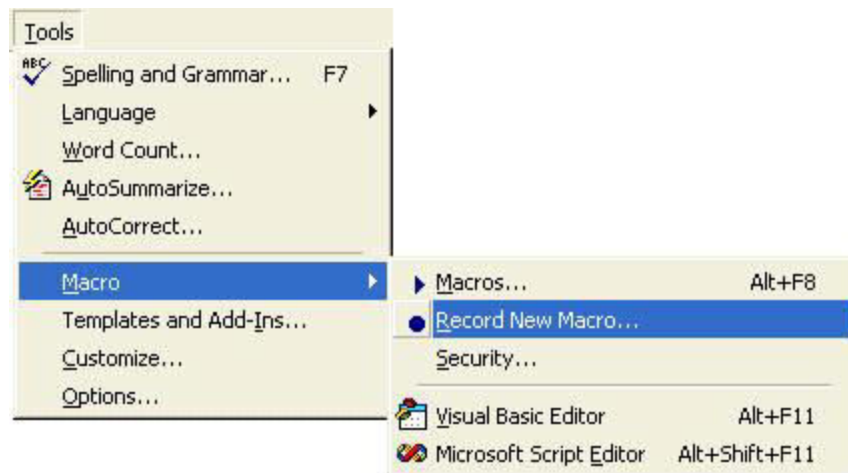
You can create a Macro in two ways-

- * Record as series of steps/action using the keyboard or mouse, or
 - * Type a Macro directly into a Macro editing window using Visual Basic programming language.
- Needless to say that the first option is easier and the second is more powerful and flexible.

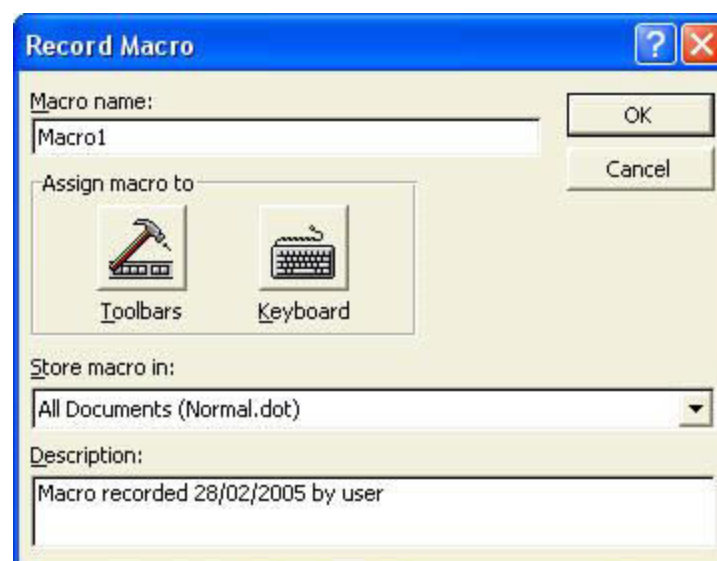
8.4 Creating Macro

You have seen that a Macro is a (program) shortcut for a task that we do a lot, Now you will learn how to create your own Macros. We are creating a “Macro” for changing some highlighted text to an Arial, 16 point Bold font. The Simple Macro we are going to create will do the following steps

1. Open a new Word document.
2. Type in a few words of text.
3. Highlight the text that your want to change or Format.
4. Click on Tools from menu bar.
5. Then select and click on Macro from the drop down list.
6. A sub menu will appears.
7. Then click on Record New Macro.



After click on Record New Macro you will get the Macro dialogue on your screen. Which looks like the one below image.



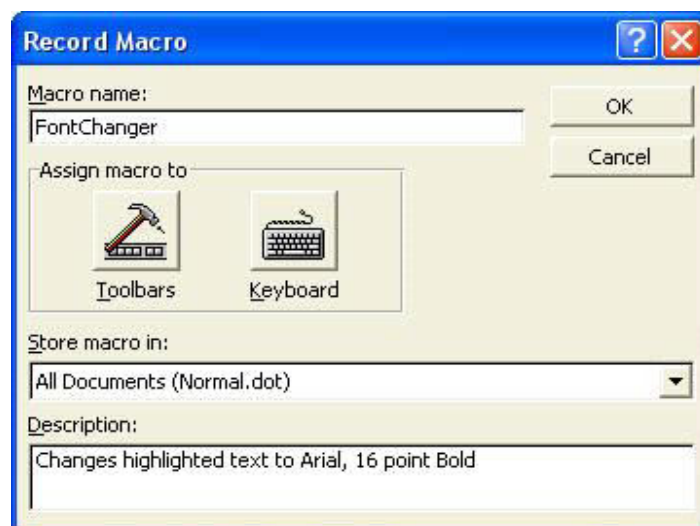
In the above image you can see that there are four areas to the Record Macro dialogue box-

- * Macro Name
- * Assign Macro to
- * Store Macro in, and
- * Description.

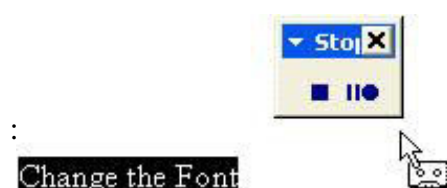
8. The First thing that you have to do is to give a name to your Macro. Here at this moment it is called "Macro 1". That is not a very descriptive name for what we want our macro to do. We will call our Macro FontChanger. Here you have notice that we have not put a space between the two words, this is because Macro don't like having spaces between words. You have to put the name of your Macro as all one word.

So just go ahead and type your Macro name as the "FontChanger" instead of Macro.

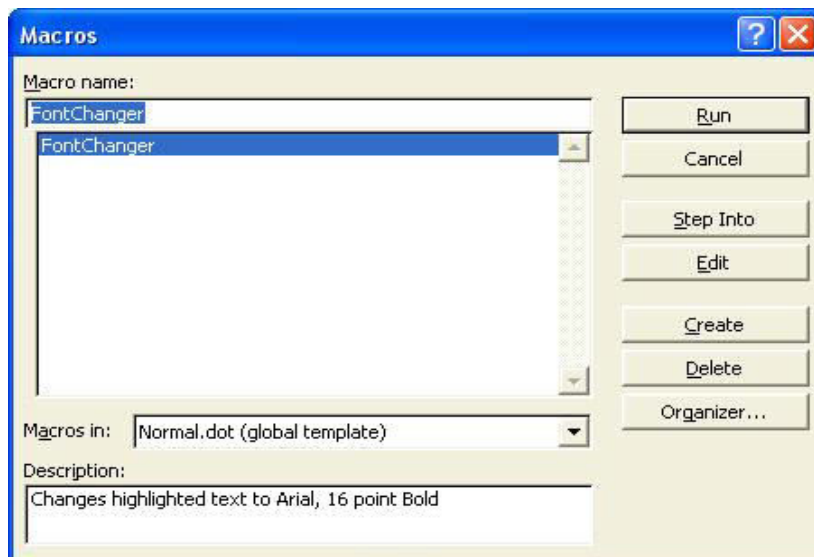
9. In the next section "Assign macro to" you need to give the choice of either Toolbar or keyboard. Right now just ignore this section, we will see latter how to assign our Macro to a toolbar and to the key board.
10. The Next section is "Store Macro in". At this moment it reads All Document (Normal.dot). The normal.dot is the basic templet for all Microsoft word document. In other words the Macro we create will be available to any new word document. You can change this so that the Macro is created in only the document you are working on. Click the black down arrow to see the title of the document you have open.
11. The Final section is "Description" this is just a record of when the macro was created and who it. Now you can change this to anything you like.
12. When you have given your Macro names, just click the OK button. Your dialogue box will look like this -



13. After click the OK button, your are returned to your word document. Now you will find a strange toolbar floating over your page. And the mouse pointer will be different. Your page will look like this



14. The little floating toolbars says stop because your Macro is already being recorded. The process has started. You don't have to worry about this, and hurry it along. Take your time and think about what you are going to do.
15. The floating toolbar has only two buttons. The square one is to stop button and two lines and the circle is the pause button. You can see that mouse pointer has changed with a little cassette tape on the end of it. This indicates that you are recording a Macro.
16. We highlighted the text before recording for our Macro, so we don't need to move the cursor. Whatever we do from now on will become part of our Macro. So you follow these steps
 - Click on Format from the menu bar
 - From the drop down menu, click on Font.
 - The Font dialogue box appears.
 - Select Arial as your font
 - Select Bold
 - Select size 16
 - Click the OK button on the Font dialogue box
 - You are returned to your page.
17. Now Click the Stop button on your floating Macro Recorder. The Macro will stop recording and the process is finished. You have recorded the Macro. If nothing went wrong. You will now have a Macro. You can now use your new Macro, do the following steps.
 - Type in some new text and highlight it.
 - Click on Tools from the menu bar
 - From the drop down menu click on Macro
 - From the sub menu that appears click on Macros
 - The Macros dialogue box appears.



- Select the Macro that you want, then click the Run button at the top right of the dialogue box. When the Run button is clicked the dialogue box will disappear and the highlighted text will change to Arial, Bold, 16 points.

8.5 Assign a Macro to the Keyboard

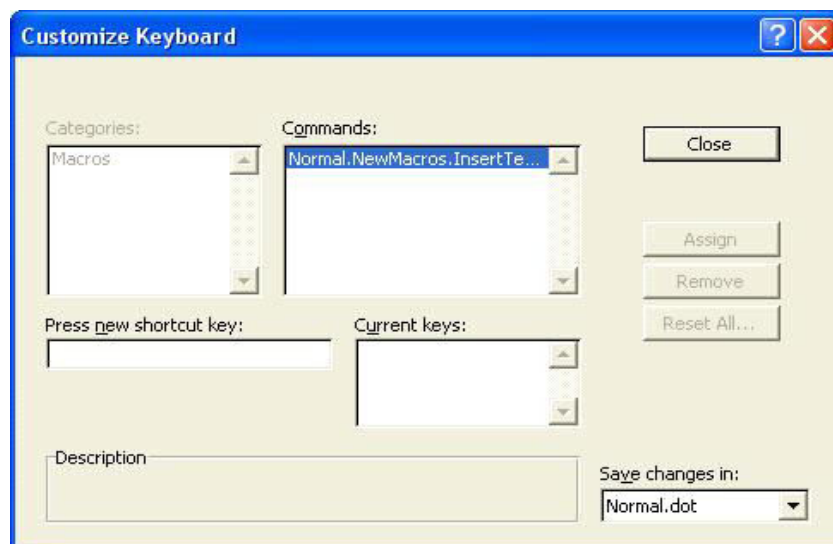
Assign your Word Macro to a key on your keyboard. We will create a Macro, that will insert a text box onto the page for us. It will do this when we press certain keys on the keyboard.

To create a new Macro and then assign it to the keyboard, you do the following steps -

1. Position your cursor at the start of a new blank line.
2. Then click on Tools from the menu bar.
3. Click on macro from the drop down menu.
4. Then select Record New Macro from the sub menu .
5. The Record Macro dialogue box appears.
6. Type the new Macro Name, called it “InsertTextBox.”
7. Now to assign the Macro to the keyboard, click the keyboard icon as shown in the image below -



8. After clicking the keyboard icon a new dialogue box will appear like this one below -

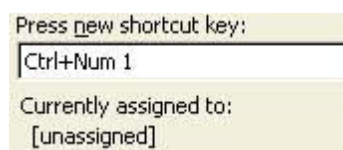


9. Now Press new shortcut key, right at the bottom and perform following task :

- Click your cursor inside the text box
- Press the F2 one key on your keyboard
- Your text box will say this understands it.

As you can see, it says currently assigned to : Move Text - It is just telling you that the key F2 already has a shortcut assigned to it. So we can't use F2 for our Macro. So just do following steps -

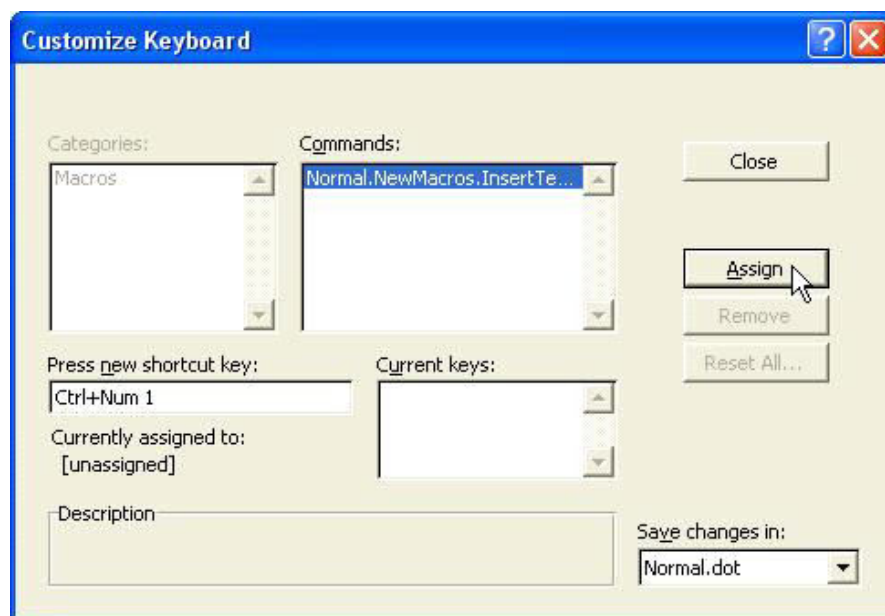
- Click inside the text box again, and delete F2 by hitting backspace key on keyboard.
- Hold down the Ctrl key on your keyboard.number 1 above the QWERTY Keys, but the number 1 on the right hand side of your keyboard.)
- Now your "Press new shortcut key" text box will look like this one below :



10. Now you can see that it now says currently assignment to : Unsigned.

(If you don't get unsigned, Then try a different number) That means no other shortcut is using these key combination.

11. Now we can go ahead and use them for our Macro. For that just click on "Assign" button of the following image appearing below -



- Then click the Close button.
- Now you will be returned to your document.
- The recorded will be displayed again waiting for you to record new Macro.

To Record your New Macro do the following -

- 1 With the recorder displayed, click on Insert from the menu bar.
2. Click the Text Box from the drop down menu.
3. Move your mouse pointer down to your white page.
4. Hold down your left mouse button.
5. Keep the left mouse button held down and drag your mouse outwards until you have a decent sized text box
6. Let go of your mouse button, then click the Stop button on the recorder.

Your Macro is now recorded. To test the Macro just do the following steps -

1. Get rid of the text box on the page by clicking Edit from the menu bar. (Make sure your text box has the white squares around it. If not, click on the text box with your left mouse button)
2. From the drop down Edit menu, click on cut.
3. The text box is deleted from your page.
4. Hold down the Ctrl key on your keyboard.
5. Keep the Ctrl key hold down.
6. Press the number1 on your keyboard, the same number1 that you used when recording your Macro.
7. A text box will appear on your page.

If you didn't get the text box on the page, then something went wrong. So no choice but to try again. So there you have it : a handy shortcut every time you need a text box. All you have to do is press Ctrl and then the number1 key. A text box will appear on the page

8.6 Deleting Macros

In the previous section you saw how to add a button to the toolbar. Now we will see how to delete Macros. We will see how to delete Macros. We will start with deleting the one from the toolbar.

For deleting a Macro from the toolbar we do the following steps -

1. Click on the button with your right mouse button
2. A menu appears
3. Click on customize right at the bottom
4. The following dialogue box appears

sending information to many person's simultaneously. we can create a Macro which is a shortcut for a task that you do a lot. A Macro can create to perform a lot of task that are sequence in a series of steps. A Macro may be assign to an option in menu, or As an icon in a tool bar or a shortcut key of a keyboard. Macros make out task easier by just clicking of mouse or keyboard.

8.8 Key Words

- **Current Document** : The current, or active document is the document you see on the Word screen.
- **Data Source**: A data source contains the information from which a merged document is created. The data source is merged with a main document, which specifies the kind of output required.
- **Database**: A database is a collection of organized information.
- **Database Field** : A field is a specific category of information in a database. Some examples of possible fields are Name, Telephone Number, and Address.
- **Field** : A field is an area in your document where a specific type of data is entered or calculated.
- **Macros**: Macros are recordings of commands that automate commonly performed or complicated procedures, speeding up your work.
- **Mail Merge**: Mail Merge refers to the process of combining a data source, and a main document to produce a unique output.

8.9 Self Assessment Test

1. What do you mean by Mail Merge
2. How can you create a Mail Merge document ? Explain.
3. How can you create a data Source give steps? and explain.
4. What is a Macro ? Explain
5. How can we create a Macro to Microsoft word document.
6. What are the steps to assign a Macro to the keyboard.
7. Can we assign a Macro to the word toolbar ? How explain.
8. How can you delete your Macro from the toolbar ? Explain.

8.10 Reference Books

- MS-Word 2000, Sanjay Saxena, Vikas Publishing House Pvt. Ltd.
- MS-Office Bible, Edwards James and Derek Suttan II, Comdex Publishing New Delhi

UNIT - 9 : MICROSOFT EXCEL

Unit Structure

- 9.0 Objectives
- 9.1 Introduction
- 9.2 Spreadsheet Concepts
- 9.3 Starting With Excel
- 9.4 Workbook and Worksheets
- 9.5 Worksheet as a Database
- 9.6 Closing the Worksheet
- 9.7 Opening An Existing Worksheet
- 9.8 Formulas and Functions
- 9.9 Formatting Features of MS-Excel
- 9.10 Graphics and Charts
- 9.11 Summary
- 9.12 Key Words
- 9.13 Self Assessment Test
- 9.14 Reference Books

9.0 Objectives

After reading this unit you should be able to understand :

- Spreadsheet and Concepts
- Mathematical calculation using formula.
- Preparation of graphs and charts.

9.1 Introduction

Microsoft Excel is one of the most versatile and popular spreadsheet programs. Excel serves as an electronic pad for accountants. The spreadsheet has many similarities with an accounting document called ledger. In a ledger you can insert new sheet or remove unwanted sheets, Excel works on the concept of workbooks which has worksheets which can be added or removed as and when required. However, before we start in depth study of Excel, let us first understand what a spreadsheet is all about.

Spreadsheet is a simple worksheet consisting of rows and columns. The intersections of row and column is called cell every cell can be defined with a unique cell address and whatever data we enter are stored in these cells. For example the report cards of a student or the ledger that we create for maintaining bank account can be termed as a spreadsheet.

The Excel provides following additional features:

- * Excel has a grid of columns and rows into which you can enter numeral, text etc.
- * Excel can perform mathematical or logical operations and show the results.
- * We may customize the appearance of the sheet very similar to the flexibility of a word processor which makes our data easy to read and understand.

9.2 Spreadsheet Concepts

9.2.1 What Is An Electronic Spreadsheet?

A spreadsheet application accepts data values and relationships between the data values in a tabular format consisting of rows and columns. It also allows users to perform calculation or on these values. Electronic spreadsheet is a software package which shows us in a grid form. Just like square note book which all have used in our childhood.

9.2.2 Spread Sheet Terminology

Before working with spreadsheet we have to understand some spreadsheet terminologies. Some important terms are as follows:

Workbook

A workbook is a collection of many worksheets. In a single workbook, you can store information in an organized manner. By default a workbook has three worksheets within it and it can contain a maximum of 255 worksheets.

Worksheets

A worksheet is also called a spreadsheet. It is made up of rows and columns. Worksheet refers to the actual document you create by using the spreadsheet program. MS-Excel is a popular spreadsheet program, where you design worksheet using this program.

Row

A row is a horizontal block of cells that runs through the entire worksheet. The rows are numbered from top to bottom at the left edge of the worksheet starting from 1. The maximum number of rows in a worksheet is 65536.

Columns

A column is a vertical block of cells, that runs through the entire worksheet. A worksheet may contain up to 256 columns. Labeled A through Z. The first column is A, the second is B and so on up to Z, then next columns come AA, AB, AC through Z the last column of the worksheet, Z is the 256th column.

Cells

A cell is the intersection of a row and a column. The movement of cursor indicates current active cell. For example, the cell A1 is the intersection of column A and row 1, and cell E6 is intersection of column E and row 6. The cell becomes active when you select it by clicking mouse button or moving arrow keys to it using the keyboard. All the value formula/operation that you use in any specific application referred cell address. The source of operation that you want to apply on certain cells.

Formula

A formula always begins with equal (=) or (+) sign. It is an order of values, cell references, names, operations and function in a cell that results in a new value.

Function

A Function is a predefined set of formula that perform complex calculation by using specific values in a particular order to give a result. These are ready-made formulas available with Excel. For example accounting formula, statistical functions etc.

9.3 Starting With Excel

Starting Excel

To open Excel follow these instructions.

1. Click the Start button on the task bar, select Programs and then click Microsoft Excel.
2. MS-Excel windows open.

MS-Excel 2000 Interface

An Excel may have multiple documents or worksheets open simultaneously. The elements of the Excel application window and open Excel workbook in detail most of the features and facilities are common as described in word/window.

9.4 Workbook and Worksheets

In MS-Excel a workbook is a file of stored data and work. The work or data is saved as a .XLS file extension. A workbook can contain many sheets which may contain charts, macros, formulas, calculation etc.

9.4.1 Working in a Workbook

We can use a workbook for manipulating data stored in various worksheets. When you open an Excel file it is a workbook that contains multiple worksheets. To work on a workbook you need to activate it first. To activate a workbook just click the Window menu and select the document name of the document window at the button that you want to activate.

9.4.2 Inserting and Removing Sheets

Excel provides the flexibility to easily insert and remove sheets from the workbook.

Inserting a Sheet

To insert a sheet into your workbook do this -

1. Activate the Workbook in which you want to insert the sheet.
2. Select the existing sheet by clicking its sheet tab or by pressing Ctrl + PgUp or Ctrl + PgDn as the case may be.
3. Click the Insert menu and choose Worksheet and press Shift + F11 to insert a new worksheet.

Deleting a Sheet

When a sheet is deleted, the stored data is also deleted. To delete a worksheet from a workbook do this -

1. First of all select the sheet you want to delete.
2. Click the Edit menu and select Delete Sheet, then position the mouse pointer on the tab of the sheet to be deleted and click the right mouse button and choose Delete.

9.4.3 Copying and Moving Worksheets in a Workbook

You can re-create the worksheets in the new workbook or copy the data from one workbook to another, but it would be easier to copy the entire sheet of other workbook.

To copy or move a sheet, within the workbook using mouse, do this :

1. Select the sheet you want to copy.
2. To copy worksheet within a workbook press and hold down Ctrl key and drag the sheet tab to its new location.
3. If you want to move the sheet within the original workbook, drag the sheet tab to the location where you want to move the worksheet.

To copy between workbooks, do this

1. Open both workbooks
2. Click the Window menu and select Arrange work book in dialog box, and select the desired arrangement.
3. To Copy : Press and hold down Ctrl key and drag the sheet tab from one workbook onto the tabs in the other workbook.
4. To Move : Drag the sheet tab onto the tabs at the bottom of the other workbook.
5. A black triangle shows above the receiving tabs, to show the location for the copy's insertion.
6. Release the mouse button.

9.4.4 Renaming a Sheet:

The worksheets name in a workbook by default are sheet1, sheet2, etc. You can also name the sheet as required -

To Rename a sheet, do this

1. Select the sheet.
2. Double click the left mouse button at the sheet tab. Then click the Format menu, highlight sheet and choose Rename the selected sheet tab or click the right mouse button, then select Rename.
3. Type the new name and press Enter key.

9.5 Worksheet as a Database

9.5.1 What is a Database?

A database is a collection of related data. The collection of data or database serves as a base (database) from which specific information can be accessed and processed. The telephone directory is also a database. Dictionary is one of the most common example of a database. We use data and database to generate /information.

When database is used in a computer program such as Excel, it provides a number of facilities to store data/information in a desired order. To retrieve the required information, mathematically process it and so on. Before learning these commands, let us familiar with some technical terms regarding database.

Types of Data Entered in a Cell

There are four types of data that can reside in a cell, They are as follows :

Text

A text may be any combination of letters, numbers and keyboard symbols. A cell can contain up to 32,000 characters. The display extends over neighbouring cells, if column width prevents a text string from fitting visually in a cell.

Numerals

A numeral contains all the decimal digits from 0 to 9 , on which we can perform mathematical or statistical operations such as addition, subtraction, multiplications. Numeric calculations is the most common thing that is done with spreadsheet in Excel. A numeral may be displayed using common scientific notation or built in numeric formats. Date and time are special formatting numbers. When a formatted number does not fit in a cell, number signs (###) like hash are displayed.

Logical values

The logical values are like TRUE or FALSE into cells. These values are used in writing conditional formulas.

Error values

An error value is a different type of data. For example if a formula used to divide a number by zero, then the result is the # DIV / 0 Error value.

9.5.2 Entering Data In Worksheet

You can enter any type of data or information in the worksheet.

For entering data in Excel there are basically 3 steps:

1. Activate the cell in which you want to enter data.
2. Type the data .
3. Finalize the data entry by pressing Enter key, Tab or any one of the arrow key

To enter data in cell, do this

1. Select the cell in which you want to enter data.
2. Type your data. Two buttons appear in the formula bar: the Entry button and the Cancel button.
3. Click the Entry button to indicate that you have complete the data entry. You can also press Enter key or Tab key or any arrow key.
4. If you done a mistake before finalizing your data entry, you can delete the character by pressing the backspace key to the left of the insertion point. To erase every thing just click the Cancel button.
5. Repeat the above steps to complete the data entry.

To enter text in a cell, do this

1. Select the cell, type the text entry and enter the text by click the enter box in the formula bar or by pressing the Enter key.
2. To enter number as text, type an apostrophe (') at the beginning of the number like '45000.

You can format a range of number as text by using the text numeric format by the following steps

1. Select the range of cells containing the numbers, and click the right button of mouse.
2. Click the Format menu and select cells, or press Ctrl + I and click the number tab and select the text from the category list.
3. And click OK button.

To enter a number in cell, do the following steps:

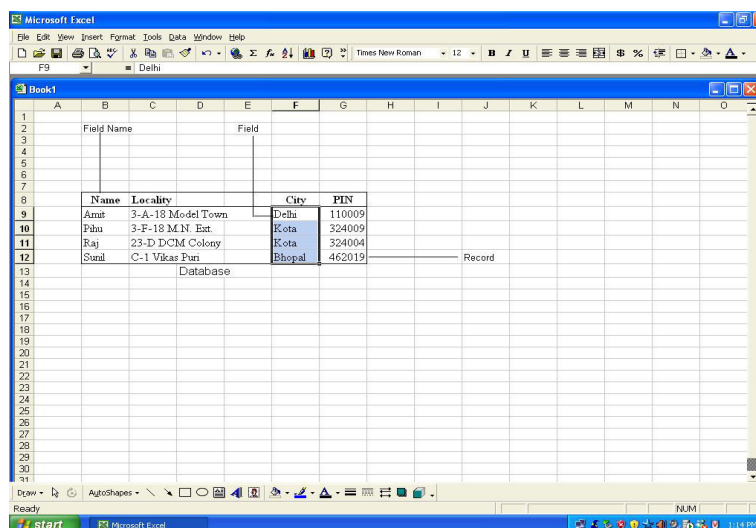
1. Select the cell, type the number and then press Enter key or click the Enter box.
2. You can enter integers such as 135; decimal fractions such as 135. 437; integer fractions such as one and half or scientific notion such as 1.3536E+2.

9.5.3 Database Records, Fields And Field Name

The following list in a worksheet is called a database. A worksheet can have more than one database.

Name	Locality	City	PIN
Amit	3-A-18 Model Town	Delhi	110009
Pihu	3-F-18 M.N. Ext.	Kota	324009
Raj	23-D DCM Colony	Kota	324004
Sunil	C-1 Vikas Puri	Bhopal	462019

The above list containing information of person comprising a name and address (Name, Locality, City and PIN) is written in one line on the paper. The second line contains the name and address of another person and so on, each set of information is stored in one row. This row is called a **record**. The records in a worksheet of database are stored in form of columns, for example, the Name may be typed in column A, Location in column B, City in column C, and so on. These columns are called **fields** in database terminology. The fields are also named in a worksheet database at which are known as **fieldnames** and the row containing fieldnames is called the header row. The concept of a database, records, fields, fieldname and heading row(Name, Locality, City and PIN) is shown in the diagram.



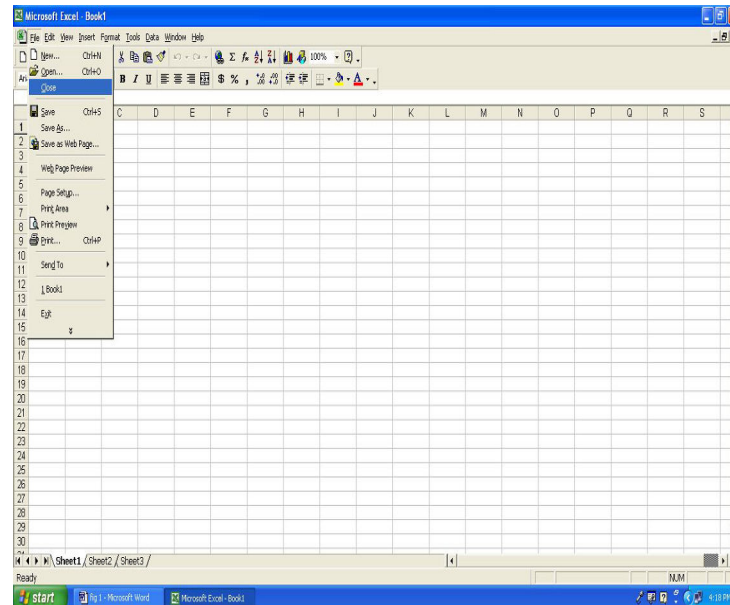
A database can be entered in any worksheet area. While entering a database the following rules must be remembered.

1. The first row must contain the fieldnames.
2. Fieldnames may be entered in upper or lower case or mix of the two.
3. Each fieldname must be unique and should identify the type of stored information in fields.
4. The rows below fieldnames contain the records.
5. Do not leave any blank row.
6. The relevant information must be entered in the fields.
7. Do not type a space before entering a number in the database.
8. Do not type an extra space after typing text entries in the database.

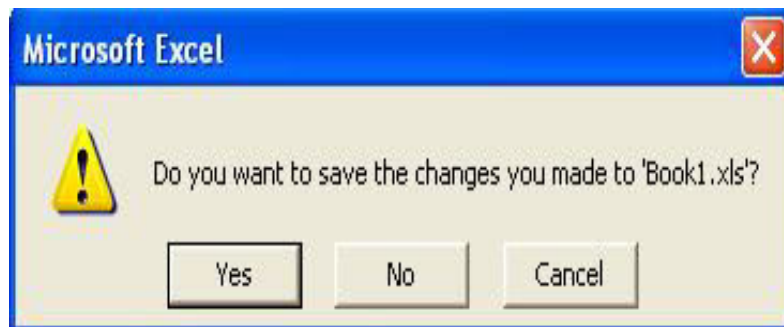
9.6 Closing The Worksheet

To close the worksheet and quit MS-Excel, You just do this

1. Click the File menu and select the Close option from the pull-down menu.



2. As you click the Close option the message box appears on the screen, which asks whether you wish to save the changes made to the sheet or not.

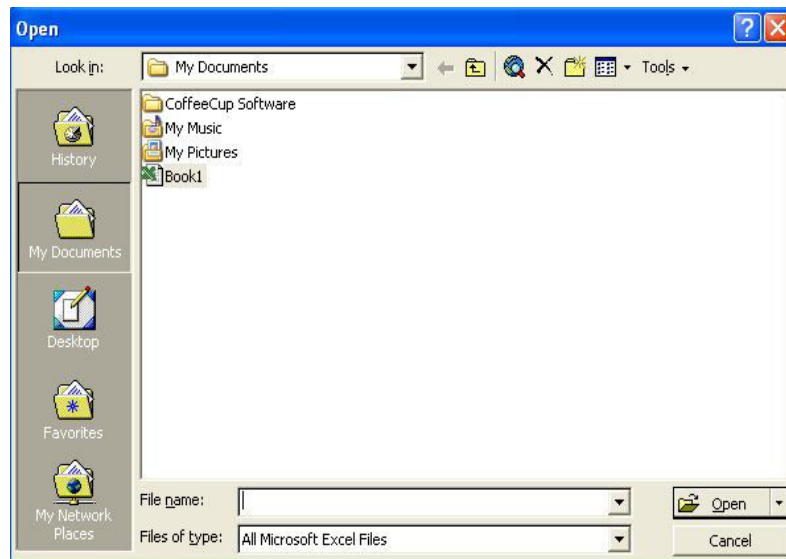


3. Just click on Yes button to save the data of sheet.
4. You can now quit MS-Excel by click on the Close button of the Tittle bar.

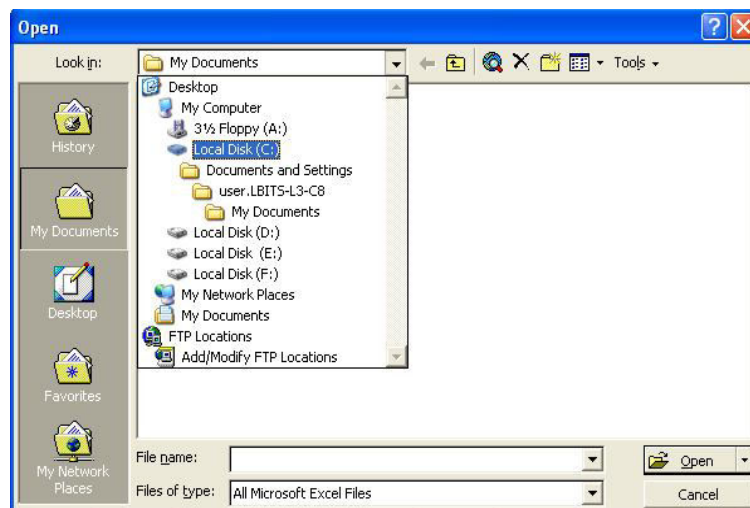
9.7 Opening An Existing Worksheet

To open an already created worksheet in MS-Excel, you do this

1. Just open the MS-Excel by click on Start, then select Programs option from the submenu and click the MS-Excel.
2. Click on the Open button of Tool bar.
3. Immediately the Open box appears on screen, then click on the down arrow button.



4. Then choose the Local Disk [C:] from the pull - down menu, immediately a list of folders and files displayed inside the box.



5. Locate the name of your worksheet.

6. Finally click on Open button of the “Open box”. Your worksheet will appear on the screen.

9.8 Formulas and Functions

The special feature of a spread sheet program is that it allows you to create mathematical formulas and execute functions.

9.8.1 Formulas

Formulas are used to solve numerical problems and analysis data in a sheet. A formula is entered in the worksheet cell and must begin with an equal sign (“=”) or (+) . The formula then include the address of the cells whose values will be manipulated with the appropriate operands placed in between , the calcula-

tion executes immediately as the formula is typed in the cell and formula is visible in the formula bar. In the diagram we calculate the Sub Total and Total by using formula that multiplies the quantity and price of each textbook and adds the sub total for each book.

The screenshot shows the Microsoft Excel interface. The formula bar at the top displays the formula `=((B2*C2)+(B3*C3)+(B4*C4)+(B5*C5))`. Below the formula bar is a table with the following data:

	A	B	C	D	E	F
1	Textbook	Quantity	Price			
2	Biology	4	\$99.99			
3	Chemistry	2	\$79.95			
4	Calculus	7	\$65.99			
5	English	12	\$49.99			
6						
7		Sub Total	\$1,621.67			
8		Sales Tax	6%			
9		Total	\$1,718.97			
10						
11						
12						

All formulas using numbers start with an equal to (=) sign or plus (+) sign. If you do not use an equal to (=) or plus (+) sign, MS-Excel treats it as text. The five operators used in a formula are : plus (+), minus (-), division(/) , multiplication (*), and exponential (^). For example if you wish to add the content of cell address A20, to the cell address C13, then type the following formula.

= A20 + C13

Relative, Absolute and Mixed Referencing

The calling cells by just their column and row labels (such as “A1”) is called “**Relative Referencing**” when a formula has relative reference and it is copied from one cell to another , the Excel will change the cell addresses relative to the row and column they are moved to. For example, if a simple addition formula in cell C1”= (A1+B1)” is copied to cell C2, then the formula would change to “= (A2+B2)” to replace new row.

To prevent this change, cells must be called by “**Absolute Referencing**” and this is accomplished by placing dollar sign(\$) within the cell address in the formula . Then the previous formula in cell C1 will be read as “= (\$A \$1 +\$B \$1)”. If the value of cell C2 should be the sum of cells A1 and B1. Both column and row of both cells are absolute and will not change when copied.

The “**Mixed Referencing**” can also be used where only the row or column fixed. For example, in the formula “= (\$A1 + \$B2) “, the row of cell A1 is fixed and the column of cell B2 is fixed.

Ranges

For carrying out calculation through functions, you have to make use of ranges. A range is a sequence of cell addresses. It is specified in the following format :

first cell address : last cell address

It can also be written as -

first cell addresslast cell address

However we work with the format

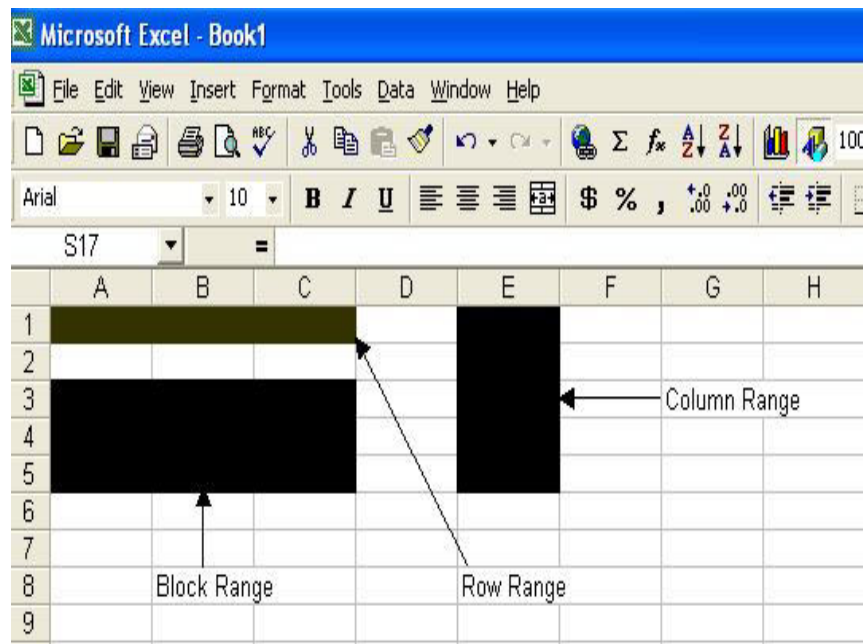
first cell address : last cell address

There are following types of cell ranges.

Row Range (A1:C1) - It includes the cell address of row 1, such as A1, B1 and C1.

Column Range (E1:E5) - It includes the cell address of column E, such as E1, E2, E3, E4, E5.

Block Range (A3:C5) - It includes the cell address of columns A to C and rows 3 to 5.



9.8.2 Functions

Functions can be more efficient way of performing mathematical operations than formulas. A function is typed in the following formula :

= Function name(range of cell address)

For example , if you want to add the values of cell D1 through D10, you would type the formula.

= (D1+D2+D3+D4+D6+D7+D8+D9+D10).

A shorter way would be to use the SUM function and simply type

= SUM(D1:D10)

The Common Excel Functions

Excel -2000 offers over 200 functions to help you to perform any calculations on numerical data in the worksheet. There are various types of functions in MS-excel .Some most useful functions are as follows.

SUM, AVERAGE, MAX, MIN,.....

Microsoft Excel - Book1

File Edit View Insert Format Tools Data Window Help

Arial 10 B I U

	A	B	C	D	E	F	G
1	Name	Roll No	English	Maths	Science		
2	Ajay	101	70	60	80		
3	Raj	102	50	70	50		
4	Naveen	103	60	60	70		
5	Sanjay	104	80	60	60		
6	Saurabh	105	50	70	70		
7	Vikash	106	70	70	70		
8							
9							

The SUM Function

The SUM Function allow you to calculate automatically the sum of the values in a range of cell addresses. The general syntax of the function is :

SUM(starting cell address : ending cell address)

Let us see how this function will apply :

1. Move the mouse pointer to the cell address where you want to calculate the sum, such as (F2).
2. Type the function = SUM (C2:E2).
3. And press the Enter Key ,immediately the contents of the cell addresses C2,D2, and E2 get added and the result is displayed in the cell address (F2).

Microsoft Excel - Book1

File Edit View Insert Format Tools Data Window Help

Arial 10 B I U

	A	B	C	D	E	F	G
1	Name	Roll No	English	Maths	Science	Total	
2	Ajay	101	70	60	80	=SUM(C2:E2)	
3	Raj	102	50	70	50		
4	Naveen	103	60	60	70		
5	Sanjay	104	80	60	60		
6	Saurabh	105	50	70	70		
7	Vikash	106	70	70	70		
8							

The AVERAGE Function

The AVERAGE Function allow you to find out the average of values in a given range of cell addresses.

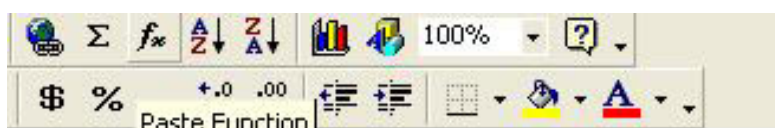
For example you can calculate the average marks of Maths subject in cell address D8, by using the formula.

$$=(D2+D3+D4+D5+D6+D7)/6$$

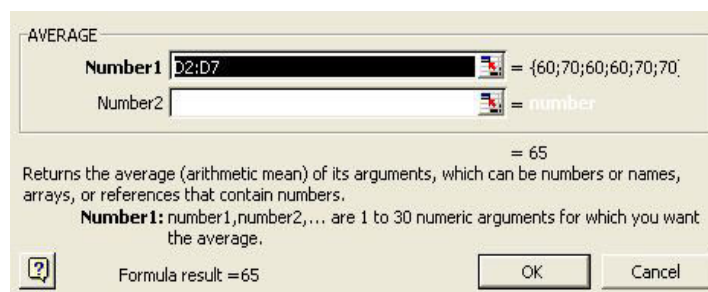
But it is very lengthy method as you need to type this formula at each cell address separately. Excel -2000 provides another single method to calculate average of data.

Use the following steps to learn this method :

1. First move the mouse pointer over the cell address where you wish to display average-say the cell address D8, and click there.
2. Now click at the Paste Function button (fx) present on Standard Toolbar.



3. Immediately a Paste Function box appears.
4. Now click on the Most Recently Used option in the list box below the Function category option .
5. Instantly ,a list of functions get displayed in the box below the Function name option.
6. Now click on AVERAGE function name.
7. Finally click on OK button, instantly an AVERAGE box get displayed.
8. Now just type the cell range where average you wish to calculate. So type D2 : D7



9. Finally click on the OK button. You will get the average mark in D8 cell address, and function = AVERAGE(D2 : D7) will displayed on Formula bar.

The MAX Function

The MAX function is very useful function. It displays the largest value of cell range in the active cell . The general syntax is :

$$= \text{MAX}(\text{starting cell address} : \text{ending cell address})$$

Suppose you want to put the highest marks scored in Maths at the cell address D9. For that you do this

1. Click at the cell address D9, so that it will get active.
2. Now type = MAX(D2 : D7) and then press the Enter Key.

3. Immediately you will get the highest value in cell address D9.

Note : You can also do the same by using the Paste Function method as shown for AVERAGE Function.

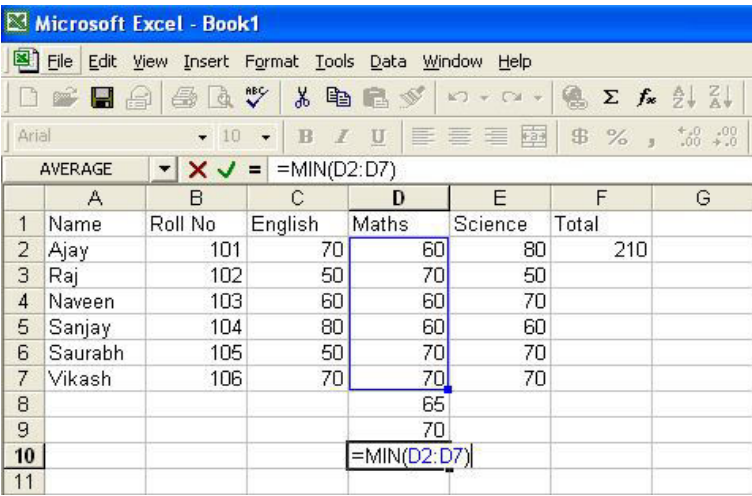
The MIN Function

The MIN Function is used to return the minimum value from a range of cell addresses. The general format is :

= MIN(starting cell address : ending cell address)

Let us now calculate the minimum marks obtained in Maths subject, in cell address D10 by using following steps :

1. Click at D10 cell address.
2. Now type the function =MIN (D2 :D7)



The screenshot shows the Microsoft Excel interface. The formula bar at the top displays '=MIN(D2:D7)'. The spreadsheet has columns A through G and rows 1 through 11. The data is as follows:

	A	B	C	D	E	F	G
1	Name	Roll No	English	Maths	Science	Total	
2	Ajay	101	70	60	80	210	
3	Raj	102	50	70	50		
4	Naveen	103	60	60	70		
5	Sanjay	104	80	60	60		
6	Saurabh	105	50	70	70		
7	Vikash	106	70	70	70		
8				65			
9				70			
10				=MIN(D2:D7)			
11							

3. Then press the Enter Key .

4. Immediately the minimum value will be appear in D10 cell address.

9.9 Formatting Features of MS Excel

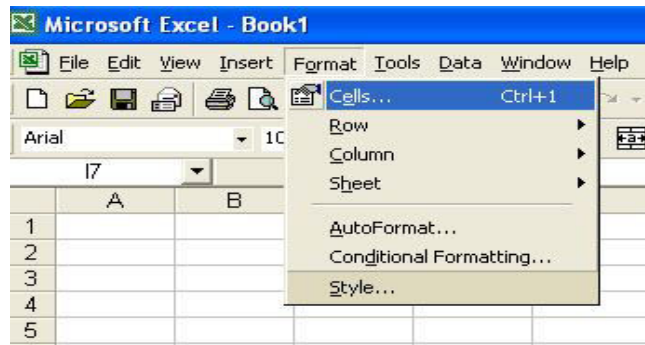
The Formatting Toolbar provides a lot of options and tools to format or modify the cell contents. The cell must be first selected (highlighted) before it can be modified or formatted .The selection can be done in many ways, as given in table below -

9.9.1 Formatting Cell Contents

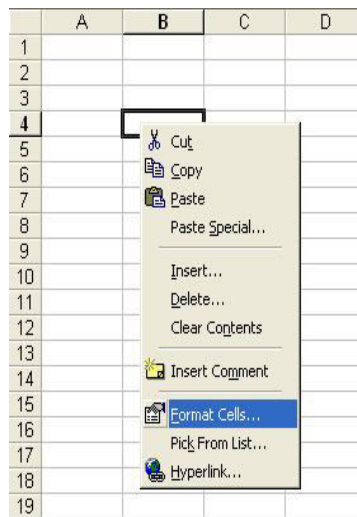
The contents of a highlighted cell can be formatted in many ways. Font and cell attributes can be added from shortcut buttons on the formatting toolbars.

