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Basic Computer Skills

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Chapter One

AN OVERVIEW OF COMPUTERS

Unit Objectives

In this unit you will learn about the origins of computer and the different generations of computers. You identify the characteristics and applications of computers along with their limitations.

After completing this unit, you should be able to:

- ⇒ **Define the term computer and outline some of its capabilities and limitations.**
- ⇒ **Discuss the characteristics of computers.**
- ⇒ **Tell the different periods into which the history of computers fall and the type of computers used in these periods.**
- ⇒ **Describe the types of technology in each period.**
- ⇒ **Tell the personalities that contributed to the development of computers.**
- ⇒ **Understand the deriving factors of computer technology.**
- ⇒ **Discuss the application of computers.**

Definition:

- A computer is an electronic device that not only does the arithmetic calculations but also logical manipulations at a high speed.
- A computer is a digital machine that takes data as input, processes them in a predefined manner and gives the required information in the form of output.

1.1. HISTORICAL DEVELOPMENT OF COMPUTER

The history of computers is an interesting and important topic. A review of the history of computers puts the computer field in proper perspective and is help in remembering computer terms.

Blaise Pascal

The French mathematician, physicist, and religious philosopher Blaise Pascal developed the first adding machine between 1642 and 1644 to help his father, a civil servant, in tax calculations.

Charles Babbage

- ✓ Called as Father of Computer Science, a brilliant and eccentric English mathematician.
- ✓ Charles Babbage was attempting to develop an automatic computing device for calculations. Then he invented an analytical machine which was a digital machine capable of one addition per second with data entered from punched cards and a built-in storage unit.

Herman Hollerith

- ✓ Herman Hollerith, a government statistician, provided the solution with a punched-card system of collecting and tabulating the data. Tabulating equipment was extremely successful and allowed the 1890 census of USA to be completed in less than two years.
- ✓ Hollerith continued to develop his card methods for railroad accounting and founded the Tabulating Machine Company at the turn of the century. Upon Hollerith's retirement in 1904, Thomas Watson, Sr., became president and later changed the name of the company to International Business Machines Corporation (IBM).

Mauchly and Eckert

- ✓ In 1945, two scientists of University of Pennsylvania, John Mauchly and Presper Eckert, designed and developed the **Electronic Numerical Integrator And Computer (ENIAC)**, an electronic device often acknowledged to be the first modern electronic computer.
- ✓ Eckert and Mauchly subsequently developed the **Universal Automatic Computer - I (UNIVAC)** the first electronic computer offered as a commercial product.

John Von Neumann

- ✓ John von Neumann, a mathematics genius at Princeton, is called the intellectual father of computers.
- ✓ He has been credited with developing highly significant stored-program theory.
- ✓ He was first to point out the advantages of binary-based circuitry over its decimal counterpart.
- ✓ He also defined and promoted flowcharts as logic aids for computer programming.

1.1.1. GENERATIONS OF COMPUTERS

Computer generations are usually characterized by dramatic improvements in the hardware or better increases in speed and reliability.

First Generation (1945-1956)

- ✓ These are the earliest general-purpose computers.
- ✓ Most input and output media were punched cards and magnetic tape, and main memory was almost exclusively made up of hundreds of vacuum tubes-although one computer used a magnetic drum for main memory.
- ✓ These computers were slow and large and produced a tremendous amount of heat. They could run only one program at a time.
- ✓ **ENIAC** and **UNIVAC – I** the **UNIVERSAL Automatic Computer**, which was used by the U.S Bureau of the Census from 1951 to 1963, are examples of first generation computers.

Second Generation (1956-1963)

- ✓ By the early 1960's, transistors and some other solid-state devices that was much smaller than vacuum tubes were being used for much of the computer circuitry.

- ✓ Magnetic cores, which looked like very small metal washers strung together by wires that carried electricity, became the most widely used type of main memory.
- ✓ Removable magnetic disk packs (stacks of disks connected by a common spindle like a stack of records) were introduced as storage devices.
- ✓ Second-generation machines tended to be smaller, more reliable, and significantly faster than first-generation computers.

Third Generation (1964 - 1971)

- ✓ During this period, the integrated circuit (a complete electronic circuit on a silicon chip) replaced transistorized circuitry.
- ✓ The use of magnetic disks became widespread, and computers began to support such capabilities as multiprogramming (processing several programs simultaneously) and timesharing (people using the same computer simultaneously).
- ✓ Minicomputers were being widely used by the early 1970s. The production of operating systems—a type of systems software and applications software packages increased rapidly. The size of computers continued to decrease.

Fourth Generation (1972 - 1985)

- ✓ In 1971, the first electronic computers were introduced that used Large-Scale Integration (LSI) circuits (thousands of integrated circuits on a chip) for main memory and logic circuitry (the circuitry that performs the logical operations of the CPU; different types of chips had different functions).
- ✓ These computers had a much larger capacity to support main memory. This period has also seen increased use of input and output devices that allow data and instructions to be entered directly through the keyboard.
- ✓ The microprocessor, introduced in 1971, combined all of the circuitry for the central processing unit on a single chip. LSI and the microprocessor enabled the development of the supercomputer.

Fifth Generation (1985 onwards)

- ✓ These are also termed as knowledge information processing systems.
- ✓ This generation computers aim to solve highly complex problems which require reasoning, intelligence and expertise when solved by the people. Scientists have also tried to develop new superconductors that can conduct electricity with no resistance, thus generating no heat but great speed.
- ✓ These generations are with new parallel architecture, new memory organization and new languages.
- ✓ These are functionally and conceptually different from the first four generations. Most of these are used in artificial intelligence, Temperature prediction, Satellite connectivity etc.

Generation of Computer

	First	Second	Third	Fourth	Fifth
Time Frame	1945-1956	1956-1963	1964-1971	1972 – 1985	1985 onwards
Circuit Component	Vacuum Tube	Transistor	Integrated Circuit (Silicon Chip)	LSI (Large scale Integration)	VLSI (Very Large Scale Integration)
Internal Storage	Magnetic drum, Tape & Punched cards	Magnetic Cores	Magnetic Disks	Integrated Circuits	Integrated Circuits
Memory Capacity (Characters)	4,000	32,000	128,000	100 million	>100 million
Popular computers	IBM 650, Univac – I	IBM-1401, CDC 36000	IBM 360, Honeywell 200	IBM 303X, Univac 6000	PARAM 2000

1. 2. CLASSIFICATIONS OF COMPUTER

Computers come in variety of sizes, shapes and with variety of processing capabilities. The earliest computers were quite large because of the technology used. As technological improvements were made in computer components, the overall size of the computers began to shrink.

Computers are generally classified into 4 basic categories –

1. Microcomputers – least powerful and more familiar compared to others and are mostly used for all purposes.
2. Minicomputers – are the next more powerful
3. Mainframe computers – large, extremely powerful computers used by many large companies.
4. Supercomputers – powerful giants of the computer world

1.2. 2. MICROCOMPUTER

- ✓ Is the type of the computer that we use for our daily purposes, commonly called as *Personal Computer (PC)*.
- ✓ They vary in size from small portables, such as laptops that can be carried around like a briefcase to the desktop workstations such as those used by engineers and scientists.
- ✓ The Microcomputer uses a Microprocessor chip as its CPU (small as quarter of an inch square), made of silicon, a material made from sand. Silicon is referred as a Semiconductor because it sometimes conducts electricity and some times does not.

Basically microcomputers are grouped into three: Laptop, Palmtop and Desktop computers.

Laptop computer are smaller versions of microcomputers about the size of a briefcase designed for portability. People can easily carry these personal computers with them in their car, on airplane, or when walking from one location to another.

Palmtop Computer is the smallest microcomputer that is about the same size as a pocket calculator. It is the most portable computer and is growing in popularity among the latest entries in the microcomputer market.

Desktop computer is the most widely used type of personal computer (microcomputer). It is the most widely spread type of computer in our country.

1. 2. 2. MINICOMPUTER

- ✓ Known as mid-sized or low-end mainframe computer, is similar to but less powerful than a mainframe computer. It can support 2 to about 50 users.
- ✓ Micro computers work well in what are known as Distributed Data Processing. That is, a company's processing power is decentralized, or distributed across different computers.
- ✓ These can work much faster than the Microcomputers and have many more storage locations in main memory. Many medium-sized companies in the business world today use minicomputers.

1. 2. 3. MAINFRAME COMPUTER

- ✓ These computers can process several million program instructions per second.
- ✓ These are housed in a controlled environment, which can support the processing requirements of hundreds to thousand users.
- ✓ These are mainly used by airlines, Banks, Insurance companies, Accounting companies, Universities etc.

1. 2. 4. SUPERCOMPUTER

- ✓ These machines can handle huge amount of scientific computations and 50,000 times faster than the Microcomputer.
- ✓ These machines are mostly used in defense and weaponry, weather forecasting, scientific research, large Universities or for the national Aeronautics and space administration.
- ✓ A new type of supercomputer, called *Massively Parallel Computer*, has recently been introduced, which has hundreds to thousands of processors housed in it.
- ✓ Indian Research organization developed a Super Computer Known as PARAM. This has been used in various defense applications.

1. 3. STORED PROGRAM CONCEPT

- Von Neumann defined this concept that, the instructions are first stored in the memory before they are processed. i.e., the computer executes or runs stored programs. [A program is a detailed set of instructions which computer follows in order to perform data processing tasks]
- All the instructions of a given program, as well as corresponding data, are stored in the main memory prior to the execution of the program.
- Computer by exactly following the instructions contained in the program does all the calculations and gives the required results as output.
- This allows one program to be used over and over again by the user to perform the common tasks like payroll, accounts payable, inventory control etc.

1. 4. CHARACTERISTICS OF COMPUTER

1. **Speed:** - A computer is a very fast device. It can perform in a few seconds the amount of work that a human being can do in an entire year – if he worked day and night and did nothing else. To put it in a different manner, a computer does in one minute what would take a man his entire lifetime.
While talking about the speed of a computer, we do not talk in terms of seconds or even milliseconds (10^{-3}). Our units of speed are the microseconds (10^{-6}), the nanoseconds (10^{-9}), and even the picoseconds (10^{-12}). A powerful computer is capable of performing about 3 to 4 million simple arithmetic operations per second.
2. **Accuracy:** - The accuracy of a computer is consistently high and the degree of accuracy of a particular computer depends upon its design.
Errors can occur in a computer, but these are mainly due to human rather than technological weaknesses, that is, due to imprecise thinking by the programmer (a person who writes instructions for a computer to solve a particular problem) or due to inaccurate data.
3. **Diligence:** - Unlike human beings, a computer is free from monotony, tiredness, lack of concentration, etc., and hence can work for hours together without creating any error and without grumbling.
4. **Versatility:** - Versatility is one of the most wonderful things about the computer. One moment, it is preparing the results of particular examination, the next moment it is busy preparing electricity bills and in between, it may be helping an office secretary to trace an important letter in seconds.
5. **Power of Remembering:** - A computer can store and recall any amount of information because of its secondary storage capability. Every piece of information can be retained as long as desired by the user and can be recalled as and when required. Even after several years, the information recalled will be as accurate as on the day when it was fed to the computer.