To format a cell value, you do this:

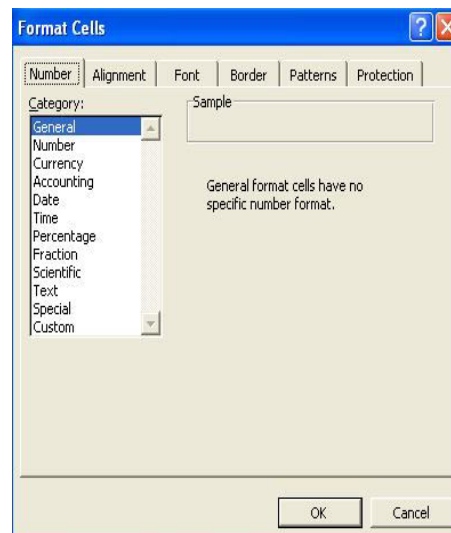
1. Click on the cell that you want to format.
2. The cell will get highlighted.
3. Click on the Format option of the menu bar.
4. And then click the Cell option from the pull down menu.



Or Just Right- click the mouse button on highlighted cell and choose the Format cells option from the drop-down list.



5. Immediately the Formate Cells box appears on the screen. Now you can perform various formatting operation which are present on the Format Cells box. These are -



Number Tab

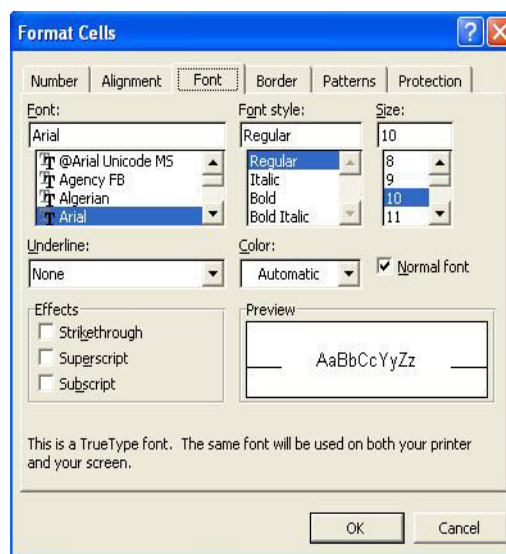
By selecting the Number Tab you can choose any type of data (Number) format from the Category list box. Just select the General Category if the cell contains text and number, or other numerical Category like Currency, Accounting, Date, Time, Percentage, Fraction etc., and click OK button to apply.

Alignment Tab

These option allow you to change the position and alignment of the data with in the cell. It has various options like Text alignment (horizontal, vertical), Orientation and Text control(wrap text, shrink to fit, merge cells) etc.

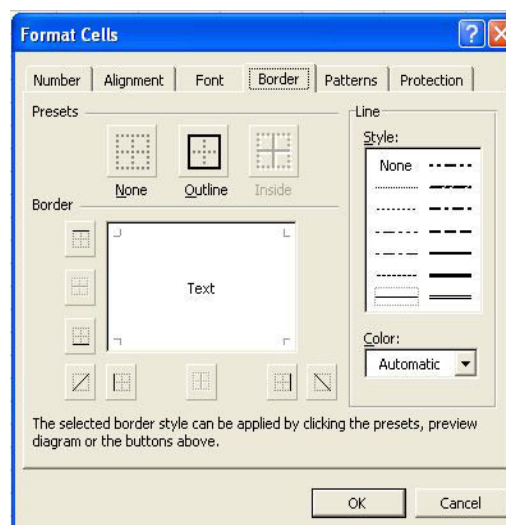
Font Tab

This option has a variety of operation that can be apply to cell value. By using this tab you can change the Font Face, Font size, Font style and Font color (effects) selecting particular list box.



Border and Pattern Tabs

These Tabs allow you to add borders of different types, shading and Background colors to a cell.



9.9.2 Moving and Copying Cell Contents

Moving Cells(Cut)

To cut the cell contents or to move the data of a cell from one place to another, you just do this-

1. Select or highlight the cell by click the mouse left button on cell.
2. Click on Edit option of menu bar.
3. Then select the Cut option from pull down list.

Or Just highlight the required cell or cells by the left -mouse button, and click on the Cut button present on the Standard Toolbar.

Copying Cell Or Cells

To copy the cell contents, Just follow these steps-

1. Select or highlight the required cell or cells.
2. Click on Edit option of menu bar.
3. Click the Copy option from the drop-down list.

Or Firstly highlight the required cell/cells and click on the Copy button on the Standard Toolbar.

Pasting The Cutted and Copied Cells

The selected cell contents that have been copied or cutted down by the previous operation can be pasted at another location. For pasting the cutted or copied cell contents follow these steps-

1. Select the particular location by mouse where you want to past the cell value.
2. Click the Edit option of menu bar.
3. Then select and click the Paste option from pull down menu.

Or Select the particular location and click on the Paste button present on the Standard Toolbar.

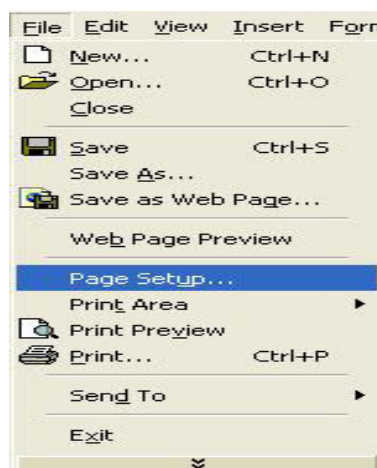
9.9.3 Page Formatting

To format a document page. You can perform following operation.

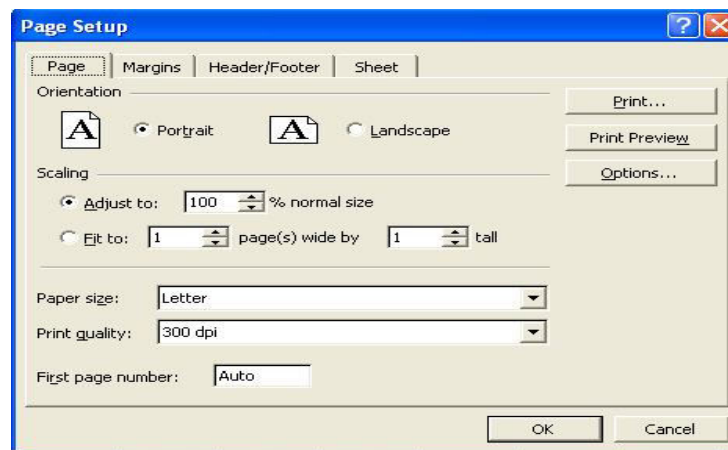
Page Setup Option

Page Setup is the part of page formatting. To setup a page you just do this-

1. Click the File option from menu bar.
2. Select and click the Page Setup option from the drop down list.



3. Immediately a Page Setup box appears on the screen.



4. This box has a number of Operation Tabs such as Page, Margins, Header and Footer and Sheet.
5. You can select any Tab to perform regarding operation. Lets do one-by one.

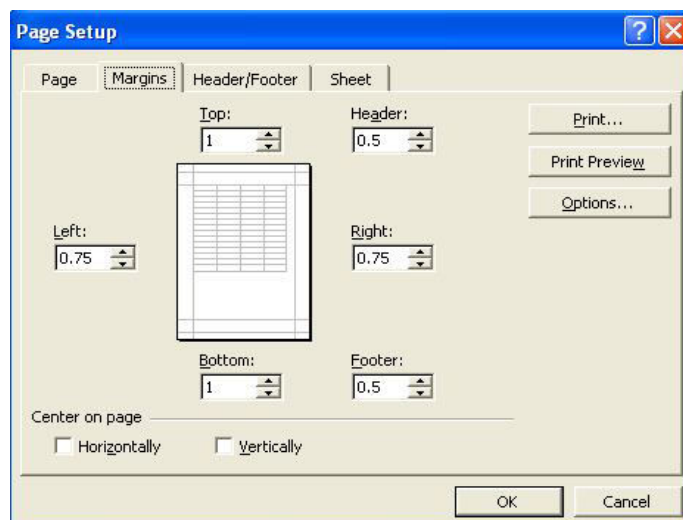
Page Option

If the page Tab is by default selected, then the box will look like the above one.

Then Select the Orientation option which is at the top of window. It is of two types - Landscape and Portrait. You can select any one as you need. The size of the worksheet on the page can also be formatted under Scalling which has Adjust to and Fit to Text box option. To force a worksheet to print only one page wide so that all the columns appears on the same page select Fit to 1 page(s) wide.

Margins Option

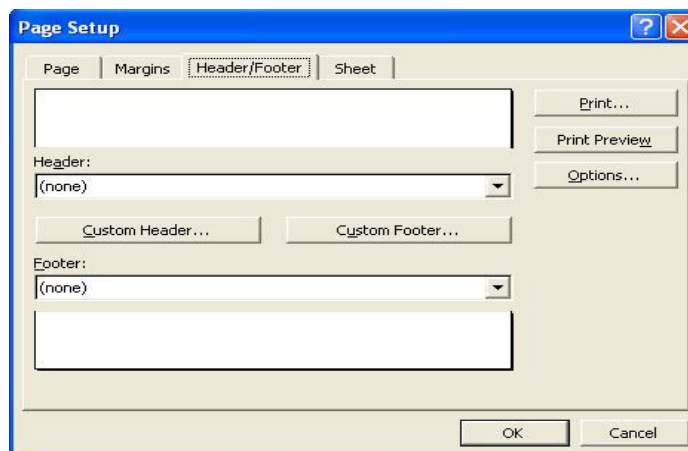
When you click the Margin Tab of Page Setup box the box will look like this.



The Margin Tab has various option to format page margins like top, bottom, left and right, for setting up the page location from each side and Header, footer fields to indicate how far from the edge of the page this text should appear. Check the boxes for centering horizontally.

Header/Footer Option

When you click at the Header/Footer Tab of Page Setup box the box will look like this.



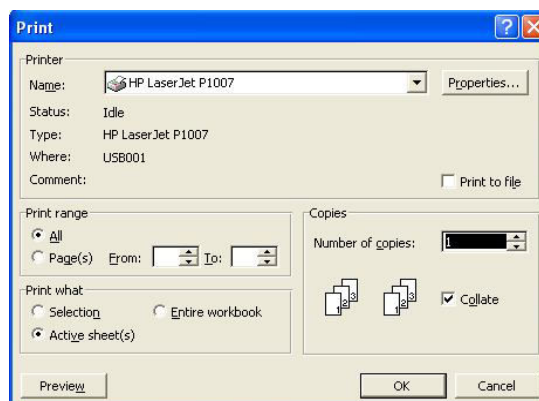
Print

To print the page or document after completing formatting and other task you, do this.

1. Click the File menu bar option.
2. Select and click the Print option from pull down list.

Or Click the Print button present on the Standard Toolbar.

Or Press the Ctrl + P keys from the key board. Then print dialog box appear.



9.10 Graphics and Charts

MS Excel -2000 provides facilities to insert an image (graphics) or chart. You can add any type of image or chart to your document from the built-in functions.

9.10.1 Graphics

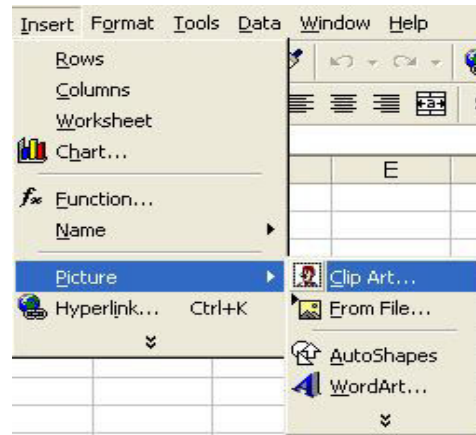
In graphics you can do a lot of work like adding a clip art, adding an image from a file etc.

Adding Clip Art

The basic function of adding a file or clipart remain same as that adding/inrterting clipart or file in MS Word.

To add a clipart image to the worksheet follow these steps-

1. Click at the Insert option of the menu bar.
2. Select and click the Picture option from pull down menu.
3. And the click the ClipArt option. Immediately you get a ClipArt box on the screen.



4. To find an image, click in the white box following search for clip. Delete the box words and type image name you want to use

Autoshapes

MS-Excel-2000 provides the Autoshapes Toolbar which allow you to draw a number of geometrical shapes, arrows, flow charts, stars and many more on the worksheet.

To activate the Autoshapes toolbar, do this :

1. Click the Insert option of menu bar.
2. Select the Picture option and then click the Autoshapes from the sub menu.
3. Then click the button on the Toolbar to view the option for drawing the shape.



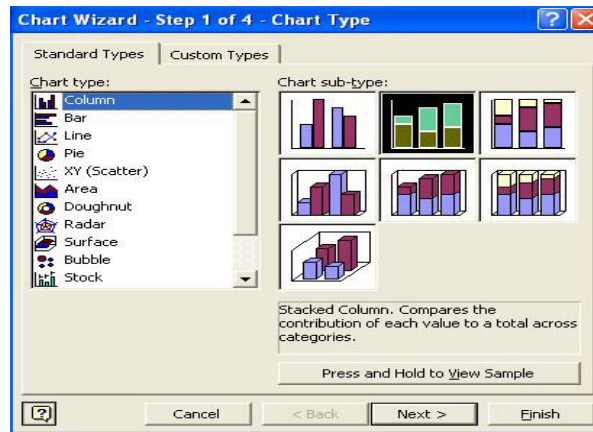
9.10.2 Charts

The MS-Excel-2000 provides the chart facilities to you. That allow you to present the worksheet data in a visual format using a variety of graph types. Here you can learn that how to create simple charts from the data.

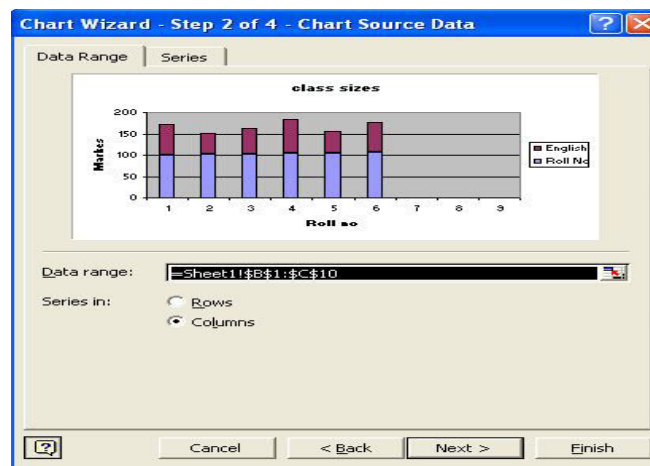
Chart Wizard

Chart Wizard allow you to create a chart by displaying a series of dialogue boxes. To use the Chart Wizard for designing a chart you do this :

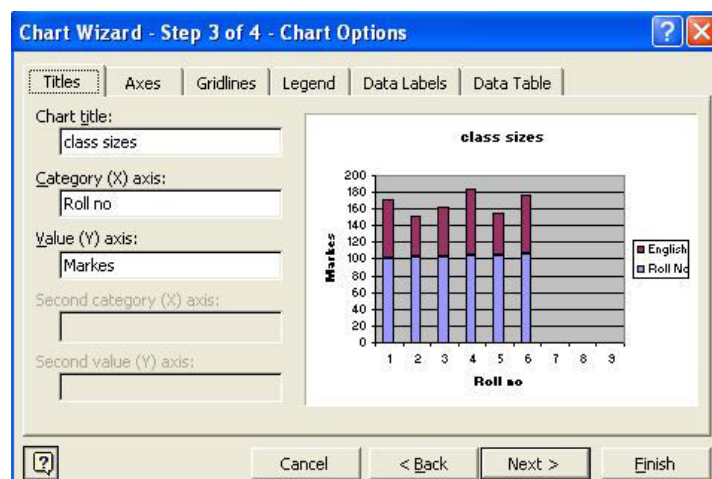
1. Click the Chart Wizard button on the Standard toolbar.
2. The Chart Wizard dialog box appears on the screen.



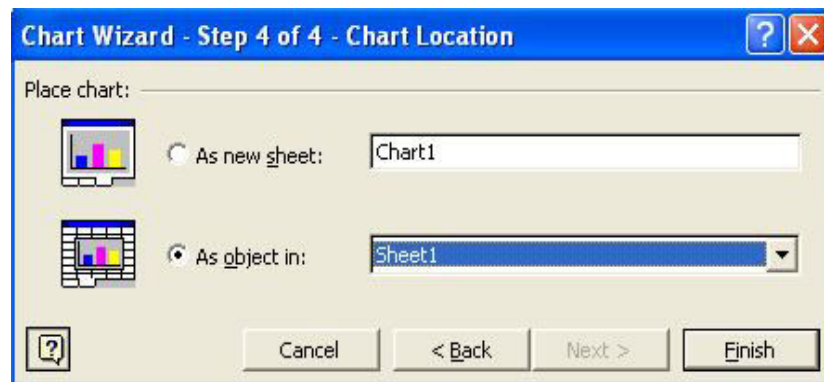
3. Select the Chart type from Chart type list box.
4. And Click the required chart subtype from the Chart subtype option, and click Next.
5. Immediately the Chart Wizard look like the below one.



6. Select the Data Range Tab and select the required option of Row/Column from the Series in and click Next.
7. Now you get the chart option box. Enter the name of the chart and titles for X- and Y-axis. There are other option tabs like Axe, Grid lines, Data labels and Data table. Press the Next to move the next set of options.

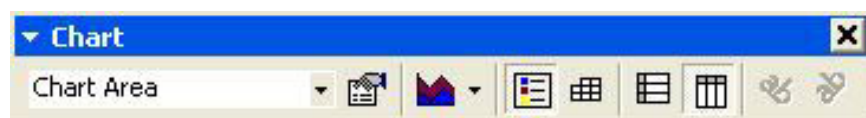
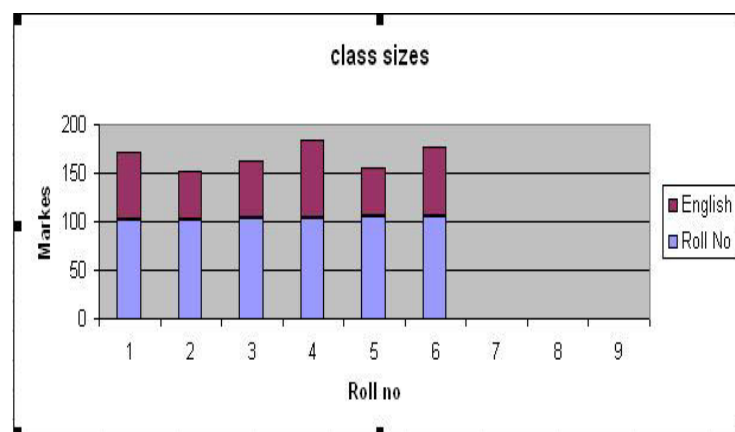


8. The Chart Location window appears. Click at As a New sheet option of place chart, if you wish to place the chart on a new or blank work sheet or select As object in option if the chart should be embedded in an existing sheet and select the Work Sheet from drop down menu.



9. Now click Finish button to create the chart.

You can resize the chart by click on its border and drag any of the nine black handles to change the size. Handles on corners will resize the chart.



9.11 Summary

The MS-Excel 2000 is a powerful data processing package. It is developed by Microsoft Corporation to overcome all the drawback of the paper sheet work. It include automatic and instant recalculation of all functions, several built-in functions for performing calculations, presentation of data or results in the form of graphs and a lot of different formulas. A formula always begin with equal (=) sign. In some cases Excel automatically prefixes equal (=) sign to the formula. This helps you in performing “what if” analysis on the worksheet data. Excel has Standard and Formatting Toolbar which provider a lot of in-built buttons of functions those can be used just by clicking of left - mouse button like New, Open, Save, Print, Cut, Copy ,Past etc. Formula bar provides various functions regarding formulas.

9.12 Key Words

- **Absolute Address:** An absolute address in a formula refers to a specific cell location or range. It always points to the location of a specific cell, even if you copy it. Absolute addresses are created by adding a \$ sign in front of each character in the cell address. For example, \$C\$8 always refers to cell C8.
- **Borders:** Borders are line effects that you can place around cells or cell ranges to improve the appearance or effectiveness of your worksheets.
- **Cell Address:** A cell address is the location of a cell on a worksheet and is defined by the column letter and the row number. For example, cell A1 is where column A and row 1 intersect.
- **Cell References:** A cell reference, or cell address, identifies a particular cell, such as cell B5. Cell references are used in formulas to indicate where a value is stored.
- **Charts:** Charts are graphic presentations of data from a worksheet.
- **Data Range:** The data range is the area of the worksheet that you want to chart. It includes any numeric data that you want to chart and can include the titles for the data.
- **Database:** A database is a collection of information that a user can manage and analyze. Any range of cells can be considered to be a database, but information kept in list form works best if you want to use Excel's database tools.
- **Field:** A field is a cell in a database that contains information. In Excel, fields appear in columns. For example, fields in a Customer database might include Name, Address, and Zip Code.
- **Formula Bar:** The formula bar is located under the toolbars at the top of the working screen. It contains the edit line for working with formulas, and provides information regarding cell addresses.
- **Functions:** A function is a preset formula. Functions consist of the function name and its arguments. The function name tells Excel what calculation you want it to perform.
- **If Function:** An If function performs a logical test on an argument, then performs an action based on whether the logical test is true or false.
- **Page Orientation:** Most printers will allow you to print your document so that the information can be read in one of two orientations, or ways of viewing the page. Portrait page orientation is long. Landscape page orientation is wide.
- **Page Setup:** Page Setup is the process of getting your worksheet projects ready to appear on the printed page.
- **Range Address:** A range address identifies a range by the cells located at diagonally opposed corners. For example, F3:G59 identifies a range that starts in cell F3 at the upper left and extends through cell G59.
- **Relative Addresses :** A relative address is a standard cell reference that appears like this: A1,E15,M42. A relative address changes if you copy a formula that contains it to a new location on the worksheet. Think of it like saying "in two weeks" - the date will always be different (or relative) depending on the current date.
- **Spreadsheet:** Spreadsheet is the generic term for applications, such as Excel, that you can use to enter, analyze, and calculate data. It performs mathematical calculations and projections based on data entered. Common spreadsheet uses include analysis, charting, and budgeting.

- **Workbook :** A workbook is the Excel file that stores your information. Each workbook may contain numerous worksheets.
- **Worksheet :** A worksheet is an electronic spreadsheet that lets you enter, analyze, and calculate data. Within a workbook, worksheets can share information, and calculations pertaining to several worksheets can be performed at one time. The default number of worksheets in a new workbook is three.

9.13 Self Assessment Test

1. What is an electronic spreadsheet ?
2. What do you understand by workbook ? Give the steps for inserting and deleting sheet from workbook.
3. What is a database ? Explain the process of entering data in a worksheet.
4. How can you modify a database ? Explain.
5. What do you mean by formulas and functions ? Explain the special function with their syntax.
6. Explain the copying, cutting and pasting operations in MS-Excel ?
7. How could you print a page in excel ? Explain.
8. Give the steps of inserting a ClipArt in excel ?
9. What are the steps for using a chart in the excel sheet ?

9.14 Reference Books

- Greauer, Rend Barber M (2007). Exploring MS Excel 2003, Pearson.
- Reisher, T.(2003), Sams Teach yourself MS Excel in 24 hours. Pearson

UNIT - 10 : ADVANCED FEATURES OF EXCEL

Unit Structure

- 10.0 Objectives
- 10.1 Automating “What-if” Analysis
- 10.2 Scenarios
- 10.3 Goal Seek
- 10.4 Data Table
- 10.5. Pivot Table
- 10.6 Summary
- 10.7 Key Words
- 10.8 Self Assessment Test
- 10.9 Reference Books

10.0 Objectives

After reading this unit you should be able to understand,

- Automating “what-if” analysis
- Scenarios
- Goal Seek
- Data Table
- Pivot Table

10.1 Automating “What-if” Analysis

The What-if analysis is a Tool of Microsoft Excel 2000. By this you can use several different sets of values in one or more formula to explore all the various results. For example, you can use what-if analysis to build two budgets that each assumes a certain level of revenue or you can specify a result that you want a formula to produce and then determine what sets of values will produce that result.

The what-if analysis is a process of changing the values in a cells to see how those changes will effect the outcome of formula on the worksheet.

Three kinds of what-if analysis tools come with Excel are -

- Scenarios
- Goal Seek
- Data Table
- Pivot Tables

10.2 Scenarios

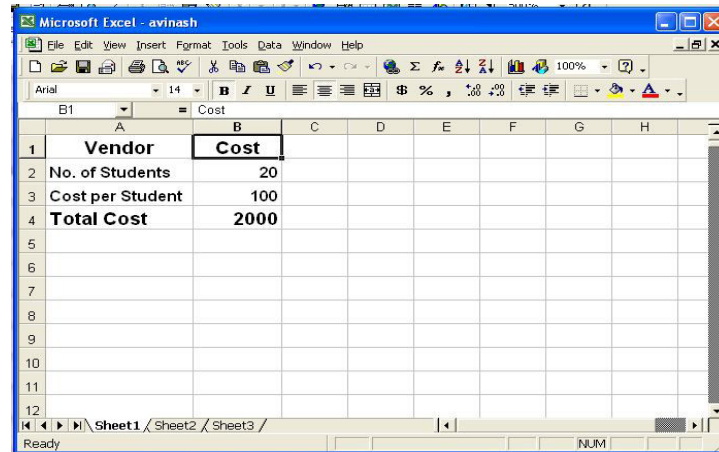
Scenarios is a situation in which you by changing some of the variable you can calculate extreme values of the situation. You can create and save different groups of values on a worksheet and then switch to any of these new scenario to view different results. So a scenario allows you to change variable information cells that affect the final total of formula in minutes and prepare scenario report instantly.

For example you are the Training Manager working from the Corporate Office, and you want to prepare a report that comparing how much a Customer Training Workshop would cost from two vendors. You already had prepared a report with the original vendor for the training and conduct the workshop training. So you need to add this new data and compare it to the one that you had already created.

These two vendors have different cost per student and total number of students in the workshops. These are the pieces of data that will vary.

To create a scenario do the following steps:

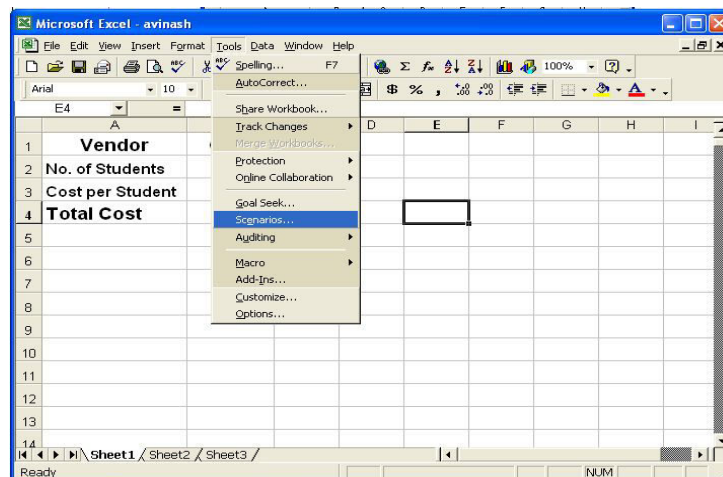
1. First of all open a new Excel worksheet and prepare a sheet for original vendors as show in below image.



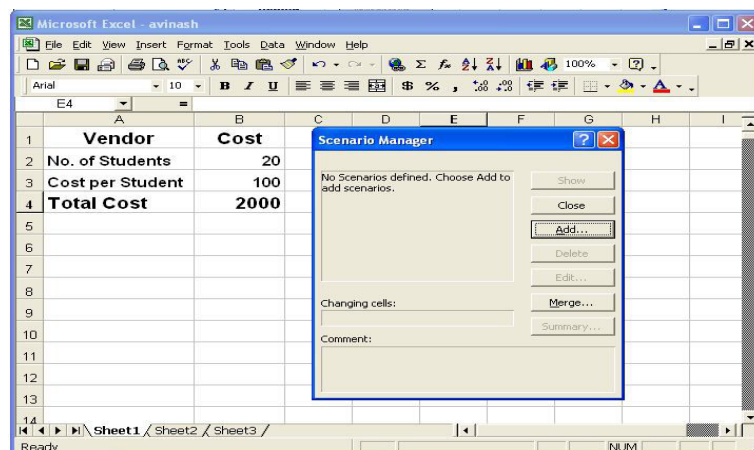
The screenshot shows a Microsoft Excel window titled 'Microsoft Excel - avinash'. The worksheet contains the following data:

	A	B	C	D	E	F	G	H
1	Vendor	Cost						
2	No. of Students	20						
3	Cost per Student	100						
4	Total Cost	2000						
5								
6								
7								
8								
9								
10								
11								
12								

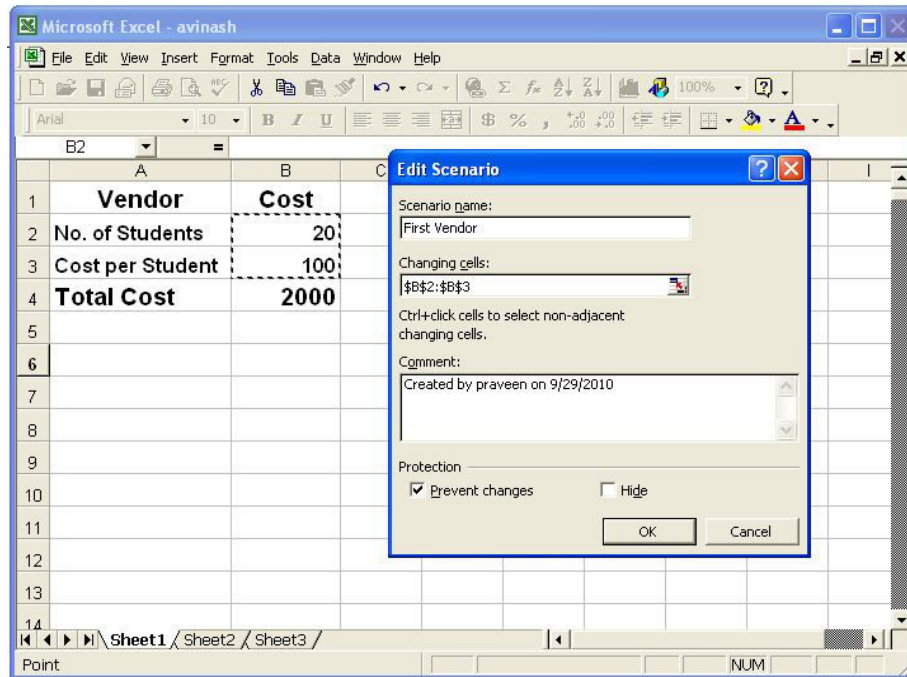
2. Click at Tools option of menu bar and select the scenario option from drop-down list.



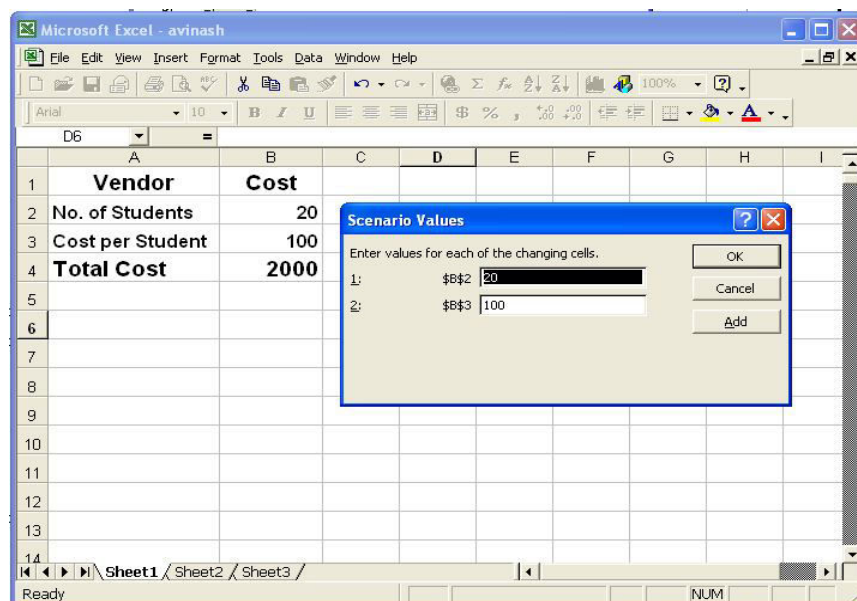
3. Immediately a window “Scenario Manager” appears. Then, click the Add button to create the first.



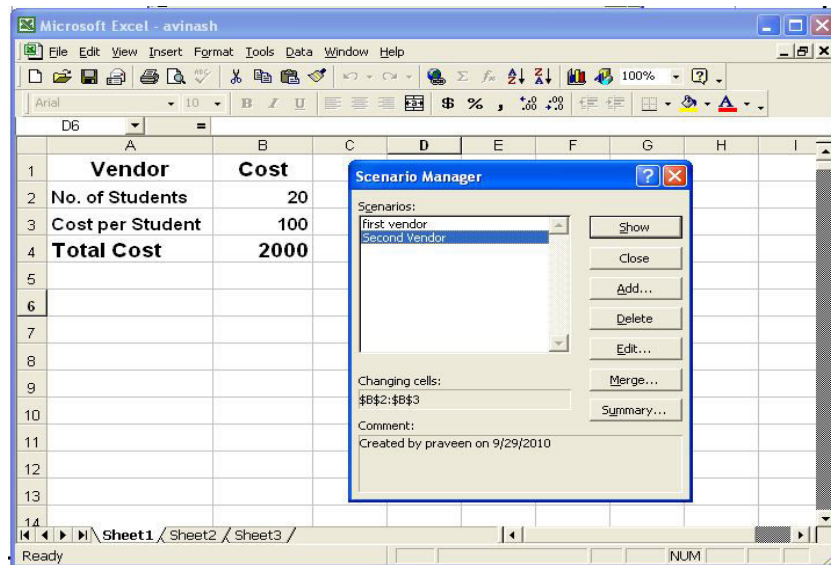
4. A pop-up window Add scenario will appear, and here you first enter the original information to create a scenario vendor. enter the name of the vendor, Scenario Name under Changing Cells select the cells where the information will vary and finally under Comments enter the name of the vendor again. Next check the prevent changes box and click OK.



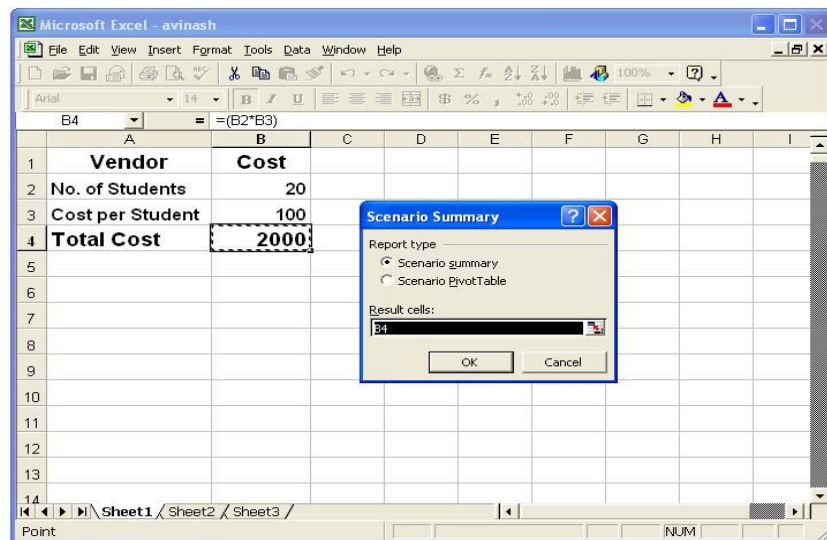
5. Now, another pop up window will appear called Scenario Values, here you enter the values for the cells that will change. This is a scenario for original information. In the next steps you will repeat steps 5 and 6 and create an additional scenario for the remaining vendor.



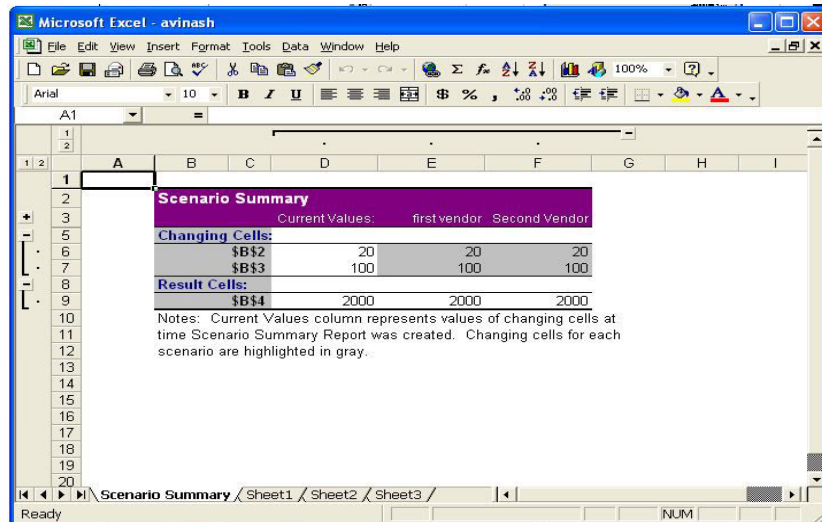
6. After creating scenario for remaining vendor when you goto Tools -> Scenario and open the Scenario Manager, you see both scenario listed by Vendor Name, Now to quickly print a report that shows all two scenarios with the final totals click on Summary.



7. Next a pop up window Scenario Summary will appear on the screen. Now select the summary report and under result cells, select the cell or cells that you want to see in the summary report. We will select cell B4 'Total Cost' since we want to compare the Totals of the vendors, and click OK.



8. The summary report will look like the image below. Now you can print the report.



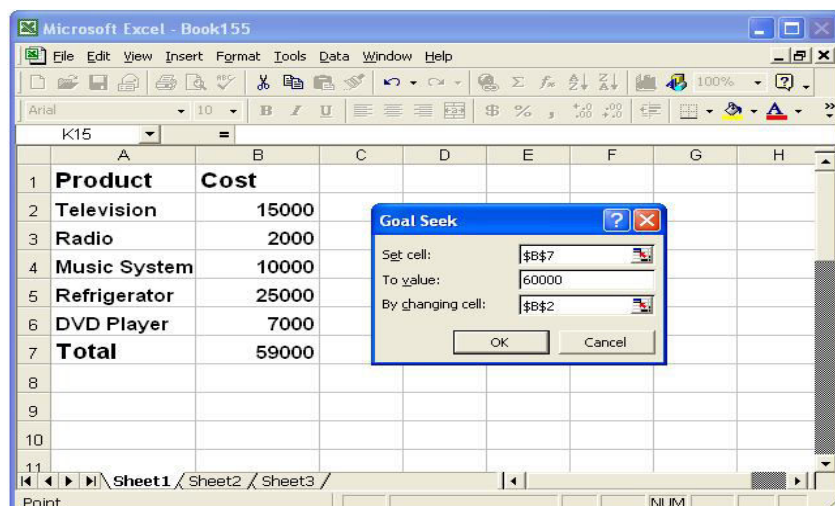
10.3 Goal Seek

Goal Seeking is a method of determining requirement of resources in achieving the target achieving target if then relationship required.

The Goal Seeking is used to force a particular result in a calculation by changing one of the calculation's components. For example if you know the percentage growth you are looking for, you can use Goal Seeking to determine the change that would be necessary to produce that result.

To seek a goal follow these steps-

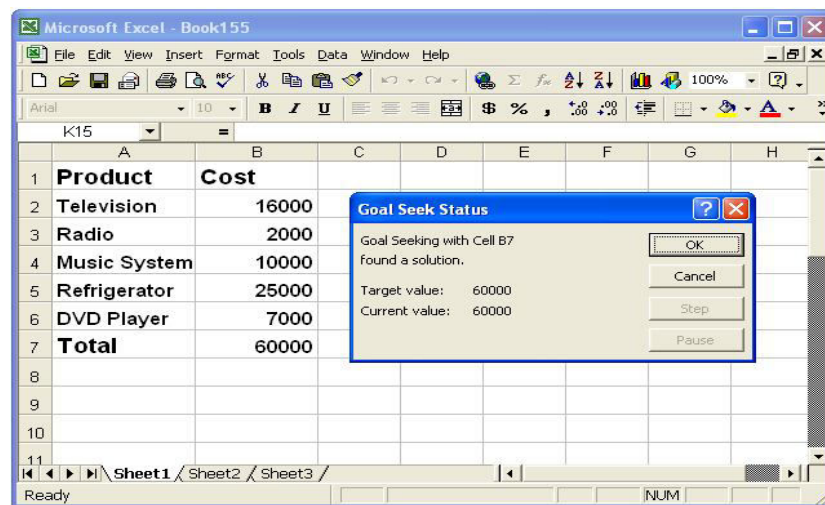
1. Click the tool menu bar option.
2. Then select the Goal Seek from the drop-down list immediately a dialog box appears.



3. In the dialog box specify the cell whose value you want to set (this should be a cell whose value is usually calculated through a formula) the value you want that cell to have, and the cell whose value can vary to make the result come out to the value you want.

4. Then click OK.

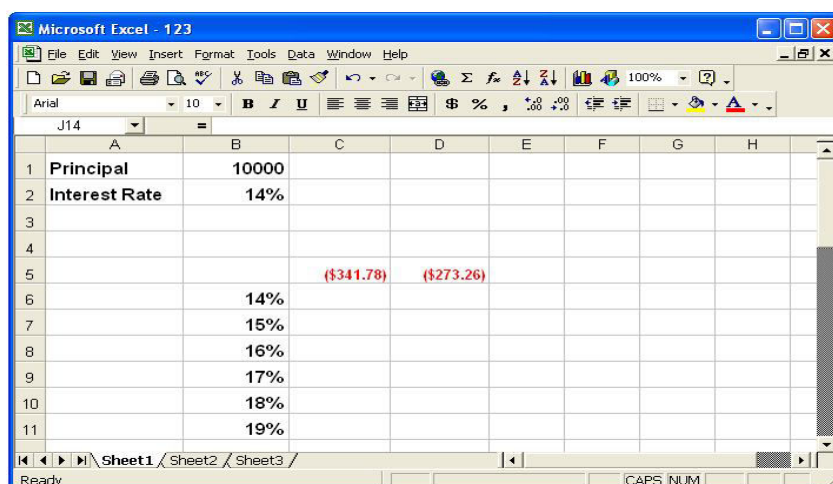
5. If a solution is possible the Goal Seek Status dialog box will tell you, and the variable of cell you specified will change.



6. Click OK to accept the change to click cancel to reject it.

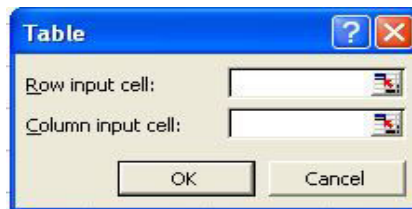
10.4 Data Table

When you change any data in any cell of the worksheet, Excel automatically recalculates all formulas and display the new results. Before you can use the Data, Table command, you should enter data in a worksheet as shown in the figure. The loan amount is entered in cell B1 and rate of interest in cell B2. The formula to calculate the monthly instalment to pay of a loan is $PMT(rate, nper, pv)$. The formula $=PMT(B2/12, 36, B1)$ in cell C5 calculate the monthly installment for a 36 month repayment period and $=PMT(B2/12, 48, B1)$ in cell D5 for a 48 month repayment period.



The various other interest rates are entered in the range B6:B11. We want to calculate and show the monthly instalment to repay the loan at these interest rates in the range C6:D11. After you have entered the worksheet data, perform the following steps :

1. Select the range B5:D11. This range includes the formulas, the input values to be used in calculation (B6:B11) and the range to hold the result (C6:D11).
2. Use the Data option of Menu bar and select the Table option from the drop-down list.
3. Immediately the Excel displays the Table dialog box on the screen. Type B2 in the Column Input Cell. Since the input values B6:B11 are arranged in the column mode so we have to use the Column Input Cell.



4. By specifying B2 as the Column Input Cell, we are asking excel to substitute cell B2 in the formula with the input values and calculates results for all input values.
5. Click OK or press Enter and excel fill the range C6:D11 with results
6. Format the range C6:D11 in the currency format with two decimal places and your worksheet displays the monthly installment required to pay off the loan at different interest rates as shown in the diagram.

	A	B	C	D	E	F	G	H	I
1	Principal	10000							
2	Interest Rate	14%							
3									
4									
5			(\$341.78)	(\$273.26)					
6		14%	-341.776	-273.265					
7		15%	-346.653	-278.307					
8		16%	-351.57	-283.403					
9		17%	-356.527	-288.55					
10		18%	-361.524	-293.75					
11		19%	-366.56	-299.001					
12									
13									

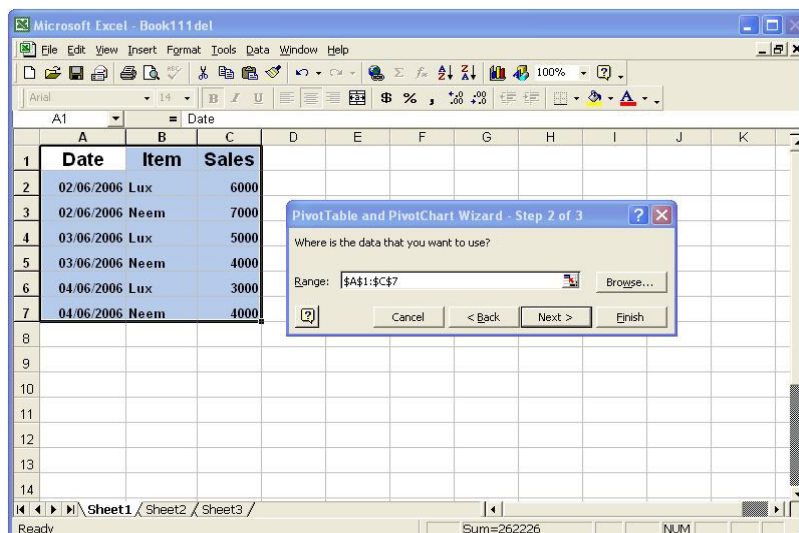
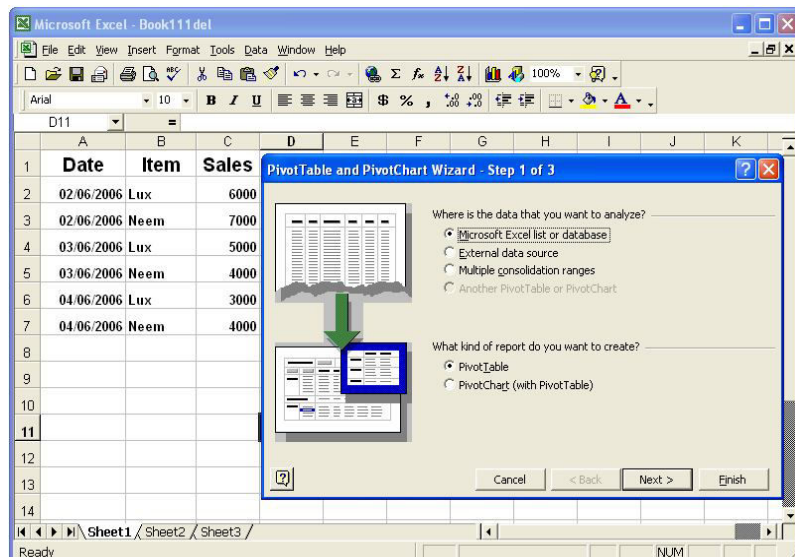
10.5 Pivot Table

A Pivot Table is an interactive table that analyze and view large size of data in a list or database so that it can be easily understood you can remove its rows and columns to see different summaries details and views of the source data as per your need.

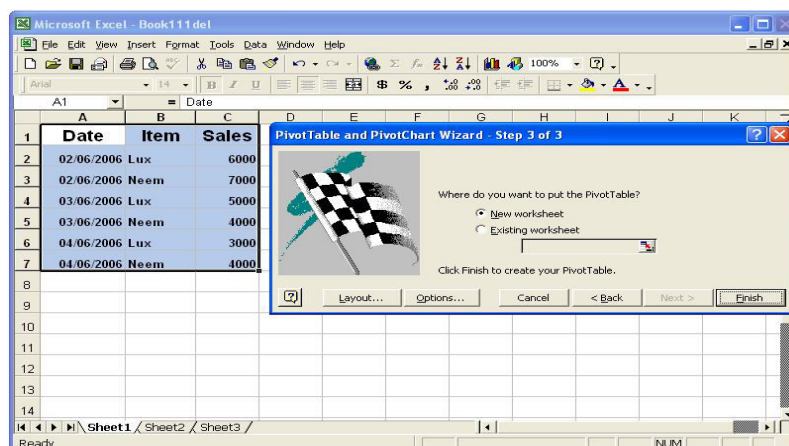
You can use Pivot Table report to do sorting, totaling or to compare related items.

To Create a Pivot Table use following steps :

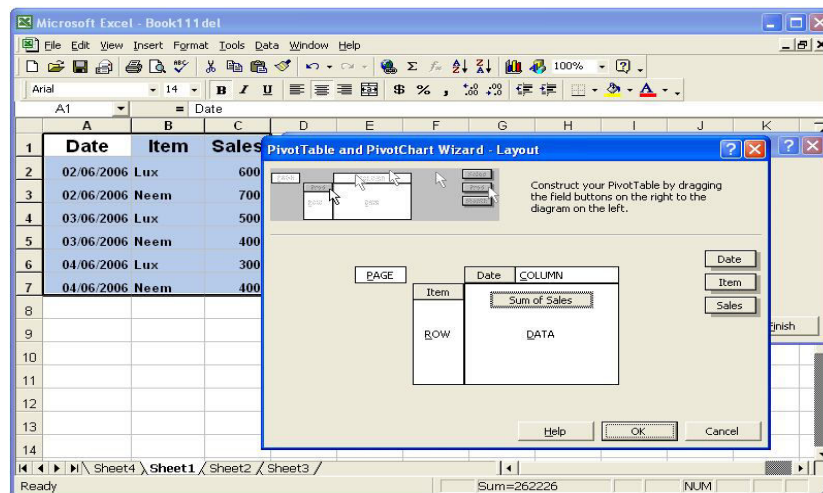
1. Click Data Menu option and select Pivot Table and Pivot Chart Report option from drop-down list.
2. A dialog box appears on screen. In this dialog box select the type of report which you want to create and then lick next button.



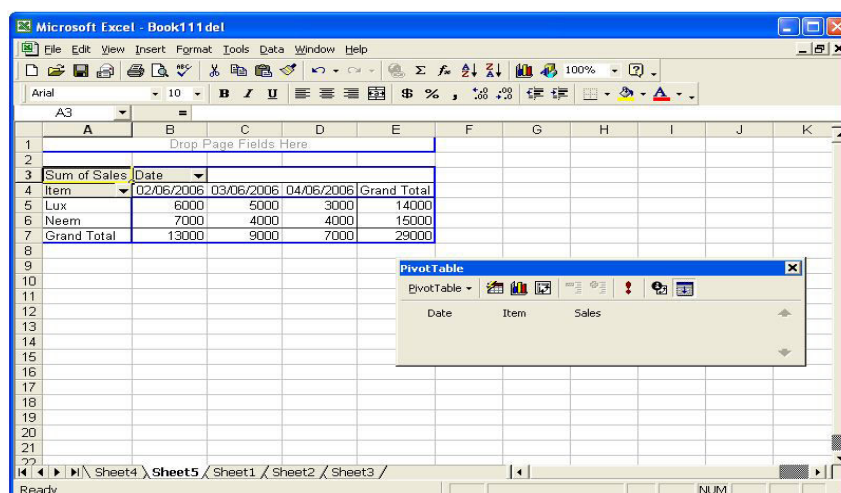
3. A dialog box Wizard steps 2 of 3 appears on screen. Select the range or if the data is in different worksheet. Then click on the Browser button to select the range and click Next.



- Then the Wizard step 3 of 3 dialog box appears, select the option where you want to put the Pivot Table and choose the Option button to specify the desired setting for the new Pivot Table.



- Now click the Layout button. A layout dialog box appears, which allows you to define which field will be displayed in the table. On the right side there are different field names. You have to drag these field names to different positions. After selecting the place of the field, click OK button.
- And then click on Finish button of Pivot Table and Pivot Chart Wizard dialog box.



10.6 Summary

The MS-Excel 2000 is a powerful data processing package. It includes creation and updation of database. It provides various analysis tools like Goal seek , Data Table, Scenarios and Pivot Tables. A formula always begin with equal (=) sign. In some cases Excel automatically prefixes equal (=) sign to the formula. This helps you in performing “what if“analysis on the worksheet data. Formula bar provides various functions regarding formulas.

10.7 Key Words

- **Goal Seek :** Goal Seek adjusts the value of a specific cell until a formula that includes that cell reaches the result you want.
- **PivotTable :** PivotTables are interactive worksheet tables that allow you to summarize data with great flexibility. Their row and column headings can be adjusted to get different looks at original data.
- **PivotTable Wizard:** The PivotTable Wizard is a series of dialog boxes that guides you step-by-step through the process of creating a PivotTable.
- **Record:** A record is a series of fields in a database that pertains to one item in the list, such as a customer or an order. In Excel, records appear in rows.
- **Selecting:** Selecting is highlighting an object or data in order to perform a command or operation
- **Syntax:** The syntax of the function refers to the order of the functions arguments. In some functions, the order of the arguments determines how Excel solves the function.

10.8 Self Assessment Test

- 1 What do you mean by term WHAT-IF Analysis? Explain.
- 2 Explain the use of Pivot Table.
- 3 Illustrate the working of Goal Seeking analysis
- 4 Create a Table for computation of Income.Tax of the employeer.

10.9 Reference Books

- Grver, R and Barber M (2007). Exploring MS Excel 2003, Pearson.
- Reisher, T.(2003), Teach yourself MS Excel in 24 hours, Pearson

UNIT - 11 : MS - POWER POINT

Unit Structure

- 11.0 Objective
- 11.1 Introduction
- 11.2 Starting Power Point
- 11.3 Creating Presentation
- 11.4 Anatomy of Power Point
- 11.5 Presentations through Auto Content Wizard
- 11.6 Presentations through Design Templates
- 11.7 Blank Presentation
- 11.8 Saving the Presentation
- 11.9 Working With Slides
- 11.10 Working With Text
- 11.11 Working With Graphics
- 11.12 Slide Transitions and Animations
- 11.13 Printing the Slides
- 11.14 Summary
- 11.15 Key Words
- 11.16 Self Assessment Test
- 11.17 Reference Books

11.0 Objectives

After reading this Unit you should be able to

- Create presentation Understand various views of slide.
- Understand design templates.
- Work picture and Graphics

11.1 Introduction

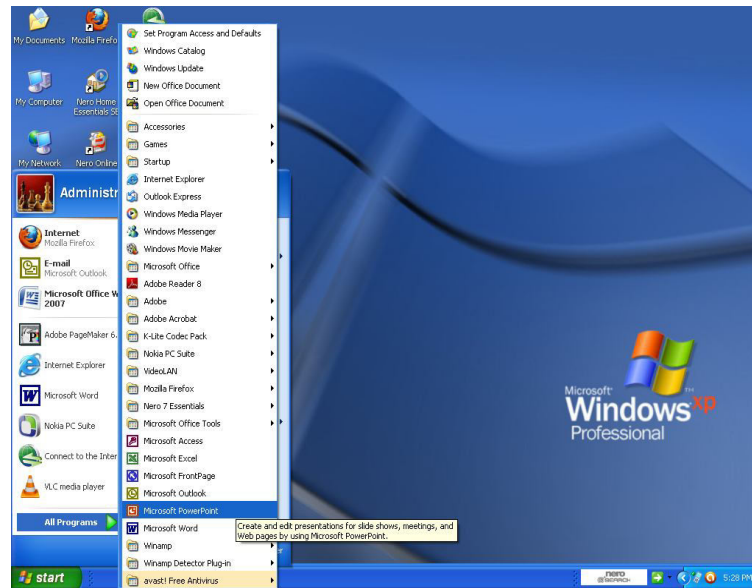
Microsoft PowerPoint is the presentation graphics application software of the Microsoft Office 2000, that is used to create professional quality presentations. Powerpoint is currently the most common software used for making visual aide for presentations .It is fairly user-friendly and graphics based. Powerpoint provides you the basic tools for making a successful powerpoint slide show presentations. Powerpoint helps you to structure the ideas and information that you want to convey to your audience. It allows you to create effective presentation by typing the text and inserting image , sounds and animations etc. It also allows you to add charts, tables and pictures for making the presentation look alive. Powerpoint provid you built-in professional designs called auto layouts and presentation templates.

11.2 Starting Power Point

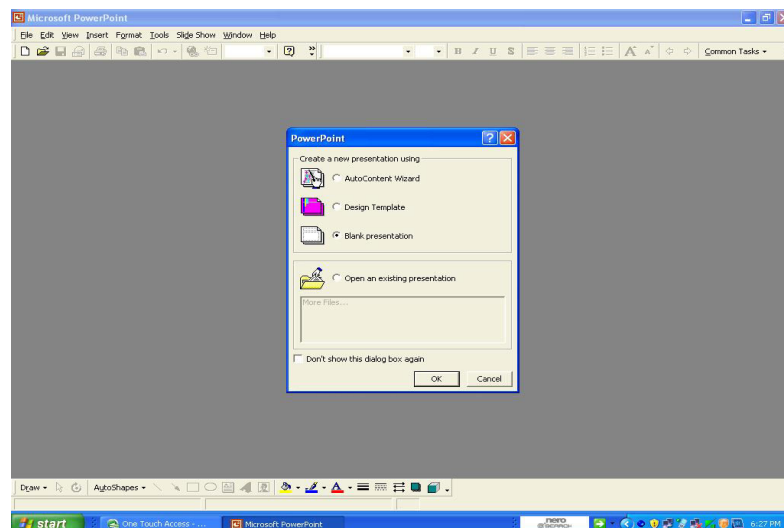
We can start powerpoint by following steps:

1. Click on Start button.
2. Select the Programs option.

3. Click on Microsoft Powerpoint as show in following figure.



4. The dialog box will be appear and gives us three options for creating a presentation.



11.3 Creating Presentation

When Powerpoint opens, the Powerpoint dialog box allows you to select the desired option. There are three options to create a presentation as under:

1 AutoContent Wizard :-

AutoContent wizard will use to produce a quick and well designed presentation. This wizard will guide us through the various steps in creating a presentation. This is probably the best method of creating a presentation.

2 Design Template :-

Design Template will be used to select a predefined look. Choose any one of the various presentations available with the software of the starting point and then proceed to construct your own presentation.

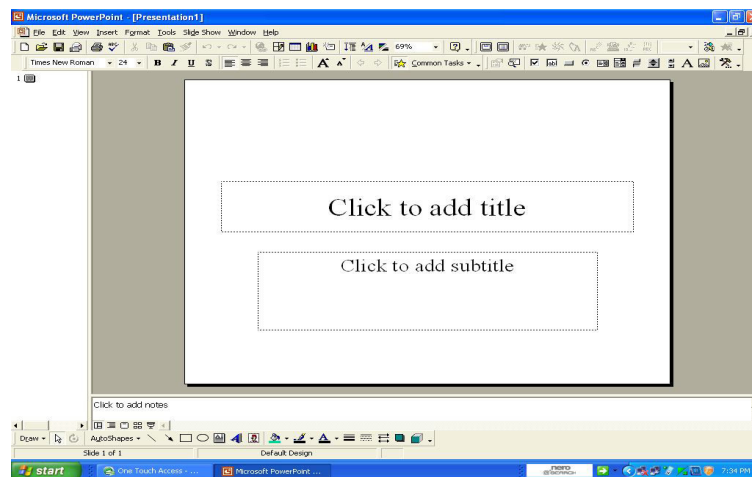
3 Blank Presentation :-

Powerpoint 2000 provides you facilities to create your own presentation. Selecting this option powerpoint start a blank presentation without any design or sample text.

Whichever way you choose to work you will be working on the structure of powerpoint window.

11.4 Anatomy of Powerpoint

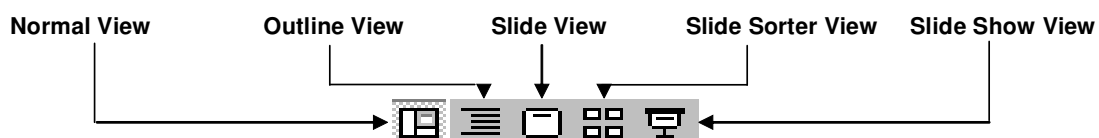
Before you start creating presentations, you need to understand the structure of the power point screen. The power point screen displays several toolbar and other screen elements are shown in the following figure.



The components of a powerpoint screen are same at that of other MS office application like word. excel etc. The similar buttons and bars are title bar, menu bar, toolbar.

Slide Views

Microsoft Powerpoint comes with different views to help you while you are creating a presentation .The powerpoint gives you five screen layout for constructing your presentation in addition to the Slide Show. You can select the page views by clicking the buttons at the left bottom of the page.



1. **Normal View:** This screen is split into three sections showing the presentation outline on the left, the slide in the main window, and notes at the bottom.
2. **Outline View:** The presentation outline is displayed on the majority of the screen with small windows for the slide and notes. This view is recommended for editing text.
3. **Slide View:** The slide view displays each slide on the screen and is helpful for adding images,

formatting text, and adding background styles.

4. **Slide Sorter View:** A small image of each slide is displayed in Slide Sorter view. Slides can easily be ordered and sorted from this screen.
5. **Slide Show View:** This view of powerpoint shows the progress of the presentation from slide to slide just like a real slide show. When click on slide show all menus, toolbars, status bar, scroll bars and windows task bar are removed from the screen.

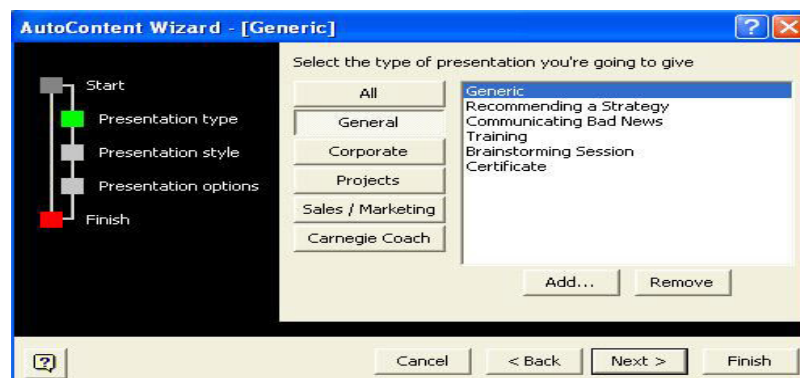
11.5 Creating Presentations through Auto Content Wizard

It is the easiest way of creating presentations specially for these who are new to the power point software. This wizard creates your entire presentations for you almost on its own. Just add your text and any graphic object and your presentation is complete. For creating a presentation using auto content wizard the Process is as follows:

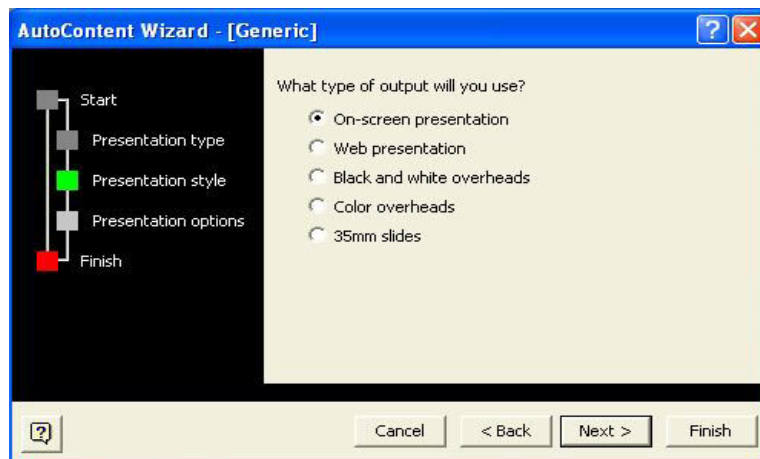
1. Click on the File menu of menu bar.
2. Select the New option of pull-down menu .
3. The New Presentations dialog box appears.
4. Click on Auto Content Wizard option and then click on OK button.
5. The opening screen of AutoContent Wizard appears. Then click on the Next button to start creating your presentations.



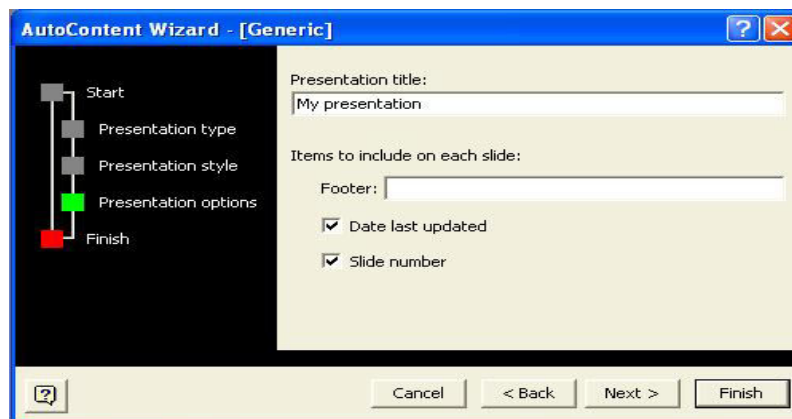
6. Click on a category that matches your type of presentations. In the right side of the dialog box a list appears to select the category of presentations and click on the Next button.



7. Click on the type of output you want to use for your presentation. Then click on Next button to proceed further



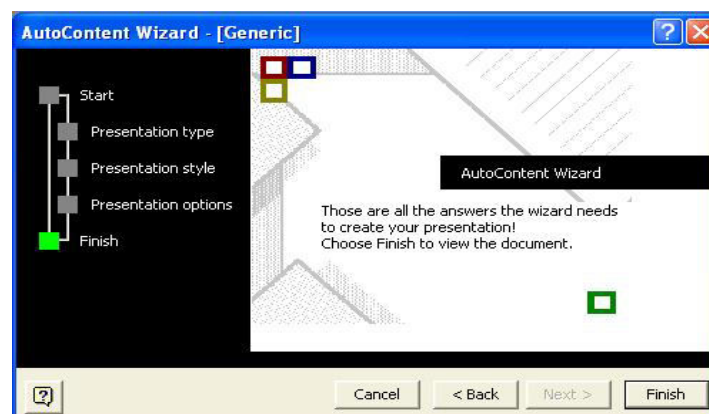
8. Type a title for your presentation this title will appear on the first slide of your presentation.



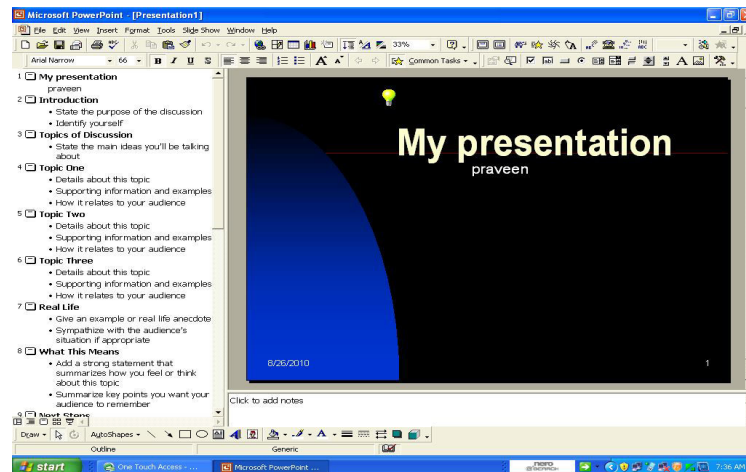
9. Type the footer text in the footer text box. This text will appear at the bottom of each slide in your presentation.

10. Click on Next button.

11. Click on the Finish button. To end the auto content wizard session.



12. A presentation is created for you. The left side provides a sample text for each slide which you can replace according to your requirement .

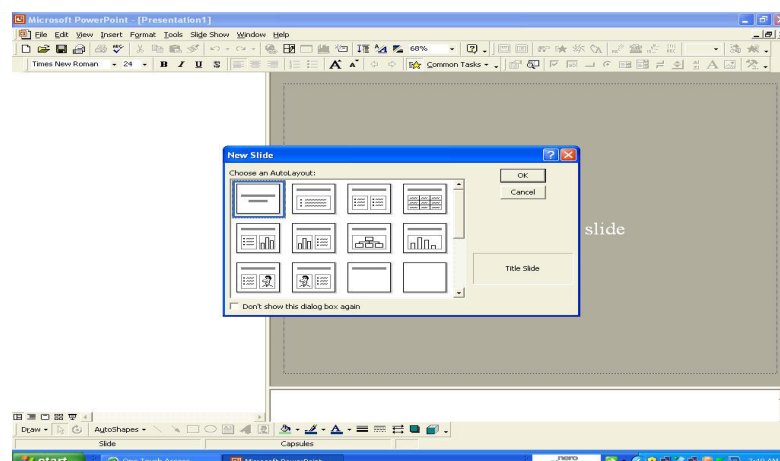


11.6 Presentations through Design Templates

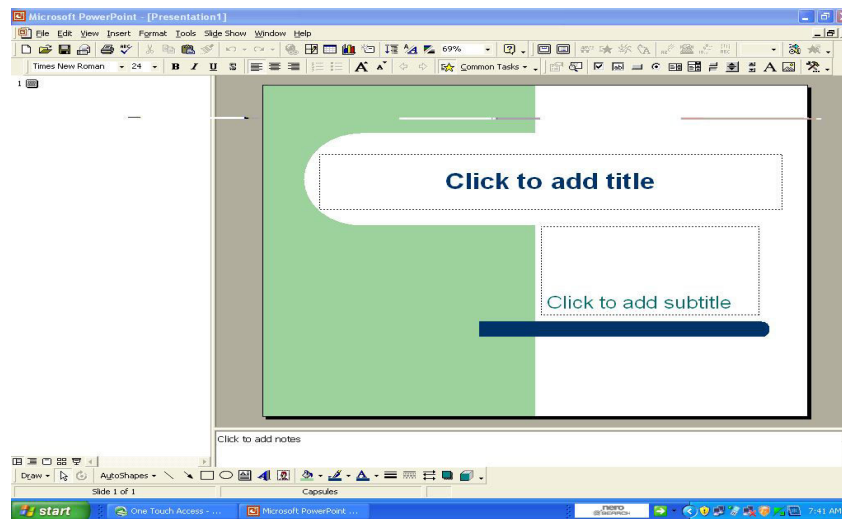
Templates are predefined power point presentations as based on which you can create your own presentation. You can replace text and graphics of templates on your own. Templates can provide either the graphic design and color scheme of a presentation (design template) or suggest content and structure, using a set of slides whose contents you can edit.

For creating a presentation using a template, process is as follows :

1. Click on the File menu of menu bar.
2. Select the New option of pull-down menu .
3. The New Presentations dialog box appears.
4. Click on the Design Templates tab in the dialog box. The list of all the design templates of power point is displayed.
5. Choose any one of the Templates.
6. Click on the OK button. The New Slide dialog box appears prompting you to select a Slide Layout for the first slide of your presentation.



7. Select any one layout for the slide and click on OK button. The slide appears in the normal view.

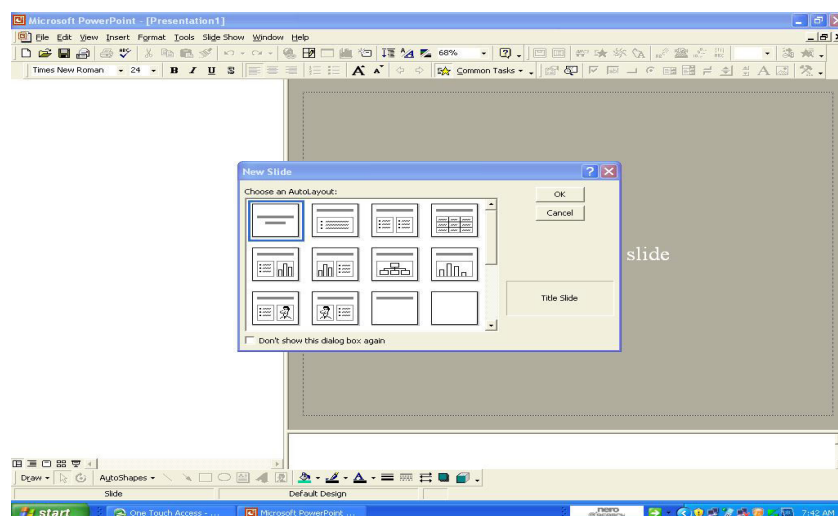


The process of creating first slide of the presentation using design templets is finished. You can now add as many slides as required for the presentation.

11.7 Blank Presentation

A blank presentation provides full flexibility to create your own designs and contents for the presentation. For designing a new blank presentation just follow these steps-

1. Click on the File menu of menu bar.
2. Select the New option of pull-down menu .
3. The New Presentation dialog box will be opened on the screen.
4. Click on the OK button.
5. Powerpoint offers some layouts to choose. Select any one layout for new blank slide according to your needs.



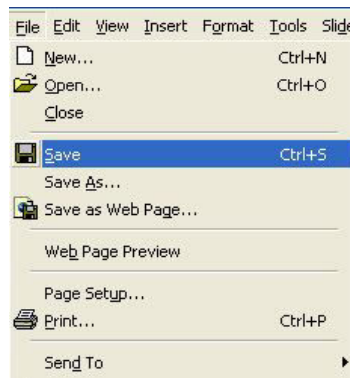
6. Finally Click on the OK button.

Powerpoint creates a blank presentation for you work with show in following figure.

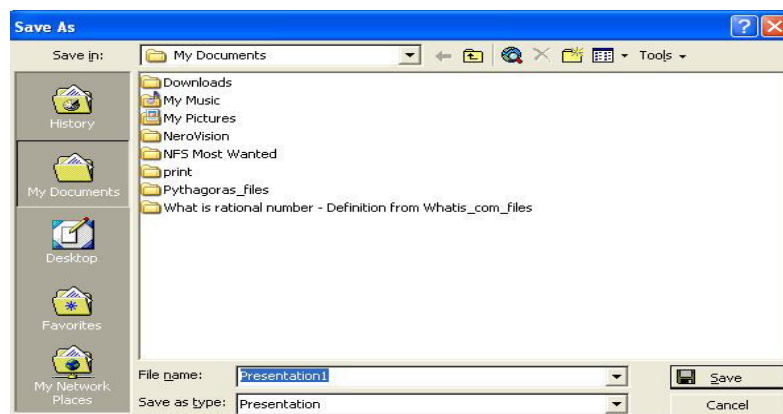
11.8 Saving The Presentation

After you have finished creating your presentation , now you have to save it on the disk of your computer, so that you can access it later. There are following steps for saving the presentation.

1. Click on the File menu bar option the drop-down menu appears on the screen.



2. Click on Save or Save As option the following dialog box appears, asking you to specify the file name and location at which the file may be saved.




If you have already saved your file, the Save As box will not be displayed. But you will be saved. The file is saved under my document folder by default.

11.9 Working With Slides

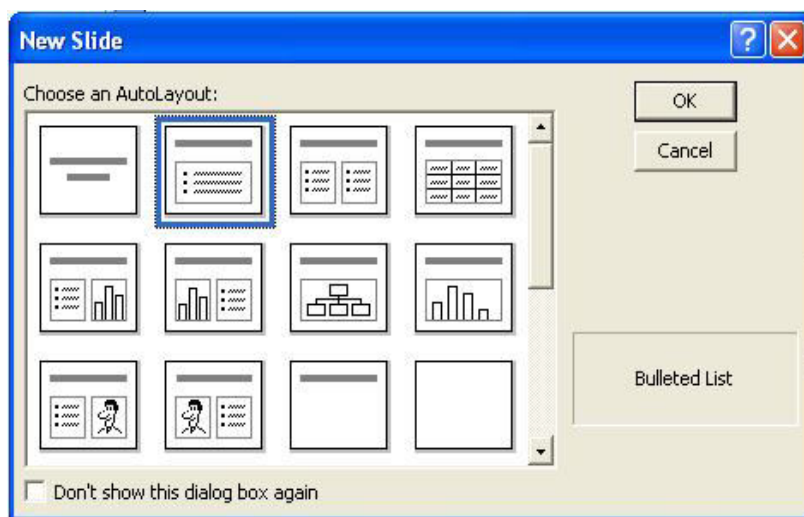
1 Insert A New Slide

The following steps can be used to insert a new slide into the presentation

1. Click the Insert option of the menu bar.
2. Choose New Slide option and click. or
3. Click on New Slide button on the standard toolbar .



4. Powerpoint immediately opens a New Slide-AutoLayout window.

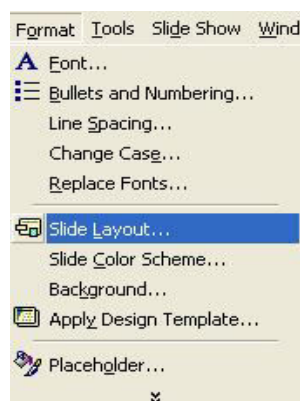


4. Select any one of the layout as you required and then press OK button.

2 Changing Slide Layouts

To change the layout of the slide the following steps are given below.

1. Click on Format menu and choose Slide Layout option from drop-down menu.



2. Slide Layout window open to change any one of the layout. Different layouts are :

- Title Slide
- Graphics
- Organizational Charts
- Bullets List
- Video Clips

3. And click on Apply button to change the Layout of slide.

3 Re-Ordering Slides

To Re-Order a slide in slide sorter view simply click on the slide you want to move and drag it to the new location. In Normal or Outline view , click the slide icon beside the number of the slide want to move and drag the icon to a new location.

4 Hide Slides

If you do not want a slide to appear during the slide show, but do not want to delete the slide as it may be used later , the slide can be hidden by the following steps?

1. Click on Slide Show option of menu bar.
2. Choose the Hide Slide option from the drop down list.

The slide will be hidden. To add the slide back to the slide show, then click on slide show menu bar and choose the hide slide option again.

5 Delete a Slide

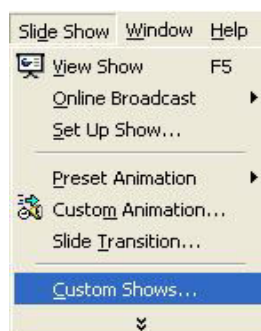
If you do not want a slide to appear during the slide show. Then you can delete any slide using following steps-

1. Select the slide you want to delete.
2. Click on Edit menu and Choose Delete Slide option
3. Delete multiple slide, switch to slide sorter view and press Ctrl key while you click on slide, click on Delete Slide.

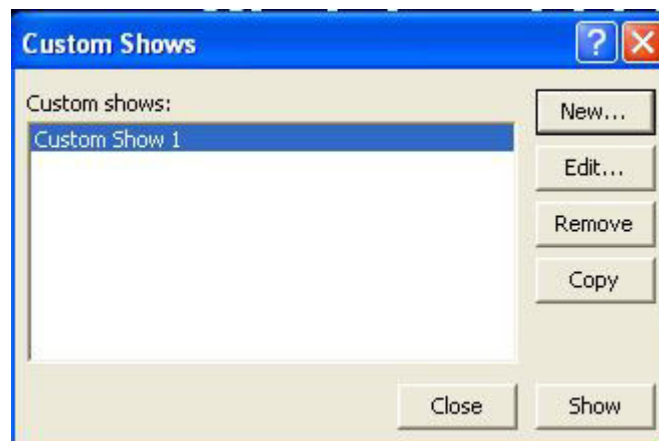
6 Create A Custom Slide Show

Microsoft Powerpoint has another feature to create a custom slide show. The custom slide show feature allows you to select the slides you want to display in the slide show if not all the slides should be used. This feature also allows you to save different subsets of slides in a presentation to create different versions of the show from the same set of slide.

1. Click on Slide Show menu of menu bar.
2. Choose Custom Shows option from the menu bar



3. Click on the New button in the custom shows window



4. Type the Slide Name of slide show in the defined Custom Show window.
5. Add slide to the custom show and clicking the Add >> button. Those slides will then appear in the Slides in custom show window.



6. You can remove slides from the custom show, click on remove button.
7. To reorder slides in the custom show, selected slide that should be moved and click on Up and Down arrows to change its order in the show.
8. Click OK button when finished.
9. Then click the Show button on the Custom Show window to preview the custom slide show and click Close to exit.
10. You can edit a custom slide show window using Edit option in above (custom show) and you also delete a show using remove button.

11.10 Working With Text

The way the slides look will determine the success of our presentation. It is therefore important that the text and the objects on the slides are arranged well for the best visual impact. The adding text to the slide contents are presented in short and compact language. Powerpoint slide always contains text of some kind, just like a title text and add text in bulleted list. The entering and editing text in powerpoint is also similar to entering and editing text in MS-word and MS-excel.

1 Adding Text Box

The amount of text you can enter depends upon the slide layout. If the slide layout includes text in the text boxes, simply click on the text box to add text. To add a text box to the slide just follow these steps :

1. Click on Insert menu of menu bar.
2. Choose the Text Box option from drop-down menu.
3. Draw the text box with the mouse.

2 Editing Text On A Slide

Editing the text by simply click on the text box. An insert point appears, indicating that the text is ready for editing in text box. You can change the text.

Copy Text: You can copy the text that appears in one place to another place.

- * Select the text you want to copy.
- * Click Edit menu bar and select the Copy option or click on the Copy command button on the standard toolbar or press Ctrl + C shortcut key together.
- * Move the text where you want to paste.
- * Click on the Paste command button on the standard tool bar or press Ctrl + V shortcut key together

Cut/Move Text: You can cut the text that is deleted from the original location and paste to a new place.

- * Select the text you want to cut.
- * Click Edit menu bar and select the Cut option or click on the Cut command button on the standard toolbar or press Ctrl + X shortcut key together.
- * Move the text where you want to paste.
- * Click on the Paste command button on the standard tool bar or press Ctrl + V shortcut key together

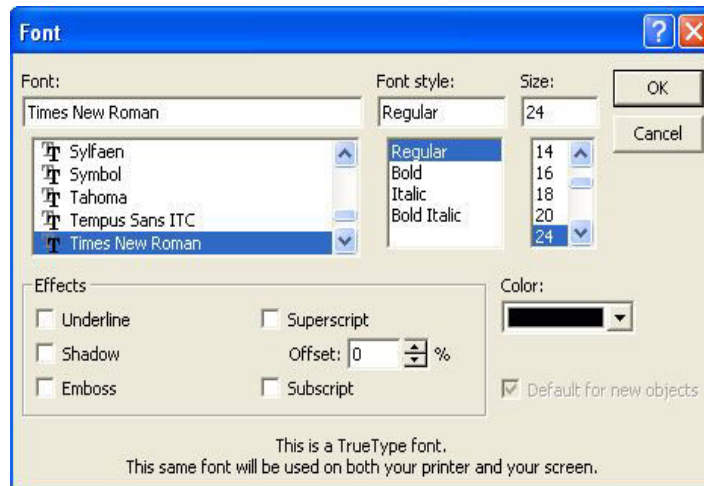
If you change in text accidentally , you can undo your text by clicking on Undo button on the standard tool bar or press Ctrl + Z shortcut key together or Click on Edit menu bar then choose the Undo clear option.

Formatting Text

Formatting text means applying characteristics and effects to the text. The formatted text or styled text or rich text as opposed to plain text, has styling information such as colors, style (bold, italic, underline), size and other special features of MS- powerpoint. Select the text that will be formatted by highlight-

ing the text either on the outline or on the slide.


1. Click on Format menu of menu bar.
2. Choose the Font from drop down list or right-click on the highlighted selected text.
3. And select Font from the popup shortcut menu. The Font dialog box appears as under.

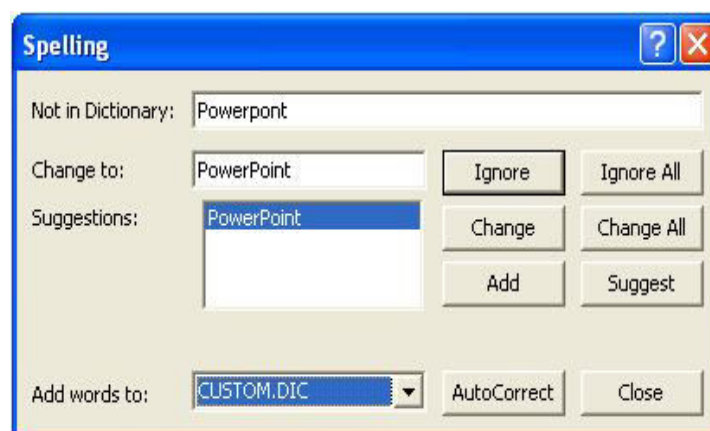


4. You can select Font, Font Style, Size of font, Effects, and Color from the Font dialog box.
5. Select any font option you want to use then click on OK button. Or you can use the font command buttons of Formatting toolbar.

4 Spelling Check

Correct the spelling in the presentation by using the following steps:

1. Click on Tools option of menu bar.
2. Choose the Spelling from the drop down list or by pressing the F7 key on the keyboard or click on Spelling command button on standard toolbar  .



3. The Spell checker will prompt you to make corrections of the first word that is spelled wrong.

4. If the word is spelt correctly, click Ignore or Ignore All if the same word appears several times during the presentation. If this word will appear in many presentations (such as your name), click Add to add the word to the dictionary and you won't be prompted by a misspelling again.
5. If the word is spelt wrong, highlight one of the Suggestions or type your own revision in the Change to box. Click Change to correct this occurrence of the word or Change All to correct all occurrences of the word in the presentation.
6. Click Close to abort the spelling check early.
7. When the spell checker has read through the entire presentation, you will be prompted by a window telling you that the spelling check is complete.
8. Then Click OK button.

5 Changing Text Color

The color schemes are always used to suit the atmosphere. So the color depends where the presentation is going to be. Depending upon that the color of the powerpoint presentations are selected as under.

1. Select the text you want to change color.
2. Click on Font Color button on drawing toolbar.
- 3 To change color click on More Fill Colors options and use color tab to mix your own color.
4. Then click on OK button.

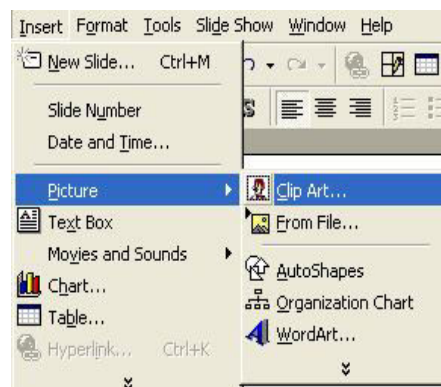
11.11 Working With Graphics

You can insert Clip Art and graphics to your slides. The Drawing Toolbar provides many commands for creating and editing graphics. The toolbar is located at the left bottom of the Powerpoint window. The toolbar can be activated by selecting View menu and choose Toolbars option, then select Drawing from the menu bar.

1 Inserting Clip Art

Inserting a ClipArt image to a slide, follow these steps:

1. Click on Insert option of menu.
2. Select the Picture from pull-down list.
3. Choose Clip Art option as shown in figure.

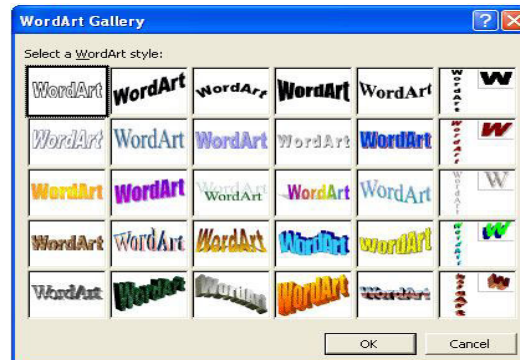


4. And then click the ClipArt option. Immediately a ClipArt box appear. Inserting clip art peocen is same as that of word.

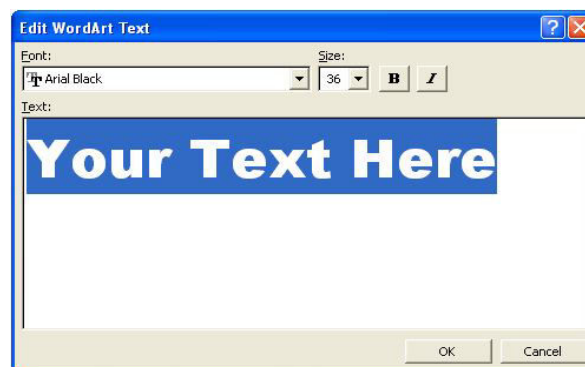
2 Insert Word- Art

Word- Art is predefined text that bends and twists and is dramatically colored and shadowed shapes. To insert WordArt to a slide, follow these steps:

1. Click on Insert option of menu bar.
2. Select the Picture from drop down list.
3. Choose WordArt option or click on WordArt button on the Drawing Toolbar.
4. The WordArt Gallery dialog box appear.



5. Select a WordArt style and click on OK button.
6. The Edit Wort-Art text box appears.



7. Type desired text in the text box and use desired Font, Size from drop-down button if required.
8. Click on OK button to return to the slide.

3 Editing The Graphics

You can edit image. At first activate the image you wish to edit by clicking on it once with the mouse. Several handles will appear around the graphic. Click and drag these handles to resize the image. The handles on the corners will resize the image, while the handles on the straight lines will stretch the image. More picture effects can be changed using the Picture toolbar.



4 AutoShapes

MS-Powerpoint AutoShapes are the shapes given to you by the software are much more better looking than the usual ones drawn by you , make the best use of them to highlight the text or the matter anything in your powerpoint. The AutoShapes provides the following categories of tools.

- * Lines
- * Connectors
- * Basic Shapes
- * Block Arrows
- * Stars and Banners
- * Actions Buttons

1. Click the AutoShapes buttons on the Drawing toolbar
2. Select any Categories of the shapes from the pop-up menu appear.
3. If select the lines .the line pop-up menu show six line options.



4. Position the pointer on slide where you want to be.
5. Move the pointer in any direction to next end point of the line.