Self Check 1.1

1. From the following one is called as the father of computer.
 - a. Blaise Pascal
 - b. Charles Babbage
 - c. John Von Neumann
 - d. Herman Hollerith
2. The ENIAC was designed and developed by _____?
 - a. Mauchly and Eckert
 - b. John Von Neumann
 - c. Herman Hollerith
 - d. Blaise Pascal
3. Which one of the following is not an invention of the first generation of computer?
 - a. Punched card
 - b. Magnetic tape
 - c. Vacuum tube
 - d. Microprocessor
4. Which one of the following is different from the other?
 - a. Minicomputer
 - b. Laptop
 - c. Palmtop
 - d. Desktop

5. A characteristic of computer, in which a computer is free from monotony and tiredness, is called _____?
- | | |
|----------------|-------------------------|
| a. Versatility | c. Diligence |
| b. Accuracy | d. Power of remembrance |

1. 5. LIMITAIONS OF COMPUTERS

Although computers can be applied in different areas there are activities that computers can't perform. For example, a computer can't do the following.

- Computers can't decide how to be programmed. It is always humans that are responsible for programming the computers.
- Computers do not provide their own inputs unless people provide it with the inputs.
- Interpretation of data and implementation of decisions is always left for humans. That is, a computer doesn't interpret the information it produces and it doesn't implement decisions based on the information obtained.

1. 6. APPLICATIONS OF COMPUTERS

Applications of computers differ from organization to organization or from individual to individual based on the specific needs of organizations and individuals. Sometimes applications may be associated with the size of the computer. For example, a supercomputer is not generally used for word processing activity. Supercomputers are used in scientific applications such as aerodynamics design, processing of geological data, and collecting and processing weather data, etc.

Mainframe computers are used by large organizations to coordinate and manage vast amounts of data. They can be used by many businesses to update inventory, schedule production, keep employee records, generate sales and management reports, etc. Minicomputers are well adapted for functions such as accounting, word processing, database management, etc.

Microcomputers are used in a variety of application. They are the most widely used computer types for business and personal purpose. In general minicomputers are used for:

- word processing,
- computerized worksheet analysis and modeling,
- education,
- record keeping,
- graphics,
- engineering activities and
- personal and home use

UNIT SUMMARY

The history of computers falls into different periods, each characterized by a principal technology used by the computers in the manual-mechanical devices. These include Pascaline, Babbage's difference engine, Babbage's analytical engine and etc.

The next generation is characterized by the development and use of punched cards to input data, and electromechanical machines to process data by counting. Machines were also developed to verify input data and merge sorted cards in this period.

The modern age is characterized by the use of highly integrated electronic circuitries to process data. The computers developed in this periods fall into five categories: First generation computers, second generation computers, third generation computers, fourth generation computers, fifth generation computers. This classification is based on the kind of technology used by the computer to process data. First generation computers used vacuum tubes, the second generation computers used transistors, the third generation computers used integrated circuits, fourth generation computers used large scale (LSI) integration of transistors on a single chip and the fifth generation of computers used very large scale (VLSI) integration of transistors on a single chip.

Different types of computers are used at present. Some examples: palmtop computers, laptop computers, desktop computers, minicomputers mainframes, and super computers. All of them use up-to-date technology. Their difference is on their size, processing speed, storage capacity, and complexity.

EXERCISE

1. What is computer?
2. Discuss the basis on which one divides the evolution of computers into the different periods.
3. The ENIAC is usually considered to be a machine which served as a link between the technologies used in the two technologies. Why do you think is the reason for this?
4. Compare the distinction between third- and forth-generation of computers.
5. What invention or innovation do you think is most responsible for making the computer a successful product? Explain.
6. What is the difference between mainframe and super computers?
7. Describe each of the following types of computers.
 - a. Palmtop
 - b. Laptop
 - c. Desktop
8. List and explain the characteristics of computer.
9. Discuss the limitations of computer.
10. Write at least two application of computer.

Chapter Two

BASIC FUNCTIONAL UNITS OF A DIGITAL COMPUTER

Unit Objective

In this unit you will learn about the basic functional units of a digital computer and data representation inside the computer. You identify the different components (units) of the computer system and how these components are interrelated along with their responsibility.

At the end of this unit you should be able to:

- ⇒ **Describe the major functional units of a digital computer.**
- ⇒ **Define what a CPU is and its functions.**
- ⇒ **Define what a memory unit is.**
- ⇒ **Discuss data representation and coding system.**
- ⇒ **Discuss the computer number system.**
- ⇒ **Identify 1's and 2's complement.**

2.1. CENTRAL PROCESSING UNIT (CPU)

A typical computer system consists of input, output, storage and the central processing unit (CPU). Each of these components are equally important to the functioning of the entire computer system. The CPU consists of Control unit, Arithmetic logic unit and main memory, all of which work together to electronically control the functions of the computer system. Because of the CPU's central authority in running the computer system, it is sometimes referred to as the *mainframe* unit.

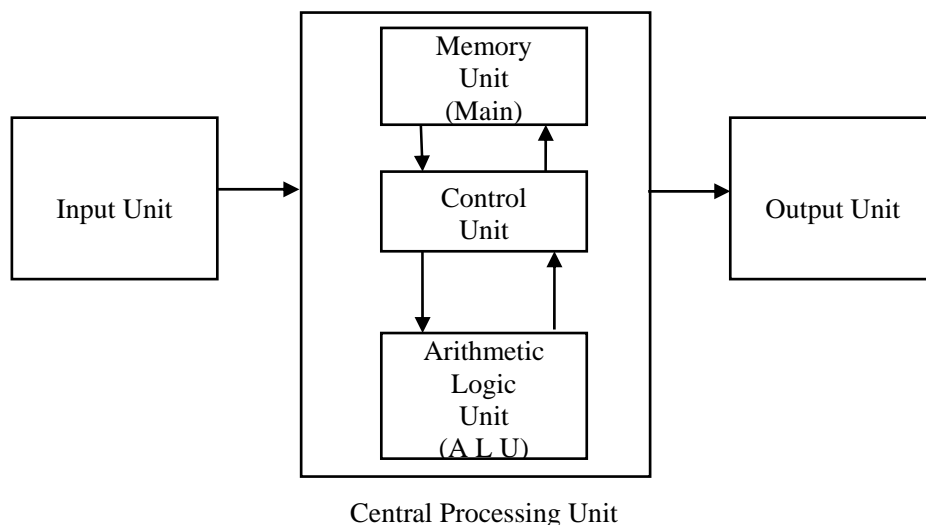


Figure 2.1 BLOCK DIAGRAM OF COMPUTER

2. 2. THE CONTROL UNIT

The control unit is like the brain of the computer. It performs all the control functions for the computer. It retrieves instructions from memory, translates those instructions into computer functions, and sends signals to the other computer units to carry out these functions. It is also responsible for determining the next instruction to be executed by the computer.

On a whole, it tells input devices how data is to be inputted and where, the memory unit where the data to be stored, the Arithmetic Logic Unit where to find the data, what operations to perform and where the results are to be stored and the output devices what information to give and where to display.

2. 3. ARITHMETIC – LOGIC UNIT

This is a part of CPU which performs the Arithmetic calculations of addition, subtraction, multiplication, division and it is used to keep track of and execute instructions. This unit contains adder, counter, comparator, and complimentor etc. to do different operations.

When it comes to calculation,

- The computer does is addition.
- Subtraction is the addition of the complement of the number to be subtracted.
- Multiplication is repeated additions.
- Division is the addition of complements.

So, all the four arithmetic operations can be expressed in terms of addition.

The three major logic operations are AND (Logical Multiplication), OR (Logical addition) and OR (Logical Negation)

Registers are storage units that connect the arithmetic-Logic unit to the main memory. When an instruction is fetched from main memory, it is placed in a register to await instructions from the control unit. Data are also stored in registers prior to execution in the ALU.

2. 4. MEMORY UNIT

This is called primary storage of the computer and is the one which is directly accessible by the control unit and Arithmetic- Logic unit. It holds the instructions and data elements which are currently being used by the computer and is used to store both data and programs. It is also used to hold intermediate and final results of computation. The memory can be visualized as an ordered sequence of storage locations or cells labeled from zero. The label of the location is called its *address*; each storage location is called as *a word* and consists of bits.

2. 5. INPUT UNIT

This unit acts as a bridge between the user (Person who operates the computer) and the CPU. It feeds the Information or Data into the computer. There are different types of input devices that can be connected to the computer system. viz., Keyboard, Mouse, Scanner, Punched card, Punched tape etc.

2. 6. OUTPUT UNIT

This acts as a media between the computer and the user. It is used to retrieve information from computer memory for human use. The different types of output devices available are Visual display unit (Screen or monitor), Printer, Plotter etc.

Self Check 2.1

1. Which one of the following is not the basic functional unit of a digital computer?
 - a. Input device
 - b. CPU
 - c. Output device
 - d. Storage device
 - e. None
2. Part of the CPU, responsible for controlling the overall computer is _____?
 - a. Memory unit
 - b. Control unit
 - c. CPU
 - d. ALU
3. From the following which one is a logic operation?
 - a. AND – Logical Multiplication
 - b. OR – Logical Negation
 - c. OR – Logical Addition
 - d. All
4. From the following one is not an input unit.
 - a. Punched card
 - b. Screen
 - c. Punched tape
 - d. Scanner
5. Which one of the following is different from the others?
 - a. Scanner
 - b. Screen
 - c. Printer
 - d. Plotter

2.7. DATA REPRESENTATION

The basic unit of the memory is a **Bit**. A Bit is an abbreviation for a **Binary** digit and can be either 0 or 1.

Group of continuous 4 bits is termed as **Nibble**.

Eight adjacent bits designed to store the binary code of a single character (letter, decimal digit or other character) is referred as **Byte**.

A **Word** consists of 32 bits, which is equal to 4 bytes (this depends on the computer i.e., a word may contain 8, 16, or 32 bits) commonly used notation in modern computers is 32 bits. Frequently the memory capacity is represented in terms of **K**(Kilo) , which is equivalent to 1024 words of 8 bits each (2^{10} Bytes).

1 KILO = 1024 Bytes (approx. 10^3 bytes)

1 MEGA = 10^3 K B

1 GIGA = 10^3 M B

1 META = 10^3 G B

1 PETA = 10^3 META B

These are all the
approximate values
B stands for Byte

2.7.1. DIGITAL NUMBER SYSTEM

The number systems we are accustomed to use consist of 10 digits 0 ... 9 and is called as Decimal number system or base-10. The significance of these digits in a number depends upon the positions occupied by these digits. For e.g., 596 represents five hundred and ninety six and can be written in expanded form as

$$5 \times 10^2 + 9 \times 10^1 + 6 \times 10^0 \text{ or } 5 \times 100 + 9 \times 10 + 6 \times 1$$

In most of the programming languages, the numbers contain decimal points known as real numbers or floating point numbers. The fractional part of such number is called the **Mantissa**

and the integer part the **Exponent**. Thus 47.89 is a real number, 47 is called exponent and 89 called its mantissa.

Different number systems are used in the computer organization and calculations.

1. **Binary** – is a base-2 system and makes use of binary digits or bits 0 and 1. The significance of bits is determined by their positions in that number.

For example

1) 110 can be expanded as $1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$ and thus this has a decimal value $4 + 2 + 0 = 6$

2) 11.110 can be written as $1 \times 2^1 + 1 \times 2^0 + 1 \times 2^{-1} + 1 \times 2^{-2} + 0 \times 2^{-3}$ and the decimal value is $2 + 1 + 1/2 + 1/4 + 0 = 3.75$

2. **Octal** - is a base-8 system and makes use of the eight digits 0 7. In this number system the digits represent co-efficient of powers of 8.

For e.g., 703 can be expanded as $7 \times 8^2 + 0 \times 8^1 + 3 \times 8^0$ and the decimal value is $448 + 0 + 3 = 451$.

3. **Hexadecimal** – is a base-16 system and makes use of 16 digits 0.... 9, A(10), B(11), C(12), D(13), E(14), F(15). Here the digits represent co-efficient of powers of 16.

For e.g., 1AB can be represented as

$$1 \times 16^2 + A \times 16^1 + B \times 16^0 = 1 \times 16^2 + 10 \times 16^1 + 11 \times 16^0 = 256 + 160 + 11 = 427$$

Conversion of base-10 number to its base-b equivalent

In order to find the base-b equivalent of a base-10 whole number

- The number is repeatedly divided by b until the quotient becomes zero.
- The successive remainders are the digits from left to right of the base-b representation.

To convert a decimal number with a fractional part to its base-b equivalent

- The fractional part is repeatedly multiplied till the fractional part reduces to zero.
- The integer parts are the digits from left to right of the base-b representation.

Note: even though the base-10 representation of a fraction may terminate, its representation in some other base need not terminate. For e.g., binary representation of 0.7 does not terminate

Decimal	Binary	Octal	Hexa decimal
	$2^4 \ 2^3 \ 2^2 \ 2^1 \ 2^0$		
0	0	0	0
1	1	1	1
2	1 0	2	2
3	1 1	3	3
4	1 0 0	4	4
5	1 0 1	5	5
6	1 1 0	6	6
7	1 1 1	7	7
8	1 0 0 0	10	8
9	1 0 0 1	11	9
10	1 0 1 0	12	A
11	1 0 1 1	13	B
12	1 1 0 0	14	C
13	1 1 0 1	15	D
14	1 1 1 0	16	E
15	1 1 1 1	17	F
16	1 0 0 0 0	20	10
17	1 0 0 0 1	21	11
18	1 0 0 1 0	22	12
19	1 0 0 1 1	23	13

Decimal	Binary	Octal	Hexa decimal
	$2^4 \ 2^3 \ 2^2 \ 2^1 \ 2^0$		
20	1 0 1 0 0	24	14
21	1 0 1 0 1	25	15
22	1 0 1 1 0	26	16
23	1 0 1 1 1	27	17
24	1 1 0 0 0	30	18
25	1 1 0 0 1	31	19
26	1 1 0 1 0	32	1A
27	1 1 0 1 1	33	1B
28	1 1 1 0 0	34	1C
29	1 1 1 0 1	35	1D
30	1 1 1 1 0	36	1E
31	1 1 1 1 1	37	1F

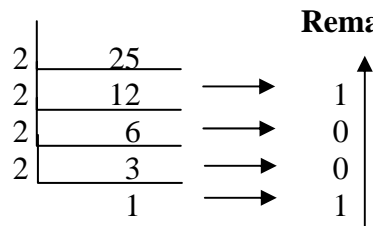
32 – 63 **6 bits** required for representation

64 – 127 **7 bits** required for representation

128 – 255 **8 bits** and so on.

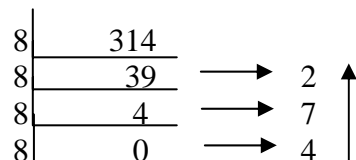
Examples

1. Convert the decimal number 25 to its binary equivalent



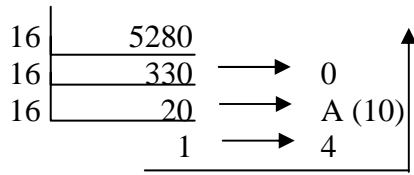
The Binary representation of $25_{(10)}$ is $11001_{(2)}$

2. Convert the decimal number 314 to its octal equivalent



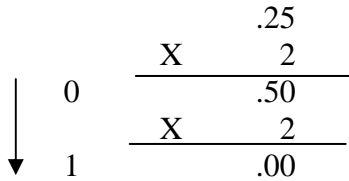
The octal equivalent of $314_{(10)}$ is $472_{(8)}$

3. Convert the Decimal number 5280 into its Hexadecimal equivalent



The Hexadecimal representation of $5280_{(10)}$ is $14A0_{(16)}$

4. Convert the Decimal number 0.25 to its Binary equivalent.



The Binary equivalent of $.25_{(10)}$ is $.01_{(2)}$

Conversion from Octal /Hexadecimal to Binary & Vice-versa

Conversion from Octal/Hexadecimal to Binary is done by only replacing each Octal/Hexadecimal digit by its binary equivalent

For e.g.,

- 1) $2705_{(8)}$ to binary is to replace the numbers with their codes $010\ 111\ 000\ 101_{(2)}$
- 2) To convert $ABC_{(16)}$ to Binary is $1010\ 1011\ 1100_{(2)}$

To convert a Binary numeral to Octal /Hexadecimal, we can group the digits in groups of 3/4 respectively, starting from the right end of the decimal point, if there is no decimal point and from the left end if there exists a decimal point. If, while converting a binary number to Octal /Hexadecimal, the number of digits left in the last group is less than 3/4, the number of digits is made up by adding zeroes, to the left of the last group to left of the decimal point and to the right of the last group to the right of the decimal point.

E.g., 1) $110010_{(2)} = 110\ 010_{(2)} = 62_{(8)} = 0011\ 0010_{(2)} = 32_{(16)}$

2) $1010.10101_{(2)} = 001\ 010.\ 101\ 010_{(2)} = 12.\ 52_{(8)}$

3) $1010.1010\ 1000_{(2)} = A.A\ 8_{(16)}$

In order to store a decimal integer in a computer: It is first converted to its binary equivalent, and then stored right justified in a word. One bit of the word, usually the leftmost is reserved to specify the sign of the integer.

Self Check 2.2

1. Which one of the following is equivalent to 4 bits?

a. 1 byte	c. 1 mega byte
b. 1 word	d. 1 nibble

2. 1 kb is equivalent to _____?
 - a. 1024 bytes
 - b. 1024 Mb
 - c. 1 Gb
 - d. All
3. Which one of the following is equivalent to 011_2 in decimal?
 - a. 5
 - b. 10
 - c. 3
 - d. 2
4. 7 is equivalent to _____ in binary.
 - a. 011_2
 - b. 110_2
 - c. 101_2
 - d. 111_2
5. The binary number 1111110011111011_2 is equivalent to _____ in hexadecimal/octal.
 - a. $CFBA_{16}/275373_8$
 - b. $FCFB_{16}/176373_8$
 - c. $ACBF_{16}/373671_8$
 - d. None

2.7.2. 1's COMPLIMENT and 2's COMPLIMENT

In many computers 1's compliment and 2's compliment is used to store negative numbers. In binary system, the compliment of 1 is 0 and that of 0 is 1.

In 1's compliment of a binary number N, denoted (usually) by \bar{N} , is the number obtained by complementing each of the digits of N. for e.g.,

$$N = 01100101 \quad \text{then} \quad \bar{N} = 10011010$$

The 2's complement of a binary number N is the number resulting from adding 1 to its 1's compliment \bar{N} i.e., $\bar{N} + 1$ Thus, N if converted to 2's compliment then

$$\bar{N} + 1 = 10011010 + 1 = 10011011$$

The advantage of representing a negative number by 2's complement is that the subtraction operation can be realized by adding 2's complement of the subtrahend.

Examples:

		<u>1's complement</u>	<u>2's complement</u>	
1)	$\begin{array}{r} 5 \\ - 2 \\ \hline 3 \end{array}$	$\begin{array}{r} 101 \\ - 010 \\ \hline 1010 \end{array}$	$\begin{array}{r} 101 \\ - 110 \\ \hline \textcircled{1}011 \end{array}$	Here carry 1 represents the result is positive.
		$\begin{array}{r} + \quad \text{---} \rightarrow 1 \\ \hline 011 \end{array}$	$\begin{array}{c} \uparrow \\ \text{Discard} \end{array}$	
	$\begin{array}{r} 2 \\ - 5 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 010 \\ - 101 \\ \hline 100 \end{array}$	$\begin{array}{r} 010 \\ - 011 \\ \hline 101 \end{array}$	
		$\begin{array}{c} \downarrow \\ \text{1's complement} \\ 011 \end{array}$	$\begin{array}{c} \downarrow \\ \text{2's complement} \\ 101 \end{array}$	
		011	101 + 1	→ 011

2.7.3. CHARACTERS

Computer systems store and process character data also. The binary representation of character data is based on the assignment of a numeric code to each of the characters used.

The characters using the numeric codes assigned to them are arranged in an order in which one character precedes another if its numeric code is less than the numeric code of the other. Amongst the several coding schemes that have been developed are ASCII (American Standard Code for Information Interchange) and EBCDIC (Extended Binary Coded Decimal Interchange Code). Characters are represented internally by these 8-bit binary codes. An 8-bit memory word can thus store one character. A 16-bit memory word is usually divided into two 8-bit segments or bytes. Each of which can store a single character. Similarly, a 32-bit memory word can store four characters. Character strings of length greater than the number of bytes in a word are stored in two or more consecutive words.

ASCII character set (Sample)

Character	A S C I I value	Character	A S C I I value	Character	A S C I I value	Decimal	A S C I I value
A	65	a	97	(40	0	48
B	66	b	98)	41	1	49
C	67	c	99	*	42	2	50
.	.	.	.	+	43	.	.
.	.	.	.	,	44	.	.
.	.	.	.	-	45	9	57
.	.	.	.	/	47		
Z	90	z	122				

UNIT SUMMARY

In this unit you learned about the basic functional units of a digital computer system and the data representation inside the computer.

A typical computer system consists of input, output, storage and the central processing unit (CPU). Each of these components are equally important to the functioning of the entire computer system. The CPU consists of Control unit, Arithmetic logic unit and main memory, all of which work together to electronically control the functions of the computer system. Because of the CPU’s central authority in running the computer system, it is sometimes referred to as the *mainframe* unit.

There are two ways of representing data in the computer. EBCDIC (that uses eight-bit bytes to represent characters) and ASCII, which uses seven bit bytes to represent letters, numbers, and symbols. The computer uses four numbering system: decimal, binary, octal and hexadecimal systems.

In many computers 1’s compliment and 2’s compliment is used to store negative numbers. In binary system, the compliment of 1 is 0 and that of 0 is 1. Computer systems store and process character data also. The binary representation of character data is based on the assignment of the numeric code to each of the characters used.