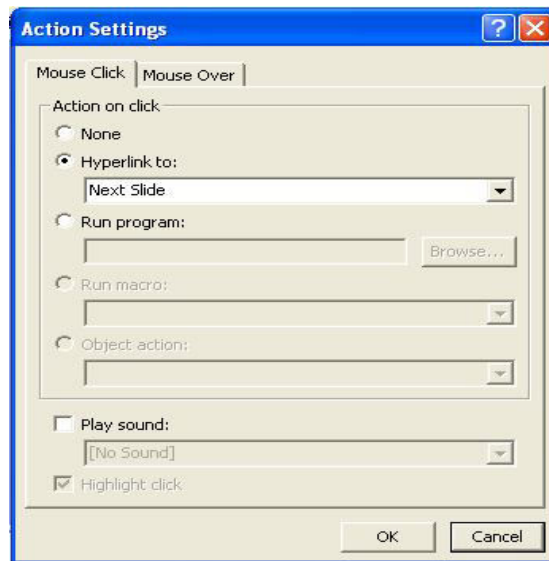
5 AutoShapes Action Buttons

MS-Power Point contains action buttons and action setting. These buttons enable you to adding buttons to your presentation. The viewers can click to jump to any slide in the slide show. Viewer can play a video and jump to web page on internet. To add an action buttons to a slide show follow these steps

1. Click on Slide Show option of menu bar.
2. Choose Action Buttons option from drop-down menu.



3. Select the button you want to add to the slide. When you add the button, the action setting dialog box appears

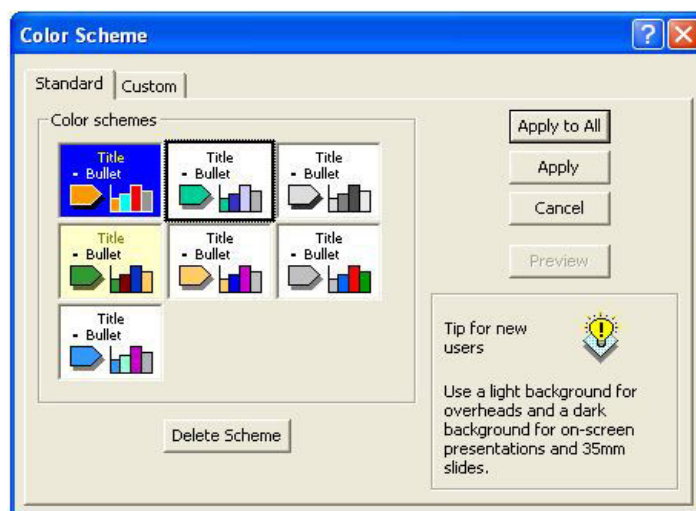


4. Select the Hyperlink to:... and choose any option from drop-down list.
5. The Run Program option to open a different application from within the presentation.
6. Play Sound option to select sound type.
7. Then click on OK button.

6 Slide Color Scheme

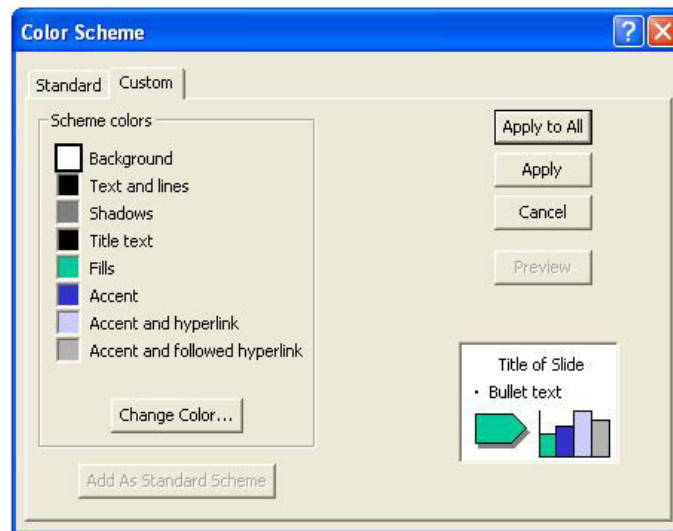
The colors of slide and predesigned slide templates can be changed and a color scheme can be added to blank slide presentations. To change the color schemes and background of the slides presentation follow these steps:

1. Choose the Slide Color Scheme option from the Format menu.
2. The Color Scheme dialog box will appear.



3. In the Color Scheme dialog box, the Standard tab allows you to choose a predetermined Color Scheme by clicking on the desired choice. The Custom tab allows you to selectively change the colors of the applied Design's features.

4. Click one of the present color scheme thumbnail images in the Color schemes box.
5. Click the Preview button to see how the scheme will appear on the slide.
To make changes to the color scheme, click the Custom tab on the dialog box.




5. Change the colors of the slide by selecting the color and clicking the Change color button.
6. Select the Custom tab to view more color choices and click OK button to finished.
7. Click Apply to All to apply the color scheme to all the slides in the presentation or Apply to add the scheme only to the current slide.

11.12 Slide Transtions and Animations

11.12.1 Slide Transitions

Slide Transitions are special effects used when moving slide from one slide to another in a slide show. A person can make effective presentation by adding slide transitions. The slide transition can be applied in Normal View or Slide Sorter View. The best way to apply Slide Transition is through the Slide Sorter View options.

To applying Slide Transitions follow these steps:

1. Click the Slide Sorter View button on the lower left corner of the document window .
2. The thumbnail of all the slide in the presentation will be displayed.
3. Now, Select the Slide Show menu bar option. A drop-down menu will appear.
4. Choose the Slide Transition option and click, then the transition dialog box appears.



5. From the Effect section option, select a transition from the drop-down menu
6. Notice the Preview after the transition is selected. Select a Speed for the transition as well.
7. Under Advance option, “On mouse click” for the slide transition by clicking the mouse or “Automatically after” for setting time in seconds if the transition should occur automatically .
8. Select a Sound option if necessary.
9. Click Apply To All if the transition effects should be added to every slide or Apply if the effects should be added only to the current slide.
10. Now Click on the Slide Show button to run the slide show.

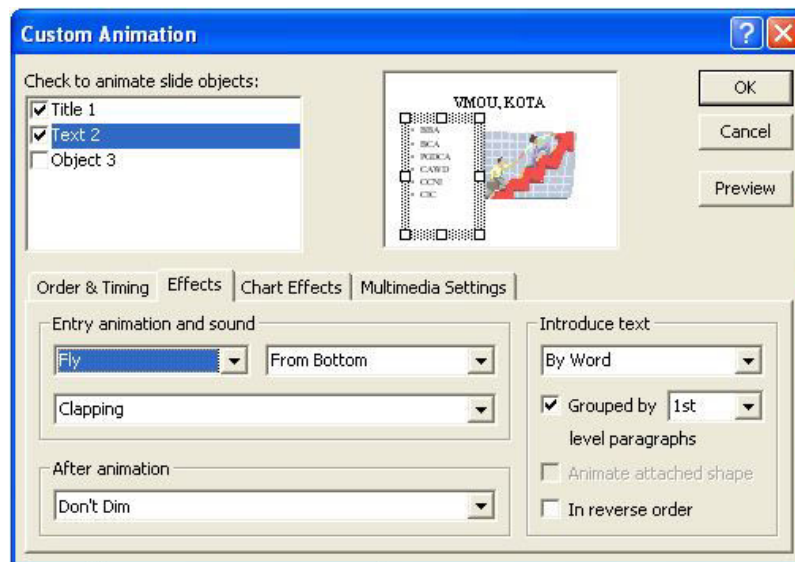
11.12.2 Slide Animations

You can add animation to the slide to display. This helps in presenting a slide with special effects. To apply Slide Animation follow these steps

1. Select the text box or graphic, which you want to add the animation effect.
2. Select the Slide Show menu bar option. A drop-down menu appear.
3. Choose the Present Animation option and click on different animation.

To more options follow these steps

1. Select the object you want to animate.
2. Click on Slide Show menu bar then choose Custom Animation option.
3. The Custom Animation Dialog box appears as in following figure.

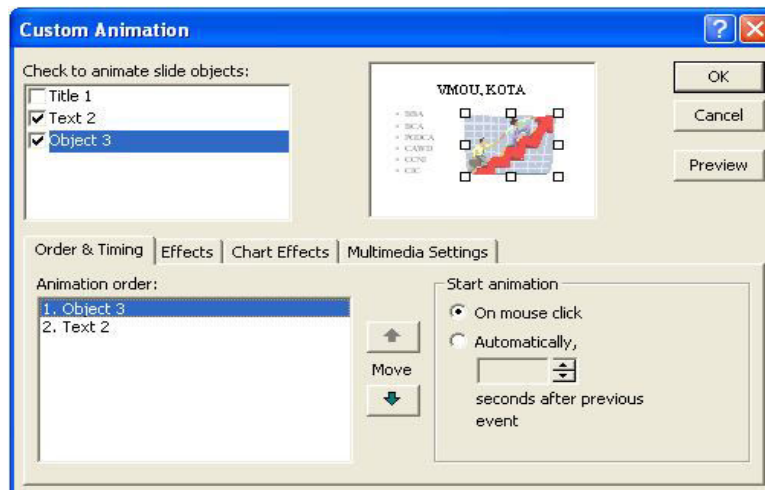


4. Select the object that will be animated from the Check to animate slide objects list option.
5. Then click on Effects tab for select the animation type and direction from the drop-down menus and select a sound if you wish.
6. Select an After animation effect if the text should change colors, Hide After the Animation effect, Don't Dim (erases all After Animation effects) etc.
7. In the Introduce text section, The drop-down menu provides options for displaying the characters.

Select “All at once” for the text to appear immediately, “By Word” for the text to appear one word at a time, or “By Letter” for a typewriter effect that displays one letter at a time.

8. Select Order & Timing tab to alter the order that the objects appear on the slide. Select the object in the Animation order box and click on the Up and Down arrows to move the object.

9. The Start animation option, choose “On mouse click” to activate the animation by clicking the mouse or “Automatically” for the animation to execute after a set number of seconds.



10. Click the Preview button to preview the animation on the slide and click OK button to finished.

11.13 Printing the Slides

After making the slides presentation, you need to print them. The Page Setup option of File menu bar use to set the page format to print the slide such as Slide Size, Width and Height of slide, Page Orientation etc. For printing the slides, undertake the following steps:

1. Make sure that your printer is on and is connected to computer.
2. Move the mouse pointer over the File menu bar option, and click the left mouse button.
3. Select the Print option from the drop-down menu and click.
4. Print dialog box appears on the screen.
5. Select All to print all the slides in the presentation, Current slide to print only the current slide, or enter slide numbers in the Slides field to print only certain slides and the Copies option Enter the number of copies of each slide specified in Print range.

6. Print What option

- Slides: prints a full-page slide on each page.
- Handouts: prints as many slides as you designate on each page.
- Notes Page: prints one slide with that slide's notes on each page
- Outline view: prints the outline of the presentation

7. Finally Click on OK button to print the slides. Or

8. Move your mouse-pointer over the Print button present on the Standard tool bar.

11.14 Summary

Microsoft PowerPoint 2000 is an easy to use presentation application for creating impressive presentation and handouts. This unit provides an Introduction to the essential features of Microsoft Powerpoint 2000 including creating, editing and saving slide show and adding text and graphics. You can create quick and well designed presentation using the wizard for many purposes. You also can create effective presentation using various predesign templates. The Powerpoint presentation software has a number of special effects, animations, slide transitions, features etc.

11.15 Key Words

- **Action Buttons:** Action buttons are buttons that you create in a presentation that perform an action when you click them. You can have an action button to start a video, give information, play a sound, or move to a hyperlink
- **Animations:** Animations are effects that allow you to reveal the points on a slide one by one.
- **Animation Effects:** Animation effects are special effects that can be applied to objects and text to add interest and variety to a presentation.
- **Animation Preview:** Use the Animation Preview command on the Slide Show menu to preview the animation effect in the thumbnail
- **AutoContent Wizard:** The AutoContent Wizard guides you through a number of formatting selections that will help you develop a clear, professional style for your presentation.
- **AutoLayouts:** AutoLayouts are slide layouts that have ready-made placeholders for titles, text, and objects such as clip art, graphs, and charts.
- **Blank Presentation:** The Blank Presentation option opens PowerPoint's default presentation. You can design or save any presentation as the default so that presentation will open every time you select the Blank Presentation option.
- **Handouts:** Handouts are smaller versions of your slides that are printed and can be distributed to the audience.
- **Outline View:** Outline view allows you to work with slide titles and main text without being distracted by background colors and graphics. You can see most of the text in your presentation at a glance instead of scrolling from slide to slide. You can also rearrange the order and organization of your slides and text, and make formatting changes
- **Picture Toolbar:** Use the Picture toolbar to quickly make changes to the selected image. The Picture toolbar appears as a floating toolbar whenever you have an image selected.
- **Presentation:** A presentation is a collection of slides, handouts, speaker's notes, and an outline, all combined into a file that can be printed onto transparencies or projected from a computer.
- **Slide Show View:** Slide Show View shows how a presentation will look when you run it. This allows you to do a test run and even create timed presentations.

- **Slide Sorter View:** Slide Sorter View displays a reduced image of all the slides in a grid-like fashion. This view makes it easier to rearrange the slides in a presentation and add transitions and special effects
- **Slides:** Slides are the individual pages of your presentation. Slides can be designed with different titles, graphics, text, and much more.
- **Speaker's Notes:** Speaker's Notes are pages with a copy of a slide on top and space below it for taking notes.
- **Template:** A template is a slide or presentation that provides a predefined format and color scheme that can be applied to another presentation. PowerPoint provides more than 100 professionally designed templates, or you can use an existing presentation as a template.
- **Transition:** A transition is an effect that can be run between slides to signal a shift from one slide to the next.
- **WordArt:** WordArt is a supplementary application that can be used to manipulate text into shapes. For instance, you can make a phrase or sentence form a circle.

11.16 Self Assessment Test

1. Create a Presentation using Auto Content Wizard.
2. Give the steps for creating a custom slide show.
3. What are the steps for creating a blank presentation?
4. How could you check the spelling of text in a slide?
5. Create a new slide and change its layout.
6. What is the process to insert ClipArt in a slide?
7. Create a presentation and insert image from a file.
8. What are the Auto Shapes ? How will you use them in presentation?
9. What is slide transition? Give the steps to apply it in the presentation.
10. How could you use the animation in the presentation? Give the steps.

11.17 Reference Books

- MS Office Bible
- Complete Reference BPB Publication
- MS Power Point 2000 Natshel Sayox Vikas Publising House

UNIT - 12 : MS - ACCESS

Unit structure

- 12.0 Objectives
- 12.1 Creating Database Using Wizard
- 12.2 Form Designing
- 12.3 Report Generation
- 12.4 Summary
- 12.5 Key Words
- 12.6 Self Assessment Test
- 12.7 Reference Books

12.0 OBJECTIVES

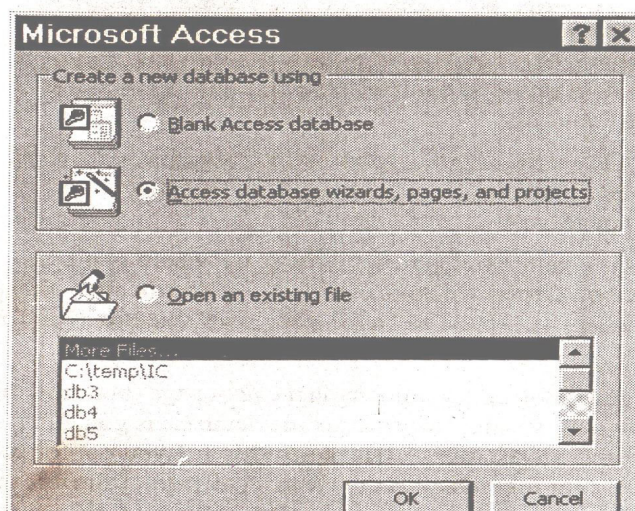
After studying this unit, we should be able to understand how

- To create an Access 2000 Database
- To create forms
- To enter and update data using forms
- To generate a report

12.1 Creating Database Using Wizard

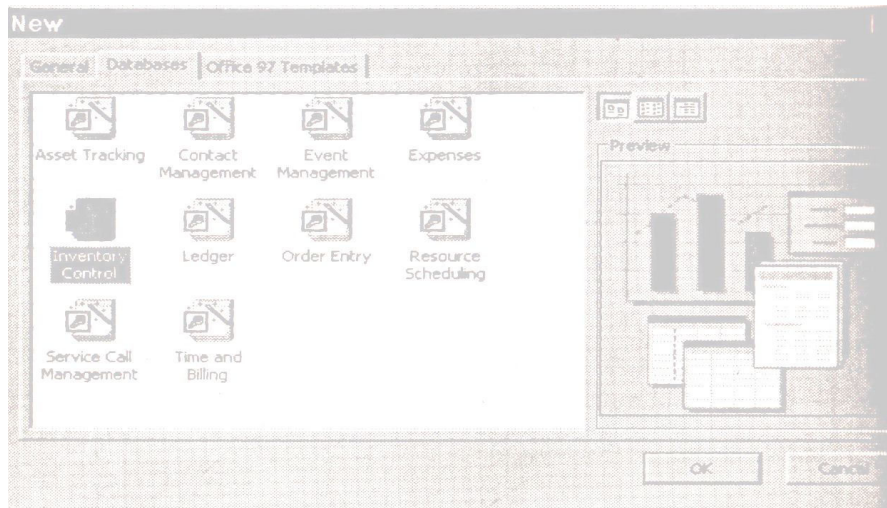
Creating database with a wizard is probably the easiest and fastest method of creating a database where we have to fill up some information and the database is ready for us. It not only creates Tables for us but all the Forms, Reports etc. connected with it are done too.

Start Access 2000 we will get the following dialog box :

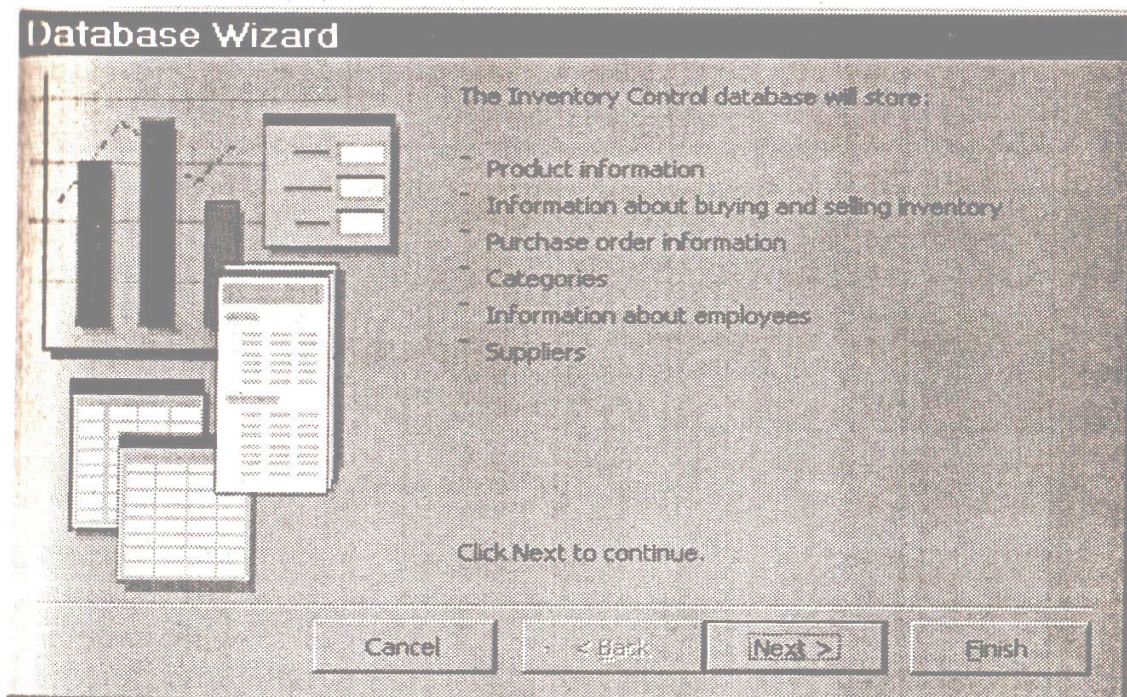


To create a table using the Table Wizard

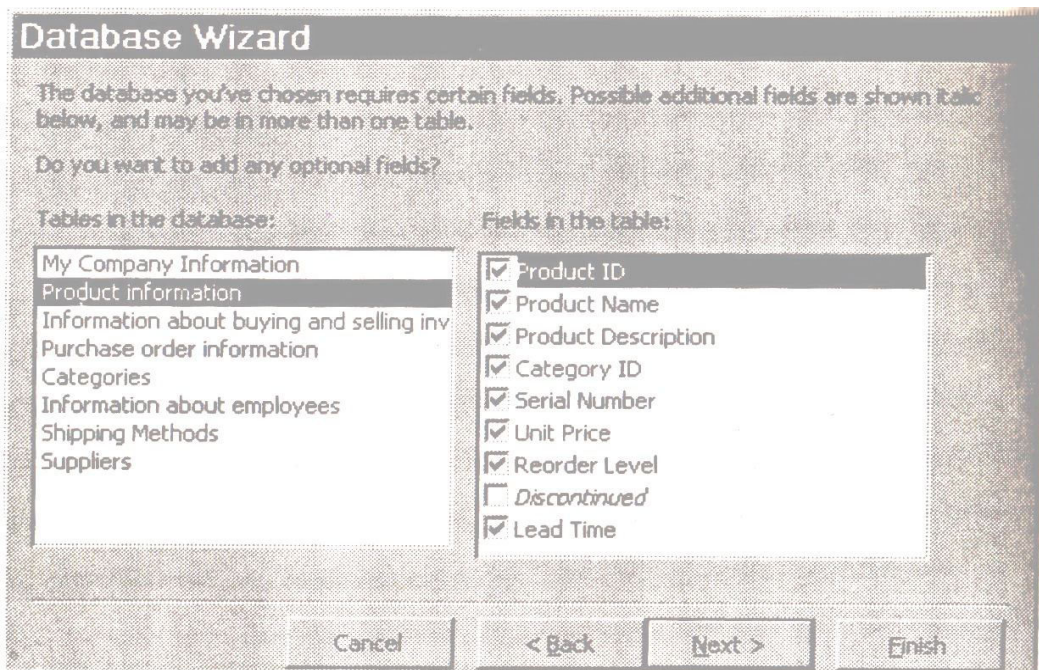
1. Click at the option Access database wizards, pages and projects.
2. This will give rise to another dialog box shown below.



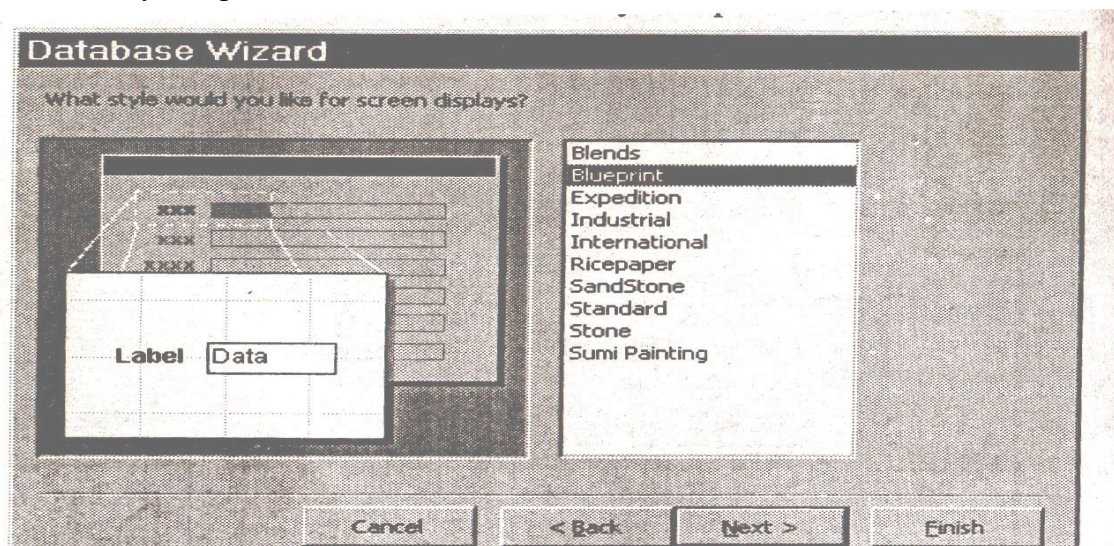
3. Choose here the type of database required. We have chosen here the Inventory control
4. Click Ok to get next dialog box, which asks us to name the database and the place where we want to save it.
5. Once we give the file name and the place where we want to save it, Database Wizard will take over and give us the first of many dialog boxes we have to make our own selections and make the database.
6. In the above dialog box, as shown above, the Wizard has shown the various information the database is going to store in the Inventory Database. Since no information is to be filled here, click next.
7. The next dialog box shows us the various types of inventory tables which we can create, select one to see the different fields attach to it.



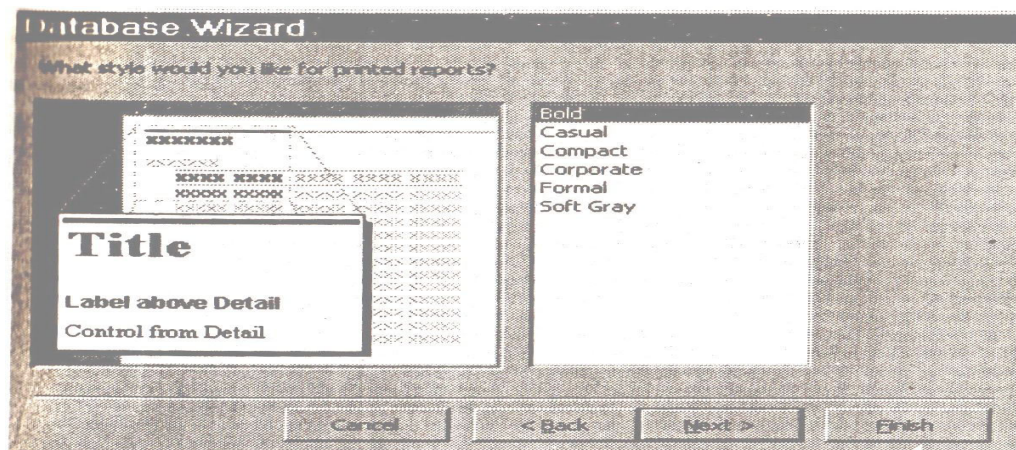
8. Click Next when we have made the choice.



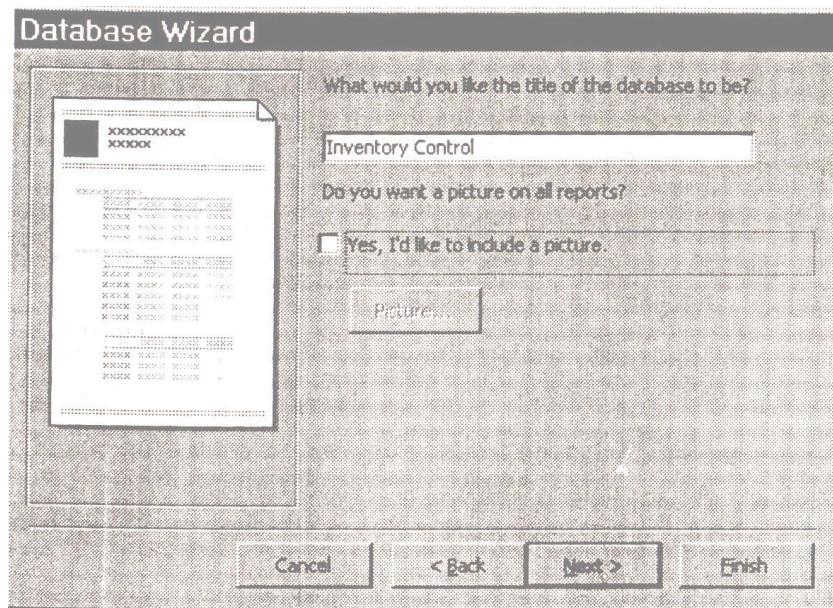
9. The next dialog box asks us the type of screen display we want for our database. Select one of the many and press Next.



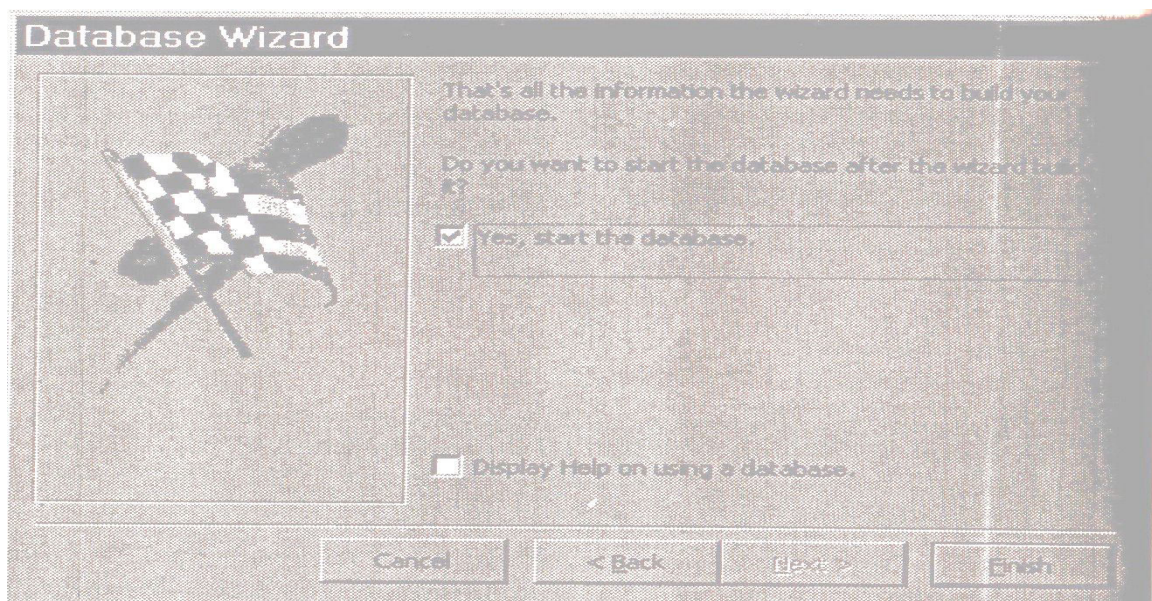
10. In the next dialog box, we are asked for the type of output printouts we want for our reports. Select one and press Next.



11. Click the next dialog box asks us to fill the name of the database which we would like to put on the top of our database. Press Next to move further.



12. The next dialog box says that the wizard's work is over and we are to just press Finish to create the database. If we want to start working on it straightway, say Yes to start the database.



13. At this stage Access will start the process of creating the database for us with all the information we have provided so far. This process takes little time, where Access will keep on showing us the various processes it is going through but none of that matters to us and we are not supposed to interrupt it too.
14. In between Access will ask us for the information as shown below to fill up the details of the company for which this Inventory Control database is being created.
15. Fill up the information according to the information that we want to fill and close the dialog box.
16. Next we would be given a dialog box which is the main box of your database. Access calls it Main Switchboard. It is called so because it is from here we will switch to various information mentioned here.

My Company Information

Enter your company's name and address information here. You will save the information by closing the form.

Company Name: ABC Corporation

Address: 2 Onkar House, Daryaganj
New Delhi - 110 002

City: New Delhi

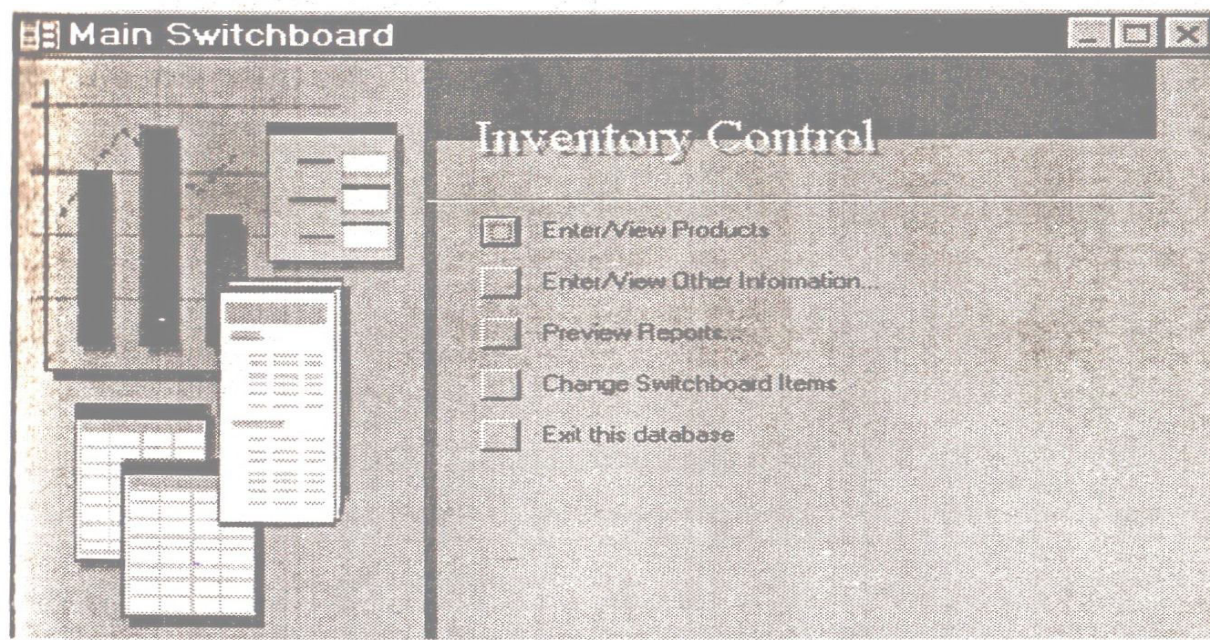
State/Province: Delhi

Postal Code:

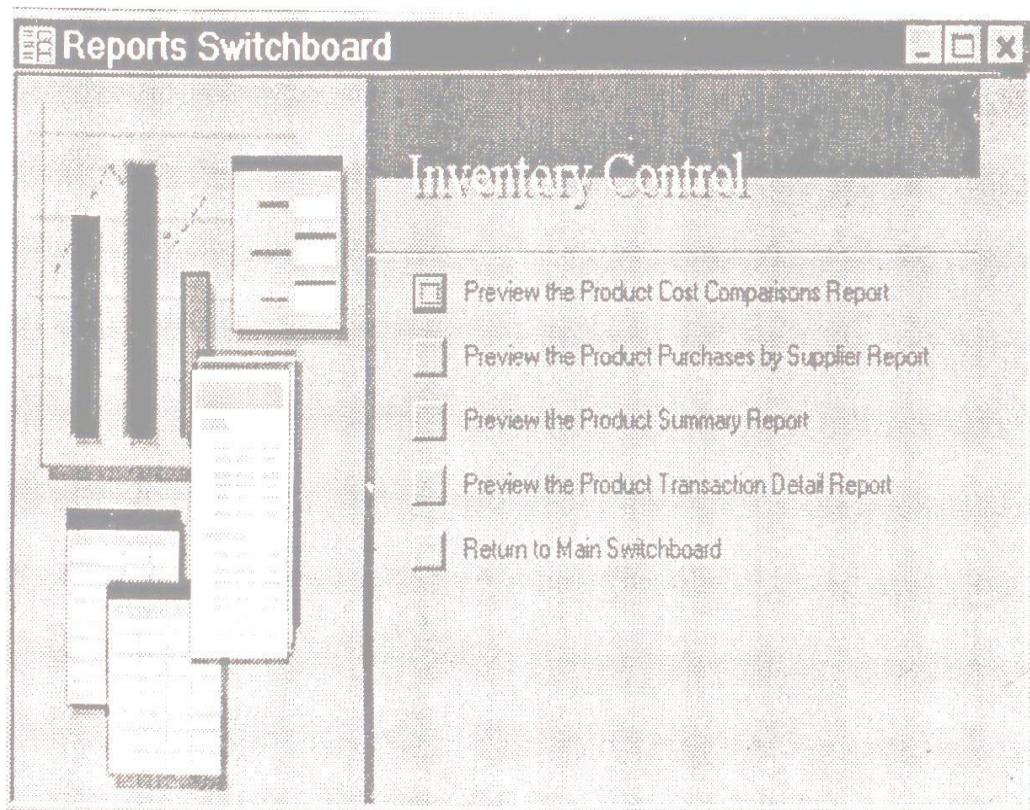
Country: India

Phone Number:

Fax Number:



17. We will now go through the various options here one by one.
18. The first option Enter/View Products will give us the dialog box given above which allow us to see the product information and allows us add and change the same.
19. Next in line is Enter/ View Other Information.
20. This gives rise to another set of options. Select one of them to see the information regarding that. Selection of Suppliers information will lead to the following fdialog box to fill up.



23. Now your database is ready, start working on it and enjoy the process of filling it up with the data available with us.

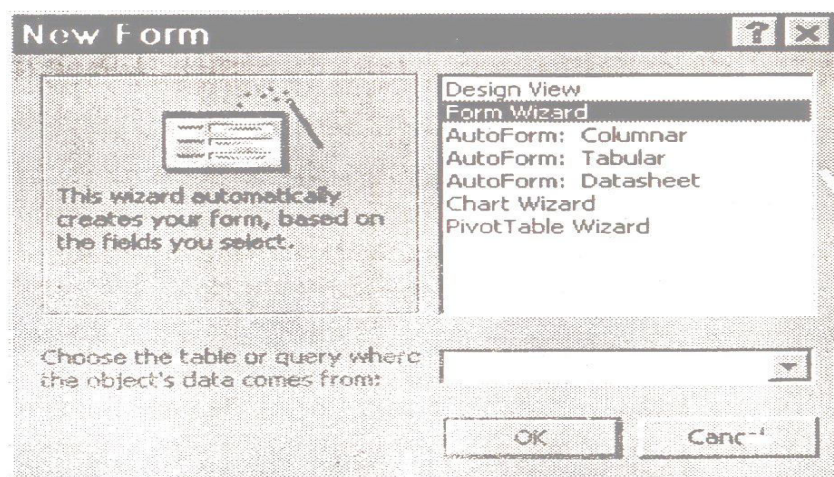
12.2 Form Designing

Form is used to enter and edit data in a table in a convenient way. The controls on a form are displayed when we are entering or editing a table using the form and also they are also printed when you print the form.

The Form Wizard makes it easy for us to select controls for our form from more than one table or query.

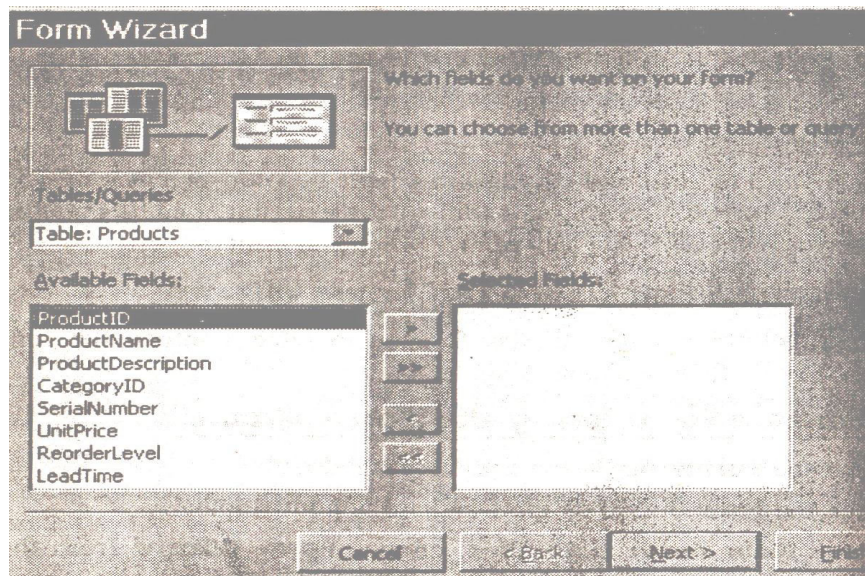
To create a form using the Form Wizard

1. Click the Formstab in the Database window.
2. Click the New button on the Database window toolbar.
3. In the New Form dialog box, choose Form Wizard from the drop-down list.

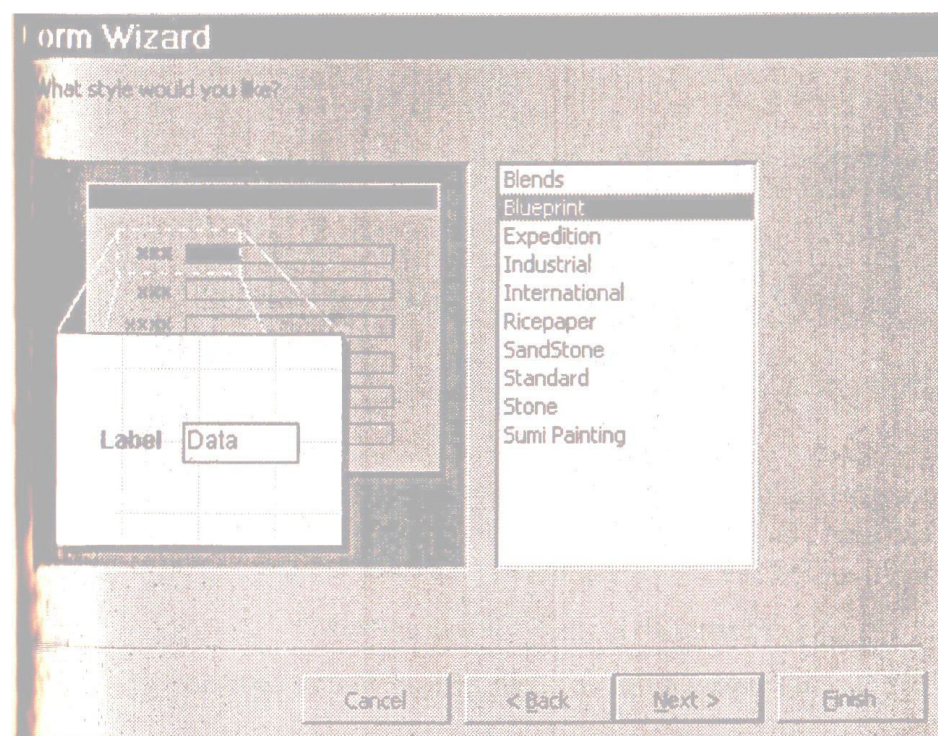


4. Click Ok. In the first page of the Form Wizard, select a table or query and then double-click each field we want to include or

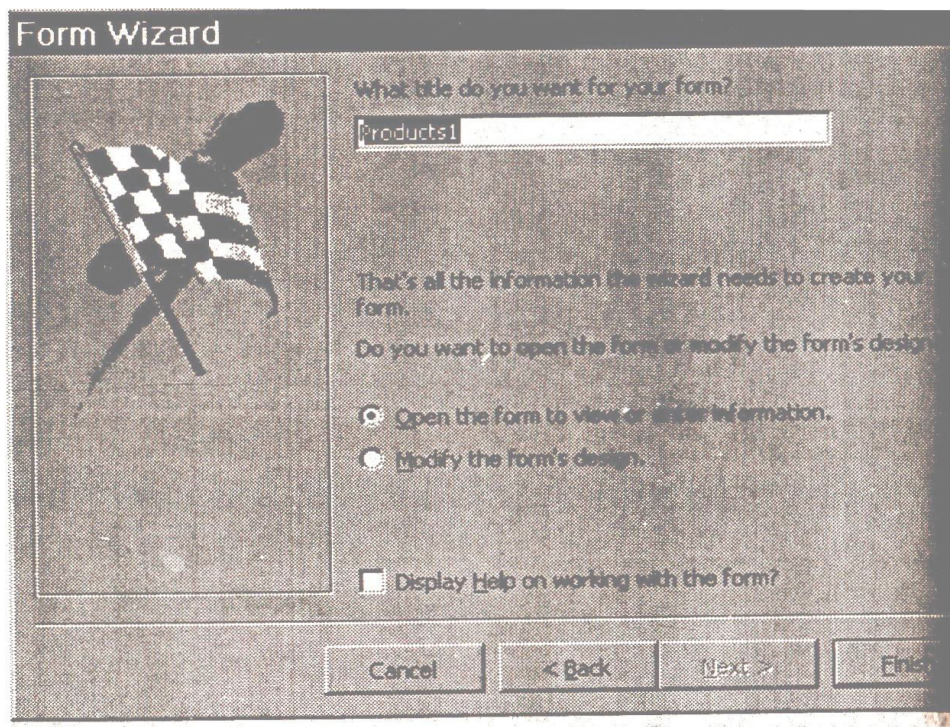
Click the >> button to include all the fields.



5. Select another table or query and add further fields, if needed.
6. When we have finished adding fields, click Next.
7. In the next page of the Form wizard, choose a layout for the form which can be either of the following: Columnar, Tabular datasheet or justified. I have selected Justified here as you can see on the next page. Click next to move further.
8. In the next page of the Form Wizard, choose a form style and then click Next. We can click each button and inspect the sample in the dialog box. Here I have chosen blueprint option as shown below.



9. In the last PAGE OF THE Form Wizard, enter a name for the form and then choose whether to open the form showing the table's data or open the form in Design view so that we can modify the form's design. I have given here the name as products.

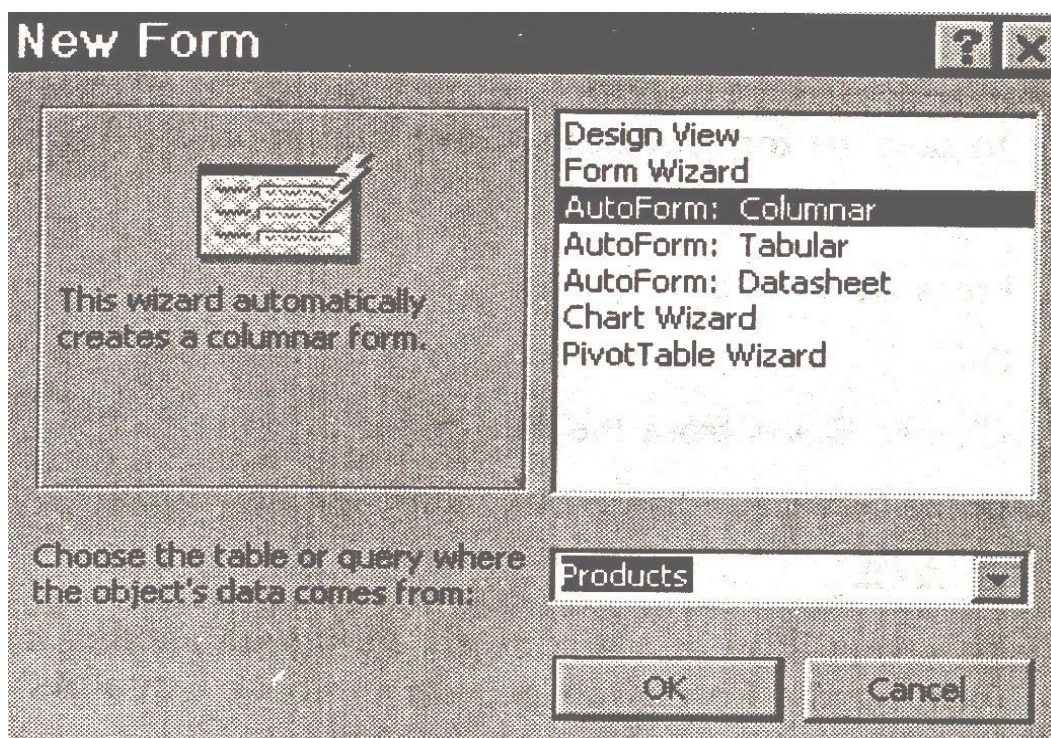


10. Click Finish. The form is automatically saved.

12.2.1 CREATING A FORM

We can create a form for every table in our database, and we can create forms that allow us to add data to more than one table or query at a time. Each time , we make changes to the design of a table, we can create a new form to reflect the changes or modify the form design.

1. Click the Forms tab in the Database window.
2. Click the New button on the Database window toolbar.
3. In the New Form dialog box, choose a method from the list.
4. If we choose one of the AutoForms, select a table or query from the Pull-down list.



5. Click Ok. The AutoForms Wizard creates a form in the default style, using all fields defined in the table.

The screenshot shows a Microsoft Access form titled 'Products'. The form is displayed in a window with standard Windows controls (minimize, maximize, close). The form contains several text boxes and a dropdown menu. The fields are: Product ID (with a value of 1 and a dropdown showing '(AutoNumber)'), Product Name, Product Description, Category ID (with a dropdown arrow), Serial Number, Unit Price, Reorder Level, and Lead Time. At the bottom, there is a record navigation bar showing 'Record: 1 of 1'.

6. The design View option in the New Form dialog box displays a blank form in design view, with the Forms toolbar box available for adding controls.

12.2.2 SAVING THE FORM

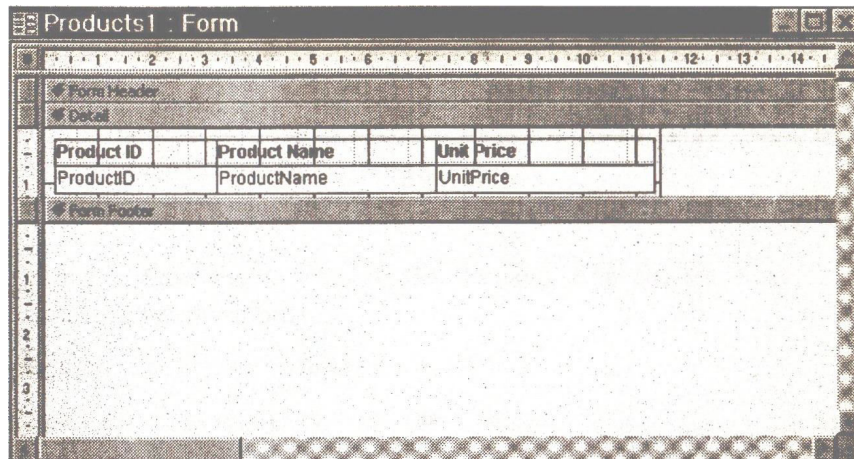
1. To save the form, click the Save button on the Access toolbar or press Ctrl + S or choose Save from the File menu.
2. In the Save as dialog box, name the new form.
3. Click Ok.
4. To save a form as a report or a form with another name, select the form on the Forms tab and then choose Save as from the File menu.

The screenshot shows the 'Save As' dialog box in Microsoft Access. The dialog box has a title bar 'Save As' and standard window controls (help, close). It contains a 'Save Form 'Form1' To:' label, a text box with 'Products2', an 'As' label, a dropdown menu with 'Form', and 'OK' and 'Cancel' buttons.

12.2.3 OPENING THE FORM IN DESIGN VIEW

To modify a form, we must open it in Design view or if it is already open, switch to Design view.

1. On the Forms tab of the database window, choose a form and click the Design button



Or

If we are currently using the form to enter or edit data, click the View button on the Access toolbar and choose Design View from the drop-down menu

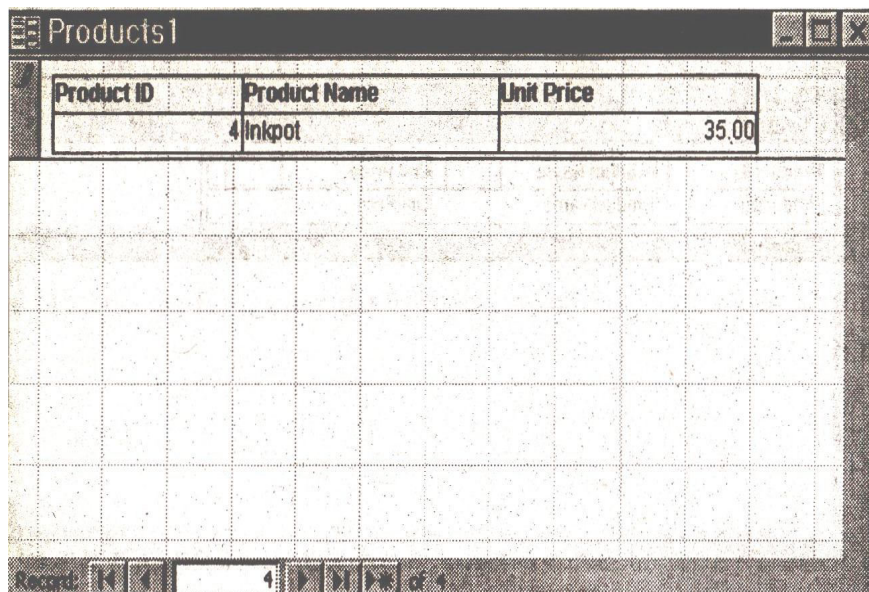
Or

From the View menu, choose Design view.

13.2.4 ENTERING DATA IN A FORM

A form provides blank fields and other controls that allow us to add data to a table easily.

1. Click the Forms in the Database window.
2. Double-click the form that you want to add data to Or
select a form and click Open on the Database window toolbar. This form, if it is columnar or justified, displays the first record. If the form is tabular in format, it shows all records.
3. Click the New Record button on the Access toolbar.
4. Enter data in the first blank field on the form and press Tab.
5. Continue entering data and pressing Tab to move to the next field.



Press Tab after the last field to move to the start of a new record.

7. To move to the previous field on a form, press shift + Tab
8. To jump to a field, click the field.
9. we do not need to save each record. The completed record is saved automatically when we move to the next record.
10. If we want to see the records added by us in a tabular manner, close this window and go to the Table panel and select Products to see all the records shown below.

Product ID	Product Name	Product Descr	Category ID	Serial Number	Unit Price
1	Pencil				Rs.2.00
2	Pen				Rs.22.00
3	Rubber				Rs.1.50
4	Inkpot				Rs.35.00
(AutoNumber)					

Record: 1 of 4

12.2.5 VIEWING AND EDITING RECORDS USING A FORM

We can use a form to view each record in a table and edit its fields.

1. Open the form by double clicking the form name on the Forms tab of the Database window.
2. Use the Next or Previous button to move forward or backward record by record through the database
Or
press the Page Down
Or
Page Up key Or From the edit menu, choose Go To, and then choose Next or Previous from the submenu.
3. Edit the entry as we would edit text in Word.
4. Click a different record to save our changes.
5. To jump to the first or last record, click the First or last button, press Ctrl + Up arrow or Ctrl + Down or choose First or Last from the Go To menu.
6. To jump to a specific record number, select the current record number, type a replacement number and press Enter.

12.2.6 ADDING LABELS

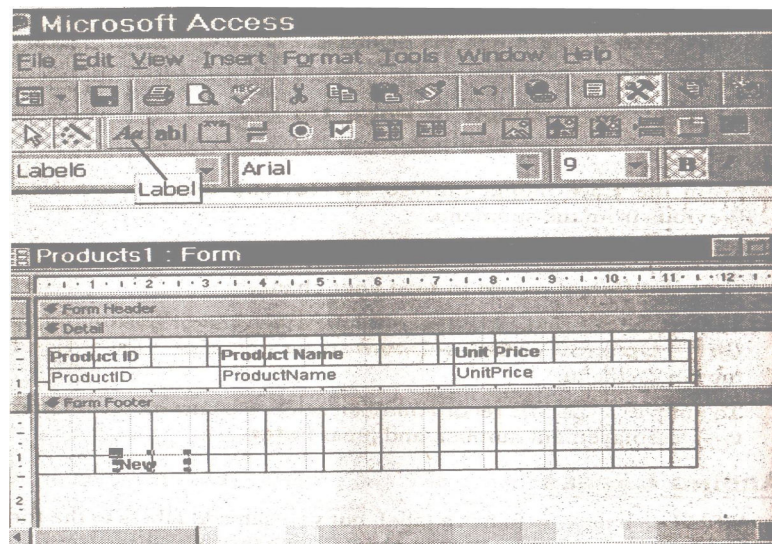
Each field on a new form has a label, but we can add labels to the form to provide special instructions to the person using the form. For example, we can enter a label for a group of fields.

1. With the form open in Design View, make sure the toolbar is visible. If it is not visible, click the Toolbox button on the access toolbar.

2. Click the Label button on the toolbox.
3. Click the form at the location for the new label.
4. Type the label next.
5. Use the move and size handles to position the label.
6. Save the changes to the form design.

12.2.7 FORMATTING LABELS

We can give a label any appearance we want by changing its formatting.



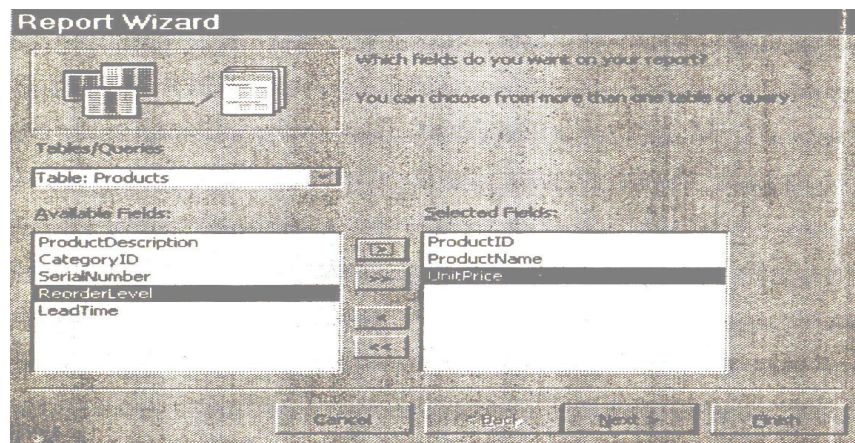
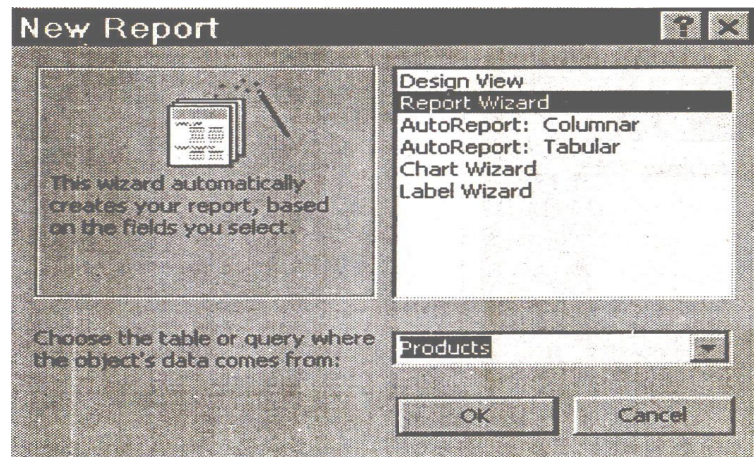
1. With the form open in design view, select the label.
2. Click the text formatting buttons on the Formatting toolbar.
3. Save the changes to the form design.
4. To view the label on the completed form, switch to Form view by clicking the Form view button on the Access toolbar.
5. To edit a label, click the label and then click again to position an insertion point in the label. Then edit the label next.
6. To add a control, drag it from the field list and place it on the form.

12.3 Report Generation

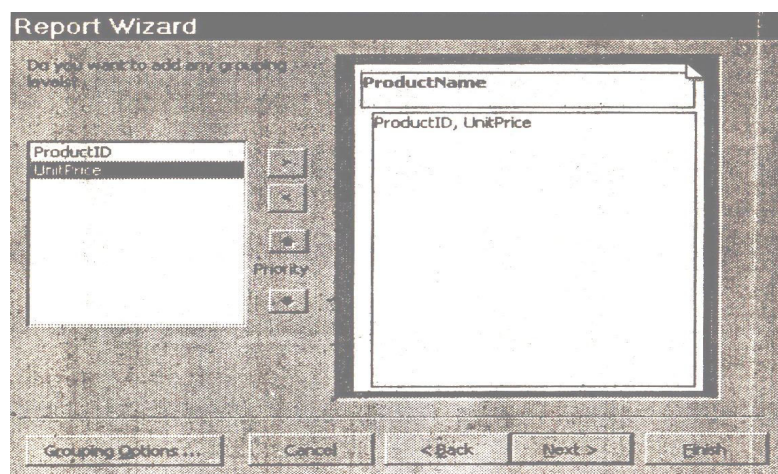
A Report will print our database in a format which looks best on the paper using the printer attached to our computer. We can even have the report displayed on the monitor too. These reports are generated by the queries using the information available in the tables.

12.3.1 CREATING REPORTS USING THE REPORT WIZARD

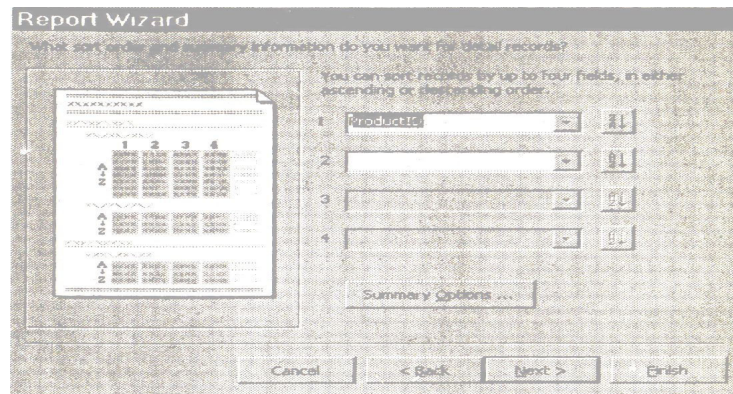
1. On the Reports tab of the Database window, click the New button.
2. In the New report dialog box, select report Wizard.
3. Click OK.
4. On the first page of the Report Wizard, select the table or query on which the report will be based, select the fields to display and click Next to get the next dialog box, as shown below.



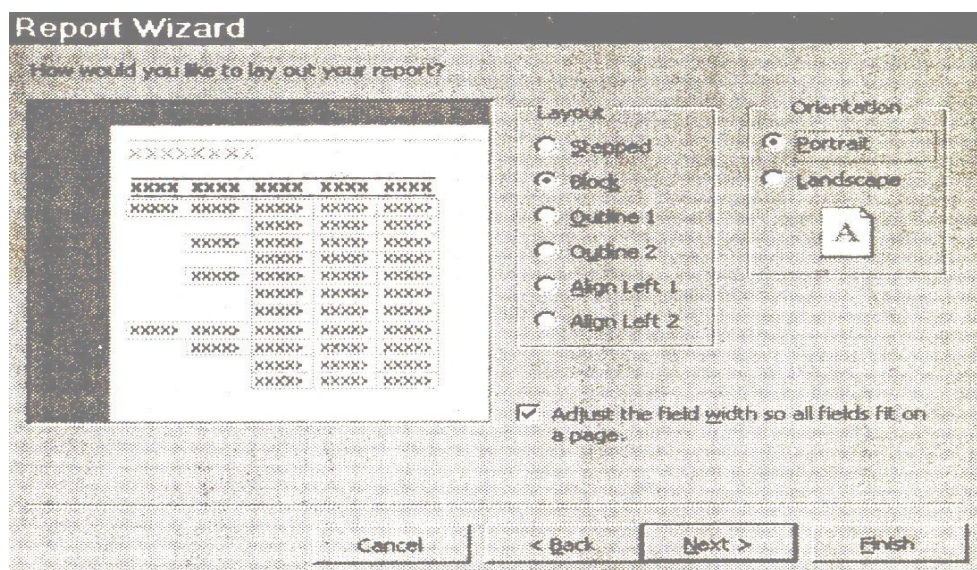
5. Select here the fields which we want to put in the report and press Next to get the next pages as shown below.



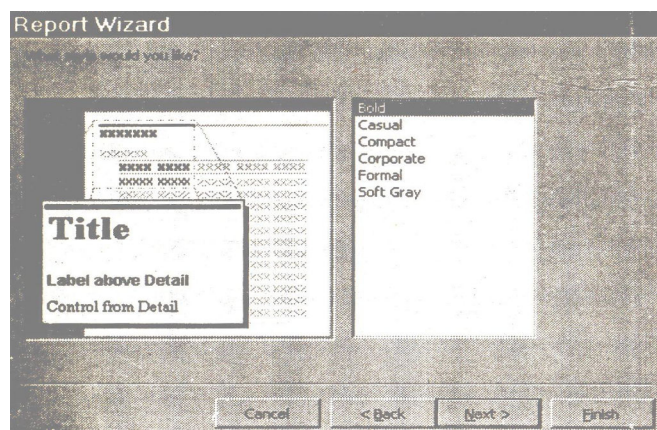
6. Select here the grouping levels and press Next to go to the next page shown below.



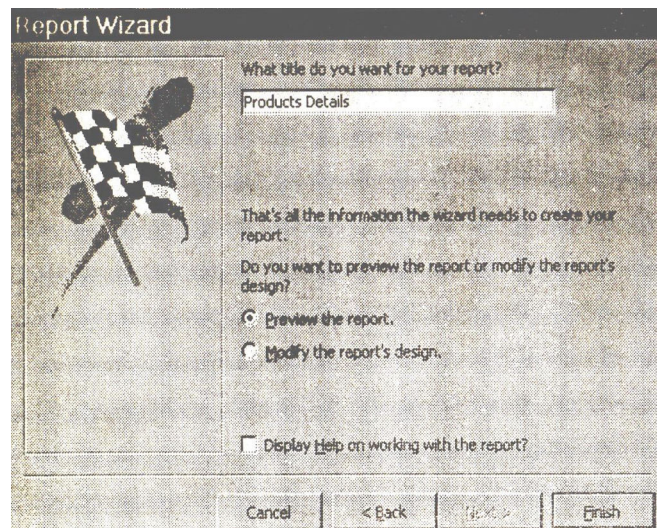
7. Select here the grouping and summary options and press Next to get the following page.



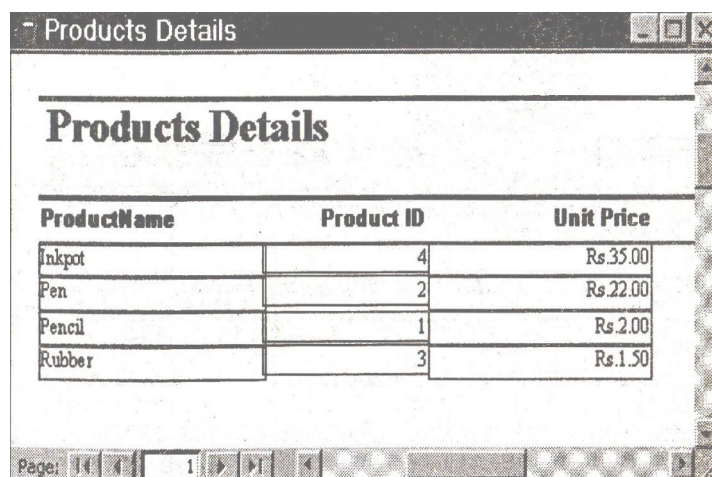
8. Select here the layout for printing and click Next to get the following page.



9. Select here the style we would like for our printing and press Next to get the last page of the Wizard as shown below.



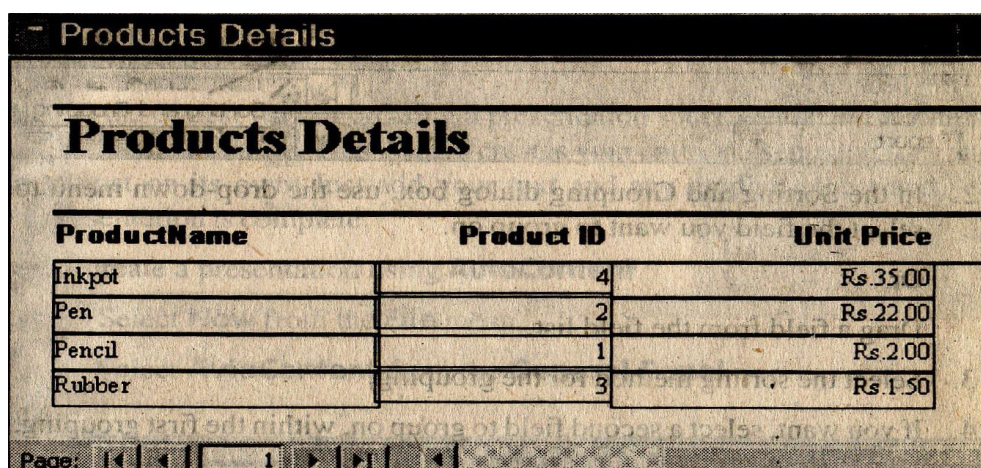
10. Press Finish. The preview of the report is shown on the screen as shown below.



12.3.2 VIEWING A REPORT

Each time we open a report to view or print it, the report reflects any changes made to the table or query on which it is based.

1. Click the Reports tab in the Database window.
2. Select a report and then click Preview to view a preview of the printed report as shown below



3. Click the Page buttons of the print preview window to move from page to page of the report
4. To close the report, click the Close button on the Access toolbar.

12.3.3 PRINT A REPORT

1. With the report open in Print Preview, click the Print button on the Access toolbar Or Press Ctrl + P Or From the File menu, choose print.
2. we can also print a report by selecting the report on the reports tab and clicking the Print button or choosing Print from the File menu.

12.3.4 SORTING AND GROUPING RECORDS IN A REPORT

A report can group together similar records and it can also sort the entries with in groups.

1. With the report open in Design view, click the Sorting and Grouping button on the Access toolbar.
2. In this, use the drop-down menu to select field we want to group on Or Drag a field from the field list.
3. Select the sorting method for the grouping.
4. If we want, select a second field to group on, within the first grouping, Click a new row to save the changes.
5. Close the dialog box.

12.4 Summary

Database is a collection of information e.g. local telephone book and card catalog in local library. In access, we first need to create a database file. That file holds everything we create for that database not only all the dat but also the customize forms, reports etc. if we have two or more businesses, we might want to create two or more separate databases, one for each business.

The heart of each database is its tables. A table is like a spreadsheet. The data is arranged in columns and rows. Access stores each database in its own row.this is a record.Each record is a collection of information about one thing, for e.g. an employee each type of detail is kept in each its own column' a field for e.g. employee no. is one field.

All the data we enter into our data base ends up in a table for storage, we can enter inf. Directly into a table but it is a little awkward to do so, most people find it easier to create a special on screen form in which to enter the data. A form resembles a fill-in-the-blanks sheet that we would complete by hand such as a job application. Although forms are designed to be used on screen, reports are designed to be printed. Reports are specially formatted collection of data organized according to our specifications. For e.g. we might want to create a report of all employees' sales performance.

Although we create database, forms, reports in separate steps, they are all related. Table are the central focus of all activities. All the other objects do something to or within the table data. Reports summarized and organized the table data. Form helps enter information into the table.

12.5 Key Words

- **Data :** Raw facts and figurers use in generating information.
- **Data base :** Collection of data in logical sequence.
- **Wizard :** Step by step approach to solve complex activity
- **Form :** Format use to feed/Print data in a computer

12.6 Self Assessment Test

1. Describe a step-by-step procedure to create a database.
2. Describe a step-by-step procedure to design a form.
3. Describe a step-by-step procedure for report generation.
4. Create a database for college having four tables as under :
 - a) Student Information
 - b) Faculty Information
 - c) Library Information
 - d) Administration Information
5. Design Forms on the above tables.
6. Generate a report on the above database and perform sorting and grouping operations on records.

12.7 Reference Books

- MS Office Bible
- Teach yourself MS Access in 24 hours.

UNIT – 13 : INTERNET

Unit Structure

- 13.0 Objectives
- 13.1 Introduction
- 13.2 Internet V/S Web
- 13.3 Protocols
- 13.4 Hardware and Software Requirements
- 13.5 Types of Internet Connection
- 13.6 Wireless Internet Connections
- 13.7 Advantages of Internet
- 13.8 Disadvantages of Internet
- 13.9 Key Words
- 13.10 Self Assessment Test
- 13.11 Reference Books

13.0 Objectives

After studying this unit you should be able to understand:

- Concept of Internet and Services
- Understanding of working of Internet and www.
- Identify key technological concepts.
- Understand limitations of Internet

13.1 Introduction

The Internet is a global system of interconnected computer networks that use the standard Internet Protocol Suite (TCP/IP) to serve billions of users worldwide. It is a *network of networks* that consists of millions of private, public, academic, business, and government networks of local to global scope that are linked by a broad array of electronic and optical networking technologies. In other words, a network of networks, or Internet, is a group of two or more networks that are; Physically interconnected, capable of communicating and sharing data with each other and able to act together as a single network.

Classification of Networks

Local Area Network (LAN)	Limited to a building/ 5-10 Kilometer
Metropolitan Area Network (MAN)	Limited to a Metro/ 50-100 Kilometer
Wide Area Network (WAN)	Limited to a Resign/Geography/ 500-1000 KM
International Network (Internet)	Connecting all the networks/ beyond

The Internet carries a vast array of information resources and services, most notably the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support electronic mail.

Most traditional communications media, such as telephone and television services, are reshaped or redefined using the technologies of the Internet, giving rise to services such as Voice over Internet Protocol (VoIP) and Internet Protocol Television IPTV. Newspaper publishing has been reshaped into Web sites, blogging, and web feeds. The Internet has enabled or accelerated the creation of new forms of human interactions through instant messaging, Internet forums, and social networking sites.

The origins of the Internet can be traced in the decade of the 1960s when the United States funded research projects of its military agencies to build robust, fault-tolerant and distributed computer networks. This research and a period of civilian funding of a new U.S. backbone by the National Science Foundation spawned worldwide participation in the development of new networking technologies and led to the commercialization of an international network in the mid 1990s, and resulted in the popularization.

Internet Growth Trends

1977:	111 hosts on Internet
1981:	213 hosts
1983:	562 hosts
1984:	1,000 hosts
1986:	5,000 hosts
1987:	10,000 hosts
1989:	100,000 hosts
1992:	1,000,000 hosts
2001:	150 – 175 million hosts
2002:	over 200 million hosts
By 2012	about 80% of the planet will be on the Internet

It has no centralized governance in either technological implementation or policies for access and usage; each constituent of internet network sets its own standards. Only the overarching definitions of the two principal name spaces in the Internet, the Internet Protocol address space and the Domain Name System, are directed by a maintainer organization, the Internet Corporation for Assigned Names and Numbers (ICANN). The technical underpinning and standardization of the core protocols (IPv4 and IPv6) is an activity of the Internet Engineering Task Force (IETF), a non-profit organization of loosely affiliated international participants that anyone may associate with by contributing technical expertise.

13.2 Internet v/s Web

The terms Internet and World Wide Web are often used synonymous in day to life without much distinction. However, the Internet and the World Wide Web are not same. The Internet is a global data communications system. It is a hardware and software infrastructure that provides connectivity between computers. In contrast, the Web is one of the services communicated through the Internet. It is concerned with a collection of interconnected documents and other resources, linked by hyperlinks and URLs.

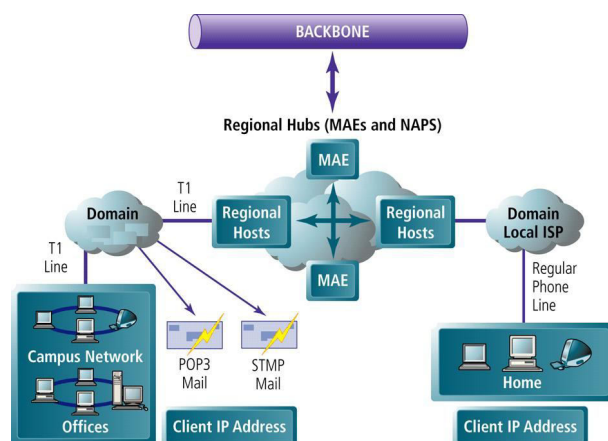


Figure: Structure of Internet (MAE: Metropolitan Area Exchanges, NAP: Network Access Point)

13.3 Protocols

Protocols are set of rules and regulation followed by two or more communication entities for the purpose of communication. Internet is based on TCP/IP Protocol. The complex communications infrastructure of the Internet consists of its hardware components and a system of software layers that control various aspects of the architecture. While the hardware can often be used to support other software systems, it is the design and the rigorous standardization process of the software architecture that characterizes the Internet and provides the foundation for its scalability and success. The responsibility for the architectural design of the Internet software systems has been delegated to the Internet Engineering Task Force (IETF). The IETF conducts standard-setting work groups, open to any individual, about the various aspects of Internet architecture. Resulting discussions and final standards are published in a series of publications; each called a Request for Comments (RFC), freely available on the IETF web site.

The principal methods of networking that enable the Internet are contained in specially designated RFCs that constitute the Internet Standards. Other less rigorous documents are simply informative, experimental, or historical, or document the best current practices (BCP) when implementing Internet technologies.

The Internet Standards describe a framework known as the Internet Protocol Suite. This is a model architecture that divides methods into a layered system of protocols (RFC 1122, RFC 1123). The layers correspond to the environment or scope in which their services operate. At the top is the Application Layer, the space for the application-specific networking methods used in software applications, e.g., a web browser program. Below this top layer, the Transport Layer connects applications on different hosts via the network (e.g., client–server model) with appropriate data exchange methods. Underlying these layers are the core networking technologies, consisting of two layers. The Internet Layer enables computers to identify and locate each other via Internet Protocol (IP) addresses, and allows them to connect to one-another via intermediate (transit) networks. Lastly, at the bottom of the architecture, is a software layer, the Link Layer, that provides connectivity between hosts on the same local network link, such as a local area network (LAN) or a dial-up connection. The model, also known as TCP/IP, is designed to be independent of the underlying hardware which the model therefore does not concern itself with in any detail. Other models have been developed, such as the Open Systems Interconnection (OSI) model, but they are not compatible in the details of description, nor implementation, but many similarities exist and the TCP/IP protocols are usually included in the discussion of OSI networking.

The most prominent component of the Internet model is the Internet Protocol (IP) which provides addressing systems (IP addresses) for computers on the Internet. IP enables internetworking and essentially establishes the Internet itself. IP Version 4 (IPv4) is the initial version used on the first generation of the today's Internet and is still in dominant use. It was designed to address up to ~4.3 billion (2^{32}) Internet hosts. However, the explosive growth of the Internet has led to IPv4 address exhaustion which is estimated to enter its final stage in approximately 2011. A new protocol version, IPv6, was developed in the mid 1990s which provides vastly larger addressing capabilities and more efficient routing of Internet traffic. IPv6 is currently in commercial deployment phase around the world and Internet address registries (RIRs) have begun to urge all resource managers to plan rapid adoption and conversion.

IPv6 is not interoperable with IPv4. It essentially establishes a “parallel” version of the Internet not directly accessible with IPv4 software. This means software upgrades or translator facilities are necessary for every networking device that needs to communicate on the IPv6 Internet. Most modern computer

operating systems are already converted to operate with both versions of the Internet Protocol. Network infrastructures, however, are still lagging in this development. Aside from the complex physical connections that make up its infrastructure, the Internet is facilitated by bi- or multi-lateral commercial contracts (e.g., peering agreements), and by technical specifications or protocols that describe how to exchange data over the network. Indeed, the Internet is defined by its interconnections and routing policies.

13.4 Hardware and Software Requirements

A 24x7 Internet connection is needed, with a dedicated IP address (DHCP is not usable), and a registered domain name. A small organization can manage with a DSL line or cable modem, as long as you get a dedicated IP address. Two DSL lines (with different IP addresses on separate networks, from different vendors) can be shared to increase uptime.

A computer collocated at a web hosting service (Internet data center) will have a faster and more reliable connection, but access to your database file will be only over the Internet. This is more expensive since the most web hosting services want you to rent a dedicated server to run a database-backed web application.

Domain Name Server(s), or Domain Name Service from your ISP/Web Host – The DNS can be configured to load balance between two Internet connections. If one connection fails, requests are directed to the other automatically.

Mail Server – Note that SMTP Server is needed for TimeLined Emails, and some Mail Servers conflict (compete for resources) with SMTP Server. As of 2003, SMTP server is more troublesome than it is worth and a separate Linux mail server with relay permissions for your web server address is recommended.

Celeron, Pentium II/III, Pentium 4 PC, 300MHz or higher recommended.

256MB of RAM (more will improve scalability).

Adequate hard drive space and speed. 100MB of free space minimum.

UltraDMA ATA drives are fine for small organizations (20GB to 80GB are very affordable). Raided Ultra-SCSI drives are more scalable for large organizations.

SVGA Monitor (800x600 minimum, small fonts).

Additional PCs on the LAN

External and Internal Firewalls.

Two Ethernet Network Interface Cards (NICs) are desirable in each machine. This allows you to have two ISP providers for redundancy. A UPS (Uninterruptible Power Supply) with at least one hour running time is strongly recommended. If your power fails, your telephone lines will probably not fail, so you can still serve. An AC generator (For power backup).

13.5 Types of Internet Connection

The Internet can be connected in many of ways dialing to computer and connecting to Internet service provider (ISP) directly. Some of the popular methods of connecting to Internet are discussed below:

Analog (up to 56k)

It is also called dial-up access, it is both economical and slow. Using a modem connected to your PC, users connect to the Internet when the computer dials a phone number (which is provided by your ISP) and connects to the network. Dial-up is an analog connection because data is sent over an analog, public telephone network. The modem converts received analog data to digital and vice versa. Because dial-up access uses normal telephone lines the quality of the connection is not always good and data rates are limited. Typical Dial-up connection speeds range from 2400 bps to 56 Kbps.

ISDN

Integrated services digital network (ISDN) is an international communications standard for sending voice, video, and data over digital telephone lines or normal telephone wires. Typical ISDN speeds range from 64 Kbps to 128 Kbps.

B-ISDN

Broadband ISDN (Intenerated Services digital Network) is similar in function to ISDN but it transfers data over fiber optic telephone lines, not normal telephone wires. SONET is the physical transport backbone of B-ISDN. Broadband ISDN has not been widely implemented.

DSL

Digital Subscriber Line (DSL) is also called an always on connection because it uses existing 2-wire copper telephone line connected to the premise and will not tie up your phone as a dial-up connection does. There is no need to dial-in to your ISP as DSL is always on. The two main categories of DSL for home subscribers are called ADSL and SDSL.

ADSL

Asymmetric Digital Subscriber Line (ADSL) is the most commonly deployed types of DSL in North America. Asymmetric Digital Subscriber Line (ADSL) supports data rates of from 1.5 to 9 Mbps when receiving data (known as the downstream rate) and from 16 to 640 Kbps when sending data (known as the upstream rate). ADSL requires a special ADSL modem.

ADSL+2

ADSL+2A is an extension to ADSL broadband technology that provides subscribers with significantly faster download speeds when compared to traditional ADSL connections. ADSL+2 works in the same fashion as ADSL a special filter is installed on a subscriber's telephone line to split existing copper telephone lines (POTS) between regular telephone (voice) and ADSL+2. ADSL+2, this service is commonly offered in highly-populated metropolitan areas and subscribers must be in close geographical locations to the provider's central office to receive ADSL2+ service.

SDSL

Symmetric Digital Subscriber Line (SDSL) is more common in Europe. It is a technology that allows more data to be sent over existing copper telephone lines (POTS). SDSL supports data rates up to 3 Mbps. SDSL works by sending digital pulses in the high-frequency area of telephone wires and can not operate simultaneously with voice connections over the same wires. SDSL requires a special SDSL modem. SDSL is called symmetric because it supports the same data rates for upstream and downstream traffic.

VDSL

Very High DSL (VDSL) is a DSL technology that offers fast data rates over relatively short distances — the shorter the distance, the faster the connection rate. All types of DSL technologies are collectively referred to as xDSL. xDSL connection speeds range from 128 Kbps to 8 Mbps.

Cable

Through the use of a cable modem you can have a broadband Internet connection that is designed to operate over cable TV lines. Cable Internet works by using TV channel space for data transmission, with certain channels used for downstream transmission, and other channels for upstream transmission. Because the coaxial cable used by cable TV provides much greater bandwidth than telephone lines, a cable modem can be used to achieve extremely fast access. Cable speeds range from 512 Kbps to 20 Mbps.

13.6 Wireless Internet Connections

Wireless Internet or wireless broadband is one of the newest Internet connection types. Instead of using telephone or cable networks for your Internet connection, you use radio frequency bands. Wireless Internet provides an always-on connection which can be accessed from anywhere — as long as you are geographically within a network coverage area. Wireless access is still considered to be relatively new, and it may be difficult to find a wireless service provider in some areas. It is typically more expensive and mainly available in metropolitan areas.

T-1 Lines

T-1 lines are a popular leased line option for businesses connecting to the Internet and for Internet Service Providers (ISPs) connecting to the Internet backbone. It is a dedicated phone connection supporting data rates of 1.544Mbps. A T-1 line actually consists of 24 individual channels, each of which supports 64Kbits per second. Each 64Kbit/second channel can be configured to carry voice or data traffic. Most telephone companies allow you to buy just one or some of these individual channels. This is known as fractional T-1 access.

Bonded T-1

A bonded T-1 is two or more T-1 lines that have been joined (bonded) together to increase bandwidth. Where a single T-1 provides approximately 1.5Mbps, two bonded T-1s provide 3Mbps or 48 channels for voice or data. Two bonded T-1s allow you to use the full bandwidth of 3Mbps where two individual T-1s can still only use a maximum of 1.5Mbps at one time. To be bonded the T-1 must run into the same router at the end, meaning they must run to the same ISP. T-1 Lines support speeds of 1.544 Mbps

Fractional T-1 speeds are 64 Kbps per channel (up to 1.544 Mbps), depending on number of leased channels. Typical Bonded T-1 (two bonded T-1 lines) speed is around 3 Mbps.

T-3 Lines

T-3 lines are dedicated phone connections supporting data rates of about 43 to 45 Mbps. It also is a popular leased line option. A T-3 line actually consists of 672 individual channels, each of which supports 64 Kbps. T-3 lines are used mainly by Internet Service Providers (ISPs) connecting to the Internet backbone and for the backbone itself. Typical T-3 supports speeds ranging from 43 to 45 Mbps.

OC3

Short for Optical Carrier, level 3 it is used to specify the speed of fiber optic networks conforming to the SONET standard. OC3 is typically used as a fiber optic. It is backbone for large networks with large voice, data, video, and traffic needs. Speeds are 155.52 Mbps, or roughly the speed of 100 T1 lines.

Satellite

Internet over Satellite (IoS) allows a user to access the Internet via a satellite that orbits the earth. A satellite is placed at a static point above the earth's surface, in a fixed position. Because of the enormous

distances signals must travel from the earth up to the satellite and back again, IoS is slightly slower than high-speed terrestrial connections over copper or fiber optic cables.

Typical Internet over Satellite connection speeds (standard IP services) average around 492 up to 512 Kbps.

13.7 Advantages of Internet

Internet has removed the limitation of geography and time. It has introduced the concept of 24x7 connectivity. Some of the advantages are discussed below:

Communication

The foremost target of Internet has always been the communication. And internet has excelled beyond the expectations. Still; innovations are going on to make it faster, more reliable. By the advent of computer's Internet, our earth has reduced and has attained the form of a global village.

Now we can communicate in a fraction of second with a person who is sitting in the other part of the world. Today for better communication, we can avail the facilities of e-mail; we can chat for hours with our loved ones. It is one of the cheapest and fastest medium for communication across the geography. There are plenty messenger services in offering. With help of such services, it has become very easy to establish a kind of global friendship where you can share your thoughts, and explore other cultures of different ethnicity.

Information

Information is probably the biggest advantage whatever Internet offers. The Internet is a virtual treasure trove of information. Any kind of information on any topic under the sun is available on the Internet. The search engines like Google, Yahoo is at your service on the Internet. You can almost find any type of data on almost any kind of subject that you are looking for. There is a huge amount of information available on the internet for just about every subject known to man, ranging from government law and services, trade fairs and conferences, market information, new ideas and technical support, the list is end less.

Students and youngsters are among the top users who surf the Internet for research. Today, it is almost required that students should use the Internet for research purpose and for gathering information from it. Teachers have started giving assignments. In forthcoming days, the researches of all disciplines will become easier and their outcomes will be available worldwide through Internet. Almost every coming day, researches on medical issues become much easier to locate. For example, In medical science, doctors will be available on line to discuss about the diseases. According to a report, 20 million people have retrieved health information through internet during 1998h information.

Entertainment

Entertainment is another popular reason why many people prefer to surf the Internet. In fact, media of Internet has become quite successful in trapping multifaceted entertainment factor. Downloading games, visiting chat rooms or just surfing the Web are some of the uses people have discovered. There are numerous games that may be downloaded from the Internet for free. The industry of online gaming has tasted dramatic and phenomenal attention by game lovers. Chat rooms are popular because users can meet new and interesting people. In fact, the Internet has been successfully used by people to find life long partners. When people surf the Web, there are numerous things that can be found. Music, hobbies, news and more can be found and shared on the Internet.

Services

Many services are now provided on the internet such as online banking, job seeking, purchasing

tickets for your favorite movies, guidance services on array of topics engulfing the every aspect of life, and hotel reservations. Often these services are not available off-line and can cost you more. Social networking sites have given a new dimension to integration and social awareness through its community building and discussion forums etc.

E-Commerce

E-Commerce is the concept used for any type of commercial maneuvering, or business deals that involves the transfer of information across the globe via Internet. It has become a phenomenon associated with any kind of shopping, almost anything. You name it and E-Commerce with its giant tentacles engulfing every single product and service will make you available at your doorsteps. It has got a real amazing and wide range of products from household needs, technology to entertainment.

13.8 Disadvantages of Internet

Theft of Personal information

If you use the Internet, you have a risk also as your personal information such as name, address, credit card number etc. can be accessed by other culprits who may put you in a problem. Spamming refers to sending unwanted e-mails in bulk, which provide no purpose and needlessly obstruct the entire system. Such illegal activities can be very frustrating. You should make an effort to stop these activities so that using the Internet can become much safer.

Virus Threat

Virus is nothing but a program which disrupts the normal functioning of your computer systems. Computers attached to internet are more prone to virus attacks and they can end up into crashing your whole hard disk, causing you considerable headache.

Pornography

This is perhaps the biggest threat related to your children's healthy mental life and a very serious issue concerning the Internet. There are thousands of pornographic sites on the Internet that can be easily found and can be a detrimental factor to letting children use the Internet. Though, internet can also create havoc, destruction and its misuse can be very fatal, yet the advantages of it outweigh its disadvantages.

13.9 Key Words

- **Internet:** Interconnection of computers across the globe for the purpose of exchange of Information.
- **WWW:** World wide web is a service available over internet
- **TCP/IP:** Transmission Control protocol/ Internet Protocol used to send and received data on internet.
- **Server:** A high configuration computer which provide variety of services to client/ user.

13.10 Self Assessment Test

- What is Internet? How does it work?
- Discuss different type of Internet connection.
- What are the hardware and software requirements for internet.
- List all the advantages and disadvantages of internet?

- Visit a website of your choice and explain various features and services available on this website.
- What do you mean by protocols.

13.11 Reference Books

- Internet Complete : BPB Publications. New Delhi.
- Fundamental of Information Technology, New Age Publication.

UNIT – 14 : INTERNET TOOLS

Unit Structure

- 14.0 Objectives
- 14.1 Modems
- 14.2 World Wide Web
- 14.3 E-mails
- 14.4 Chat
- 14.5 Browsers
- 14.6 Search Engines
- 14.7 Intranet
- 14.8 Extranet
- 14.9 Summary
- 14.10 Key Words
- 14.11 Self Assessment Test
- 14.12 Reference Books

14.0 Objectives

After studying this unit you should be able to understand:

- Need and Importance of MODEMS.
- Understand of working of WWW.
- Identify key concept of e-mail and chat.
- Requirement and Working of Browsers.
- Working and Importance of Search Engines.
- Concept of Intranet.
- Use and Benefit of Intranet.
- Concept of Extranet.
- Use and Benefit of Extranet.

14.1 Modems

A modem (modulator-demodulator) is a device that modulates an analog carrier signal to encode digital information, and also demodulates such a carrier signal to decode the transmitted information. The goal is to produce a signal that can be transmitted easily and decoded to reproduce the original digital data. Modems can be used over any means of transmitting analog signals, from driven diodes to radio.

The most familiar example is a voice band modem that turns the digital data of a personal computer into analog audio signals that can be transmitted over a telephone line, and once received on the other side, a modem converts the analog data back into digital.

Modems are generally classified by the amount of data they can send in a given time, normally measured in bits per second (bit/s, or bps). They can also be classified by Baud, the number of times the modem changes its signal state per second. For example, the ITU V.21 standard used audio frequency-shift keying, aka tones, to carry 300 bit/s using 300 baud, whereas the original ITU V.22 standard allowed 1,200 bit/s with 600 baud using phase-shift keying.

Faster modems are used by Internet users every day, notably cable modems and ADSL modems. In telecommunications, wide-band radio modems transmit repeating frames of data at very high data rates

over microwave radio links. Narrow-band radio modem is used for low data rate up to 19.2k mainly for private radio networks. Some microwave modems transmit more than a hundred million bits per second. Optical modems transmit data over optical fibers. Most intercontinental data links now use optical modems transmitting over undersea optical fibers. Optical modems routinely have data rates in excess of a billion (1x10⁹) bits per second. One kilobit per second (kbit/s, kb/s, or kbps) as used in this article means 1,000 bits per second and not 1,024 bits per second. For example, a 56k modem can transfer data at up to 56,000 bit/s (7 kB/s) over the phone line.