EXERCISE

1. What do you mean by the central unit (CPU)? What are its major components?
2. What is the function of arithmetic and logic unit?
3. What is an address?
4. What do you mean by a binary digit?
5. Define the following terms
 - a. bit
 - b. nibble
 - c. byte
 - d. word
6. Convert the following numbers into their decimal equivalents.
 - a. 100101011101_2
 - b. 111011100011_2
 - c. 3604_8
 - d. 5217_8
 - e. $B29C_{16}$
 - f. $57DA_{16}$
7. Redo question 6 as follows
 - ii. convert a) and b) into base-8
 - iii. convert c) and d) into base-2
8. Perform the following operations in binary.
 - a. $11100+11.11+111.10$
 - b. $100010000.100-1001001.101$
 - c. 1101.01×11.11
 - d. $10010.1011 \div 11.01$
9. Perform the following subtraction using 2's complement in 6-bits.
 - e. $111100-111011$
 - f. $1101.010-11011$
 - g. $30-15$
 - h. $-30-15$
10. Redo problem 9 using 1's complement

Chapter Four

COMPUTER APPLICATIONS

Unit Objective

In this unit you will learn how to use different applications software's and identify the different applications that a computer can perform.

At the end of this unit you should be able to:

- ⇒ **Define word processing, spread sheets and database**
- ⇒ **Use ms-word and its functionalities**
- ⇒ **Use ms-excel and its functionalities**
- ⇒ **Use ms-access and its functionalities**

4.1. WORD PROCESSING

Word processing is the ability to create documents using a *word processor*. It can also refer to advanced shorthand techniques, sometimes used in specialized contexts with a specially modified typewriter.

A **word processor** (more formally known as **document preparation system**) is a computer application used for the production (including composition, editing, formatting, and possibly printing) of any sort of printable material.

4.1.1 Microsoft Word

Microsoft Word is the most popular office application. It is a tool for creating, editing, formatting, saving, and printing documents with enough layout and graphics handling capabilities. There are different versions of ms-word, in this text we will discuss about word 2000.

1. Explain the features of MS-Word

MS-Word is a full featured word processor that you can use to create letters, memos, reports, newsletters, manuals and just any kind of document. It is a legendary word processing system. MS-Word is a graphical user interface (GUI) programming package.

Features:

1. Words/letters can be processed in desired manner.
2. Spell checking is made automatically.
3. Word's designers have created a collection of templates and wizards to help with everyday tasks.
4. Word supports Auto Text & Auto Correct.
5. Word allows to inserting pictures.
6. In word there is a possibility to quickly create headings, tables, indexes and more.
7. Word also provides a macro capability to help you automate repetitive tasks.
8. Word is having Word Wrap feature i.e. when you reach the end of line, word for windows automatically begins a new line for you. This feature is called as *word wrapping*.

9. You can easily arrange the data in MS-Word either ascending or descending order.
10. Word's mail-merge is another important feature. It lets you quickly create personalized correspondence and other documents by merging information from two files.

2. Briefly discuss about MS-Word basics

Starting Word: To start a Word, choose it from the Start menu or click the Word button in the Office shortcut Bar.

Creating New Document When Word is Running

Whenever you start Word for windows, it opens a new, untitled, "normal" document so that you can begin a new project. If you want to start a new project with Word already running, simply choose File | New.

Opening Preexisting Document

To open a Word document when Word for windows is running simply choose File | Open.

Selecting Text

Double-click anywhere on a word to select the entire word and the space that follows it. To select entire line, move the mouse pointer to the selected bar, click on the primary mouse button only once. For selecting entire Paragraph, move the mouse pointer to the selection bar and double-click. For selecting entire document, move the mouse pointer to the selection bar at the left edge of the document, hold down CTRL and click.

Deleting Text

You can delete text by selecting it and then pressing DELETE key, or by using the Clear command on word's Edit menu.

Undo: Word watches as you work. It remembers which steps you last took. When asked, it frequently undoes your errors. There are three ways to undo.

1. Edit | Undo reverses your last action; choose Edit | Undo again to reverse the action before that, and so on.
2. If you press CTRL + Z repeatedly, it will reverse previous actions.
3. The UNDO toolbar button and its associated drop-down list let you undo multiple actions in sequence.

Redo: Use the Redo command to undo and Undo. To redo your last action only, choose Edit | Redo, press the keyboard shortcut (F4), or click the Redo button on the Standard toolbar.

3. Explain MS-Word Screen

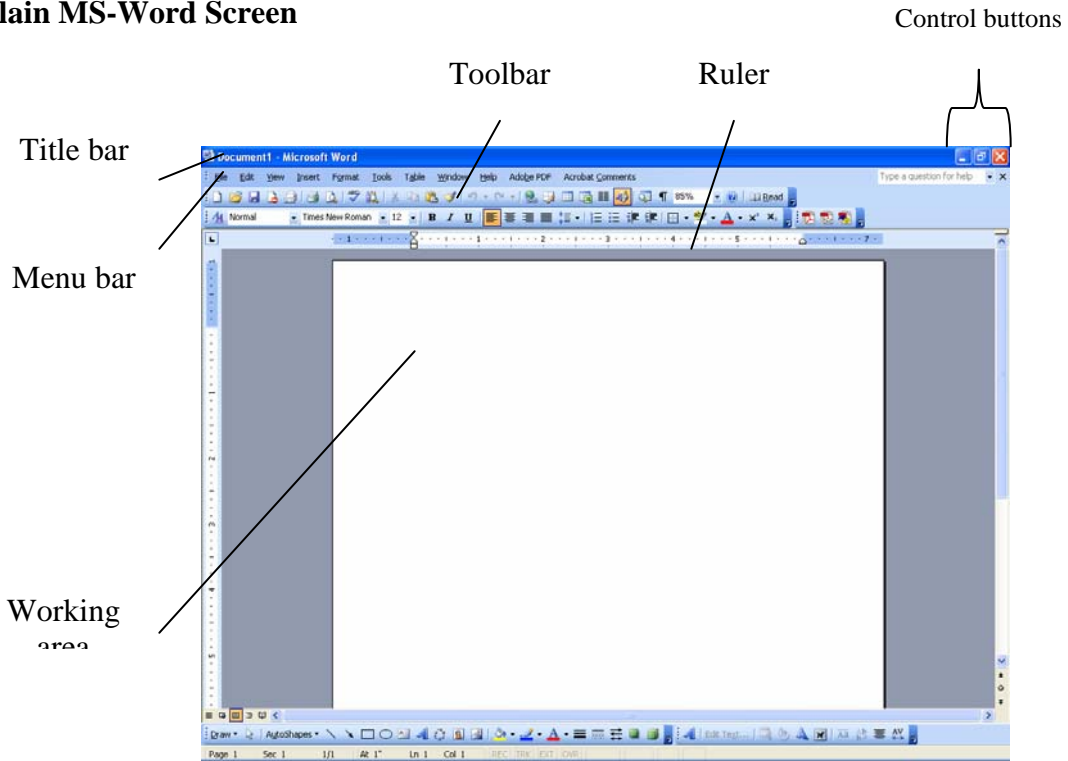


Figure 4.1 Ms – Word Window

Title Bar:

The initial row at the top of the screen is the title bar, which shows the name of the program, “Microsoft Word” followed by name of the document. On the far right of the title bar are the minimize, maximize and close buttons are available commonly known as control buttons.

Menu Bar

Under the title bar is the menu bar. The menu bar contains all of the procedures you will need for working with work. One of the letter in each menu item is underlined. To activate that menu you can press <ALT> + the underlined letter, rather than use the mouse, Alt + F, for File menu. Once the dropdown menu appears, you can type the underlined letter to select that menu item, like ‘S’ to save the document. Dimmed command can not be used until other functions have been performed.

Mouse Pointer

Your Mouse Pointer should look like an I-beam, and you should be able to move it freely about the screen. The pointer will change shapes when it passes over certain parts of the Word for windows workplace. For instance it turns in to a large arrow at the edges of Word windows.

Toolbars

Word for Windows provides over a dozen toolbars, but you will normally display only two or three at once. Microsoft's factory settings display only the Standard and formatting toolbar

The other toolbars include

- ◆ Standard
- ◆ Formatting
- ◆ Border
- ◆ Database
- ◆ Drawing
- ◆ Forms
- ◆ Microsoft
- ◆ Word for Windows 2.0
- ◆ Tip Wizard

Toolbars contain buttons, dropdown menus, and other controls that help you quickly alter the appearance and arrangement of documents by executing a variety of Word for Windows commands. For example, you can use the Formatting toolbar's bold button to make text boldface, or its dropdown font menus to pick a font size. Point to the down-arrow buttons next to the font and type size boxes on the Formatting toolbar to see drop-down lists of choices. You can also type font names or sizes directly into the font and size boxes.

The show/hide button on the standard toolbar alternatively shows and hides paragraph marks, tab marks, space marks, and other nonprinting items. You can display a toolbar by right-clicking on any toolbar on to your screen and selecting from the drop-down menu that appears.

Ruler Bar

Use the ruler to quickly change margins and indents. The ruler lets you alter the appearance of multiple paragraphs or just the paragraph containing the insertion point. To display or hide the ruler, choose View | Ruler.

Status Bar

The status area at the bottom of your Word window gives additional information about your work. It's always present unless you choose the full screen view.

4. Explain different view available in MS-Word

Word for Windows can show your document with varying levels of detail to make things easier to visualize or quicker to work with. These display options are called **Views**. Word provides six views.

- ◆ Normal view
- ◆ Online Layout view
- ◆ Page Layout view
- ◆ Print Preview
- ◆ Outline View
- ◆ Master Document

Switching Views

Normal View

This is the default view in Word. It is an all-purpose view for typing, editing and formatting the text. Normal view shows text formatting but simplifies the layout of the page so that typing and editing can be done faster. To return to Normal View from any other view, select View → Normal. It will not display side by side column positioning, headers, footers or the printing position of framed items. Automatic page breaks are shown as dotted lines. Manual page breaks, if you have defined any, are shown as darker lines containing the words “Page Break”, while section breaks are double dark lines with the words “End of Section”, and so on.

Online Layout View

This view optimizes the layout to make online reading easier. Text appears larger and wraps to fit the window. It will not display the text the way in which it is actually printed. By default, online layout view includes a resizable navigation pane called *Document Map*, which shows the outline view of the document’s structure. By clicking on outline topic of the document, the cursor can be moved to that part of the document.

Page Layout View

This view displays the text and graphic objects, as it will appear when printed. This view is useful for editing headers and footers, for adjusting margins and working with columns, drawing objects, inserting pictures etc. Both horizontal and vertical margins will be displayed for allowing the user to set the tabs and margins easily. To return to Page Layout View select View → Page Layout.

Print Preview

It display one or multiple pages of a document in a reduced size to display the document as it will be on a printed page. This view is useful to check the layout of the document by displaying the header, footer and margins and allows the user to edit or format before printing the document. To switch to Print Preview select File → Print Preview. To return from the Print Preview, select Close button from the toolbar displayed at the top of Print Preview window.

Outline View

It makes easy to look at the structure of a document and to move, copy and reorganizes text. In the outline view there is a provision to collapse the document to see only the main headings or the document can be expanded to see the entire document. To return to Outline View select View → Outline View.