14.2 World Wide Web (WWW)

The World Wide Web, abbreviated as WWW or W3 and commonly known as the Web, is a system of interlinked hypertext documents accessed via the Internet. In other words WWW is an Internet service comprising 10s of thousands of independently owned computers that work together as one. These computers are called web servers which are scattered all over the world and content every imaginable type of data. With a web browser, one can view web pages that may contain text, images, videos, and other multimedia and navigate between them by using hyperlinks. Using concepts from earlier hypertext systems, English engineer and computer scientist Sir Tim Berners-Lee, wrote a proposal in March 1989 for what would eventually become the World Wide Web. He was later joined by Belgian computer scientist Robert Cailliau while both were working at CERN in Geneva, Switzerland. In 1990, they proposed using HyperText to link and access information of various kinds as a web of nodes in which the user can browse at will and released that web in December.

The terms Internet and World Wide Web are often used in every-day speech without much distinction. However, the Internet and the World Wide Web are not one and the same. The Internet is a global system of interconnected computer networks. In contrast, the Web is one of the services that run on the Internet. It is a collection of interconnected documents and other resources, linked by hyperlinks and URLs. In short, the Web is an application running on the Internet. Viewing a web page on the World Wide Web normally begins either by typing the URL of the page into a web browser, or by following a hyperlink to that page or resource. The web browser then initiates a series of communication messages, behind the scenes, in order to fetch and display it.

First, the server-name portion of the URL is resolved into an IP address using the global, distributed Internet database known as the domain name system, or DNS. This IP address is necessary to contact the Web server. The browser then requests the resource by sending an HTTP request to the Web server at that particular address. In the case of a typical web page, the HTML text of the page is requested first and parsed immediately by the web browser, which then makes additional requests for images and any other files that form parts of the page. Statistics measuring a website's popularity is usually based either on the number of 'page views' or associated server 'hits' (file requests) that take place.

While receiving these files from the web server, browsers may progressively render the page onto the screen as specified by its HTML, CSS, and other web languages. Any images and other resources are incorporated to produce the on-screen web page that the user sees. Most web pages will themselves contain hyperlinks to other related pages and perhaps to downloads, source documents, definitions and other web resources. Such a collection of useful, related resources, interconnected via hypertext links, is what was dubbed a "web" of information. Making it available on the Internet created what Tim Berners-Lee first called the WorldWideWeb (in its original CamelCase, which was subsequently discarded) in November 1990.

Many web addresses begin with **www**, because of the long-standing practice of naming Internet hosts (servers) according to the services they provide. The hostname for a web server is often **www**, as it is **ftp** for an FTP server, and **news** or **nnntp** for a USENET news server. These host names appear as

Domain Name System (DNS) subdomain names, as in www.example.com. The use of such subdomain names is not required by any technical or policy standard; indeed, the first ever web server was called nxoc01.cern.ch, and many web sites exist without a www subdomain prefix, or with some other prefix such as “www2”, “secure”, etc. These subdomain prefixes have no consequence; they are simply chosen names. Many web servers are set up such that both the domains refer to the same site, others require one form or the other, or they may map to different web sites.

When a single word is typed into the address bar and the return key is pressed, some web browsers automatically try adding “www.” to the beginning of it and possibly “.com”, “.org” and “.net” at the end. For example, typing ‘apple<enter>’ may resolve to <http://www.apple.com/> and ‘openoffice<enter>’ to <http://www.openoffice.org>. This feature was beginning to be included in early versions of Mozilla Firefox (when it still had the working title ‘Firebird’) in early 2003. It is reported that Microsoft was granted a US patent for the same idea in 2008, but only with regard to mobile devices.

The ‘<http://>’ or ‘<https://>’ part of web addresses does have meaning. These refer to Hypertext Transfer Protocol and to HTTP Secure and so define the communication protocol that will be used to request and receive the page, image or other resource. The HTTP network protocol is fundamental to the way the World Wide Web works, and the encryption involved in HTTPS adds an essential layer if confidential information such as passwords or bank details are to be exchanged over the public internet. Web browsers often prepend this ‘scheme’ part to URLs too, if it is omitted. Despite this, Berners-Lee himself has admitted that the two forward slashes (//) were in fact initially unnecessary.

In overview, RFC 2396 defines web URLs to have the following form:

<scheme>://<authority><path>?<query>#<fragment>

1. Internet Addressing

Each computer on the Internet has a numerical address, called an IP address. Which is unique in nature used to identify computer or other resources on Internet. For example, the numerical address of the Devi Ahilya University, Indore web server is 172.16.1.4. Because the numbers are hard to remember, popular servers on the Internet have names associated with their numbers. For example, the name associated with the Devi Ahilya University web server is www.dauniv.ac.in.

There are several parts to an internet name:

2. Top Level Domain (TLD)

This is the last part of the name. It can be .com for commercial companys purpose, .org for non profit organizations, .net for network infrastructure providers, .edu for educational institutions, .mil for military, .gov for government, or a code for a country, for example, .us for United States or .jp for Japan or .in for India.

3. Domain Name

This is the middle part of the name and often the most important. It is specific to the company / organization. Example: google, yahoo, dauniv.

4. Host Name

This is the name of the server within the company, usually named after the service provided. Example: www, [ftp](ftp://), news, [mail](mailto:).

5. Method / Scheme

This is the method used for the communication. It is usually a few letters followed by a colon and two forward slashes. Example: <http://> for web connections, <ftp://> for ftp connections.

14.3 E-mails

Electronic mail, most commonly abbreviated email or e-mail, is a method of exchanging digital messages. E-mail systems are based on a store-and-forward model in which e-mail server computer systems accept, forward, deliver and store messages on behalf of users, who only need to connect to the e-mail infrastructure, typically an e-mail server, with a network-enabled device for the duration of message submission or retrieval. Originally, e-mail was always transmitted directly from one user's device to another's; nowadays this is rarely the case.

An electronic mail message consists of two components, the message header, and the message body, which is the email's content. The message header contains control information, including, minimally, an originator's email address and one or more recipient addresses. Usually additional information is added, such as a subject header field.

The foundation for today's global Internet e-mail service was created in the early ARPANET and standards for encoding of messages were proposed as early as 1973 (RFC 561). An e-mail sent in the early 1970s looked very similar to one sent on the Internet today. Conversion from the ARPANET to the Internet in the early 1980s produced the core of the current service.

Network-based e-mail was initially exchanged on the ARPANET in extensions to the File Transfer Protocol (FTP), but is today carried by the Simple Mail Transfer Protocol (SMTP), first published as Internet standard 10 (RFC 821) in 1982. In the process of transporting e-mail messages between systems, SMTP communicates delivery parameters using a message envelope separately from the message (header and body) itself.

Most modern graphic e-mail clients allow the use of either plain text or HTML for the message body at the option of the user. HTML e-mail messages often include an automatically-generated plain text copy as well, for compatibility reasons.

Advantages of HTML include the ability to include in-line links and images, set apart previous messages in block quotes, wrap naturally on any display, use emphasis such as underlines and italics, and change font styles. Disadvantages include the increased size of the email, privacy concerns about web bugs, abuse of HTML email as a vector for phishing attacks and the spread of malicious software.

Mailing lists commonly insist that all posts to be made in plain-text for all the above reasons, but also because they have a significant number of readers using text-based e-mail clients such as Mutt. Some Microsoft e-mail clients allow rich formatting using RTF, but unless the recipient is guaranteed to have a compatible e-mail client this should be avoided.

In order to ensure that HTML sent in an email is rendered properly by the recipient's client software, an additional header must be specified when sending: "Content-type: text/html". Most email programs send this header automatically.

14.4 Chat

Chatting is to communicate with others on the Internet. It is analogous to face-to-face conversation or telephone conversation. The only difference is that on Internet conversation is done via typing the text. This is usually done in a chat room while typing. Chatting can be done on a one to one basis or in a group.

On the Internet, chatting is talking to other people who are using the Internet at the same time. Usually, this "talking" is the exchange of typed-in messages requiring one site as the repository for the messages (or "chat site") and a group of users who take part from anywhere on the Internet. In some cases, a private chat can be arranged between two parties who meet initially in a group chat. Chats can be

ongoing or scheduled for a particular time and duration. Most chats are focused on a particular topic of interest and some involve guest experts or famous people who “talk” to anyone joining the chat. Voice and video chat is another option, but you must have microphone, web cam, sound card, headphone, a fast modem and voice chat software compatible with that of the other participants. Internet Relay Chat (IRC) is a system for chatting that involves a set of rules and conventions and client/server software.

Internet chatting involves real-time instant text messaging between two or more users in chat rooms. They are many different types of Internet chats all with different purposes. Internet chatting has its advantages and disadvantages; therefore it is important to understand them so that you do not fall victim to predators who would seek to harm you. Some of the important rules for safe chatting:

Internet chat rooms allow you to communicate with different kinds of people from all over the world. They allow you to meet different kinds of people who share similar interests, goals, hobbies and desires. Internet chats can also be a great learning center (e.g. chatting forums) where people can ask questions and receive answers on products and services, computer troubleshooting and more.

Singles chat rooms are probably the most common chats on the internet. They managed and run by dating websites. Video/Webcam chats are also common forms of chatting because they allow you to view your contact as you chat. While video chatting is the most interactive form of chatting but they are also the most dangerous. Other Internet chats include business chat rooms, which allow speedy exchange of trade stock tips, and business related information.

Internet chats not only allow you to send and receive instant messages, they also allow you to share pictures, and files. Some Internet chat rooms include emoticons which are smiley faces used to describe what your present emotion. Some Internet chats include sound effects which range from serious to silly and allow you to. Other chat rooms allow you to change color combinations to create a theme or background that works for you as you are chatting.

Now a days it is a serious matter of concern regarding identity, theft and fraud, it is important to protect personal information at all costs. If you have youngsters who are using chat rooms, monitor the conversations and the people they communicates with. There are many Internet predators, pedophiles and sex offenders who send explicit information and pictures to underage children. Always read the rules and regulations before using chat rooms.

Because an Internet chat website claims that their chat rooms are secure but it does not mean that people cannot be exploited. While many Internet chat websites may have a set of governing rules, but rules can still be broken. Because a chat room is labeled “Children’s chat room” does not mean everyone is a child. Any online predator can create a screen name and log into a children’s chat room; therefore it is important to still monitor chat rooms and conversations.

14.5 Browsers

Browsers or Web browser is a software application that allows for the browsing of the World Wide Web or Internet. It acts as an intermediate application between user and the Internet. It can be defined a web browser as a computer program, used for accessing sites or information on a network (as the World Wide Web). This is a simple, and accurate description. Web browsers have many different styles, each with their own nuances. However, a person who utilizes a web browser, can view web pages on the Internet. What ever you view during your net surfing session is result of web browser.

The browser application retrieves or fetches code, usually written in Hyper Text Markup Language (HTML) and/or another language, from a web server, interprets this code, and renders (displays) it as a web page on users screen. Web Browser work on the principle of action and reaction. User's interaction is needed to tell the browser what web site or specific web page he or she would like to view. One way this is done is via the browser's address bar.

The web address, or URL (Uniform Resource Locator), that you type into the browser's address bar tells the browser where to obtain a page/s. For example, let's say that you typed the following URL into the browser's address bar: *http://www.dauniv.ac.in/Admission_2010.php*

In this case, you're attempting to reach the admission section of Devi Ahilya university website. The browser looks at this particular URL in two main sections. The first is the protocol, which in the address shown is "http://". HTTP, which stands for Hyper Text Transfer Protocol, is the standard protocol used to request and transmit files on the Internet, mostly web pages and their respective components. Since the browser now knows that the protocol is HTTP, it knows how to interpret everything located to the right of the forward slashes. It now looks at "dauniv.ac.in", which tells the browser the location of the web server it needs to retrieve the page or pages from.

14.5.1 Components of the Web browser

14.5.1.1 Status bar: This is the box at the bottom of your browser window. The status bar displays all sorts of information, depending on what you're doing at the time, but mostly it's for showing load speed and the URL of whatever address your mouse is hovering over.

14.5.1.2 Address bar: This is the box at the top of your browser window that displays the entire URL, or Web site address.

14.5.1.3 Title bar: The title bar is at the very top of your browser window; in both Firefox and Internet Explorer it is the blue bar at the top of the window. You'll see the title of the Web page there.

14.5.1.4 Toolbar Icons: The toolbar and its icons are at the top of your browser window right underneath the Title Bar. This is where you'll see the Back button, the Home button, the Refresh button, etc.

14.5.1.5 Display Window: The Display Window is just a fancy term for your browser workspace; it's the frame through which you see any website.

14.5.1.6 Scroll Bars: If you've ever been to a website that you had to "scroll down" to read something, then you've used the scroll bars. They're just navigational/directional aids.

Everything that is produced for the WWW must take various Web browsers into consideration, and marketing is no exception. Different browsers can have radically different capabilities and limitations. Some sites try to support almost all existing browsers, while others try to support only the newest and most popular browsers. Some of the Popular Web Browsers are:

- 1. Microsoft's Internet Explorer:** Most Internet users are using Internet Explorer because it's easy to use and the most Web sites are written with Internet Explorer in mind, meaning that they are compatible.
- 2. Mozilla's Firefox:** Firefox is rapidly gaining ground because of its tabbed browsing, superior security features, and fast load.

3. **Opera:** Opera is another popular browser that's easy to use; however, it can have some compatibility issues with certain websites.
4. **Mac Safari:** Specifically for Mac users, Safari is an excellent choice for a Web browser, with fast load and good compatibility with most websites out there.

14.6 Search Engines

A web search engine is designed to search for information on the World Wide Web. The search results are usually presented in a list of results and are commonly called hits. The information may consist of web pages, images, information and other types of files. Some search engines also mine data available in databases or open directories. Unlike Web directories, which are maintained by human editors, search engines operate algorithmically or are a mixture of algorithmic and human input.

14.6.1 Growth of Search Engine

During the early development of the web, there was a list of web servers edited by Tim Berners-Lee and hosted on the CERN web server.

The very first tool used for searching on the Internet was Archie. The name stands for "archive" without the "v." It was created in 1990 by Alan Emtage, a student at McGill University in Montreal. The program downloaded the directory listings of all the files located on public anonymous FTP (File Transfer Protocol) sites, creating a searchable database of file names; however, Archie did not index the contents of these sites.

The rise of Gopher means go far (created in 1991 by Mark McCahill at the University of Minnesota) led to two new search programs, Veronica and Jughead. Like Archie, they searched the file names and titles stored in Gopher index systems. Veronica (Very Easy Rodent-Oriented Net-wide Index to Computerized Archives) provided a keyword search of most Gopher menu titles in the entire Gopher listings. Jughead (Jonzy's Universal Gopher Hierarchy Excavation and Display) was a tool for obtaining menu information from specific Gopher servers. While the name of the search engine "Archie" was not a reference to the Archie comic book series, "Veronica" and "Jughead" are characters in the series, thus referencing their predecessor.

In the summer of 1993, no search engine existed yet for the web, though numerous specialized catalogues were maintained by hand. Oscar Nierstrasz at the University of Geneva wrote a series of Perl scripts that would periodically mirror these pages and rewrite them into a standard format which formed the basis for W3Catalog, the web's first primitive search engine, released on September 2, 1993.

In June 1993, Matthew Gray, then at MIT, produced what was probably the first web robot, the Perl-based World Wide Web Wanderer, and used it to generate an index called 'Wandex'. The purpose of the Wanderer was to measure the size of the World Wide Web, which it did until late 1995. The web's second search engine Aliweb appeared in November 1993. Aliweb did not use a web robot, but instead depended on being notified by website administrators of the existence at each site of an index file in a particular format.

JumpStation (released in December 1993) used a web robot to find web pages and to build its index, and used a web form as the interface to its query program. It was thus the first WWW resource-discovery tool to combine the three essential features of a web search engine (crawling, indexing, and searching) as described below. Because of the limited resources available on the platform on which it ran, its indexing and hence searching were limited to the titles and headings found in the web pages the crawler encountered.

One of the first “full text” crawler-based search engines was WebCrawler, which came out in 1994. Unlike its predecessors, it let users search for any word in any webpage, which has become the standard for all major search engines since. It was also the first one to be widely known by the public. Also in 1994, Lycos (which started at Carnegie Mellon University) was launched and became a major commercial endeavor.

Soon after, many search engines appeared and vied for popularity. These included Magellan, Excite, Infoseek, Inktomi, Northern Light, and AltaVista. Yahoo! was among the most popular ways for people to find web pages of interest, but its search function operated on its web directory, rather than full-text copies of web pages. Information seekers could also browse the directory instead of doing a keyword-based search.

In 1996, Netscape was looking to give a single search engine an exclusive deal to be their featured search engine. There was so much interest that instead a deal was struck with Netscape by five of the major search engines, where for \$5 Million per year each search engine would be in a rotation on the Netscape search engine page. The five engines were Yahoo!, Magellan, Lycos, Infoseek, and Excite.

Search engines were also known as some of the brightest stars in the Internet investing frenzy that occurred in the late 1990s. Several companies entered the market spectacularly, receiving record gains during their initial public offerings. Some have taken down their public search engine, and are marketing enterprise-only editions, such as Northern Light. Many search engine companies were caught up in the dot-com bubble, a speculation-driven market boom that peaked in 1999 and ended in 2001.

Around 2000, the Google search engine rose to prominence. The company achieved better results for many searches with an innovation called PageRank. This iterative algorithm ranks web pages based on the number and PageRank of other web sites and pages that link there, on the premise that good or desirable pages are linked to more than others. Google also maintained a minimalist interface to its search engine. In contrast, many of its competitors embedded a search engine in a web portal.

By 2000, Yahoo was providing search services based on Inktomi’s search engine. Yahoo! acquired Inktomi in 2002, and Overture (which owned AlltheWeb and AltaVista) in 2003. Yahoo! switched to Google’s search engine until 2004, when it launched its own search engine based on the combined technologies of its acquisitions.

Microsoft first launched MSN Search in 1998 using search results from Inktomi. In early 1999 the site began to display listings from Looksmart blended with results from Inktomi except for a short time in 1999 when results from AltaVista were used instead. In 2004, Microsoft began a transition to its own search technology, powered by its own web crawler (called msnbot).

Microsoft’s rebranded search engine, Bing, was launched on June 1, 2009. On July 29, 2009, Yahoo! and Microsoft finalized a deal in which Yahoo! Search would be powered by Microsoft Bing technology.

According to Hitbox, Google’s worldwide popularity peaked at 82.7% in December, 2008. July 2009 rankings showed Google (78.4%) losing traffic to Baidu (8.87%), and Bing (3.17%). The market share of Yahoo! Search (7.16%) and AOL (0.6%) were also declining.

In the United States, Google held a 63.2% market share in May 2009, according to Nielsen NetRatings.[10] In the People’s Republic of China, Baidu held a 61.6% market share for web search in July 2009.

14.6.2 How web search engines work?

A search engine operates in the following order

1. Web crawling
2. Indexing
3. Searching

Web search engines work by storing information about many web pages, which they retrieve from the html itself. These pages are retrieved by a Web crawler (sometimes also known as a spider) — an automated Web browser which follows every link on the site. Exclusions can be made by the use of robots.txt. The contents of each page are then analyzed to determine how it should be indexed (for example, words are extracted from the titles, headings, or special fields called meta tags). Data about web pages are stored in an index database for use in later queries. A query can be a single word. The purpose of an index is to allow information to be found as quickly as possible. Some search engines, such as Google, store all or part of the source page (referred to as a cache) as well as information about the web pages, whereas others, such as AltaVista, store every word of every page they find. This cached page always holds the actual search text since it is the one that was actually indexed, so it can be very useful when the content of the current page has been updated and the search terms are no longer in it. This problem might be considered to be a mild form of linkrot, and Google's handling of it increases usability by satisfying user expectations that the search terms will be on the returned webpage. This satisfies the principle of least astonishment since the user normally expects the search terms to be on the returned pages. Increased search relevance makes these cached pages very useful, even beyond the fact that they may contain data that may no longer be available elsewhere.

When a user enters a query into a search engine (typically by using key words), the engine examines its index and provides a listing of best-matching web pages according to its criteria, usually with a short summary containing the document's title and sometimes parts of the text. The index is built from the information stored with the data and the method by which the information is indexed. Unfortunately, there are currently no known public search engines that allow documents to be searched by date. Most search engines support the use of the boolean operators AND, OR and NOT to further specify the search query. Boolean operators are for literal searches that allow the user to refine and extend the terms of the search. The engine looks for the words or phrases exactly as entered. Some search engines provide an advanced feature called proximity search which allows users to define the distance between keywords. There is also concept-based searching where the research involves using statistical analysis on pages containing the words or phrases you search for. As well, natural language queries allow the user to type a question in the same form one would ask it to a human. A site like this would be ask.com.

The usefulness of a search engine depends on the relevance of the result set it gives back. While there may be millions of web pages that include a particular word or phrase, some pages may be more relevant, popular, or authoritative than others. Most search engines employ methods to rank the results to provide the "best" results first. How a search engine decides which pages are the best matches, and what order the results should be shown in, varies widely from one engine to another. The methods also change over time as Internet usage changes and new techniques evolve. There are two main types of search engine that have evolved: one is a system of predefined and hierarchically ordered keywords that humans have programmed extensively. The other is a system that generates an "inverted index" by analyzing texts it locates. This second form relies much more heavily on the computer itself to do the bulk of the work.

Most Web search engines are commercial ventures supported by advertising revenue and, as a result, some employ the practice of allowing advertisers to pay money to have their listings ranked higher in search results. Those search engines which do not accept money for their search engine results make money by running search related ads alongside the regular search engine results. The search engines make money every time someone clicks on one of these ads.

14.6.3 Major Search Engines :

1. Ask.com (formerly Ask Jeeves)
2. Baidu (Chinese, Japanese)
3. Bing (formerly MSN Search and Live Search)
4. Cuil
5. Duck Duck Go
6. Google
7. Kosmix
8. Sogou (Chinese)
9. Yodao (Chinese)
10. Yahoo! Search
11. Yandex (Russian)
12. Yebol

14.7 Intranet

An intranet is a private computer network that uses Internet Protocol technologies (TCP/IP) to securely share any part of an organization's information or network operating system within that organization. The term is used in contrast to Internet, a network between organizations, and instead refers to a network within an organization. Sometimes the term refers only to the organization's internal website, but may be a more extensive part of the organization's information technology infrastructure. It may host multiple private websites and constitute an important component and focal point of internal communication and collaboration.

An intranet is built from the same concepts and technologies used for the Internet, such as client-server computing and the Internet Protocol Suite (TCP/IP). Any of the well known Internet protocols may be found in an intranet, such as HTTP (web services), SMTP (e-mail), and FTP (file transfer). Internet technologies are often deployed to provide modern interfaces to legacy information systems hosting corporate data.

Intranets may provide a gateway to the Internet by means of a network gateway with a firewall, shielding the intranet from unauthorized external access. The gateway often also implements user authentication, encryption of messages, and often virtual private network (VPN) connectivity for off-site employees to access company information, computing resources and internal communication. Intranets can also help users to locate and view information faster and use applications relevant to their roles and responsibilities.

14.7.1 Uses & Benefits

Intranets help users to locate and view information faster and use applications relevant to their roles and responsibilities. Intranets allow organizations to distribute information to employees on an as-needed basis; Employees may link to relevant information at their convenience, rather than being distracted indiscriminately by electronic mail.

Intranets can serve as powerful tools for communication within an organization, vertically and horizontally. From a communications standpoint, intranets are useful to communicate strategic initiatives that have a global reach throughout the organization. The type of information that can easily be conveyed is the purpose of the initiative and what the initiative is aiming to achieve, who is driving the initiative, results achieved to date, and who to speak to for more information. By providing this information on the intranet, staff has the opportunity to keep up-to-date with the strategic focus of the organization. Some examples of communication would be chat, email, and or blogs. A great real world example of where an intranet helped a company communicate is when Nestle had a number of food processing plants in Scandinavia. Their central support system had to deal with a number of queries every day (McGovern, Gerry). When Nestle decided to invest in an intranet, they quickly realized the savings. McGovern says the savings from the reduction in query calls was substantially greater than the investment in the intranet.

Web publishing allows cumbersome corporate knowledge to be maintained and easily accessed throughout the company using hypermedia and Web technologies. Examples include: employee manuals, benefits documents, company policies, business standards, newsfeeds, and even training, can be accessed using common Internet standards (Acrobat files, Flash files, CGI applications). Because each business unit can update the online copy of a document, the most recent version is always available to employees using the intranet.

Users can view information and data via web-browser rather than maintaining physical documents such as procedure manuals, internal phone list and requisition forms. This can potentially save the business money on printing, duplicating documents, and the environment as well as document maintenance overhead. "PeopleSoft, a large software company, has derived significant cost savings by shifting HR processes to the intranet". Gerry McGovern goes on to say the manual cost of enrolling in benefits was found to be USD109.48 per enrollment.

Promote common corporate culture: Every user is viewing the same information within the Intranet. With information easily accessible by all authorized users, teamwork is enabled. Being able to specifically address your "viewer" is a great advantage. Since Intranets are user specific (requiring database/network authentication prior to access), you know exactly who you are interfacing with. So, you can personalize your Intranet based on role (job title, department) or individual ("Congratulations Jane, on your 3rd year with our company!"). The intranet can also be linked to a company's management information system, for example a time keeping system.

14.8 Extranet

An extranet is a private network that uses Internet protocols, network connectivity. An extranet can be viewed as part of a company's intranet that is extended to users outside the company, usually via the Internet. It has also been described as a "state of mind" in which the Internet is perceived as a way to do business with a selected set of other companies (business-to-business, B2B), in isolation from all other Internet users. In contrast, business-to-consumer (B2C) models involve known servers of one or more companies, communicating with previously unknown consumer users.

An extranet can be understood as an intranet mapped onto the public Internet or some other transmission system not accessible to the general public, but managed by more than one company's administrator(s). For example, military networks of different security levels may map onto a common military radio transmission system that never connects to the Internet. Any private network mapped onto a public one is a virtual private network (VPN), often using special security protocols.

14.8.1 Uses & Benefits

- Exchange large volumes of data using Electronic Data Interchange (EDI).

- Share product catalogs exclusively with trade partners.
- Collaborate with other companies on joint development efforts.
- Jointly develop and use training programs with other companies.
- Provide or access services provided by one company to a group of other companies, such as an online banking application managed by one company on behalf of affiliated banks.
- Share news of common interest exclusively.

14.9 Summary

Intranet and extranet are subset of Internet when you are dealing with network organization where internal users are allowed to access some of the resources in the organization is called intranet i.e. internal internet of the organization. An extranet is private network that uses internet technology. An extranet can be viewed as a part of companies intranet that is extended to external user to that company. These technologies are very popular in B2B and B2C application. Modems are devices which allow us to send and receive digital data on Telephone line its consist of to process modulation(MODE) and Demodulation (DEM). World Wide Web is a system of interlinked Hypertext documents accessed via Internet. its a service available on Internet. The Most use application on Internet based on a protocols to enable messages containing text graphics images sound and video clips to transferred from one Internet user to another. face to face electronics conversation by exchanging typed text is called chat. Browser is a software application which act an interface between Internet, its services and user. its a graphical user interface results in popularity of internet services among the masses. Search engine are software application which allow us to locate information of our choice on Internet.

14.10 Key Words

- **HTTP:** Hyper Text Transfer Protocol use to transfer text on web.
- **WWW:** World wide web is a service available over internet
- **HTTP/s:** Secure Hyper Text Transfer Protocol.
- **Modem:** A device to use telephone line for internet connection.
- **Browser:** A software which act as interface for using internet.
- **URL:** Uniform Resource Locator is the scheme locating address in web
- **Email :** Electronic Mail are analog to physical mail. this mail is delivered to receiver on the basis of unique email account using internet.
- **Intranet:** A network within the organization where access can be restricted to Identify users with login password
- **Extranet:** A intranet mapped on to the public internet where restricted access will be given external user.
- **EDI:** Electronic Data interchange is a method of exchanging data between computers.
- **VPN:** Virtual Private Network is proprietary connectivity between two or more destination.

- **B2B** : Business to Business Transaction occurs by Interaction of two business entities
- **B2C** : Business to Consumer transaction occurs when business are interacted by end user that is consumer.

14.11 Self Assessment Test

1. Explain the working of MODEM.
2. Describe the feature of email available with any free email service provider like gmail or rediffmail.
3. Describe any URL known to you.
4. Explain the use of search engines. How it enables us to search any information.
5. Describe the feature of any web browser known to you.
6. Explain the concept of Intranet.
7. Give various uses of Intranet in business
8. Explain Extranet. How it is different from Intranet
9. Visit an Extranet of any organization and write various features of the Extranet
10. Visit an Intranet of any organization and write various features of the Intranet

14.12 Reference Books

- Intranet Unleashed ; A Complete Reference
- Internet Complete Second Edition BPB Publication, New Delhi
- E-Commerce; Business Technology Society by Kenneth C Laudon & Carol Guercio Traver, Pearson Education.
- Introduction to Information Technology; ITL Education Solutions Ltd., Pearson Education

UNIT - 15 : INFORMATION TECHNOLOGY : AN OVERVIEW

Unit Structure

- 15.0 Objectives
- 15.1 Introduction
- 15.2 Components of Information Technology
- 15.3 Information Technology Evolution
- 15.4 Role of Information Technology
- 15.5 Impact of IT in Business
- 15.6 Future of IT in Business
- 15.7 Summary
- 15.8 Key Words
- 15.9 Self Assessment Test
- 15.10 Reference Books

15.0 Objectives

After reading this unit, you will be able to understand

- The basics of Information Technology(IT)
- The meaning of IT and its components
- How IT fits into the present scenario
- The role of IT in various areas
- The relationship between IT and Internet
- Impact and Future of IT in business

15.1 Introduction

The world is changing at a fast speed. These changes can be seen in every aspect of life. The impact of technology can be felt in various areas market, home, office, business activities etc. Information can be easily collected, stored process & transfer using technology. Information is essential for the development of good management practices. It plays a very important role in drawing a conclusion. The merging of information with Technology leads to new branch known as Information technology. It involves collection, storage data retrieval, transfer, process and dissemination of information by a computers and otherrelated technology. This is possible through the use of hardware, software and supporting infrastructure to manage and deliver information.

The Information Technology (IT) refers to creation, gathering, processing, storage, delivery of information, the processes & devices that make all this possible. These processes & devices act like a tool that make our life more efficient. Use of computer in day to day activity booking of Railway tickets, interactive voice response system of telephone company and railway enquiry. Smart cards which include driving license and registration card etc are some of the example of information technology.

Information Technology can do at least three things :

- It can process raw data into useful information
- It can recycle processed information and use it as data in another processing step.
- It can package information in a new form so it's easier to understand

Data can originate from the internal operations of the firm and also from external entities such as suppliers or customers. Data is also taken from external sources as a secondary data in the form of database & services. For example, organizations purchase a great deal of marketing and competitive information from private consultancy services and Brokerage firms who provide a variety of research information on different companies.

An information system usually processes these data in some way and presents the results to users. With the easy availability of personal computers. Users often process the output of a formal system themselves in an ad hoc manner. Human interpretation of information is extremely important in understanding how an organization reacts to the output of a system.

Information Technology however, extends far beyond the computational capabilities of computers. Today computers are used extensively for communications as well as for their traditional roles of data storage and computation. Many computers are connected together various kinds of communications lines to form networks. There are more than 43 million host computers. For example, on the Internet, and over 100 million computers around the world access it, an estimated 70 million of which are in the U.S.

Information technology can be defined as a hybrid technological application developed using variety of technologies including computer, microprocessor, storage media, data retrieval methods, communication technology some decision making etc. The IT field is dynamic in nature as it keeps as developing new application by merging these mentioned technologies with other technology.

Information Technology includes the following

- ❖ Software applications and Operating systems
- ❖ Telephones & means of telecommunications
- ❖ Video equipment & multimedia products
- ❖ Web based information and applications such as distance learning
- ❖ World Wide Web

15.2 Components of Information Technology

It includes

- ❖ Hardware
- ❖ Software
- ❖ Data
- ❖ People
- ❖ Telecommunication System

Hardware : It consists of physical components that form a computer system. Both hardware & software are required in order to run a computer. Hardware is physical unit that stores and Transmit information. For example monitor, keyboard, mouse, mobile phone and television which are popular inventions in the field of IT.

Software : It is a set of instructions in the form of a program which controls the sequence of operations. For example, software used in mobile phones allow users to perform various functions like sending messages, recording a person's voice and taking photographs

Data: It is an unprocessed collection of raw facts, concepts or instructions in a manner suitable for communication, interpretation and processing by humans

Telecommunication System : The technology which allow us to transfer data from one geography to another. This include telephone networks, mobile network, satellite communication etc.

People: People play an important role in information technology. They perform various functions with the help of hardware and software to produce the desired output using information technology.

15.3 Information Technology Evolution

Core of information technology is computer we have started using computer since its invention in 1950s. These application are strictly based on business need and available technology during that period. Businesses has an impact on computer technology which demand improvement in existing business processes similarly computer technology also has some impact business processes to develop new and efficient business application of information technology. Let us discuss some of the phases of use of information technology in business. Figure indicates use of IT / IS in business activity. It is to mention here that computers, information system, information technology are used as synonyms for business application.

Phase I : 1940s to 1950s Business Accounting Machine : In this particular phase we have very early stage of computers in which diode technology are used these computers offer limited processing capability and storage capacity. As a result some applications related to calculation are developed in this phase. More specifically computer is being used as business accounting machine and business are very happy to use these application for their correctness accuracy and speed.

Phase II : 1950s to 1960s Electronic Data Processing System : The improvement in the hardware technology i.e. Development of transistor results in development of more efficient computers which in turn results in development of newer application as computers has got more processing capabilities and storage. In this phase electronic data processing (EDP) department are established in various organization. These EDP department caters the processing requirement of the whole department. It means processing work flow from one department to EDP department and the result of the processing is delivered to concern department. This has result in further increase in efficiency and effectiveness of the organization. If you notice most of the navratna and other organization established during this phase has got EDP department.

Phase III : 1960s to 1980s Information System Phase: This particular phase is characterize by ICs in hardware, Hard disk in storage capacity, Operating system and other languages in computer software, Data transfer and internet in communication field. Many application of providing information to various levels of organization using appropriate information system are developed in this phase e.g. Management Information System, Operational Information System, Decision Support System etc.

This phase has got one more crucial invention in which data can be transferred from one geography to another geography as a result new business application has been developed limitation of time and geography has been removed by these application of computer technology. Electronic data interchange (EDI), online databases, Interactive decision making process are some of the tools use for development of various IT applications.

Phase IV : 1980s to Till Business Integration Phase : The expanding role of information technology has been used to integrate business processes. The merging of business process reengineering

(BPR) with information technology has result in evaluation of new domain called Enterprise Resource Planning (ERP). In ERP we try to reduce operational cost with the proper utilization of all the resources like human, machine, material, method, money, information etc of an enterprise. Through ERP we try to integrate all vendors manufacturing unit, warehouses, marketing office, distributors retailers etc to minimize cost associated with complete production chain.

The invention of www and Web browser has enhanced popularity of the internet in the society. The level of integration is further enhanced by using internet commercially by developing business application under the name of e-commerce and e-business. These days are user on net can have personalized service sitting at home. Use of IT has given businesses various opportunity performing transaction using plastic money, electronic fund transfer, ITZ cards, new business model are also evolved.

15.3.1 COMMONLY USED IT ARCHITECTURE in AN ORGANIZATION

An organization's IT architecture includes :

- Computers often of different sizes from different manufacturers
- Operating systems frequently more than one.
- Database management programs
- Packages applications software
- Networks ranging from those within a department to an international, private network to the Internet
- Languages for developing applications

Beyond the technology, architecture also includes considerations of the way Organization processes information, particularly at the location processing take place. The IT application can be characterized by following factor:

- **Volume of processing.** The volume of information processed may determine the kind of architecture needed.
- **Database.** The amount of data storage available on each class of computer is increasing but in general more data still can be stored on large computers.
- **Interface.** What kind of user interface is generally associated with a given option
- **Number of Users.** How many users can the architecture support?
- **Discretion.** How much processing and ad hoc analysis can the user do on his or her own?

Option Discretion	Volume	Database	Interface	Number of Users	
Mainframes	High-volume transactions processing	Large	Simple character-oriented	Large	Limited
Midrange, Fault-tolerant	Medium-volume transactions	Medium to large	Simple character-oriented	Moderate number	Limited
PCs and workstations	Low	Medium to small; user may input and download all data	Elaborate workstation	One at a time	Extensive
LANs	Low to medium	Medium to small; download capability	Elaborate workstation	Multiple	Extensive
Client-server	Varied	Small to large	Elaborate workstation	Multiple	Extensive

15.4 Role of Information Technology

Information Technology plays a vital role in today's global economy. People are doing research in computing, networking and many other areas for exploring the existing methodologies. Education pattern is going to be changed with advent of new interactive online learning methodologies. Media, education, mobile computing, public sector etc. are major areas affected by information technology.

15.4.1 Information Technology in Media

Two powerful forces have emerged to change the media with the advancement of information technology. First is the use of computers as a means of processing and analyzing information. The second is to accelerate capacity of the technology to enhance communication. Examples of information technology used in media are radio, television, VCR, video cameras and computers. Media can be classified in two categories

- Print Media
- Electronic Medias

Print Media: Most widely used media is print media. The most common example of media is paper (e.g. newspaper and books). The reason being popular is that it can be read by anyone, anytime without any special knowledge except the language. For example, an event happening in the remotest area of the world can be easily covered by satellite links. The information provided by these links can be converted into a readable form enabling people around the world to know about happenings.

Electronic Media: In spite of Internet popularity, radio and television still represent the mode through which people receive information about national and international events. The improvement in technology has enhanced the prospect in this area. Instantly one can view any news that is happening anywhere around the world.

15.4.2 Information Technology in Public Sector

The Indian information technology (IT) industry has played a key role in putting India on the global map. growth next year. India's IT growth in the world is primarily dominated by IT software and services such as Custom Application Development and Maintenance (CADM), System Integration, IT Consulting, Application Management, Software testing, and Web services. At present, there are 60 million Internet users in the country. According to the Manufacturer's Association of IT (MAIT), the number of active Internet entities rose to 8.6 million by March 2009 from 7.2 million units in March 2008.

There is a great deal of activity in outsourcing of information services. In countries where public sector is still developing and is under the control of government, there is a great requirement to automate services such as booking of railway tickets and payment of electricity bill.

IT sector has become a boon for public sector companies by helping them to increase their output and efficiency. IT has enabled the companies to have a greater quality control so that they are able to meet the standards. This has been possible as IT has been able to

- Promote and ensure cost-effective and efficient IT solutions
- Promote Transparency
- Minimize duplication
- Minimize sharing of resources

15.4.3 Information Technology in Health

Information Technology (IT) in human health care involves the widespread use of digitized products, online databases, and network infrastructures as the means of communication between hospitals, physicians, providers, patients and suppliers. Always evolving and advancing, health IT will play a critical role in decisions regarding the future of personal health management and health care reform.

IT includes many types of administrative and clinical roles within health care today. IT provides administrative applications for electronic billing, Integrated Delivery Systems (IDS), medical claim submission and patient scheduling. Clinically, IT provides physicians with computerized provider order entry (CPOE), accessibility to online treatment and drug databases and networks for e-prescribing medications. IT advancements in the electronic storage of health care data include Recognition and Imaging Software, the Personalized Health Record (PHR), the Electronic Medical Record (EMR) and the Personal Digital Assistant (PDA).

IT in human health care provides an interactive network where medical facilities, physicians, and providers can communicate, collaborate, develop partnerships, exchange ideas and ultimately increase the quality of health care worldwide. In addition, health IT advancements now offer patients online access to e-health tools, personalized health record software and other methods for self-managing healthcare.

Electronic billing, electronic claim submission, and digital imaging equipment are IT applications that provide hospitals and physicians with a quick and consistent return on the investment. The long-term financial benefits to using IT administratively and in clinical practice include improved patient safety and quality of care, physician accessible medical information at patient point of care, improved administrative accuracy and clinical efficiency, increased interaction between patient and provider, increased morale among employees and enhanced hospital public relations.

15.4.4 Information Technology in Defense Services

Now a days, military operations are restricted their access to information. Mostly military operators use voice over radio or formatted text message in crisis. To improve military readiness and response, flexible, dependable and timely access to information is needed. The main research are in this field are input language understanding, language generation and eyes-free interaction.

New capabilities of information technology allow military personnel to communicate with computers for creating, accessing and managing information. Information technology helps to gain relevant information in an organized manner that is easily usable by military personnel equipped with information devices. For example, pilot-less warplanes have been developed.

15.4.5 Information Technology in Mobile Computing

Mobile computing is a technology of wireless networking that uses frequencies for transmission to permit networked devices move freely within broadcast coverage area yet remain connected the network. It enables people to access network services anytime, anywhere and permits data transmission with the help of computers. This is achieved by integrating the cellular telephone technology with the portable computers having cabled network.

Mobile communication has been established throughout the world and number of subscribers of various cellular networks goes on increasing. An extension to this technology is the ability to send and receive data across cellular networks which is the basic principle of mobile computing. Similarly mobile data communication has become a rapid technology because it permits users to transmit data from one remote location to other remote location. There is a significant difference between mobile voice communication and mobile data communication. In voice communication, mobile phones permit user to move around and talk at the same time. Latest technology used in mobile computing is GPRS (general packet radio service) which is a packet based data transfer technology which provides higher capacity and data rates for accessing over mobile Internet.

Mobile computing is used in various fields such as e-mail, emergency services, credits, stock information control etc. Mobile computing relieves users from desk working and enables them access to information when they required. It provides a better lifestyle through improved communication.

15.4.6 Information Technology in Manufacturing

Corporate are developing a manufacturing society to provide manufactures, researchers and distributors with structured methods and practices for implementing technologies in manufacturing environments. Initial implementation of this collaborator enhances research in robotics are welding, which requires support and use of diverse data format such as audio, video and image annotations.

Simulation systems have been developed using information technology which enable manufacturer to prepare prototypes plan layout, optimize usage of raw material and assess factors prior to invest in plant redesigns. Industries are investigating ways to commercial modeling and simulation software systems with programmable human modeling capabilities to harness manufacturing resources. Natural language interfaces are developed by researchers which can help simulate human tasks in a manufacturing operations environment.

15.4.7 Information Technology in Publication

In this evergreen changing world, publishing houses, e-book stores and universities have started to use information written in printed books on the computer screen through the use of technology. E-text plays an important role in education and research. Websites like wikipedia, Net Library and Bibliomania offer full text of many classes. The files can be downloaded from these websites and can be read on the screen.

Digital revolution is gaining pace when it comes to books. like e-text, e-books also evolved. These are special kinds of files, which can be viewed using specific software and offers more functionality for researchers. Some of the software's like Adobe E-book Reader, Microsoft Reader and MobiPocket etc. are available which allows user to build their own library, read book on the screen comfortably. E-books can be installed on a library computer and allows fast access and search to every user. Special E-book devices permit users to carry an entire library with the comfort and size of a single book,

15.4.8 Information Technology in Education

World has been changed constantly due to emerging technologies. These technologies have affected the way of learning and the way processes carried out. The present education system is facing substantial pressure to prepare the students to learn, work and live in digital age. Technology is becoming a powerful tool for problem-solving and communication.

E-Learning

What do we mean by E-Learning? E-learning is nothing but learning through computer technology. It is fast becoming an extremely versatile solution of providing learning with the tools necessary for need of students in order to provide good and standardization education. Students can interact with e-learning software and enjoy colorful presentation, answer quiz questions while learning through personal involvement.

In recent years, schools, colleges, universities and industries have started to utilize web as a platform for distance E-Learning. There are various tools like WebEx, HP virtual classrooms, Web CT; Enspire any many others which allows students to understand, learn and interact effectively as the class experience is available online. Students can log in from home or any computer centre enjoy interactive presentation, watch a video broadcast of the teacher over network, live discussions, quizzes and voice/video interaction. Students as well as teachers both gain benefits by utilizing E-Learning tools. It includes

- Computer based Training(CBT)
- Web based training(WBT)

Computer based training is a training where a computer program provides motivation and feedback in place of live instructor. Delivering modes are

- Internet
- LAN
- CD-ROM

Web based training is the training which delivers educational content through a web browser over the public Internet or a private Intranet. It provides links to other learning resources such as discussion groups-mail, bulletin boards. It includes an instructor who can instruct course guideline, manage discussion etc.

New technology Virtual Classrooms involves a student with software that reacts and interacts, unlike a book. In this way, students can get immediate feedback on their actions whether it is a quiz answer or a request for information. With the help of virtual learning, students can

- Listen to pre-recorded audio comments to enhance knowledge
- Use appropriate resources to access and apply knowledge
- Search the database for different students' views
- Communicate with teachers and other students about subject related matter through E-mail and discussion groups

Virtual classrooms are beneficial to students who are unable to attend the centralized classrooms due to distant location on universities.

15.5 Impact of IT in Business

Information technology is a wide field, and has enabled organizations across the world to work in an efficient manner. It plays a very important role in effective management and running of a business. The use of information technology in organizations is inevitable, be it any type of company like manufacturing or medicinal sector. It has contributed largely to the process advancements in organizations. The exact impact of information technology on business administration can be determined by the elements mentioned below.

Software and Applications

Software is an important part of information technology which relates to computer applications that enable a company to generate, store, program, and retrieve data as and when needed. There are many software's developed for different purposes. All operations in the business sector are carried out by software that is assigned for executing specific tasks. Without these computer applications the businesses wouldn't have been able to carry out their functions in a proper and efficient manner. Operating systems, ERPs, special purpose applications, and web browsers are some examples of different softwares. There are some software's which are exclusively built to contribute to the proper collaborative working of all sections of the businesses, which are known as Enterprise resource Planning (ERP). These are complex applications which enable people to efficiently manage all functions and operations of all processes in the businesses.

Hardware Devices

These are various computer equipments that house the software's. Devices like microcomputers, mid-size servers, and huge mainframe systems are some examples of hardware. Businesses have to maintain a huge collection of important data. For this purpose, they employ these devices which are responsible for storing confidential company data and retrieving it back when required. Other hardware devices include

network devices that are used for providing Internet Access to the businesses to work and communicate expeditiously. There are even devices which enable manufacturing tools and equipments to work accurately in the industrial sector.

In the last few years, rapid development in information technology particularly in communications, electronic service networks and multimedia have opened up new opportunities for corporate. All these are contributing towards new and effective ways of processing business transaction, integrating business processes, transferring payments and delivering services electronically. E-Commerce refers to the electronic means to conduct commerce between business communication and transactions over Internet.

E-Commerce websites are critical to industry for increasing e-Commerce sales, improving worked productivity, lowering costs and user grievances. The e-business approach consolidates a company's position by opening up new business opportunities and improving financial status. It has affected business in the following ways

Competitiveness

E-business offers a reliable and cost effective means of doing business. The Customers can be provided support round the clock i.e. 24 hours a day. With advancement in IT sector, corporates are spreading business around the world thus increasing their presence and entering new markets.

Security

With growth of information technology in business, there is more insecurity of the data and programs. Due to this, every organization has some security programs to avoid the illegal access of the company's information by unauthorized persons. The three fundamentals attributes of a security program are confidentiality, integrity and availability which allow access to only authorized persons in an organization.

Marketing

Corporate engaged in e-business can take help of their respective websites create brand awareness of their products thus creating new avenues of promotion of their products.

Cost Benefits

The extensive availability of Internet based information means that companies have a wider choice of suppliers which leads to a more competitive pricing. Due to presence of Internet, role of the middleman becomes less important as companies can sell their product or services directly to the customers.

Running Businesses with Information Technology

Small scale businesses need to buy software packages that would cater to their specific management, operational, and functional needs. For this purpose, they need to approach firms and IT manufacturers who deal in such software applications. Other IT services include Internet marketing and email marketing, web hosting and promotions, and maintaining client networks. Larger businesses on the other hand have their own operational and functional employees who develop software applications and work on several IT needs of the businesses. They usually purchase ERP software's to coordinate different processes and functions into a single application, which is actually more convenient.

Manufacturing businesses may make use of servers and databases to store their vast data regarding inventory, B2B, B2C, FMCG (in the retail business sector), etc. Automobile manufacturers use computers to guide manufacturing and designing tools to function in a precise manner, ruling out the possibilities of any human error. Businesses all around the globe have to take the aid of information technology in some way or the other to keep themselves in sync with the market and the world. There are several departments in business organizations such as HR and recruitment, finance and payroll, administration, and security. All these departments utilize IT to carry out their respective operations in a productive manner and efficient manner.

The information technology role in business sector certainly is of a great importance, which enables businesses too effectively and successfully plan, manage, execute strategies which lead to profit. Moreover, the impact of information technology on business is on the rise, as several advancements are focused on to be implemented in various business processes.

15.7 Future of IT in Business

It is a highly important aspect today. Having the ability to transfer data, stored data and keep it safe is crucial in many ways and corporations would find it difficult to keep information stored securely. Computers allow users to communicate with many people at once or in far away places. Computers play a vital role in the ongoing support of information technology in the future. They allow users now to do many things such as writing much faster than a traditional typewriter or pen and paper would do. They also make it very possible to keep track of people, conduct business globally much easier than before and organize and store multiple files. They also make education possible from remote locations and provide communication that far outreaches what a traditional telephone could ever do. Of course the human brain is far more advanced than a typical home computer. Our brain allows us to keep track of things as well and to remember faces and names, find entertainment and enjoy the simpler things. The future of IT may very well involve using computers to enhance the human brain. Common computers are expected to possess the same or nearly same capabilities as the human brain in future.

Today's information technology amplifies brain power." We no longer need to rely on human memory or on human eyes for scanning or human brains for organizing and computing information and data." .Delong and Cohen suggest.

Business clearly sees the internet as a way to enhance productivity and competitiveness. The thrust of the original Industrial revolution was separation- to break work up into its component parts so as to permit mass production. The effect of computer networks in the Digital Revolution however is unification- to erase boundaries between company departments, suppliers and customers. Indeed the parts of a company can now as easily be scattered around the globe. Thus designs for a new product can be tested and exchanged with factories in remote location. If information is flowing faster then goods can be sent to market faster and inventories reduced.

Some area of business that are undergoing rapid change are :

- sales and marketing
- retailing
- banking
- manufacturing and stock trading
- green IT.

Sales and Marketing

In old days ,a salesperson can earn a good living if he/she can talk and read a price list but now sale representatives not only need to be better educated and more knowledgeable about their customer's business but also be comfortable with company technology. For example, sales staff having laptop containing software that configures customized windows and calculates the prices on the spot. This process once handled by company technical people. It'll take only a week. A number of companies are also taking advantage of information technology in marketing. The Internet and the WWW also becomes popular marketing tool.

Retailing Becomes E-Tailing

What can be sold on Internet? Is there any limitation? But what about groceries? The challenges for Internet food ventures are daunting. Even designing a website shopping menu can be difficult because the profusion of groceries make them hard to categorize pointing out how to deliver item? Even filling orders can be an expensive task, since most online grocers employ clerks to wheel carts through a warehouse and fill individual order.

Banking

The world of cyber cash has come to banking, not only smart cards but internet banking, electronic bill paying, electronic deposit and online insurance shopping.

Manufacturing

Computers have been used in manufacturing for some time perhaps in pictures where robot welding on car assembly line. But computers and the Internet are players in other ways. Business-to-business automation save space and funds since company does not have to pay for a part until it arrives.

Businesses are turning themselves into global concerns. Information Technology is an important tool in making this transformation and in designing the international organization. As tariffs fall, you can expect to see firms rapidly moving operations to different parts of the world to take advantages of special competencies and disparities in wage rates. Even a one-person company can have worldwide sales through the Internet. One researcher who studied international business suggests that information technology is the glue that can hold an international organization together and help coordinate its operations. All of our IT design variables that focus on communications such as electronic links, electronic customer-supplier relationships and virtual components are available to help manage and coordinate the global firm.

15.7 Summary

The rapid evolution of digital technologies is creating not only new opportunities for the society but also challenges. Government and corporations are reorganizing their work culture to enhance productivity, improve quality and control cost. Entire industries have been reconstructed to better align themselves with the realities of digital age. Information Technology (IT) refers to creation, gathering, processing, storage & delivery of information & the processes & devices that make all this possible. Hardware, Software, data and people constitutes components of Information Technology. It has a very important role in today's global economy. People are doing research in computing, networking and many other areas for exploring the existing methodologies. Education pattern is going to be changed with advent of new interactive online learning methodologies. Health, defense services, manufacturing, media, education, mobile computing, public sector etc. are major areas affected by information technology. Internet is the fastest growing information system for distributing wide variety of things such as products and services along with their links to other files over Internet. Due to this, it is known as Distributed System. The information residing on different computers can be easily linked together using hyperlinks. A hyperlink is a method of organizing information on the system by linking documents from one document to another. It provides a wide variety of services accessible by users. These services includes E-mail, transfer, Newsgroup, Multimedia displays, Shopping opportunities, Access to latest news.

E-Commerce websites are critical to industry for increasing e-Commerce sales, improving worked productivity, lowering costs and user grievances. The e-business approach consolidates a company's position by opening up new business opportunities and improving financial status. Small scale businesses

need to buy software packages that would cater to their specific management, operational, and functional needs. For this purpose, they need to approach firms and IT manufacturers who deal in such software applications. Other IT services include Internet marketing and email marketing, web hosting and promotions, and maintaining client networks.

15.8 Key Words

- **Information:** It is collection of facts gathered by various means to draw a conclusion. It is representation of knowledge such as data, facts or opinions including textual, numerical, graphical, audio-visual aids.
- **Technology:** It is the study of science. It is the specific information and knowledge required for the practical purposes like development in various fields.
- **Information Technology:** It refers to the scientific, technological and engineering disciplines as well as management technologies used in information handling, communication, processing, their applications and associated software equipment and their interaction.
- **Components of Information:** Technology are hardware, software, data and people.
- **Print Media:** it is one of the most popular media technologies as it is flexible, portable and economical
- **Electronic media:** It is a means of communication characterized by the use of radio technology and computers.
- **Internet:** It is a network of network which connects several computers globally forming a network in which any computer can communicate with each other.
- **Chatting:** It refers to live discussions conducted on the Internet between two or more users with the help of computers connected through a network.
- 9. **Newsgroup:** It is a group formed for the discussion on a particular subject in which the notes on the website are accessed and redistributed through a worldwide network of news groups.
- **Electronic Bulletin Board:** It is an internet service that allows users to leave messages and access the required information through the software running on computer.
- **Intranet:** It is a private computer network maintained by an organization for internal communication
- **E-mail:** It allows user to send and receive messages anytime and anywhere in the world. It is popular as it is fast, flexible and reliable
- **Mobile computing:** it is a form of wireless networking that uses common frequencies to permit networked devices move freely within the broadcast coverage area.
- **Virtual classroom** is a chat facility with in blackboard, which allows staff and students to conduct synchronous communication online.

15.9 Self Assessment Test

1. What do you mean by information technology? Describe components of Information Technology.
2. Explain various areas where Information Technology is being used.

3. Describe Architectures of Information Technology.
4. Write short note on
 - a) IT in public sector
 - b) Electronic learning
 - c) Print Media
 - e) Virtual Classroom
5. Explain in your own words impact and future of IT in business.
6. How does globalization affect Information Technology? Explain

15.10 Reference Books

- Managing IT by Bhushan Dewan, Vikas Publishing House Ltd.
- Fundamental of IT by Alexis Leoan Mathews Leoan , Leon Tech World

UNIT – 16 : FOURTH GENERATION LANGUAGE & VIRTUAL REALITY

Unit Structure

- 16.0 Objective
- 16.1 Introduction
- 16.2 Types of 4GL
- 16.3 Virtual Reality
- 16.4 Time Line
- 16.5 Future and Impact
- 16.6 Summary
- 16.7 Key Words
- 16.8 Self Assessment Test
- 16.9 Reference Books

16.0 Objectives

After studying this unit you should be able to understand:

- Concept of Fourth Generation Language
- Understanding of 4GL programming concept
- Types of 4GL
- Virtual Reality, TimeLine and Future

16.1 Introduction

A fourth-generation programming language (4GL) is a programming language or programming environment designed with a specific purpose in mind, such as the development of commercial business software. In the history of computer science, the 4GL followed the 3GL in an upward trend toward higher abstraction and statement power. The 4GL was followed by efforts to define and use a 5GL. Often abbreviated 4GL, fourth-generation languages are programming languages closer to human languages than typical high-level programming languages. It is a nonprocedural language as compare to procedural 3GL. It means you have to just define the result or outcome of the program which you want to have rest of the coding will be generated by 4GL environment itself. Most 4GLs are used to access databases.

Fourth generation language - (4GL) An “application specific” language, one with built-in knowledge of an application domain, in the way that SQL has built-in knowledge of the relational database domain. The term was invented by Jim Martin to refer to non-procedural high level languages built around database systems.

The natural-language, block-structured mode of the third-generation programming languages improved the process of software development. However, 3GL development methods can be slow and error-prone. It became clear that some applications could be developed more rapidly by adding a higher-level programming language and methodology which would generate the equivalent of very complicated 3GL instructions with fewer errors. In some senses, software engineering arose to handle 3GL development. 4GL and 5GL projects are more oriented toward problem solving and systems engineering.

Fourth-generation languages attempt to make communicating with computers as much like the processes of thinking and talking to other people as possible. The problem is that the computer still only

understands zeros and ones, so a compiler and interpreter must still convert the source code into the machine code that the computer can understand. Fourth-generation languages typically consist of English-like words and phrases. When they are implemented on microcomputers, some of these languages include graphic devices such as icons and onscreen push buttons for use during programming and when running the resulting application.

4GLs are closer to human language than other high-level languages and are accessible to people without formal training as programmers. They allow multiple common operations to be performed with a single programmer-entered command. They are intended to be easier for users than machine languages (first-generation), assembly languages (second-generation), and older high-level languages (third-generation).

All 4GLs are designed to reduce programming effort, the time it takes to develop software, and the cost of software development. The dependency of the user of the software on software developer and software analyst has been removed by 4GL. If a user himself can define his requirement precisely he can create background coding of the program. They are not always successful in this task, sometimes resulting in inelegant and unmaintainable code. However, given the right problem, the use of an appropriate 4GL can be spectacularly successful as was seen with MARK-IV and MAPPER (Santa Fe real-time tracking of their freight cars – the productivity gains were estimated to be 8 times over COBOL). The usability improvements obtained by some 4GLs (and their environment) allowed better exploration for heuristic solutions than did the 3GL.

A quantitative definition of 4GL has been set by Capers Jones, as part of his work on function point analysis. Jones defines the various generations of programming languages in terms of developer productivity, measured in function points per staff-month. A 4GL is defined as a language that supports 12–20 FP/SM. This correlates with about 16–27 lines of code per function point implemented in a 4GL.

Fourth-generation languages have often been compared to domain-specific programming languages (DSLs). Some researchers state that 4GLs are a subset of DSLs. Given the persistence of assembly language even now[when?] in advanced development environments (MS Studio), one[who?] expects that a system ought to be a mixture of all the generations, with only very limited use of the first.

16.1.1 History

Though used earlier in papers and discussions, the term 4GL was first used formally by James Martin in his 1982 book *Applications Development Without Programmers* to refer to non-procedural, high-level specification languages. In some primitive way, IBM's RPG (1960) could be described as the first 4GL followed closely by others, such as the Informatics MARK-IV (1967) product and Sperry's MAPPER (1969 internal use, 1979 release).

The motivations for the '4GL' inception and continued interest are several. The term can apply to a large set of software products. It can also apply to an approach that looks for greater semantic properties and implementation power. Just as the 3GL offered greater power to the programmer, so too did the 4GL open up the development environment to a wider population.

In a sense, the 4GL is an example of 'black box' processing, each generation (in the sense of the page) is further from the machine. It is this latter nature that is directly associated with 4GL having errors that are harder, in many cases, to debug. In terms of applications, a 4GL could be business oriented or it could deal with some technical domain. Being further from the machine implies being closer to domain.

The early input scheme for the 4GL supported entry of data within the 72-character limit (8 bytes used for sequencing) of the punched card where a card's tag would identify the type or function. With judicious use of a few cards, the 4GL deck could offer a wide variety of processing and reporting capability whereas the equivalent functionality coded in a 3GL could subsume, perhaps, a whole box or more of cards.

The 72-character metaphor continued for a while as hardware progressed to larger memory and terminal interfaces. Even with its limitations, this approach supported highly sophisticated applications. As interfaces improved and allowed longer statement lengths and grammar-driven input handling, greater power ensued. An example of this is described on the Nomad page. Another example of Nomad's power is illustrated by Nicholas Rawlings in his comments for the Computer History Museum about NCSS (see citation below). He reports that James Martin asked Rawlings for a Nomad solution to a standard problem Martin called the Engineer's Problem: "give 6% raises to engineers whose job ratings had an average of 7 or better." Martin provided a "dozen pages of COBOL, and then just a page or two of Mark IV, from Informatics." Rawlings offered the following single statement, performing a set-at-a-time operation.

The development of the 4GL was influenced by several factors, with the hardware and operating system constraints having a large weight. When the 4GL was first introduced, a disparate mix of hardware and operating systems mandated custom application development support that was specific to the system in order to ensure sales. One example is the MAPPER system developed by Sperry. Though it has roots back to the beginning, the system has proven successful in many applications and has been ported to modern platforms. The latest variant is embedded in the BIS offering of Unisys. MARK-IV is now known as VISION: BUILDER and is offered by Computer Associates.

Later 4GL types are tied to a database system and are far different from the earlier types in their use of techniques and resources that have resulted from the general improvement of computing with time. An interesting twist to the 4GL scene is realization that graphical interfaces and the related reasoning done by the user form a 'language' that is poorly understood.

16.2 Types of 4GL

A number of different types of 4GLs exist as discussed below :

16.2.1 Table-driven (codeless) programming usually running with a runtime framework and libraries. Instead of using code, the developer defines his logic by selecting an operation in a pre-defined list of memory or data table manipulation commands. In other words, instead of coding, the developer uses Table-driven algorithm programming. A good example of this type of 4GL language is eDeveloper. These types of tools can be used for business application development usually consisting in a package allowing for both business data manipulation and reporting, therefore they come with GUI screens and report editors. They usually offer integration with lower level DLLs generated from a typical 3GL for when the need arise for more hardware/OS specific operations.

16.2.2 Report-generator programming languages take a description of the data format and the report to generate and from that they either generate the required report directly or they generate a program to generate the report. See also RPG. Similarly, forms generators manage online interactions with the application system users or generate programs to do so. More ambitious 4GLs (sometimes termed fourth generation environments) attempt to automatically generate whole systems from the outputs of CASE tools, specifications of screens and reports, and possibly also the specification of some additional processing logic.

Data management 4GLs such as SAS, SPSS and Stata provide sophisticated coding commands for data manipulation, file reshaping, case selection and data documentation in the preparation of data for statistical analysis and reporting. Some 4GLs have integrated tools which allow for the easy specification of all the required information:

James Martin's own Information Engineering systems development methodology was automated to allow the input of the results of system analysis and design in the form of data flow diagrams, entity relationship diagrams, entity life history diagrams etc from which hundreds of thousands of lines of COBOL would be generated overnight. More recently Oracle Corporation's Oracle Designer and Oracle

Developer Suite 4GL products could be integrated to produce database definitions and the forms and reports programs.

Query language and report writers are also fourth-generation languages. Any computer language with English-like commands that does not require traditional input-process-output logic falls into this category. Many fourth-generation language functions are also built into graphical interfaces and activated by clicking and dragging. The commands are embedded into menus and buttons that are selected in an appropriate sequence. The process of software development had been much improved with modern block structured third-generation programming languages but it was still frustrating, slow, and error prone to program computers. This led to the first “programming crisis”, in which the amount of work that might be assigned to programmers greatly exceeded the amount of programmer time available to do it. Meanwhile, a lot of experience was gathered in certain areas, and it became clear that certain applications could be generalized by adding limited programming languages to them.

All 4GLs are designed to reduce:

- * programming effort.
- * the time it takes to develop software.
- * the cost of software development.

They are not always successful in this task and sometimes result in inelegant and unmaintainable code. However, given the right problem the use of an appropriate 4GL can be spectacularly successful.

A number of different types of 4GLs exist:

Report generators take a description of the data format and the report to generate and from that they either generate the required report directly or they generate a program to generate the report. Similarly forms generators manage online interactions with the application system users or generate programs to do so.

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James Martin’s own Information Engineering systems development methodology was automated to allow the input of the results of system analysis and design in the form of Data Flow Diagrams, Entity Relationship Diagrams, Entity Life History Diagrams etc from which hundreds of thousands of lines of COBOL would be generated overnight. More recently Oracle Corporation’s Oracle Designer and Oracle Developer 4GL products could be integrated to produce database definitions and the forms and reports programs.

16.3 Virtual Reality

Virtual Reality (VR) is a term that applies to computer-simulated environments that can simulate places in the real world, as well as in imaginary worlds. Most current virtual reality environments are primarily visual experiences, displayed either on a computer screen or through special stereoscopic displays, but some simulations include additional sensory information, such as sound through speakers or headphones. Some advanced, haptic systems now include tactile information, generally known as force feedback, in

medical and gaming applications. Virtual reality can be defined as creating a virtual situation with the help of a controlled environment by controlling five senses of human beings. The best example of virtual reality is the movie *Matrix*.

Users can interact with a virtual environment or a virtual artifact (VA) either through the use of standard input devices such as a keyboard and mouse, or through multimodal devices such as a wired glove, the *Polhemus*, and omnidirectional treadmills. The simulated environment can be similar to the real world—for example, in simulations for pilot or combat training—or it can differ significantly from reality, such as in VR games. In practice, it is currently very difficult to create a high-fidelity virtual reality experience, due largely to technical limitations on processing power, image resolution, and communication bandwidth; however, the technology's proponents hope that such limitations will be overcome as processor, imaging, and data communication technologies become more powerful and cost-effective over time.

Virtual reality is often used to describe a wide variety of applications commonly associated with immersive, highly visual, 3D environments. The development of CAD software, graphics hardware acceleration, head-mounted displays, database gloves, and miniaturization have helped popularize the notion. In the book *The Metaphysics of Virtual Reality* by Michael R. Heim, seven different concepts of virtual reality are identified: simulation, interaction, artificiality, immersion, telepresence, full-body immersion, and network communication.

The term “artificial reality”, coined by Myron Krueger, has been in use since the 1970s; however, the origin of the term “virtual reality” can be traced back to the French playwright, poet, actor, and director Antonin Artaud. In his seminal book *The Theatre and Its Double* (1938), Artaud described theatre as “la réalité virtuelle”, a virtual reality “in which characters, objects, and images take on the phantasmagoric force of alchemy’s visionary internal dramas”. It has been used in *The Judas Mandala*, a 1982 science-fiction novel by Damien Broderick, where the context of use is somewhat different from that defined above. The earliest use cited by the Oxford English Dictionary is in a 1987 article titled “Virtual reality”, but the article is not about VR technology. The concept of virtual reality was popularized in mass media by movies such as *Brainstorm* and *The Lawnmower Man*. The VR research boom of the 1990s was accompanied by the non-fiction book *Virtual Reality* (1991) by Howard Rheingold. The book served to demystify the subject, making it more accessible to less technical researchers and enthusiasts, with an impact similar to that which his book *The Virtual Community* had on virtual community research lines closely related to VR. *Multimedia: from Wagner to Virtual Reality*, edited by Randall Packer and Ken Jordan and first published in 2001, explores the term and its history from an avant-garde perspective. Philosophical implications of the concept of VR are systematically discussed in the book *Get Real: A Philosophical Adventure in Virtual Reality* (1998) by Philip Zhai, wherein the idea of VR is pushed to its logical extreme and ultimate possibility.[citation needed] According to Zhai, virtual reality could be made to have an ontological status equal to that of actual reality. *Digital Sensations: Space, Identity and Embodiment in Virtual Reality* (1999), written by Ken Hillis, offers a more critical and theoretical academic assessment of the complex set of cultural and political desires and practices culminating in the development of the technology.

16.4 Time Line

Virtual reality can trace its roots to the 1860s, when 360-degree art through panoramic murals began to appear. An example of this would be Baldassare Peruzzi’s piece titled, *Sala delle Prospettive*. In the 1920s, vehicle simulators were introduced. Morton Heilig wrote in the 1950s of an “Experience Theatre” that could encompass all the senses in an effective manner, thus drawing the viewer into the onscreen activity. He built a prototype of his vision dubbed the *Sensorama* in 1962, along with five short films to be displayed in it while engaging multiple senses (sight, sound, smell, and touch). Predating digital computing, the *Sensorama* was a mechanical device, which reportedly still functions today. Around this

time, Douglas Englebart uses computer screens as both input and output devices. In 1966, Tom Furness introduces a visual flight stimulator for the Air Force.

In 1968, Ivan Sutherland, with the help of his student Bob Sproull, created what is widely considered to be the first virtual reality and augmented reality (AR) head mounted display (HMD) system. It was primitive both in terms of user interface and realism, and the HMD to be worn by the user was so heavy it had to be suspended from the ceiling. The graphics comprising the virtual environment were simple wireframe model rooms. The formidable appearance of the device inspired its name, The Sword of Damocles. Also notable among the earlier hypermedia and virtual reality systems was the Aspen Movie Map, which was created at MIT in 1977. The program was a crude virtual simulation of Aspen, Colorado in which users could wander the streets in one of three modes: summer, winter, and polygons.

The first two were based on photographs—the researchers actually photographed every possible movement through the city’s street grid in both seasons—and the third was a basic 3-D model of the city. In the late 1980s, the term “virtual reality” was popularized by Jaron Lanier, one of the modern pioneers of the field. Lanier had founded the company VPL Research in 1985, which developed and built some of the seminal “goggles and gloves” systems of that decade. In 1991, Antonio Medina, a MIT graduate and NASA scientist, designed a virtual reality system to “drive” Mars rovers from Earth in apparent real time despite the substantial delay of Mars-Earth-Mars signals. The system, termed “Computer-Simulated Teleoperation” as published by Rand, is an extension of virtual reality.

16.5 Future and Impact

In the short run, the graphics displayed in the HMD will soon reach a point of near visual (but not behavioral) realism. The audio capabilities will move into a new realm of three dimensional sound, which refers to the addition of sound channels both above and below the individual or a Holophony approach.[citation needed] Within existing technological limits, sight and sound are the two senses which best lend themselves to high quality simulation.[citation needed] There are, however, attempts being made to simulate smell.[citation needed] The purpose of current research is linked to a project aimed at treating Post Traumatic Stress Disorder (PTSD) in veterans by exposing them to combat simulations, complete with smells. Although it is often seen in the context of entertainment by popular culture, this illustrates the point that the future of VR is very much tied into therapeutic, training, and engineering demands. Given that fact, a full sensory immersion beyond basic tactile feedback, sight, sound, and smell is unlikely to be a goal in the industry.[citation needed] It is worth mentioning that simulating smells, while realistically possible, requires costly research and development to make each odor, and the machine itself is expensive and specialized, using capsules tailor made for it. As a result, basic and very strong smells such as burning rubber, cordite, and gasoline fumes have been made. Japan’s NTT Communications has recently[when?] finished testing an Internet-connected odor-delivery system to be used by retailers and restaurants to attract customers. But as new trials and applications are tried out and more data is gathered, Hamada says he is sure the technology “will take communications to a new level in content richness, compared to today’s communications, which only offers images and sounds”.

In order to engage the other sense of taste, the brain must be manipulated directly. This would move virtual reality into the realm of simulated reality, similar to the brain interface ports used in *The Matrix*. Although no form of this has been seriously developed at this point, Sony has taken the first step.[citation needed] On April 7, 2005, Sony went public with information that they had filed for, and received a patent for the idea of non-invasive beaming of different frequencies and patterns of ultrasonic waves directly into the brain to recreate all five senses. There has been research to show that this is possible[citation needed]. Sony has conducted tests and says that it is a good idea.

Virtual reality is a costly development in technology. Because of this, the future of VR is dependent on whether or not those costs can be reduced in some way. If VR technology becomes affordable, it

could be very widespread, but for moment, major industries are the sole buyers that have the opportunity to utilize this resource.

16.5.1 Impact

There has been an increase in interest in the potential social impact of new technologies, such as virtual reality. Mychilo S. Cline, in his book *Power, Madness, and Immortality: The Future of Virtual Reality*, argues that virtual reality will lead to a number of important changes in human life and activity. He argues that:

Virtual reality will be integrated into daily life and activity, and will be used in various human ways. Techniques will be developed to influence human behavior, interpersonal communication, and cognition. As we spend more and more time in virtual space, there will be a gradual “migration to virtual space”, resulting in important changes in economics, worldview, and culture.

The design of virtual environments may be used to extend basic human rights into virtual space, to promote human freedom and well-being, and to promote social stability as we move from one stage in socio-political development to the next. Virtual reality can also be used to induce body transfer illusions.

16.6 Summary

4GL is one of the important development in software industry where procedural dependency of the languages is replaced by non-procedural language. The programming dependency of user on programmers can be removed by Fourth General Language. Fourth generation language is one of effective and efficient language which save programming efforts time and other resources.

Virtual reality is one of the technical outcome of the information technology in which five sensory organs are being controlled to create an environment which is not real. This domain is very useful to different segments of society: training of soldiers, training of pilots, training of doctors etc. The only limitation of virtual reality is cost of the technological infrastructure requirement and complexity of programming language.

16.7 Key Words

- **Non Procedural Language** : It is a language in which end result is being described instead of various steps.
- **Procedural Language** : In this we have to describe all the steps in detail to achieve a desired result.
- **4GL** : A language in which we have to describe result and rest of the program are developed by 4GL environment.
- **SQL** : Structured Query Language is an example for 4GL used for manipulation of databases.
- **Virtual Reality** : It is an artificially created reality by controlling sensory organs.

16.8 Self Assessment Test

- 1 Describe the unique features of 4GL.
- 2 Discuss the limitations of procedural language and how these limitations are overcome in 4GL.
- 3 List four advantages of 4GL.
- 4 Describe the concept of Virtual Reality.

- 5 Give various application area in which virtual reality can be used.
- 6 What type of future development and application that you feel virtual reality can have to improve quality of life for human beings.

16.9 Reference Books

- Information Technology Today, S Jaiswal, Galgotia
- Computer Today.

UNIT - 17 : VIDEO CONFERENCING AND ARTIFICIAL INTELLIGENCE

Unit Structure

- 17.0 Objectives
- 17.1 Videoconferencing
- 17.2 Core Technology
- 17.3 Video Conferencing Softwares
- 17.4 Impact of Video Conferencing
- 17.5 Barriers in the Growth of Video Conferencing
- 17.6 Artificial Intelligence
- 17.7 Characteristics Intelligent System
- 17.8 Applications of Artificial Intelligence
- 17.9 Branches of Artificial Intelligence
- 17.10 Information Superhighway
- 17.11 Internet as Information Superhighway
- 17.12 Information Superhighway as an Amalgam
- 17.13 Advantages of Information Superhighway
- 17.14 Summary
- 17.15 Key Words
- 17.16 Self Assessment Test
- 17.17 Reference Books

17.0 Objectives

After studying this unit, you should be able to understand:

- The concept of video conferencing and the technology.
- Effect of videoconferencing to society
- Factors hindering the growth of video conferencing
- Artificial Intelligence (AI) concept and applications
- Characteristics of Intelligent System
- The concept of Information Superhighway
- Advantages of Information Superhighway

17.1 Video Conferencing

Videoconferencing can be explained as face to face discussion between two geographical locations in which involved party can see and hear each other. Video conferencing also called as video teleconference is basically a set of interactive telecommunication technologies which allows two or more people residing at different locations to interact simultaneously with audio and video transmission.

It can also be called as visual collaboration as it allows people residing at different locations to collaborate with each other and allows sharing of documents and even computer applications.

Video conferencing is designed to serve a conference rather than individuals. It was first deployed commercially in 1970 by AT & T. It failed due to poor picture quality and lack of efficient video compression technique. In 1980 digital telephony came into existence, such as ISDN which allowed a minimum bitrate for compressed audio and video transmission.

It was only in 1990 that video conference systems were available to general public at affordable cost. In 1990 IP (Internet protocol) based video conferencing became possible, during that time more efficient video compression technologies were developed which led to PC and desktop based video conferencing.

In 2000 video teleconference (VTC) finally arrived for the general public by providing free services, online telecommunication programs which were possible with an internet connection. Video conferencing provides a facility to schools, colleges and other educational institutions to connect with speakers and experts from different areas and indulge in different professional activities, project collaboration and community events

Placing a video call is like placing a telephone call, after you connect you see the other person on a TV screen. A video conference between two or more participants at different sites can be conducted using computer networks to transmit audio and video data.

A point-to-point video conferencing system works like a video telephone. Each participant has a video camera, microphone and speakers at his premises. As the two participants speak to one another, their voices and images are carried over the network and delivered to other person on the network. Multipoint videoconferencing allows three or more participants to communicate in a virtual conference room and it provides an environment as if they are sitting next to each other.

17.2 Core Technology

The technology behind video teleconference (VTC) system is digital compression of audio and video streams in real time. This functionality is provided with the help of codec also called as coder/decoder. It can provide compression rates of up to 1:500. The resulting digital stream of 1s and 0s is subdivided into labeled packets, which are then transmitted through a digital network which can be ISDN or IP.

The components of video teleconference (VTC) are:

1. **Video input:** can be provided with the help of video camera or webcam.
2. **Video output:** can be viewed on a computer monitor, television or projector.
3. **Audio input:** can be provided with the help of microphones, CD/DVD player and cassette player.
4. **Audio output :** can be provided with the help of loudspeakers
5. **Data transfer:** can be done by analog or digital telephone network, LAN or Internet, ISDN, ADSL.
6. **Software:** The two most popular videoconferencing software being used over the Internet are CU-SeeMe and Microsoft NetMeeting

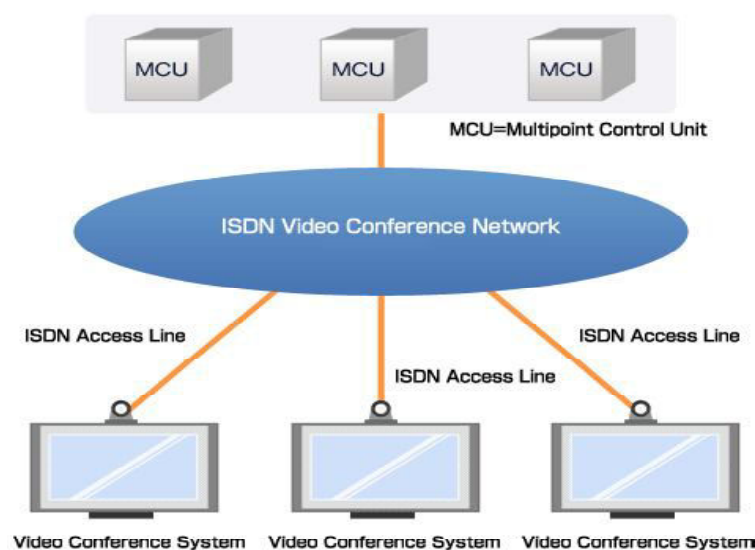
There are two types of **VTC systems**:

1. **Dedicated systems:**

They have all the components that are required to do VTC packaged into a single piece of equipment. It is usually a console with a high quality remote controlled video camera. These cameras can be controlled from a distance and can be moved in various directions like left, right, up, down and

zoom. These cameras are called as PTZ cameras. The console contains all electrical interfaces, the control computer and the software or hardware based codec, omni directional microphones. Dedicated VTC can be further divided into following:

- (a) **Large group VTC:** These are non- portable, large, expensive and are used for large rooms and auditoriums.
 - (b) **Small group VTC:** These can be portable or non-portable, smaller, less expensive and are basically used for small meeting rooms.
 - (c) **Individual VTC:** These are portable devices, meant for single users, have fixed cameras, microphone and loudspeakers integrated in to the console.
2. **Desktop systems:** These are the add-ones to normal PCs, transferring them in to VTC devices. They are usually the hardware boards. A wide range of different cameras and microphones can be used with the board. This board contains the necessary codec and transmission interfaces.H.323 is the widely used standard for desktop systems.



17.3 Video Conferencing Softwares

Software's used for doing videoconferencing over Internet are as follows:

1. CU-SeeMe:

It is a videoconferencing program that combines audio, video and text based chat capabilities. It is an application initially developed at Cornell University and later developed by White Pine Software. With CU-SeeMe, you can do videoconference with another site located anywhere in the world. Companies can hire out video conferencing equipped meeting rooms in different cities and customers can simply turn up for the meeting and everything is arranged.

2. Microsoft NetMeeting:

It is also an Internet videoconferencing package. It can be used over local LAN. It has been supported by International Telecommunication Union (ITU) H.323 standard for audio and video conferencing and thus interoperates with other H.323 compliant software packages. NetMeeting supports multi-point T.120 compliant data conferencing. Some of its data collaboration tools include a shared whiteboard, application sharing, file transfer and a chat tool.

Codec A codec is the name given to the encoding/decoding algorithm that compresses and decompresses audio video data. The effectiveness of a streaming IP connection is determined partly by the codec. A high compression codec will provide the data stream quickly, but at low quality. In general compression schemes can be classified as “lossy” and “lossless.”

- (i) **Lossy compression** schemes reduce the size of the data stream by discarding some data during the encoding process. Once received on the client side, the codec attempts to reconstruct the information that was lost or discarded.

Lossy compression offers data savings of around 10:1. If a voice file was compressed using lossy compression, silence would be removed, and both high and low frequency data may be lost from the data stream.

- (ii) **Lossless compression** simply squeezes data into smaller packets of information, without permanently discarding any of the data. Lossless compression algorithms usually require more computing power to compress and decompress the data stream, and do not give the same data savings as lossy compression. If a voice file was compressed using lossless compression, it could still be encoded, in order to reduce the size, but no data would be lost. The resultant file would sound exactly the same as the original.

Codecs typically used combine elements of both compression schemes; in this way, for example, silence can be discarded from a voice file, but all non-silent parts retained and compressed

17.3.1 Cost involved in Video Conferencing

Its cost depends on the number of endpoints, the type of client and choice of networks. Videoconferencing can cost as little as the price of Webcam (\$100) per seat to more than \$ 15,000 per conference room.

The exact fixed costs are going to depend on the number of systems and features your users need. Complete enterprise conferencing portal environments suitable for large companies can exceed \$100,000 per installation depending on hardware and software components.

Recurring costs are composed of the monthly cost of network access, network usage cost and potentially the salary for one or more technicians managing network provisioning, installations, rooms or conferencing system reservations, technical support and user training. The largest variable in it is the network usage costs.

17.3.2 Video conferencing

Videoconferencing can be used over

1. The existing public telephone network
2. A private IP network
3. The Internet.

The bandwidth required for interactive video communications is in the 300K to 400K bit/sec per stream range. In videoconferencing, bandwidth is assumed to be symmetrical. In full-duplex networks such as ISDN, Ethernet, ATM and time division multiplexed networks; capacity is expressed as bandwidth in one direction, though equal bandwidth is available for traffic in the opposite direction.

You need to estimate the number of simultaneous sessions your network needs to support, and figure out if your network has bandwidth end-to-end. Multipoint conference bandwidth (with which three or more locations can see and hear one another) is calculated separately from point-to-point sessions. Multipoint can be conducted in either IP or ISDN environments, and some conferencing units will support both network types.

17.3.3 Protocols Video Conferencing:

The following two transport protocols are for the general transmission of data over IP:

- Transmission Control Protocol (TCP)
- User Datagram Protocol (UDP)

Protocols that are specific to video solutions over IP are relatively new, and still evolving.

The following two main sets of call control protocol are in use by the Internet at the time of publication:

- H.323
- Session Initiation Protocol (SIP)

TCP:

1. TCP and UDP are transport protocols that are used to transmit data over IP connections.
2. The TCP protocol is configured to deliver data from end to end in a reliable manner.
3. It is connection oriented and provides flow control and retransmission of lost packets.

UDP:

1. The UDP protocol is connectionless, and does not guarantee reliability, flow control or detection of lost packets.
2. It is designed for faster delivery.

Typical corporate application i.e. Email, Web browsing, FTP etc uses TCP.

UDP is more suited to Streaming IP because if packets are lost, they are ignored and packet transmission continues. This may cause a slight loss of quality in the transmission, but the transmission is not interrupted.

If the same packets were lost over a TCP connection, TCP would stop delivery of further packets until the lost packets are successfully been retransmitted. This would cause an unacceptable break in the flow of the application. Therefore, UDP thus gives streaming applications greater control over the data flow than TCP.

These characteristics mean that majority of the audio video applications use a combination of TCP and UDP where needed. Typically, call set-up and data flow control is carried out using TCP. The audio and video data is sent using UDP.

H.323:

1. The H.323 protocol is defined by the ITU-T (International Telecommunications Union).
2. It describes how real-time multimedia communications can be exchanged on packet-based networks.
3. In addition to fully-interactive media communications such as video conferencing, H.323 also has provisions for other forms of communication, such as multi-media streaming.
4. During a point to point H.323 call, an initial TCP connection is made (using default port 1720). Data is exchanged over this connection to determine which port will be used for the actual multi-media connection. Once this port has been decided, an H.245 connection is made, to the new port.

The H.245 protocol handles all of the call parameter negotiations, such as which codec's to use.

5. H.245 also has commands that make UDP connections. Once the audio and video codec's and parameters have been negotiated, the H.245 session starts the underlying data stream.

The data stream consists of an RTCP (Real-Time Transport Connection Protocol) connection (UDP), and the actual data stream which uses the RTP (Real Time Protocol).

The H.323 protocol covers all aspects of telephony and conferencing, including capability exchange, conference control, basic signaling, Quos, registration, service discovery, gateways etc.

SIP:

- 1 SIP (Session Initiation Protocol) is defined by the IETF (Internet Engineering Task Force)
- 2 It is designed to be modular, allowing the protocol to be extended to cover specific applications.
3. SIP is defined as being responsible for basic call signaling, user location, and registration .two SIP users require a SIP server in order for them to communicate.

SIP clients send a series of messages (defined in the Session Description Protocol) to the server in order to set-up a call with another user. The client must first register with the server, then invite the other user to join a call. The SDP message will detail what is to be included in the call; audio, video, Codec's etc. Once the call recipient has accepted the call by responding to messages from the SIP server, the actual data Connect is set-up directly between the two SIP users.

17.4 Impact of Video Conferencing

With the growing technology the high speed Internet connectivity has become more widely available and that too at a reasonable cost. The cost of video capture and display technology has also decreased significantly. These factors have made personal video teleconference systems based on a webcam, personal computer system, software compression and broadband Internet connectivity affordable for the general public.

The hardware used for this technology has continued to improve in quality, and prices have dropped dramatically. The availability of freeware that are called as chat software's have made software based videoconferencing accessible and affordable to the general public.

Videoconferencing can be considered in a number of scenarios like:

- 1 When live conversation is needed.
- 2 When visual information is an integral component of the conversation.
- 3 When the parties of the conversation can't physically come to the same location.
- 4 When the expense or time of travel is a consideration.
- 5 Deaf and mute individuals have a particular interest in the development of affordable high-quality videoconferencing as a means of communicating with each other in sign language.

1. Effect on the educational system

Students can learn by participating in a 2-way communication platform. Teachers and lecturers from all over the world can be brought to classes from remote places. Students from diverse communities and backgrounds can come together to learn about one another.

Students are able to explore, communicate, analyze and share information and ideas with one another. Through videoconferencing students can visit another part of the world to speak with others, visit a zoo, a museum and so on, to learn. Educational institutions can use this technology to pool resources and teach courses which could not otherwise be offered.

Videoconferencing can benefit people involved in education in following ways:

- Faculty members can keep in touch with students while away.
- Guest lecturer can be brought into a class from another institution
- Researchers can collaborate and share data with colleagues on a regular basis without loss of time
- Researcher can answer questions related to student queries from remote places.
- Student interviews can be conducted with an employer in another city

2. Effect on medicine and health sector :

Videoconferencing is extremely useful technology for telemedicine and telenursing applications. This can help in diagnosis, consulting, transmission of medical images in real time. Patients can contact nurses and physicians in time of emergency. Physicians and other professionals can discuss cases across large distances. Rural areas can use this technology for diagnostic purposes, thus saving lives and making more efficient use of health care money. Special peripherals such as microscopes fitted with digital cameras, imaging devices, etc., can be used in conjunction with VTC equipment to transmit data about a patient.

3. Effect on Business:

Videoconferencing helps individuals in faraway places to have meetings on short notice. Time and money that used to be spent in traveling can be used to have short meetings. Low-cost face-to-face business meetings without leaving the desk can be conducted especially for businesses with wide-spread offices. The technology is also used for telecommuting, in which employees work from home.

Videoconferencing is now being introduced to online networking websites, in order to help businesses form profitable relationships quickly and efficiently without leaving their place of work. This has been leveraged by banks to connect busy banking professionals with customer in various locations using video banking technology.

Employees do not use the videoconference equipment because they are afraid that how they will appear to be wasting time or looking for the easiest way if they use videoconferencing to enhance customer and supplier relationships. This anxiety can be avoided if managers use the technology in front of their employees.

Attendees of business and medical videoconferences must work harder to interpret information delivered during a conference than they would if they attended face-to-face. They recommend that those coordinating videoconferences make adjustments to procedures and equipment

17.5 Barriers in the Growth of Video Conferencing

1. **Complexity of systems:** Most users are not technical they want a simple interface. Successful systems are backed by support teams who can pro-actively provide support and provide fast assistance whenever required.
2. **Lack of interoperability:** not all systems can readily interconnect, for example ISDN and IP systems require a gateway. Popular software solutions cannot easily connect to hardware systems. Some systems use different standards, features and qualities which can require additional configuration when connecting to dis-similar systems.

3. **Low bandwidth and quality of service:** In some countries it is difficult or expensive to get a high quality connection that is fast enough for good-quality video conferencing.. As Internet speeds increase higher quality and high definition video conferencing will become more readily available.
- 4 **Expensive systems** - a well designed system requires a specially designed room and can cost hundreds of thousands of dollars to fit out the room with codec's, integration equipment and furniture.
- 5 **Self conscious & Lack of eye contact:** Participants being self-conscious about being on camera, especially new users and older generations.

17.6 Artificial Intelligence

Artificial intelligence (AI) is the intelligence of machines and the branch of computer science that aims to create it. It is also defined as “the study and design of intelligent agent” where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success.

John McCarthy was the one who initially used this term in 1956 and defined it as “the science and engineering of making intelligent machines. AI research is highly technical and specialized, deeply divided into subfields. The central problems of AI include such traits as reasoning, knowledge, planning, learning, communication, perception and the ability to move and manipulate objects.

The field of AI research came to limelight at a conference on the campus of Dartmouth College 1956. The attendees included McCarthy, Marvin, Allen Newell and Herbert Simon. Later they became the leaders of AI research. They and their students wrote programs that were, to most people, simply astonishing & amazing. Computers were solving word problems in algebra, proving logical theorems and speaking English.

Later in 1960s, research in the U.S. was heavily funded by the Department of Defense and laboratories had been established around the world. AI's founders were positive about the future of the new field. Herbert Simon predicted that “machines will be capable, within twenty years, of doing any work a man can do” and Marvin Minsky agreed, writing that “within a generation ... the problem of creating ‘artificial intelligence’ will substantially be solved”.

In 1974, because of the criticism from Congress to fund more productive projects, the U.S. and British governments cut off all undirected, exploratory research in AI. The next few years, when funding for projects was hard to find. In the early 1980s, AI research was revived by the commercial success of expert systems. An expert system is a form of AI program that simulated the knowledge and analytical skills of one or more human experts.

By 1985 the market for AI had reached over a billion dollars. At the same time, Japan's fifth generation computer project inspired the U.S and British governments to restore funding for academic research in the field. With the collapse of the Lisp Machine market in 1987, AI market once again collapsed. In 1990s and early 21st century, AI achieved its greatest successes.

Artificial intelligence is widely used in the field of logistics, data mining, medical diagnosis and many other areas. The success was due to several factors:

1. The incredible computational power and efficiency of computers today.
- 2 A greater emphasis on solving specific sub problems.
- 3 Creation of new ties between AI and other fields working on similar problems
4. More emphasis on solid mathematical methods and rigorous scientific standards.