Master Document

This view makes it easier to organize and maintain a long document, such as a multi-part report or a book, with chapters. Use Master Document View to group several word documents into one master document. After this, an index, table of contents or cross references and be included without opening each of the individual documents. To switch to Master Document View, select View → Master Document.

5. Write about Headers and Footers

Headers and footers are the places to put repetitive information in a document top and bottom margins. Headers print at the top and footers are at the bottom. You can use the headers and footers to print the simple thing on each page such as automatic page numbers, chapter headings, and dates and times etc. You can use identical headers and footers on all pages in your document. In MS-Word the headers and footers editing always takes place in Page layout view. Once header and footers are added to a document, it is possible to see and edit them in the Page Layout View. They are also displayed in the print preview. When you are attempt to open the header and footer in Normal View or in Print previews MS-Word automatically switches you to Page lay out view and displayed the Header and Footer Tool bar.

Creating Headers and Footers

To enter the headers that repeat on all pages in your document, you may follow the steps:

1. Choose View | Header and Footer.
2. If you are worked in any view Word switches you from that view to page layout view. And opens a special area for header and display the header and footer tool bar.
3. Create and edit header text as you would like. You can place the graphics, styles, and all other formats.
4. Use Automatic Page number button for continuing the page numbers. Click Close button for normal working.

6. Write about Tables

Tables are helpful to organize the complex column of data/information. You can insert the tables anywhere else in the document. MS-Word's table consists of horizontal rows and vertical columns. The in between space of the rows and columns are known as *cells*. In the cells we can enter text, numbers, or graphics. It has also an easiest way to insert a row and a column. Tables can be created from existing text with out needless of typing. For creating the simple table you may follow the following steps.

1. Place the insertion point where you want to insert the table.
2. With the standard tool bar click the table button and drag while hold the mouse button for number of rows and columns.
3. When you release the mouse button the table can be displayed on the page according selected rows and columns.

Creating the table using the table menu

You can use the Table | Insert Table command to create more complex tables with the Insert Table dialog box. By applying the Table | Insert Table command you may display the Insert table dialog box. In that box you may select number of Columns and you may select the number of Rows. Then the appropriate table can be display in the page.

➔ For deleting the entire row apply the Table | Delete Rows command.

Inserting Columns:

To insert the single column in the middle of a table you may follow the following steps:

1. Select the column to the right of where you want to insert the new column.
2. Click the Table button in the standard tool bar or choose the Table | Insert Columns command.
 - ➔ For deleting columns, Select the column of columns to be removed and choose the Table | Delete Columns command.
 - ➔ Use merge cells feature to combine the multiple cells into only one. For making this you may select the cells which you want to merge and choose Table | Merge Cells.
 - ➔ To split cells (after merging) place the insertion point in a merged cell and choose Table | Split Cells command.

Converting Tables To Text and Vice Versa

The ordinary text can be formatted from text to table and table to text. To convert the text to table you may choose Table | Convert Text to Table command. In this dialog box you have Lines of text separated by paragraph marks of line breaks will become rows in your table. And the columns may be depending upon the below categories.

Tab: Tab-separated strings of text with in those lines will become cell entries in the row.

Comma: Comma separated strings of the text within those lines will become cell entries in the row.

Paragraphs: Word will propose a single column and create as you have paragraphs. Changing the number of columns will be distributing paragraphs among the columns from left to right.

Converting table to text

To converting an existing table to text, select the table cells you wish to convert or ALT + Double click to select the whole table. Choose Table | Convert Table to text, then Word will display the Table to Text dialog box, which asks if you want the table converted to paragraphs or another type.

Sorting

Word can sort the lines of tabular text, items you have entered in tables, or even paragraphs in the document. The sort command can be helpful when you prepare data files for mail merge.

Sorting with the Sort Table Command

Word's Table | Sort Text command will attempts to sort selected text alphabetically, numerically at your request. To sort a table with this command, follow these steps:

1. Save your work just in case.
2. Place the insertion point in the table you wish to sort.
3. Pick table | Sort Text. Word will highlight (select) the entire table, and you will see the sort dialog box.
4. If you have labels at the top of your table, choose the option My List Has Header Row. There will be up to three drop-down lists containing the column labels (if you have them) or column numbers.

5. Specify the sort order by choosing the desired column for each sort level.
6. Choose a sort order for each column.
7. Tell Word if the data in each column is text, number, or dates by choosing from the Type drop-down lists.
8. Click ok and Word will sort.

7. Write about tabs

Tabs are used for creating quick, relatively simple lists. Tabs are used to modify the Word's data with spreadsheets, databases, and another application program. Each paragraph in a Word document can have the same or different tab settings. Word offers four types of tab stops. They are:

Left: Text typed at these tab stops, the data can be aligned from left to right.

Right: Text typed at these tab stops, the data can be aligned from right to left.

Center: Text typed at these tab stops, the data can be aligned as center.

Decimal: Aligns column of numbers on the decimal point. This can be used for simple financial reports.

8. Write about Mail-Merge

Word's Mail Merge feature lets you quickly create personalized correspondence and other documents by merging information from two files. You could merge the list of names and addresses from one file, which is known as *data document*, with form letter in another file, which is known as *main document* to produce a number of personalized form letters. You may insert the data fields in the main document wherever you want the data of the data source to appear in your merged documents. Once the main document and data source are prepared, you are ready to merge them. The mail merge helper lets you send merged documents directly to your printer or save them to a file for editing and later printing. In both cases that is in the case of data source and the main document.

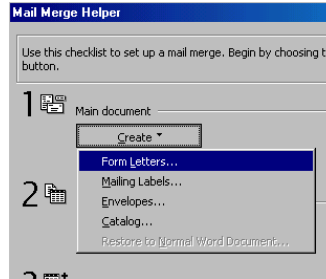
About Data Source and Main Document

Data sources are organized collection of information of data and stored in the form of Word's tables. Word's mail merge helper helps you to the creation of the new data source. Word can also use the data from the other applications, such as Microsoft Excel or Microsoft Access. All the data sources contain records and fields. You can use a main document from the other application by opening the document in Word and converting its contents to Word. Field names and formatting from some applications may not translate into word format. Check the fields in your main document and adjust them if necessary before completing the merge.

Using the Mail Merge helper

Word's Mail Merge Helper guides you through the steps of merging documents. The process may seem a little convoluted the first time. When you select Tools | Mail Merge, the mail merge helper can be displayed in the following format. In mail merge helper dialog box we have three types of options are there. They are

1. Main Document.
2. Get data
3. Merge



The first step in mail merge is to create your main document, in the mail merge helper Form letters, Mailing Labels, Envelopes, and Catalog have different components. So that mail merge helper offers you different choices of data sources. For creating the main document you may follow the following steps:

1. Select the Create button to start creating your main document. A list will be drop down offering you four choices – Form Letters, Mailing Labels, Envelopes, and Catalog.
2. Select the Form letters as the main document. Then a dialog box will be displayed offering you the choice of the active window or a new main document.
3. Select the window you want to use. If you want restart a new document, or if the active window contains information for your main document choose the Active Window button.

For specifying the data source you may follow the following steps:

1. Click the Get Data button to display a list of options for your data source.
2. If you already have a data source that you want to use, select Open Data Source. If you want to create the data source, then select Create Data Source.

Create Data Source dialog box that appears when you choose Create Data Source contain a list of commonly used field names for the type of, mail merge you are performing. If you want to create a new field list you may delete the entire common fields and create your own format. The steps involving in this process are:

1. Type the field name in the Field Name box. Note that the field name should not be greater than 40 characters and have some rules that you may use only characters, digits, and underscore.
2. Click the Add Field Name button. The new field name is added at the bottom of the list.
3. To move the new field name to different position in the list.

After finishing the adding, removing, and rearranging the fields click OK to save the data source. In the Save Data Source dialog box that appears to save the data source file.

Editing the Data Source

Get back in to the Mail Merge Helper dialog box, and there you may select the edit data source at the second option. You may enter the records through the dialog box, which you see as follows:

1. To add new record, choose Add New button
2. To delete a record, Choose the Delete button
3. If you want to find any name type the name in the name field and choose Find button.

Editing Main Document

The main document contains the following:

- Text and punctuation
- Merge instructions and field names that Word uses to merge the data.

Inserting the Data Instructions

The Mail Merge Helper makes it easy to insert field names and other data instructions in your main documents. You may place the insertion point and insert a data field name from the Mail Merge toolbar. You can combine the merge fields then pull down the appropriate list from the Mail Merge Tool bar and then insert the necessary field in the necessary place.

9. Write about Templates and Wizards

Read – Only documents with styles and other design elements that you can use to create or restyle your own documents are called *templates*. Wizards are computerized assistants. Wizards also use templates to create documents, first asking some questions and making a few design decisions on their own. The following wizards come with Word.

- Agenda
- Award
- Calendar
- Fax
- Letter
- Memo
- Newsletter
- Pleading
- Resume
- Table

Template Types

Word's standard templates come in up to three different "flavors." Microsoft refers to these as Template Types. They are:

- Contemporary
- Elegant
- Professional

Wizards

Wizards ask you questions, and then use your responses to design documents for you. Take the Calendar wizard for instance. You start Wizards with the File | New command. Pick the Calendar wizard from the other documents tab in the new dialog box. You will be asked questions about your hopes and dreams for the new document. Do you want portrait of

landscape orientation? Word you like to leave space for a picture or other graphic? Do you want fries with that? And so on. As you answer questions, Word shows you a preview, making changes so you can see the effect of your decisions. The preview allows you to try several settings in each window to see which you prefer. Eventually the Calendar Wizard tires of this and, when you click the Finish button it works its magic.

10. Write about Macros

A macro is defined as “A Set of interrelated commands which are grouped together and can be applied through a single and user defined name”. A MS-Word’s macro is a series of Word commands grouped together as a single command to make everyday tasks easier. You can assign a macro to a toolbar, a menu, or a shortcut and run it by simply clicking a button selecting a menu choice, or presenting a key combination. Macros are recorded as instructions in Word’s macro language, WordBasic. You can create a macro in two ways.

Record a series of actions using the keyboard and mouse. This is the easiest way.

Type a macro directly into a macro-editing window. This way you have more flexibility and can include WordBasic instructions that you can’t record using the keyboard and mouse.

To record a macro, you start the Word macro recorder and record a sequence of actions. You then stop the recorder and edit the macro if you need. Then you can run the macro whenever you need to perform the same sequence of actions. There are three ways to start the macro recorder.

Double-click REC on the status area. This is the quick and easy way.

Select Tools | Macro, and then click the Record button in the Macro dialog box. Easy but slower. Click the Record button on the Macro toolbar if you have is displayed.

How to record a macro?

Start the macro recorder. Enter a name for the macro in the Record Macro Name box. If you don’t give your macro a name, Word will name it macro1, macro2, and so on. No spaces, commas, or periods are allowed in the name.

Enter a description of what the macro does in the Description box. This is optional but highly recommended. Use up to 255 characters.

To assign the macro to a toolbar, a menu or a keyboard shortcut click the toolbars, menus or keyboard button.

Click OK and then perform the actions you want to record.

To stop the recording the macro, click the Stop button on the Macro Record toolbar that appears when you start recording. The macro record toolbar will disappear.

How to run a macro?

Once you have recorded your macro, you can assign it to a toolbar, menu, or a shortcut key combination. You can then run it as you would a normal Word command or feature. You can also run a macro by choosing Tools | Macro, selecting the macro name in the Macro dialog box, and clicking the Run button.

11. Write about AUTO TEXT

The text entries which are stored, and can be inserted by a few shortcut keys, are Auto Text entries. Frequently used word can be stored as Auto Text entries like Yours Faithfully, Thanking You etc.

You will find it that it is an easy way to include the text into the document without typing it in full, i.e. the Auto Text entry will be stored in some shortcut name. To store an Auto Text entry, type the text, and block it, then select Insert → Auto Text → New. A dialog will be displayed to enter a name to the Auto Text Entry. Type the short cut name to the text blocked and click on OK. To insert the Auto Text into the document, type the shortcut name given and press the function key F3. Automatically, the shortcut name will be converted to the original text. Auto Text can also be inserted into the document by selecting Insert → Auto Text, click on the required shortcut name and click on Insert. To delete the Auto Text entry, select Insert->Auto Text->Auto Text, click on the Auto Text shortcut name to be deleted and click on delete. To come out of the dialog, click on close.

12. Write about Spelling and Grammar

You can check the spelling of the word in the document and also check for possible grammar and style errors.

Spelling: While typing the text, if any spelling mistake is made, a red wavy underline will be included for such words and if there is a suspected grammar mistake in the sentence, a green wavy underline will be included. To correct the spelling mistakes, right click on the word which has the red underline. Possible correct spellings will be displayed in the shortcut menu. From the displayed words, if the required correct spelling is available, click on such a word in the shortcut menu.

Options:

- Change: Changes the wrongly spell words with words present in change to box.
- Change All: Changes every occurrence of a particular wrongly spells word with the word in the change to box.
- Ignore: Ignores the word that is not correct but which the user wants to keep as it is.
- Ignore All: Ignores this word in the entire document.
- Add: Stores a specified word in the dictionary
- Undo: Will undo the last spelling check and also checks out the last word again.
- Auto Correct: Adds the wrongly spell word and its correction to AutoCorrect list so the Ms-Word will correct it automatically in future.
- Cancel: Stops the spell checking

Grammar: If there is a grammar mistake in the document, it will be displayed with a green underline. To correct the grammar, right click on such a word, possible suggestion will be displayed in the shortcut menu. Select the appropriate choice. If you think the grammar is right, but the green underline is still displayed, then select ignore sentence from the shortcut menu. Click on the required suggestion and click on change.

Self Check 4.1

1. _____ is computer application used for the production of any sort of printable material.
2. _____ is legendary word processing system.
3. _____ is the default view in Ms-Word.
4. _____ is a series of Word commands grouped together as a single command to make everyday tasks easier.

5. Which of the following is not features of MS-Word.
 - a. Support Auto Correct
 - b. Inserting pictures
 - c. Support video
 - d. Support mail-merge

6. Which of the following display options used to display one or multiple pages of a document in a reduced size to display the document as it will be on a printed page?
 - a. Normal view
 - b. Web layout view
 - c. Out line view
 - d. Print preview

4.2. SPREAD SHEETS

A **spreadsheet** is a computer application that simulates a paper worksheet. It displays multiple cells that together make up a grid consisting of rows and columns, each cell containing either alphanumeric text or numeric values. A spreadsheet cell may alternatively contain a formula that defines how the contents of that cell is to be calculated from the contents of any other cell (or combination of cells) each time any cell is updated. Spreadsheets are frequently used for financial information because of their ability to re-calculate the entire sheet automatically after a change to a single cell is made.

Microsoft Excel is now generally considered to have the largest market share.

4.2.1 Microsoft Excel

Excel is an appropriate easy-to-use tool that contains spread sheets and comprehensive charting capabilities among other things.

Excel let you create and quickly perform what if analysis of complex and interrelated columnar reports, in workspace called *worksheets* of *spreadsheets*. Work sheets are made up of *Cells* arranged in *rows* and *columns*. The rows are run across the screen and columns are down words. The cells are accepted labels, letters, numbers, and dates. The Excel's rows are identified by the numbers and the columns are identified by the English letters. The total number of rows is from *1* to *65,536* and the columns are available from *A* to *IV*. You can also create formulas or equations in cells. Also a chart wizard quickly converts your worksheet numbers and cell labels into all manner of impressive pie charts, line charts, bar charts, three-dimensional charts, scatter charts and other visual modes.

Let us consider the following figure.

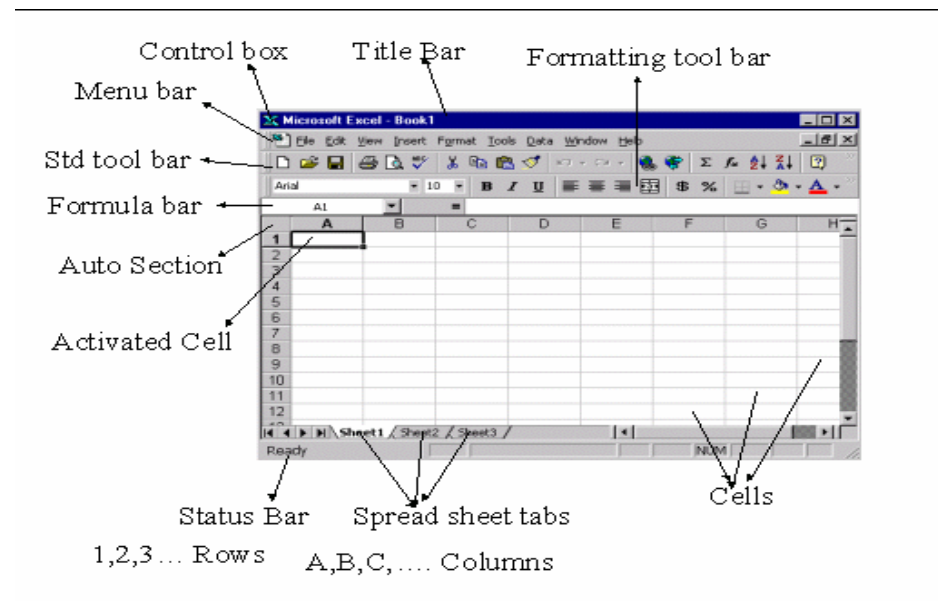


Figure 4.2 The ms-excel window

Overview of Excel Features

Microsoft Excel has much number of features. They are

1. Autocalc:

This feature allows you to sum a group of numbers when they are selected. When you select a group of numbers their sum will be automatically displayed in the status area. You may calculate other operations such as average, minimum value, maximum value etc.
2. Auto complete

Based upon entries you have already made, Auto Complete will try to figure out what you intended to type, if that is available in the previous upward cells. You can choose from the list of entries, which are already entered.
3. Auto correct

Excel automatically corrects the mistakes. These include the same features you have used in MS - Word: not allowing two consecutive initial caps, capitalizing names of days. Like MS-Word you can create your own entries.
4. Auto Filter with top ten

Auto Filter is a short cut for sorting the data. Just select the data through either row or a column and choose Data | Auto Filter. Then Excel will automatically find the top ten highest or lowest values, depending up on your settings.
5. Drag and Drop

Excels Drag and Drop feature lets you reposition the selected portion of your spreadsheet by simply dragging them with your mouse. Any proper formulas are automatically adept themselves to their new locations. This option can also apply between worksheets or the workbooks also.
6. Cell tips and Scroll tips

When you click and drag the scroll bar, a small window tells you what row or what column you are heading for. You can use the cell tips to read notes you have made your self in cells.

7. Data Map

If you do business applications through out the world, Data Map will helps you that to include the maps of different countries.

8. Number formatting

It is easy to format numbers with Excel's new number formatting feature. Select the numbers or group of numbers and choose Format | Cells. In the Number tab you may choose your likely style.

Operators

The operators you use in formula tell excel what you want to do. Excel operators can be divided into four general categories - arithmetic, comparison, text, and reference.

Arithmetic Operators:

You have already seen two arithmetic operators at work the slash symbol / (division) and the hyphen or minus sign - (subtraction). Here's the standard collection.

- + Addition
- subtraction
- * Multiplication
- / Division
- % Percentage

Simply include these at the appropriate places in your formulas to perform the desired calculation.

Comparison Operators:

Comparison operators let you inspect two values and come to a conclusion about their relative values. They are usually coupled with Excel's logical functions.

The operators are

- | | | | |
|----|--------------------------|---|--------------|
| = | Equal | > | Greater than |
| >= | Greater than or equal to | < | Less than |
| <= | less than or equal to | # | Not equal to |

Here is an example of comparison operators at work with the logical function IF.

IF ((B3<B2), "Bad OD!", B3-B2)

Would compare the contents of cells B2 and B3. If B3 is less than B2, the next "Bad OD!" is displayed else it will display the result of B3-B2

Text Operator:

Excel's only text operator is the ampersand (&). It is used to combine text. For instance, if you had the word "aero" in cell C7 and the word "plane" in C8, the formula =C7&C8 would create the text string "aeroplane"

Reference Operators:

Finally, Excel offers reference operators. The most common reference is to a range of cells. Each of the sample formulas presented in MS-Excel contain text and numeric constants. Some times the formulas having constants are very useful to achieve our problems. You can

use the cell references instead of the variables in MS-Excel. In MS-Excel the cell references are mainly two categories. They are:

1. A1 style reference
2. R1C1 style reference
1. **A1 style reference:** This is the default reference for MS-Excel. Columns are labeled with letters A to IV, allowing for maximum of 256 columns. Rows are labeled by numbers through 1 to 65536. So the combination of the column label and the row label.
2. **R1C1 style reference:** In this style the rows and columns are referenced by number. This means the row and columns are referred through its accessibility number. So R3C3 is the cell reference of 3rd row and 3rd column referenced cell.

For better and quick usage, A1 style reference is the default for all the spread sheet products including MS-Excel. It is easy to understand A1 reference than R1C1 reference.

In either of the references i.e., in A1 and R1C1 references there are three ways of references: They are:

1. Relative Reference
2. Absolute Reference
3. Mixed Reference
1. **Relative Reference:** Relative reference refers to cells relative to a given position. By using this reference you can refer to cells relative to the cell containing the formula. Since the formula uses a relative reference, the reference automatically adjusts when the cell is copied to another location of the work sheet.
2. **Absolute Reference:** This refers a specific cell or cells. This means the home address will be same whether you may copy the formula from one location to another. A dollar (\$) sign in front of the cell coordinates denotes an Absolute reference. That is \$A\$1 is an absolute reference to cell A1 and \$B\$2 is an absolute reference to cell B2 and so on. The absolute reference cell content does not change its content when it is copied to another cell.
3. **Mixed Reference:** A mixed reference has one absolute and one relative co-ordinate. For example A\$1 and \$A1 are both examples of mixed references.