17.7 Characteristics of Intelligence System

The general problem of simulating intelligence has been broken down into a number of specific sub-problems. These consist of particular traits or capabilities that researchers would like an intelligent system to display. The traits described below have received the most attention :

1. Deduction, reasoning, problem solving:

Early AI researchers developed algorithms that imitated the step-by-step reasoning that human were often assumed to use when they solve puzzles play board games or make logical deductions. By the late 1980s and '90s, AI research had also developed highly successful methods for dealing with uncertain or incomplete information, employing concepts from probability and economics.

For difficult problems, most of these algorithms can require enormous computational resources like the amount of memory; computer time becomes enormous when the problem goes beyond a certain size. The search for more efficient problem solving algorithms is a high priority for AI research.

Human beings solve most of their problems using fast, intuitive judgments rather than the conscious, step-by-step deduction that early AI research was able to model. AI has made some progress at imitating this kind of “sub-symbolic” problem solving: embodied an agent approaches that emphasizes the importance of sensorimotor skills to higher reasoning.

2. Knowledge representation:

Knowledge representation and knowledge engineering are central to AI research. Many of the problems machines are expected to solve will require extensive knowledge about the world. Among the things that AI needs to represent are: objects, properties, categories and relations between objects; situations, events, states and time; causes and effects; knowledge about knowledge that is what we know about what other people know and many other, less well researched domains. A complete representation of “what exists.

3. Planning:

Intelligent agents must be able to set goals and achieve them. They need a way to visualize the future and be able to make choices that maximize the utility of the available choices. Multi-agent planning uses the cooperation and competition of many agents to achieve a given goal.

4. Machine learning:

It has been central to AI research from the beginning. Unsupervised learning is the ability to find patterns in a stream of input. Supervised learning includes both classification and numerical regression. Classification is used to determine what category something belongs in, after seeing a number of examples of things from several categories. Regression takes a set of numerical input/output examples and attempts to discover a continuous function that would generate the outputs from the inputs. In reinforcement learning the agent is rewarded for good responses and punished for bad ones. These can be analyzed in terms of decision theory, using concepts like utility. The mathematical analysis of machine learning algorithms and their performance is a branch of theoretical computer science known as computational learning theory.

5 Natural language processing:

It gives machines the ability to read and understand the languages that humans speak. Many

researchers hope that a sufficiently powerful natural language processing system would be able to acquire knowledge on its own, by reading the existing text available over the internet. Some straightforward applications of natural language processing include information retrieval (or text mining) and machine translation.

6. Motion and manipulation:

The field of robotics is closely related to AI. Intelligence is required for robots to be able to handle such tasks as object manipulation and navigation, with sub-problems of localization (knowing where you are), mapping (learning what is around you) and motion planning

7. Perception:

Machine perception is the ability to use input from sensors (such as cameras, microphones, sonar and others more exotic) to deduce aspects of the world. Computer vision is the ability to analyze visual input. A few selected subproblems are speech recognition, facial recognition and object recognition.¹

8. Emotional and social skills:

Emotion and social skills play two roles for an intelligent agent. First, it must be able to predict the actions of others, by understanding their motives and emotional states. (This involves elements of game theory, decision theory, as well as the ability to model human emotions and the perceptual skills to detect emotions.) Also, for good human-computer interaction, an intelligent machine also needs to display emotions. At the very least it must appear polite and sensitive to the humans it interacts with. At best, it should have normal emotions itself.

9. Creativity:

A sub-field of AI addresses creativity both theoretically (from a philosophical and psychological perspective) and practically (via specific implementations of systems that generate outputs that can be considered creative). A related area of computational research is Artificial Intuition and Artificial Imagination.

10. General intelligence:

Most researchers hope that their work will eventually be incorporated into a machine with general intelligence (known as strong AI), combining all the skills above and exceeding human abilities at most or all of them. Many of the problems above are considered AI-complete: to solve one problem, you must solve them all. For example, even a straightforward, specific task like machine translation requires that the machine follow the author's argument (reason), know what is being talked about (knowledge), and faithfully reproduce the author's intention (social intelligence). Machine translation, therefore, is believed to be AI-complete: it may require strong AI to be done as well as humans can do it

17.8 Applications of Artificial Intelligence

Game playing:

You can buy machines that can play master level chess for a few hundred dollars. There is some AI in them, but they play well against people—looking at hundreds of thousands of positions.

Speech recognition:

In the 1990s, computer speech recognition reached a practical level for limited purposes. Thus

United Airlines has replaced its keyboard tree for flight information by a system using speech recognition of flight numbers and city names. It is quite convenient. On the other hand, while it is possible to instruct some computers using speech, most users have gone back to the keyboard and the mouse as still more convenient.

Understanding natural language:

Just getting a sequence of words into a computer is not enough. Parsing sentences is not enough either. The computer has to be provided with an understanding of the domain the text is about, and this is presently possible only for very limited domains.

Computer vision:

The world is composed of three-dimensional objects, but the inputs to the human eye and computers' TV cameras are two dimensional. Some useful programs can work solely in two dimensions, but full computer vision requires partial three-dimensional information that is not just a set of two-dimensional views. At present there are only limited ways of representing three-dimensional information directly, and they are not as good as what humans evidently use.

Expert systems:

A "knowledge engineer" interviews experts in a certain domain and tries to embody their knowledge in a computer program for carrying out some task. How well this works depends on whether the intellectual mechanisms required for the task are within the present state of AI. When this turned out not to be so, there were many disappointing results. One of the first expert systems was MYCIN in 1974, which diagnosed bacterial infections of the blood and suggested treatments. It did better than medical students or practicing doctors.

Heuristic classification:

One of the most feasible kinds of expert system given the present knowledge of AI is to put some information in one of a fixed set of categories using several sources of information.

An example is advising whether to accept a proposed credit card purchase. Information is available about the owner of the credit card, his record of payment and also about the item he is buying and about the establishment from which he is buying it (e.g., about whether there have been previous credit card frauds at this establishment).

17.9 Branches of Artificial Intelligence

1. Logical AI:

What a program knows about the world in general the facts of the specific situation in which it must act, and its goals are all represented by sentences of some mathematical logical language. The program decides what to do by inferring that certain actions are appropriate for achieving its goals.

2. Search:

AI programs often examine large numbers of possibilities, e.g. moves in a chess game or inferences by a theorem proving program. Discoveries are continually made about how to do this more efficiently in various domains.

3. Pattern recognition:

When a program makes observations of some kind, it is often programmed to compare what it sees with a pattern. For example, a vision program may try to match a pattern of eyes and a nose in a scene in order to find a face. More complex patterns, e.g. in a natural language text, in a chess position, or in the history of some event are also studied. These more complex patterns require quite different methods than do the simple patterns that have been studied the most.

4. Representation:

Facts about the world have to be represented in some way. Usually languages of mathematical logic are used.

5. Inference:

From some facts, others can be inferred. Mathematical logical deduction is adequate for some purposes, but new methods of non-monotonic inference have been added to logic since the 1970s. The simplest kind of non-monotonic reasoning is default reasoning in which a conclusion is to be inferred by default, but the conclusion can be withdrawn if there is evidence to the contrary.

For example, when we hear of a bird, we may infer that it can fly, but this conclusion can be reversed when we hear that it is a penguin. It is the possibility that a conclusion may have to be withdrawn that constitutes the non-monotonic character of the reasoning. Ordinary logical reasoning is monotonic in that the set of conclusions that can be drawn from a set of premises is a monotonic increasing function of the premises. Circumscription is another form of non-monotonic reasoning.

6. Common sense knowledge and reasoning:

This is the area in which AI is farthest from human-level, in spite of the fact that it has been an active research area since the 1950s. While there has been considerable progress, e.g. in developing systems of non-monotonic reasoning and theories of action, yet more new ideas are needed.

7. Learning from experience:

Programs learn from experience. This approach to AI is based on connectionism and neural nets. There is also learning of laws expressed in logic. **Mit97** is a comprehensive undergraduate text on machine learning. Programs can only learn from facts or behaviors. Learning systems are almost all based on very limited abilities to represent information.

8. Heuristics:

A heuristic is a way of trying to discover something or an idea imbedded in a program. The term is used variously in AI. Heuristic functions are used in some approaches to search to measure how far a node in a search tree seems to be from a goal. Heuristic predicates that compare two nodes in a search tree to see if one is better than the other, i.e. constitutes an advance toward the goal, and may be more useful.

17.10 Information Superhighway

The **information superhighway** also called as **infobahn** was a popular term used through the 1990s to refer to digital communication systems and the internet telecommunications network. It is associated

with United States Senator and later Vice-President Al Gore who introduced it in 1978. It is defined as, “a high-speed communications system to enhance data transmission between different geography. The Internet was originally cited as a model for this superhighway; however, with the explosion of the World Wide Web, the Internet became the information superhighway” It is also defined as “a route or network for the high-speed transfer of information; (a) a proposed national fiber-optic network in the United States; (b) the Internet.”

The Massachusetts Institute of Technology describes the concept as follows: “The information superhighway directly connects millions of people, each both a consumer of information and a potential provider. Most predictions about commercial opportunities on the information superhighway focus on the provision of information products, such as video on demand, and on new sales outlets for physical products, as with home shopping.

The information superhighway brings together millions of individuals who could exchange information with one another. Any conception of a traditional market for making beneficial exchanges, such as an agricultural market or trading pit, or any system where individuals respond to posted prices on a computer screen is woefully inadequate for the extremely large number of often complex trades that will be required.

17.11 Internet as Information Superhighway

The Internet provides a vast array of services, information sources, and ways to perform work and engage in commerce. It has an estimated 20–40 million users, and doubles every year. The Internet version 1.0 backbone operated at 56Kbps, and primarily carried email.¹ The current Internet 2.0 backbone operates at 45–155Mbps, which enables. The World-Wide Web (WWW). The next stage, Internet 3.0, has been denoted as the “Information Superhighway.”

Internet 3.0 could provide ubiquitous symmetrical, high-bandwidth links that can simultaneously carry telephone, video (television), and data. Ideally, bandwidth would be at the maximum carrying capacity of the copper wires that link central offices with homes, a minimum of 6–25Mbps.

Today’s Internet provides a glimpse of an information-rich world enabling commerce, information access and information distribution. Corporations, universities, and government organizations use economies of scale to afford high-bandwidth connection to the Internet—typically 10Mbps and higher to the desktop. However, homes and small organizations are relegated to low bandwidth connections: typically less than 28.8Kbps. This is 300 times slower than the connections offered their corporate cohorts.

It seems extremely unlikely that homes and small organizations will have substantially higher bandwidth within the next five years. The great hope of ISDN gives only four times more bandwidth at substantially higher prices. Even recent IEEE conferences focusing on broadband communications (high-speed data, including video) fail to evoke any short-term optimism. To carry television-quality video such as MPEG-2 requires 4–6Mbps. Even low-quality MPEG-1 video at 1.5Mbps is unlikely to be accessible from the home or small business before the year 2001.

Web Browser:

Internet travelers navigate their journey by means of a web browser. The browser can be thought of as the window onto the Internet, it is a software application used to locate and display Web pages. The two most popular browsers are Mozilla Firefox and Microsoft Internet Explorer. Both of these are called graphical browsers, which mean that they can display graphics as well as text. In addition to graphics and text, most modern browsers can also present multimedia information, including sound, video and moving animation

Local Area Networks:

Your computer may be connected to another computer within your home or your office. If that is the case, then you are part of a LAN, a local area network. A LAN is a series of computers that is connected on a small network. You can think of a LAN as a neighborhood of computers that are connected and are generally situated within close physical proximity. Most LANs are contained within a floor of a building, a building or a group of buildings. LANs link computers together and provide shared access to printers, file servers, and other services. The LAN server then connects all those devices to other networks, such as the Internet. A network is just a way of connecting computers. The internet is a very big network.

The Internet Backbone:

As you travel along the Internet, the router will direct you onto a network that is the equivalent of an Interstate highway - the Internet backbone. The Internet backbone is the bulwark of the Internet, spanning the globe and moving large amounts of information across vast distances at high speeds. The Internet Backbone consists of three components. The first component is made up of phone lines and cables that make up the channels along which information travels. The second component, the Network Service Providers (NSPs) provide high-speed Internet access and services for Internet Service Providers, who then make these services available to individual Internet subscribers. Finally, Network Access Points (NAPs) allow messages to 'hop' or transfer from one network to another, thereby providing the connection between different networks. The three components work together to facilitate the high-speed movement of information around the world.

Internet Service Provider:

Whether you are part of a LAN or you are trying to connect to the Internet as a single user, you will likely gain access to the Internet via an Internet Service Provider, or ISP. An ISP is essentially an off-ramp onto the Internet. ISPs are companies that allow you to connect to their computers, which in turn are connected to the Internet. ISPs are usually local companies that provide individuals and small companies with all the requirements to allow user to connect to the Internet. This may include software, domain names, user names and connectivity.

Routers:

A router is a computer that sits on a network. Its sole purpose is to direct messages to their final destination. Routers are important because messages do not always travel the same path to their final destination. As the Internet has gained in popularity the various channels of the Internet have become increasingly busy. Often the channels that link computers become overloaded with traffic. Like a policeman on a very busy road, the router may detect that there is a backlog of traffic on one of the routes to a message's destination, in which case it will simply send the data along a different, more convenient route.

How the Internet works on information superhighway:

By now, it is hoped that you have a decent idea of how the Internet is constructed. However, in addition to understanding the structure of the Net, we must also understand how computers communicate with each other in order to send, receive and understand messages. Protocols On any road or highway, there must be a system of rules and procedures that allows traffic to navigate to its chosen destination. On the internet, this system of order is known as protocols. The term protocol describes a set of rules for encoding and decoding data so that messages may be exchanged between computers so that each computer

can fully understand their meaning. Simply put, protocols allow computers and networks to speak to each other in order to exchange data.

17.12 Information Superhighway as an Amalgam

The Information Superhighway has not to be implemented or created from scratch. It will be an amalgam of partially already existing:

- Information networks,
- Services,
- End systems such as PCs or TV-sets
- Terrestrial and satellite broadcasting,
- Cable television networks,
- Wired and wireless telephone systems,
- Commercial computer network services,
- The Internet and its successor.

The Information Superhighway has been described as “a system to deliver to all the information they need when they want it and where they want it - at an affordable price.” Development in three areas is, therefore, required to make this system working:

- Interoperable, extensible end systems so that television and communications can evolve along the technology curve.
- Computer systems, televisions, telephones, and other devices converged to serve as “information appliances”.
- Digital libraries, information services, and databases to provide the information content; Since potential users will buy content, not technology, content and useful applications will attract the usage necessary for success. Therefore, cultural industries, particularly motion pictures and television, must be seen as an essential part of the implementation strategy path which, nevertheless, means that intellectual property rights associated with cultural items are to be protected by audit and control mechanisms.

The Information Superhighway should be open to all information suppliers on an equitable basis, so that applications may include distribution of entertainment programming, educational information, government data, manufacturing information, and access to health care.

17.13 Advantages of Information Superhighway

- Digital program delivery over interactive networks will permit additional cost-effective services such as “shopping at home” and “multimedia information on-demand”.
- Electronic distribution of educational material will expose all students, even those in remote locations, to a high-quality education.
- Electronic availability will facilitate access by business and the public to government reports, weather information, and other scientific data.
- Electronic “blueprints” and rapid multimedia communication between Manufacturers and their suppliers will improve manufacturing productivity.

- Health care will be improved by telemedicine and maintenance of on-line Medical records.
- Telemedicine will enable remote patient examination and diagnosis.

Most probably the Information Superhighway will be built, owned, and run by the Private sector with hundreds or thousands of companies providing services whereby the role of regulating bodies (such as the governments) is to ensure that these systems and services are interconnected and interoperable in order to provide competition and choice for the customer

Since the goal is to have a fully competitive marketplace in which any company may Provide any service to any customer we are witnessing a fundamental paradigm change:

The Information Superhighway will cause convergence of different players which found their undisturbed and independent role in Communications, Computing, Consumer products, Content provision and will, therefore, be the catalyst of new alliances.

17.14 Summary

Video conferencing also called as video teleconference is basically a set of interactive telecommunication technologies which allows two or more people residing at different locations to interact simultaneously with audio and video transmission. Video conferencing provides a facility to schools, colleges and other educational institutions to connect with speakers and experts from different areas and indulge in different professional activities, project collaboration and community events. The technology behind video teleconference system is digital compression of audio and video streams in real time. This functionality is provided with the help of codec also called as coder/decoder. Videoconferencing is extremely useful technology for telemedicine and telenursing applications. This can help in diagnosis, consulting, transmission of medical images in real time. Students can learn by participating in a 2-way communication platform. Teachers and lecturers from all over the world can be brought to classes from remote places. Students from diverse communities and backgrounds can come together to learn about one another

AI is defined as “the study and design of intelligent agent” where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success. AI research is highly technical and specialized, deeply divided into subfields. The central problems of AI include such traits as reasoning, knowledge, planning, learning, communication, perception and the ability to move and manipulate objects. Artificial intelligence is widely used in the field of logistics, data mining, medical diagnosis and many other areas. Information Superhighway refers to digital communication systems and the internet telecommunications network. It is associated with United States Senator and later Vice-President Al Gore who introduced it in 1978 .The Internet was originally cited as a model for this superhighway; however, with the explosion of the World Wide Web, the Internet became the information superhighway”.The information superhighway brings together millions of individuals who could exchange information with one another. Internet travelers navigate their journey by means of a web browser. The browser can be thought of as the window onto the Internet, it is a software application used to locate and display Web pages. It will be an amalgam of partially already existing, information networks, services, end systems such as PCs or TV-sets, terrestrial and satellite broadcasting, cable television networks, wired and wireless telephone systems.

17.15 Key Words

- **Video Conferencing:** It is called as visual collaboration as it allows people residing at different locations to collaborate with each other and allows sharing of documents and even computer applications.

- **Codec:** A codec is the name given to the encoding/decoding algorithm that compresses and decompresses audio video data. The effectiveness of a streaming IP connection is determined partly by the codec.
- **AI:** It is defined as “the study and design of intelligent agent” where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success.
- **Information Superhighway:** It is defined as “a route or network for the high-speed transfer of information; (a) a proposed national fiber-optic network in the United States; (b) the Internet.”
- **Web browser:** Internet travelers navigate their journey by means of a web browser. It provides an environment to view a webpage.
- **ISP:** To connect to the Internet and to gain access to the Internet you need an Internet Service Provider, or ISP. An ISP is essentially an off-ramp onto the Internet. ISPs are companies that allow you to connect to their computers, which in turn are connected to the Internet.
- **Router:** A router is a computer that sits on a network. Its sole purpose is to direct messages to their final destination. Routers are important because messages do not always travel the same path to their final destination.
- **Non Procedural Language** Its a language in which end result is being described instead of various steps.
- **Procedural Language** In this we have to describe all the steps in detail to achieve a desired result.
- **4GL** A language in which we have to describe result and rest of the program are developed by 4GL environment.
- **SQL** Structured Query Language is an example for 4GL used for manipulation of databases
- **Virtual Reality** Its a artificially created reality by controlling sensory organs.

17.16 Self Assessment Test

1. What do you understand by the term video conferencing? Explain the core technology behind conferencing?
2. What are the areas where video conferencing can be useful?
3. Mention the factors that are hindering the growth of video conferencing?
4. List the names of protocols and software required to do video conferencing?
5. Explain the term AI? List traits or capabilities that an intelligent system needs to display?
6. What are the areas where AI is beneficial? List the various branches of AI?
7. Explain the term Information Superhighway and how it is beneficial in different scenarios?
8. Why Internet is also called as an Information superhighway and how Internet superhighway is an amalgam of already existing technologies?

17.17 Reference Books

- Information Technology Today, S Jaiswal, Galgotia Publication
- Computer Today,

UNIT - 18 : E-COMMERCE

Unit Structure

- 18.0 Objectives
- 18.1 Introduction
- 18.2 Early Development
- 18.3 Difference Between e-Commerce and e-Business
- 18.4 Types of e-Commerce
- 18.5 Features of e-Commerce
- 18.6 Advantages and Disadvantages
- 18.7 Electronic Payment Systems
- 18.8 Summary
- 18.9 Key Words
- 18.10 Self Assessment Test
- 18.11 Reference Books

18.0 Objectives

After studying this unit you should be able:

- To understand the concept of e-Commerce.
- To Study the development of e-Commerce
- To study the difference between e-Commerce and e-Business
- To study the various types of Ecommerce.
- To study the unique characteristics of e-Commerce
- To know electronic payments and issues.

18.1 Introduction

E-Business is the one of the most exciting economic and technological trend of last century, which has been resulted from new business application of information technology. The electronic business is more than a technology, and if used strategically it provide organizational benefits through gains in productivity, market shares or even in bottom line profitability.

Electronic commerce, commonly known as e-commerce or eCommerce, consists of the buying and selling of products or services over electronic systems such as the Internet and other computer networks. Electronic commerce can be defined as any form of business transaction in which the parties interact electronically. A transaction in an electronic market represents a number of interactions between parties. It could involve several trading steps, such as marketing, ordering, payment, and support for delivery. An electronic market allows participating sellers and buyers to exchange goods and services with the support of information technology. The interaction between participants is supported by electronic trade processes that are basically search, valuation, payment and settlement, logistics and authentication. The amount of trade conducted electronically has grown extraordinarily with widespread Internet usage.

The Internet and the World Wide Web allow companies to efficiently implement these key trading processes. Many search services and brokers are available to help buyers find information, products and merchants in electronic markets. The use of commerce is conducted in this way, spurring and drawing on innovations in electronic funds transfer, supply chain management, Internet marketing, online transaction

processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web at least at some point in the transaction's lifecycle, although it can encompass a wider range of technologies such as e-mail as well.

A large percentage of electronic commerce is conducted entirely electronically for virtual items such as access to premium content on a website, but most electronic commerce involves the transportation of physical items in some way. Online retailers are sometimes known as e-tailers and online retail is sometimes known as e-tail. Almost all big retailers have electronic commerce presence on the World Wide Web.

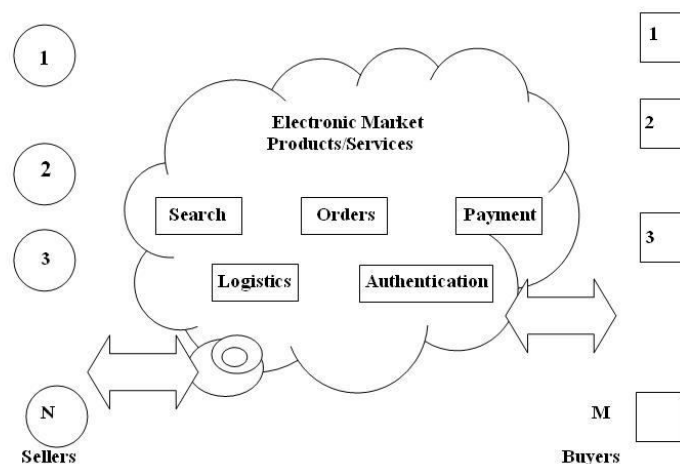


Figure: Representation of e-Commerce.

In all the professional and public world e-Business and e-Commerce terminology has been used interchangeably. We will also use these terminologies as a synonym but we must know the difference. Electronic business, commonly referred to as “eBusiness” or “e-business”, may be defined as the application of information and communication technologies (ICT) in support of all the activities of business. Here meaning of the term Business can be understood with a phrase “mind your business” which mean “keep your interest apart”. Therefore business means keeping the interest of the organization for example interest of some business could be generation of profits other could be to increase customer base. Commerce means commercial transaction between various parties. Commerce constitutes of the exchange of products and services between businesses, groups and individuals and can be seen as one of the essential activities of any business. Electronic commerce focuses on the use of ICT to enable the external activities and relationships of the business with individuals, groups and other businesses.

Electronic business methods enable companies to link their internal and external data processing systems more efficiently and flexibly, to work more closely with suppliers and partners, and to better satisfy the needs and expectations of their customers.

In practice, e-business is more than just e-commerce. While e-business refers to more strategic focus with an emphasis on the functions that occur using electronic capabilities, e-commerce is a subset of an overall e-business strategy. E-commerce seeks to add revenue streams using the World Wide Web or the Internet to build and enhance relationships with clients and partners and to improve efficiency using the Empty Vessel strategy. Often, e-commerce involves the application of knowledge management systems.

E-business involves business processes spanning the entire value chain: electronic purchasing and supply chain management, processing orders electronically, handling customer service, and cooperating with business partners. Special technical standards for e-business facilitate the exchange of data between companies. E-business software solutions allow the integration of intra and inter firm business processes. E-business can be conducted using the Web, the Internet, intranets, extranets, or some combination of these.

18.2 Early Development

The meaning of electronic commerce has changed over the last 30 years. Originally, electronic commerce meant the facilitation of commercial transactions electronically, using technology such as Electronic Data Interchange (EDI) and Electronic Funds Transfer (EFT). These were both introduced in the late 1970s, allowing businesses to send commercial documents like purchase orders or invoices electronically. The growth and acceptance of credit cards, automated teller machines (ATM) and telephone banking in the 1980s were also forms of electronic commerce. Another form of e-commerce was the airline reservation system typified by Sabre in the USA and Travicom in the UK.

From the 1990s onwards, electronic commerce would additionally included in enterprise resource planning systems (ERP), data mining and data warehousing.

An early example of many-to-many electronic commerce in physical goods was the Boston Computer Exchange, a marketplace for used computers launched in 1982. An early online information marketplace, including online consulting, was the American Information Exchange, another pre Internet online system introduced in 1991.

In 1990, Tim Berners-Lee invented the World Wide Web browser and transformed an academic telecommunication network into a worldwide everyman everyday communication system called internet/www. Commercial enterprise on the Internet was strictly prohibited until 1991. Although the Internet became popular worldwide around 1994 when the first internet online shopping started, it took about five years to introduce security protocols and DSL allowing continual connection to the Internet. By the end of 2000, many European and American business companies offered their services through the World Wide Web. Since then people began to associate a word “ecommerce” with the ability of purchasing various goods through the Internet using secure protocols and electronic payment services.

18.2.1 Timeline

- 1979: Michael Aldrich invented online shopping
- 1981: Thomson Holidays, UK is first B2B online shopping
- 1982: Minitel was introduced nationwide in France by France Telecom and used for online ordering.
- 1984: Gateshead SIS/Tesco is first B2C online shopping and Mrs Snowball, 72, is the first online home shopper
- 1985: Nissan UK sells cars and finance with credit checking to customers online from dealers' lots
- 1987: Swreg begins to provide software and shareware authors means to sell their products online through an electronic Merchant account
- 1990: Tim Berners-Lee writes the first web browser, WorldWideWeb, using a NeXT computer
- 1992: J.H. Snider and Terra Ziporyn publish Future Shop: How New Technologies Will Change the Way We Shop and What We Buy

- 1994: Netscape releases the Navigator browser in October under the code name Mozilla. Pizza Hut offers online ordering on its Web page. The first online bank opens. Attempts to offer flower delivery and magazine subscriptions online. Adult materials also become commercially available, as do cars and bikes. Netscape 1.0 is introduced in late 1994 SSL encryption that made transactions secure
- 1995: Jeff Bezos launches Amazon.com and the first commercial-free 24 hour, internet-only radio stations, Radio HK and NetRadio start broadcasting. Dell and Cisco begin to aggressively use Internet for commercial transactions. eBay is founded by computer programmer Pierre Omidyar as AuctionWeb
- 1998: Electronic postal stamps can be purchased and downloaded for printing from the Web
- 1999: Business.com sold for US \$7.5 million to eCompanies, which was purchased in 1997 for US \$149,000. The peer-to-peer file sharing software Napster launches. ATG Stores launches to sell decorative items for the home online
- 2000: The dot-com bust
- 2002: eBay acquires PayPal for \$1.5 billion. Niche retail companies CSN Stores and NetShops are founded with the concept of selling products through several targeted domains, rather than a central portal
- 2003: Amazon.com posts first yearly profit
- 2007: Business.com acquired by R.H. Donnelley for \$345 million
- 2009: Zappos.com acquired by Amazon.com for \$928 million. Retail Convergence, operator of private sale website RueLaLa.com, acquired by GSI Commerce for \$180 million, plus up to \$170 million in earn-out payments based on performance through 2012
- 2010: US eCommerce and Online Retail sales projected to reach \$173 billion, an increase of 7 percent over 2009

18.3 Difference Between e-Commerce and e-Business

E-Commerce and E-Business are two completely different terms but unfortunately they are always used interchangeably by many of us. The reason behind this lies in the meanings of “business” and “commerce” in English language. But there is a difference between e-commerce and e-business. There are many people who understand the subtle differences between the two and there had always been a debate among these two groups about the differences and similarities between e-commerce and e-business.

The differences between the two are as follows:

1. E-Commerce is the subset of E-Business. If you remember the Venn diagram you studied in school then you can very well understand it. The later one is a very broad concept while the former one is just a small part of it. This relationship will be cleared in the subsequent points.
2. Those activities which essentially involve monetary transactions are termed as “e-commerce”. However, e-business is a much broader term. There are many other things besides selling including but not limited to marketing, procurement of raw materials or goods, customer education, looking for suppliers etc.
3. To sell online is e-commerce but to bring and retain customers and educate them online about the product or service is e-business. Having a website to do it is not sufficient. But, having a professionally built website loaded with latest technologies to capture the attention of the visitor and win his/

her appreciation is required. When money is involved then the first thing which user looks for is safety and security of his/her money. Having a website laden with such qualities is important.

4. When Dell sell computers, laptops, monitors, printers, accessories etc online then it is not engaged in e-commerce but e-business. Let me tell you how. When a visitor comes on the website, the first thing he see is website design and navigation as well as those things which are going to help him find what he is looking for and if he directly lands on the page he was looking for, he looks for the information related to it. The information provided should be appealing and clear maximum doubts of the visitor so as to convert him in a client. Till now no money has been exchanged nor been talked about. So, was this e-commerce? No, it is e-business which guides the visitor.
5. E-commerce has also been defined as a process covering outward processes that touch customers, suppliers and external partners while e-business covers internal processes such as production, inventory management, product development, risk management, finance etc.

In all, e-commerce can be described as the use of the Internet and the web to transact business. More formally, digitally enabled commercial transactions between and among organizations and individuals. On the other hand, e-business can be described as the digital enablement of transactions and process within a firm, involving information systems under the control of the firm. Moreover, e-business applications turn into e-commerce precisely when an exchange of value occurs.

18.4 Types of e-Commerce

E-commerce is the use of Internet and the web to transact business but when we focus on digitally enabled commercial transactions between and among organizations and individuals involving information systems under the control of the firm it takes the form of e-business. Nowadays, 'e' is gaining momentum and most of the things if not everything is getting digitally enabled. Thus, it becomes very important to clearly draw the line between different types of commerce or business integrated with the 'e' factor. There are mainly eight types of e-commerce models:

18.4.1 Business to Consumer (B2C) -

As the name suggests, it is the model involving businesses and consumers. This is the most common e-commerce segment. In this model, online businesses sell to individual consumers. When B2C started, it had a small share in the market but after 1995 its growth was exponential. The basic concept behind this type is that the online retailers and marketers can sell their products to the online consumer by using crystal clear data which is made available via various online marketing tools. E.g. An online pharmacy giving free medical consultation and selling medicines to patients is following B2C model. Some of the sites in this category are amazon.com, dell.comebay.com and websites of all the banks offering services to their customers etc. Here we have to note that one website can have multiple models.

18.4.2 Business to Business (B2B) -

It is the largest form of e-commerce involving business of trillions of dollars. In this form, the buyers and sellers are both business entities and do not involve an individual consumer. It is like the manufacturer supplying goods to the retailer or wholesaler. E.g. Dell sells computers and other related accessories online but it does not manufacture all those products. So, in order to sell those products, it first purchases them from different businesses i.e. the manufacturers of those products. Of the site which provide B2B model are ebay.com, esteels.com, interaction at payment gateway, electronic clearing house etc

18.4.3 Consumer to Consumer (C2C) -

It facilitates the online transaction of goods or services between two people. The interaction will be carryout between two end users. Though there is no visible intermediary involved but the parties cannot

carry out the transactions without the platform which is provided by the online market maker such as eBay. Some of the example for this category are kabadibazar.com, all the job site such as naukari.com, all the matrimonial site such as jeevansaathi.com etc.

18.4.4 Government-to-Business (G2B)-

The government-to-business category covers all transactions between companies/ business and government organizations. It includes government electronic procurements and other government to business communications and vice versa. In addition to public procurement, government organizations may also offer the option of electronic transactions such as payment of corporate taxes. Some of the site in this category are filling of sale tax, all the tenders these days also appear electronically on government site, auction of the products etc.

18.4.5 Government-to-Citizens (G2C)-

The government-to-citizens category covers electronic interactions between citizens and government. This model is very popular in areas such as welfare payments and file of income tax returns (efiling), payment of taxes of local governing body such as property tax, water tax etc.

18.4.6 Government to Government (G2G)-

This category of transaction occurs when two government/ agencies/ international agencies interact with each other. In many states of India we have electronic treasury (eTreasury) for efficient and effective disbursement of funds.

18.4.7 Peer to Peer (P2P) -

Though it is an e-commerce model but it is more than that. It is a technology in itself which helps people to directly share computer files and computer resources without having to go through a central web server. To use this, both sides need to install the required software so that they can communicate on the common platform. This type of e-commerce has quite low revenue generation as from the beginning it has been inclined to the free usage due to which it sometimes got entangled in cyber laws. Some of the example in this category are napster.com, mymusic.com etc

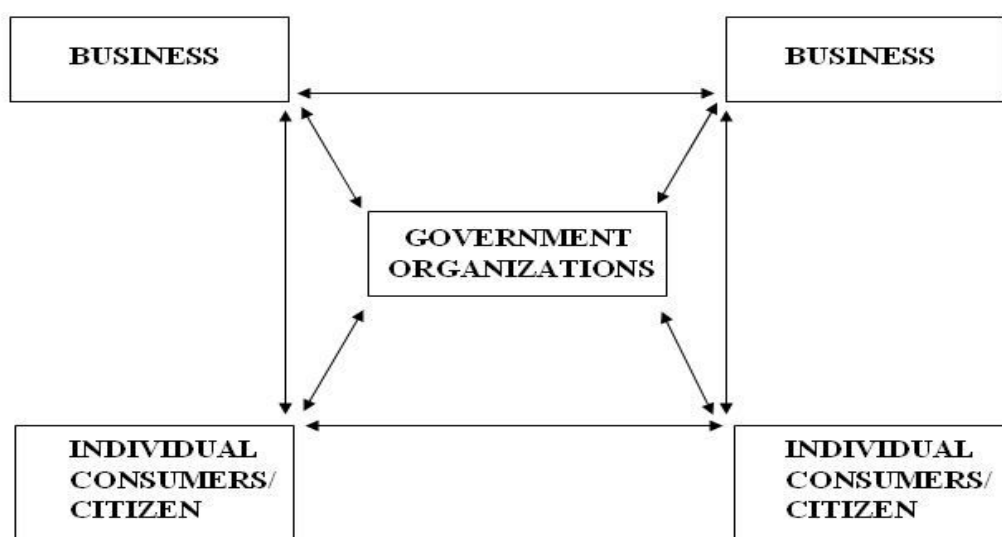


Figure: Business relations in electronic market

18.4.8 m-Commerce -

It refers to the use of mobile devices for conducting the transactions. The mobile device holders can contact each other and can conduct the business. Even the web design and development companies optimize the websites to be viewed correctly on mobile devices. These days one can perform many actions on mobile.

It is not necessary that these models are dedicatedly followed in all the online business. It may be the case that a business is using them as per its needs.

18.5 Features of e-Commerce

Nowadays E-Commerce is the buzz word. Although it is omnipresent but we never realize its importance primarily because it is known by different names. People do site promotion, SEO, affiliate marketing, and many other things but the goal is same i.e. to get clients and sell the products or services of the company. 'E' is just a medium to transact online. Here are some peculiar features of e-commerce which makes it considerably appreciable.

1. Ubiquity -

In traditional commerce, a marketplace is a physical place we visit in order to transact. For example, television and radio are typically directed to motivating the customer to go someplace to make a purchase. E-commerce is ubiquitous, meaning that it is available just about everywhere at all times. It liberates the market from being restricted to a physical space and makes it possible to shop from your desktop. The result is called a market space. From consumer point of view, ubiquity reduces transaction costs - the cost of participating in a market. To transact, it is no longer necessary that you spend time and money traveling to a market. At a broader level, the ubiquity of e-commerce lowers the cognitive energy required to complete a task.

2. Global Reach -

E-commerce technology permits commercial transactions to cross cultural and national boundaries far more conveniently and effectively as compared to traditional commerce. As a result, the potential market size for e-commerce merchants is roughly equal to the size of world's online population. Not only this it also provides reachability of business to new people but also allows 24X7 access of customers.

3. Universal Standards -

One strikingly unusual feature of e-commerce technologies is that the technical standards of the Internet and therefore the technical standards for conducting e-commerce are universal standards i.e. they are shared by all the nations around the world.

4. Interactivity -

Unlike any of the commercial technologies of the twentieth century, with the possible exception of the telephone, e-commerce technologies are interactive, meaning they allow for two-way communication between merchants and consumer. Customers have a feeling of face to face interaction on their e-commerce sessions.

5. Information Density and Richness -

The Internet vastly increases information density. It is the total amount and quality of information available to all market participants, consumers and merchants. E-commerce technologies reduce information collection, storage, communication and processing costs. At the same time, these technologies increase greatly the accuracy and timeliness of information, making information more useful and important than ever. As a result, information becomes plentiful, cheaper and of higher quality. Information richness refers to the complexity and content of a message.

6. Personalization -

E-commerce technologies permit personalization. Merchants can target their marketing messages to specific individuals by adjusting the message to a person's name, interests and past purchases. The technology also permits customization. Merchants can change the product or service based on user's preferences or prior behavior.

E-commerce technologies make it possible for merchants to know much more about consumers and use this information more effectively than ever before. Online merchants can use this information to develop new information asymmetries, enhance their ability to brand products, charge premium prices for high quality service and segment the market into an endless number of subgroups, each receiving a different price.

18.6 Advantages and Disadvantages

18.6.1 Advantages of Electronic Commerce

The greatest and the most important advantage of e-commerce, is that it enables a business concern or individual to reach the global market. It caters to the demands of both the national and the international market, as your business activities are no longer restricted by geographical boundaries. With the help of electronic commerce, even small enterprises can access the global market for selling and purchasing products and services. Even time restrictions are nonexistent while conducting businesses, as e-commerce empowers one to execute business transactions 24 hours a day and even on holidays and weekends. This in turn significantly increases sales and profit.

Electronic commerce gives the customers the opportunity to look for cheaper and quality products. With the help of e-commerce, consumers can easily research on a specific product and sometimes even find out the original manufacturer to purchase a product at a much cheaper price than that charged by the wholesaler. Shopping online is usually more convenient and time saving than conventional shopping. Besides these, people also come across reviews posted by other customers, about the products purchased from a particular e-commerce site, which can help make purchasing decisions.

For business concerns, e-commerce significantly cuts down the cost associated with marketing, customer care, processing, information storage and inventory management. It reduces the time period involved with business process re-engineering, customization of products to meet the demand of particular customers, increasing productivity and customer care services. Electronic commerce reduces the burden of infrastructure to conduct businesses and thereby raises the amount of funds available for profitable investment. It also enables efficient customer care services. On the other hand, It collects and manages information related to customer behavior, which in turn helps develop and adopt an efficient marketing and promotional strategy.

18.6.2 Disadvantages of Electronic Commerce

Electronic commerce is also characterized by some technological and inherent limitations which has restricted the number of people using this revolutionary system. One important disadvantage of e-commerce is that the Internet has still not touched the lives of a great number of people, either due to the lack of knowledge or trust. A large number of people do not use the Internet for any kind of financial transaction. Some people simply refuse to trust the authenticity of completely impersonal business transactions, as in the case of e-commerce. Many people have reservations regarding the requirement to disclose personal and private information for security concerns. Many times, the legitimacy and authenticity of different e-commerce sites have also been questioned.

Another limitation of e-commerce is that it is not suitable for perishable commodities like food items. People prefer to shop in the conventional way than to use e-commerce for purchasing food products. So e-commerce is not suitable for such business sectors. The time period required for delivering physical products can also be quite significant in case of e-commerce. A lot of phone calls and e-mails may be required till you get your desired products. However, returning the product and getting a refund can be even more troublesome and time consuming than purchasing, in case if you are not satisfied with a particular product.

Thus, on evaluating the various pros and cons of electronic commerce, we can say that the advantages of e-commerce have the potential to outweigh the disadvantages. A proper strategy to address the technical issues and to build up customers trust in the system, can change the present scenario and help e-commerce adapt to the changing needs of the world.

18.7 Electronic Payment Systems

A e-business transaction is incomplete without payment, like traditional business cycle, we have variety of alternative available as e-payment. Some of them are discussed below:

E-Cash: Recall our original definition of cash i.e legal tender (called currency) created by national authorities that is instantly convertible to other forms of value (goods and services) without the intermediation of third parties. Digital cash or e-cash as currency available, digital forms of value storage and value exchange that have limited convertibility into other forms of value and require intermediaries to convert.

Online stored value payment systems: permit consumers to make instant, online payments to merchants and other individuals based on value stored in an online account. For example ITZ cards for online purchases and Railway reservation.

Smart card: a stored value system based on credit-card-sized plastic cards that have embedded chips that store personal information. For example prepaid petro card, issued by some of the petroleum companies.

Digital credit card payment systems: seek to extend of existing credit card for use as online shopping payment tools.

Digital checking payment systems: seek to extend the functionality of existing checking accounts for the use as online shopping payment tools.

Electronic money (also known as e-currency, e-money, electronic cash, electronic currency, digital money, digital cash or digital currency) refers to money or scrip which is only exchanged electronically. Typically, this involves the use of computer networks, the internet and digital stored value systems. Electronic Funds Transfer (EFT) and direct deposit are all examples of electronic money. Also, it is a collective term for financial cryptography and technologies enabling it.

While electronic money has been an interesting problem for cryptography (see for example the work of David Chaum and Markus Jakobsson), to date, the use of e-money has been relatively low-scale. One rare success has been Hong Kong's Octopus card system, which started as a transit payment system and has grown into a widely used electronic money system. London Transport's Oyster card system remains essentially a contactless pre-paid travelcard. Two other cities have implemented functioning electronic money systems. Very similar to Hong Kong's Octopus card, Singapore has an electronic money program for its public transportation system (commuter trains, bus, etc.), based on the same type of (FeliCa) system. The Netherlands has also implemented an electronic money system known as Chipknip, which is based upon the same system in Hong Kong.

A number of electronic money systems use Contactless payment transfer in order to facilitate easy payment and give the payee more confidence in not letting go of their electronic wallet during the transaction.

- **Electronic money systems**

In technical terms, electronic money is an online representation, or a system of debits and credits, used to exchange value within another system, or within itself as a stand alone system. In principle this process could also be done offline.

Occasionally, the term electronic money is also used to refer to the provider itself. A private currency may use gold to provide extra security, such as digital gold currency. Some private organizations, such as the United States armed forces use independent currencies such as Eagle Cash.

- **Centralised systems**

Many systems—such as Paypal, WebMoney, cashU, and Hub Culture’s Ven—will sell their electronic currency directly to the end user, but other systems only sell through third party digital currency exchangers.

In the case of Octopus card in Hong Kong, electronic money deposits work similarly to regular bank deposits. After Octopus Card Limited receives money for deposit from users, the money is deposited into a bank. This is similar to debit-card-issuing banks redepositing money at central banks. Some community currencies, like some LETS systems, work with electronic transactions.

- **De-centralized systems**

Decentralized electronic money systems include:

- Bitcoin, an anonymous distributed electronic money system
- Ripple monetary system, a project to develop a distributed system of electronic money independent of local currency.
- PKTP, a pseudonymous distributed electronic money system

- **Offline ‘anonymous’ systems**

In the use of offline electronic money, the merchant does not need to interact with the bank before accepting money from the user. Instead merchants can collect monies spent by users and deposit them later with the bank. In principle this could be done offline, i.e. the merchant could go to the bank with his storage media to exchange e-money for cash. Nevertheless the merchant is guaranteed that the user’s e-money will either be accepted by the bank, or the bank will be able to identify and punish the cheating user. In this way a user is prevented from spending the same funds twice (double-spending). Offline e-money schemes also need to protect against cheating merchants, i.e. merchants that want to deposit money twice (and then blame the user).

18.8 Summary

The Internet and the World Wide Web allow companies to efficiently implement these key trading processes. Many search services and brokers are available to help buyers find information, products and merchants in electronic markets. The use of commerce is conducted in this way, spurring and drawing on innovations in electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web at least at some point in the transaction’s lifecycle, although it can encompass a wider range of technologies such as e-mail as

well. E-Commerce and E-Business are two completely different terms but unfortunately they are always used interchangeably by many of us. The reason behind this lies in the meanings of “business” and “commerce” in English language. But there is a difference between e-commerce and e-business. There are many people who understand the subtle differences between the two and there had always been a debate among these two groups about the differences and similarities between e-commerce and e-business. Ecommerce can be clasified on the basis of transaction like B2B,B2C,C2C, G2C, G2G,G2B etc, many new business model also been evolved in this era. for ecommerce transaction payment can be made by various payment machanism like ecash,echeque,EFT, debit card and credit cards.

18.9 Key Words

- **e-Cash:** Electronic representation of cash.
- **EDI:** Electronic Data Interchange ie machine to machine data exchange in ready to use format.
- **VAN:** Value added Networks
- **EBPP:** Electronic bill presentment and payment is a technique that allows consumers to view and pay bills electronically.
- **EFT :** Electronic fund transfer the development of banking and payment system that transfer fund electronically insted of using cash or paper document.
- **Hacking :** Is a process of unauthorised access and use of computer system.
- **Online :** Is pertaining to equipment or device under control of central processing unit

18.10 Self Assessment Test

1. Explain the term e-Commerce. How does it differ from e-Business? Where does it intersect with e-Business?
2. What is a business model? How does it differ from a business plan?
3. List all advantages and disadvantages of e-Commerce and also explain how we can overcome by disadvantages of e-commerce?
4. Explain with example B2B, B2C, C2C, G2B, G2C, G2G.
5. Explain various types of electronic payments.

18.11 Reference Books

- Kenneth C. Laudon and Carol G Traver, Electronic Commerce: Business, Technology, Society, Pearson Education.
- Bharat Bhaskar, Electronic Commerce, McGrow Hill