Functions: Excel’s worksheet functions are powerful tools that help you perform complex computations. The function may be defined as “A self contained program, which performs a particular task”. Excel has hundreds of functions that facilitate engineering text, manipulate text and do much more.

The functions in MS-Excel are divided into 9 groups. They are:

1. Financial Functions
2. Date and Time Functions
3. Mathematical Functions
4. Statistical Functions
5. Lookup and Reference Functions
6. Database Functions
7. Text Functions
8. Logical Functions
9. Information Functions

Functions consist of function names and arguments. Arguments are defined as the values to be processed up on the data of the cells. The arguments are in the form of direct values, cell reference, or the group of the cells. Every formula should begin with the equal (=) sign followed by the values the function uses to perform operations or calculations. The type of argument a function uses is specific to the function. Common arguments used within functions include numeric values, text values, cell references, ranges of cells, names, labels, and nested functions.”

Financial Functions

Financial functions perform common business calculations, such as determining the payment for a loan, the future value or net present value of an investment, and the values of bonds or coupons. Common arguments for the financial functions include:

1. Future values (fv) – the value of the investment or loan after all payments have been made.
2. Number of periods (nper) – the total number of payments or periods of an investment.
3. Payment (pmt) – the amount paid periodically to an investment or loan.
4. Present value (pv) – the value of an investment or loan at the beginning of the investment period. For example, the present value of a loan is the principal amount that is borrowed.
5. Rate (rate) – the interest rate or discount rate for a loan or investment.
6. Type (type) – the interval at which payments are made during the payment period, such as at the beginning of a month or the end of the month.

Date Functions

With date and time functions, you can analyze and work with date and time values in formulas. The date worksheet function returns the current date based on your computer's system clock. The date functions are given as below:

1. Date

Purpose: Returns the serial number of a particular date.

Syntax: DATE (year, month, day)

About:

Year is a number from 1900 to 9999 in Microsoft Excel for Windows.

Month is a number representing the month of the year. If month is greater than 12, then month adds that number of months to the first month in the year specified.

Day is a number representing the day of the month. If day is greater than the number of days in the month specified, then day adds that number of days to the first day in the month.

2. Day

Purpose: Returns the day of the month corresponding to serial_number. The day is given as an integer ranging from 1 to 31.

Syntax: DAY (serial_number)

About:

Serial_number is the date-time code used by Microsoft Excel for date and time calculations. You can give *serial_number* as text, such as "4-15-93" or "15-Apr-1993", instead of as a number. The text is automatically converted to a serial number.

3. Time

Purpose: Returns the serial number of a particular time. The serial number returned by TIME is a decimal fraction ranging from 0 to 0.99999999, representing the times from 0:00:00 (12:00:00 A.M.) to 23:59:59 (11:59:59 P.M.).

Syntax: TIME (hour,minute,second)

About: *Hour* is a number from 0 (zero) to 23 representing the hour.
Minute is a number from 0 to 59 representing the minute.
Second is a number from 0 to 59 representing the second.

4. Hour

Purpose: Returns the hour corresponding to *serial_number*. The hour is given as an integer, ranging from 0 (12:00 A.M.) to 23 (11:00 P.M.).

Syntax: HOUR (*serial_number*)

About: *Serial_number* - is the date-time code used by Microsoft Excel for date and time calculations. You can give *serial_number* as text, such as "16:48:00" or "4:48:00 PM", instead of as a number. The text is automatically converted to a serial number.

5. Minute

Purpose: Returns the minute corresponding to *serial_number*. The minute is given as an integer, ranging from 0 to 59.

Syntax: MINUTE (*serial_number*)

About: *Serial_number* - is the date-time code used by Microsoft Excel for date and time calculations. You can give *serial_number* as text, such as "16:48:00" or "4:48:00 PM", instead of as a number. The text is automatically converted to a serial number.

6. Now

Purpose: Returns the serial number of the current date and time.

Syntax: NOW ()

Mathematical Functions

With math and trigonometry functions, you can perform simple and complex mathematical calculations, such as calculating the total value for a range of cells or the total value for a range of cells that meet a condition in another range of cells, or round numbers.

1. ABS

Purpose: Returns the absolute value of a number. The absolute value of a number is the number without its sign.

Syntax: ABS(number)

About: *Number* - is the real number which you want the absolute value.

Examples: ABS(2) equals 2 ABS(-2) equals 2

2. CEILING

Purpose Returns number rounded up, away from zero or to the nearest multiple of significance. For example, if you want to avoid using pennies in your prices and your product is priced at \$4.42, use the formula =CEILING(4.42,0.05) to round prices up to the nearest nickel.

Syntax CEILING(number, significance)

About *Number* is the value you want to round.

Significance is the multiple to which you want to round.

Examples CEILING(2.5, 1) equals 3

CEILING(-2.5, -2) equals -4

3. COS

Purpose Returns the cosine of the given angle.

Syntax COS(number)

About *Number* - is the angle in radians for which you want the cosine. If the angle is in degrees, multiply it by PI()/180 to convert it to radians.

Examples COS(1.047) equals 0.500171

COS(60*PI()/180) equals 0.5, the cosine of 60 degrees

4. COUNTIF

Purpose Counts the number of cells within a range that meet the given criteria.

Syntax COUNTIF(range, criteria)

About *Range* - is the range of cells from which you want to count cells.

Criteria - is the criteria in the form of a number, expression, or text that defines which cells will be counted. For example, criteria can be expressed as 32, "32", ">32", "apples".

5. Floor

Purpose Rounds number down, toward zero, to the nearest multiple of significance.

Syntax FLOOR(number, significance)

About *Number* - is the numeric value you want to round.

Significance - is the multiple to which you want to round.

Examples FLOOR(2.5, 1) equals 2

FLOOR(-2.5, -2) equals -2

Statistical Functions

Statistical worksheet functions perform statistical analysis on ranges of data. For example, a statistical worksheet function can provide statistical information about a straight line plotted through a group of values, such as the slope of the line and the y-intercept, or about the actual points that make up the straight line.

Lookup Functions

When you need to find values in lists or tables or when you need to find the reference of a cell, you can use the lookup and reference worksheet functions. For example, to find a value in a table by matching a value in the first column of a table, use the VLOOKUP worksheet function. To determine the position of a value in a list, use the MATCH worksheet function.

Lookup

Purpose Returns a value either from a one-row or one-column range or from an array. The LOOKUP function has two syntax forms: vector and array. The vector form of LOOKUP looks in a one-row or one-column range (known as a vector) for a value and returns a value from the same position in a second one-row or one-column range. The array form of LOOKUP looks in the first row or column of an array for the specified value and returns a value from the same position in the last row or column of the array.

A vector is a range of only one row or one column. The vector form of LOOKUP looks in a one-row or one-column range (known as a vector) for a value and returns a value from the same position in a second one-row or one-column range. Use this form of the LOOKUP function when you want to specify the range that contains the values you want to match. The other form of LOOKUP automatically looks in the first column or row.

Syntax LOOKUP(lookup_value, lookup_vector, result_vector)

About *Lookup_value* - is a value that LOOKUP searches for in the first vector. *Lookup_value* - can be a number, text, a logical value, or a name or reference that refers to a value.

Lookup_vector - is a range that contains only one row or one column. The values in *lookup_vector* can be text, numbers, or logical values.

Result_vector - is a range that contains only one row or column. It must be the same size as *lookup_vector*.

Database Functions

When you need to analyze whether values in a list meet a specific condition, or criteria, you can use a database worksheet function. For example, in a list that contains sales information, you can count all the rows or records in which the sales are greater than 1,000 but less than 2,500. Some database and list management worksheet functions have names that begin with the letter "D". These functions, also known as Dfunctions, have three arguments $\frac{3}{4}$ database, field, criteria.

- The database argument is the range that contains your list. You must include the row that contains the column labels in the range.
- The field argument is the label for the column you want to summarize.
- The criteria argument is the range that contains a condition you specify.

Text Functions

With text functions, you can manipulate text strings in formulas. For example, you can change the case or determine the length of a text string. You can also join, or concatenate, a date to a text string. The following are some examples of text functions.

1. CHAR

Purpose Returns the character specified by a number. Use CHAR to translate code page numbers you might get from files on other types of computers into characters.

Syntax CHAR(number)

About *Number* - is a number between 1 and 255 specifying which character you want. The character is from the character set used by your computer.

Examples CHAR(65) equals "A"
CHAR(33) equals "!"

2. CODE

Purpose Returns a numeric code for the first character in a text string. The returned code corresponds to the character set used by your computer.

Syntax CODE(text)

About *Text* is the text for which you want the code of the first character.

Examples CODE("A") equals 65
CODE("Alphabet") equals 65

3. LEN

Purpose Returns the number of characters in a text string.

Syntax LEN(text)

About *Text* - is the text whose length you want to find. Spaces count as characters.

4. TRIM

Purpose Removes all spaces from text except for single spaces between words. Use TRIM on text that you have received from another application that may have irregular spacing.

Syntax TRIM(text)

About *Text* - is the text from which you want spaces removed.

Example TRIM(" First Quarter Earnings ") equals "First Quarter Earnings"

Logical Functions

You can use the logical functions either to see whether a condition is true or false or to check for multiple conditions. For example, you can use the IF function to determine whether a condition is true or false: One value is returned if the condition is true, and a different value is returned if the condition is false.

IF

Purpose Returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. You can use the IF function to conduct conditional tests on values and formulas.

Syntax IF(logical_test, value_if_true, value_if_false)

About *Logical_test* - is any value or expression that can be evaluated to TRUE or FALSE.

Value_if_true - is the value that is returned if logical_test is TRUE. If logical_test is TRUE and value_if_true is omitted, TRUE is returned. Value_if_true can be another formula.

Value_if_false is the value that is returned if logical_test is FALSE. If logical_test is FALSE and value_if_false is omitted, FALSE is returned. Value_if_false can be another formula.

Information Functions

Use an information worksheet function to determine the type of data stored within a cell. The information functions include a group of worksheet functions known as the IS functions and return TRUE if the cell meets a condition. For example, if the cell contains an even value, the ISEVEN worksheet function returns TRUE. If you need to determine whether blank cells exist in a range of cells, you can use the COUNTBLANK worksheet function to count the number of blank cells in a range of cells, or you can use the ISBLANK worksheet function to determine whether one cell in the range is blank.

Excel Chart Features

Excel helps you to create charts in two or three dimensions based on data in a worksheet. You can take almost complete control over every aspect of your chart's appearance with Excel's Chart toolbar and menu choices, or you can let Excel's Chart Wizard make most of the decisions for you. Once you've created a chart, you can print it, hide it, spell-check it, modify it, or even include it in your non-excel projects (such as Word or PowerPoint documents). Whenever you change data in a worksheet, Excel will update charts that are linked to the changed data.

Starting and Assisting the Wizard

- 1) Start by creating a worksheet containing the data you want to chart.
- 2) Select the data to be included in your chart. Don't include empty rows or columns.
- 3) Click on the chart Wizard button
- 4) Marching ants surround selected cells, and your pointer turns into cross hairs with a little chart attached
- 5) Drag with it, to define the size and shape of your new chart. To create a square, hold down SHIFT while you drag.
- 6) When you release the mouse button, you will see the first of five Chart Wizard step dialog boxes
- 7) This box shows you the range of the data to be charted and gives you a chance to alter the selected range.
- 8) Normally you will click the Next button at this point, taking you to step 2 to 5

Picking the Right Chart Type

Chart Wizard can create many chart types and many formats for each of those types. The step 2 Window illustrates all the chart types and proposes one. It's usually obvious from the chart samples which ones are best for various projects. You can also just experiment, or read online help for each chart type. Use help's search feature to find information by chart type name. Whenever you've decided on a chart type, click its sample to highlight it, and then click the Next button to continue. Don't worry if you pick the wrong type; you can easily change it later.

Once you've chosen a chart type, chart Wizard presents as step 3 dialog box showing various formatting options, which are different for each chart type. Start the choice the Wizard suggests, and experiment after you have seen those results. Click the Next button to continue. In step 4, you will see the beginning of your chart design in a sample chart box. Don't worry about the actual shape of the chart at this point, and don't be afraid if your labels are temporarily truncated or replaced with words like "Series 1" and "Series 2". As you will soon see, the settings proposed by the chart wizard. You are almost finished. Click Next button again. Step 5 gives you a chance to add chart titles for the chart itself, and for each axis. You will see the titles appear in the Sample Chart area as you type.

Self Check 4.2

1. Among the following which is not the feature of Ms-Excel?
 - a. Support video
 - b. Auto correct
 - c. Auto complete
 - d. All except A.
2. For what operation Excel use # symbol?
 - a. Multiplication
 - b. Less than
 - c. Greater than
 - d. Not equal to
3. Which reference has one absolute and one relative co-ordinate?
 - a. Mixed Reference
 - b. Absolute Reference
 - c. Relative Reference
 - d. ALL
4. Which of the following Function returns the serial number of a particular time?
 - a. Day
 - b. Time
 - c. Hour
 - d. Now
5. Which of the following function Returns the number of characters in a text string?
 - a. CODE
 - b. LEN
 - c. TRIM
 - d. CHAR

4.3. DATABASE TOOLS

A **database** is a structured collection of records or data. A computer database relies upon software to organize the storage of data. The software models the database structure in what are known as database models. The model in most common use today is the relational model. Other models such as the hierarchical model and the network model use a more explicit representation of relationships.

Database management systems (DBMS) are the software used to organize and maintain the database. These are categorized according to the database model that they support. The model tends to determine the query languages that are available to access the database. A

great deal of the internal engineering of a DBMS, however, is independent of the data model, and is concerned with managing factors such as performance, concurrency, integrity, and recovery from hardware failures.

4.3.1 Microsoft Access

Access is an appropriate tool that lets you tap into data from a variety of sources. That is, it is a tool to create and manipulate databases. Microsoft access can be found in various versions; in this text we will discuss ms-access 2000.

Introduction: What is Access?

Microsoft Access is a relational database management system (DBMS). At the most basic level, a DBMS is a program that facilitates the storage and retrieval of structured information on a computer's hard drive. Examples of well know industrial strength relational DBMS's include,

- Oracle
- Microsoft SQL Server
- IBM DB2
- Informix

Well- know PC- based (“desktop”) relational DBMS's include

- Microsoft Access
- Microsoft FoxPro
- Borland dBase

The many faces of Access

Microsoft generally likes to incorporate as many features as possible into its products. For example, the Access package contains the following elements:

A relational database system that supports two industry standard query languages: Structured Query Language (SQL) and Query By Example (QBE);

1. A full- featured **procedural programming language** - essentially a subset of Visual Basic.
2. A simplified procedural **macro language** unique to Access.
3. A **rapid application development environment** complete with visual form and report development tools.
4. The procedural programming personality expects you to view your application as commands to be executed sequentially.

Features of Access

- **Windows-based Application:** access is a windows-based application and therefore has an interface similar to Windows NT. You can cut copy and paste data from any windows application to and from Access.
- **Large Data Management Capacity:** access maintains a single disk file from a database and all its associated objects. The maximum size of this file can be 1GB. Access allows

a maximum of 32,678 tables and objects in a database. Access can also support a maximum of 255 users at a time.

- **Importing, Exporting and Linking External Files:** Access lets you import from or export to FoxPro, Excel, Oracle and other data formats. Linking means that you use external data without creating an Access table.
- **Wizard and Builders:** A wizard is a utility that helps you perform complex tasks by guiding you through the process
- **Built-in Functions:** Access includes small programs known as functions that perform simple calculations or data formatting. Access includes mathematical, financial, date, time and string functions.
- **Macros:** For those users who do not want to write programs. Access provides macros. Macros let you perform common tasks without user intervention.
- **Built-in Security:** Since Access is a multi-user database, security features are built into the DBMS.

Access Concepts and Terms

1. **Database:** A database is a computer term for a collection of related information about a certain topic or business application, such as employee database or a product database. Database helps you to organize information in a logical manner for easy access and retrieval. In Access the database will have an extension *.mdb*.
2. **Tables:** A table is a collection of similar data. Tables organize data into columns and rows. A database file contains group of tables that belong to only a particular application.
3. **Relational Databases:** Access is a relational database, which means that it allows data that has been stored in different places to be linked. Access helps us to manage data in three important ways. They are: Reduce Redundancy, Facilitate the sharing of information, and Keep data accurate.
4. **Records:** A record is all the information contained in one row of an Access database table.
5. **Fields:** Fields in a table are the columns of information.
6. **Key Field:** Access retrieves data from more than one table that are related on a common field called *key field*. The key field links the data in the two tables.

Database Objects

1. **Queries:** You use a query to extract information from a database. A query can select a group of records that fulfill a certain condition. A dynamic set of data meeting the query criteria are selected based on the query. Dynamic sets are updated even after the query.
2. **Forms:** Forms display and print data from a table or a query. Forms enable you to view, edit and print data in a custom format.
3. **Reports:** Reports present your data in a printed format. You can create different types of reports with a DBMS.

What is in an Access database file?

Although the term “database” typically refers to a collection of related data tables, an Access database includes more than just data. In addition to tables, an Access database file contains several different types of **database objects**.

1. Saved queries for organizing data.
2. Forms for interacting with the data on screen.
3. Reports for printing results.
4. Macros and Visual Basic programs.
5. The functionality of database applications. All these database objects are stored in a single file named <filename>. mdb.
6. Access, a temporary “locking” file named <filename>. ldb is also created. You can safely ignore the *. ldb file; everything of value is in the *. mdb file.

Starting Access

- To start Access, you double click the Access icon from within Microsoft Windows.

Data Type

You can use the Data Type property to specify the type of data stored in a table field. Each field can store data consisting of only a single data type. Different Data types are used in the MS-Access. They are: Text, Number, Memo, Date/Time, Currency, Auto Number, and Y/N

The default property of the data types in MS-Access is text.

Field Size

You can use the Field Size property to set the maximum size for data stored in a field.

Format

The Format property uses different settings for different data types. You can use the Format property to customize the way numbers, dates, times, and text are displayed and printed.

Input Mask

The Input Mask property is used to make data entry easier and to control the values users can enter in a table field. This property is valid for only the Date and Text data types.

Caption

The Caption property can be used to provide helpful information to the user. Through captions on objects in various views:

- Field captions specify the field labels attached to in table or query Datasheet view.
- Form captions specify the text that appears in the title bar in Form view.
- Report captions specify the title of the report in Print Preview.
- Button and label captions specify the text that appears in the control.
- The Caption property is a string expression that can contain up to 2,048 characters

Default Value

The Default Value property is used to specify a value that is automatically entered in a field when a new record is created.

Validation Rule (Check Constraint)

The Validation Rule property can be used to specify requirements for data entered into a record, field. When data is entered that violates the Validation Rule setting, you can use the Validation Text property to specify the message to be displayed to the user. Enter an expression for the Validation Rule property setting and text for the Validation Text property setting. The maximum length for the Validation Rule property setting is 2048 characters. The maximum length for the Validation Text property setting is 255 characters.

Required (Not NULL)

The Required property is used to specify whether a value is required in a field. If this property is set to Yes, when you enter data in a record, you must enter a value in the field, and the value cannot be Null.

- Yes The field requires a value. Not NULL Property is applicable and enabled.
- No (Default) The field doesn't require a value. The Not NULL property is disabled.

Allow Zero Length

The Allow Zero Length property specifies whether a zero-length string (" ") is a valid entry in a table field or not.

- Yes A zero-length string is a valid entry.
- No (Default) a zero-length string is an invalid entry.

Indexed (Unique)

The Indexed property is used to set a single-field index. An index speeds up queries on the indexed fields as well as sorting and grouping operations.

- No (Default) no index.
- Yes (Duplicates OK) the index allows duplicates.
- Yes (No Duplicates) the index doesn't allow duplicates. Unique constraint is applicable and enabled.

Data Types

Text

(Default) is used to hold text or combinations of text and numbers, as well as numbers that are not participated in calculations. The maximum length of the text data type is 255 characters.

Memo

It is used to store lengthy text or combinations of text and numbers. The maximum length of the Memo Field is 65,535 characters.

Number

Numeric data used in mathematical calculations. In this data type different sizes are there according to their usage.

Byte

A Byte can occupy 1 byte of memory. It can access numbers from 0 to 255. It cannot access any fractions.

Integer

An integer type number can occupy 2 bytes in memory. It can store the numbers ranging from -2^{16} to $+2^{16} - 1$ or $-32,768$ to $32,767$. It cannot accept any fractions.

Long Integer

This is the default number data type. A long integer number can occupy 4 bytes in memory. It can store the numbers ranging from -2^{32} to $+2^{32} - 1$ or from $-2,147,483,648$ to $2,147,483,647$. It cannot accept any fractional values.

Single

A single number data type can occupy 4 bytes in memory. It can store the numbers ranging from -2^{32} to $+2^{32} - 1$ or from $-3.402823E38$ to $-1.401298E-45$ for negative values and from $1.401298E-45$ to $3.402823E38$ for positive values. It can accept 7 decimal fractional places up to 7 places.

Double

A Double number data type can occupy 8 bytes in memory. It can store the numbers ranging from -2^{64} to $+2^{64} - 1$ or from $-1.79769313486231E308$ to $-4.94065645841247E-324$ for negative values and from $1.79769313486231E308$ to $4.94065645841247E-324$ for positive values. It can accept decimal fractions up to 15 places.

Date/Time

A Date and time data type occupies 8 bytes in memory. The default format of the date data type is DD/MM/YY.

Currency

A Currency data type can occupy 8 bytes in memory. This currency data values are used in mathematical calculations. It can accept decimal fractions up to 15 places.

Yes/No

A Yes/No data type can occupy only 1 bit in memory. Generally this data type can contain the Boolean values that contain only one of two values (Yes/No, True/False, or On/Off).

AutoNumber

An AutoNumber data type can occupy 4 bytes in memory. It is a unique sequential (incremented by 1) number or random number assigned by Microsoft Access whenever a new record is added to a table. AutoNumber fields can't be updated. (16 bytes if the Field Size property is set to Replication ID).

Creating a Database

To create a new database we have two options provided by MS-Access in starting window. They are:

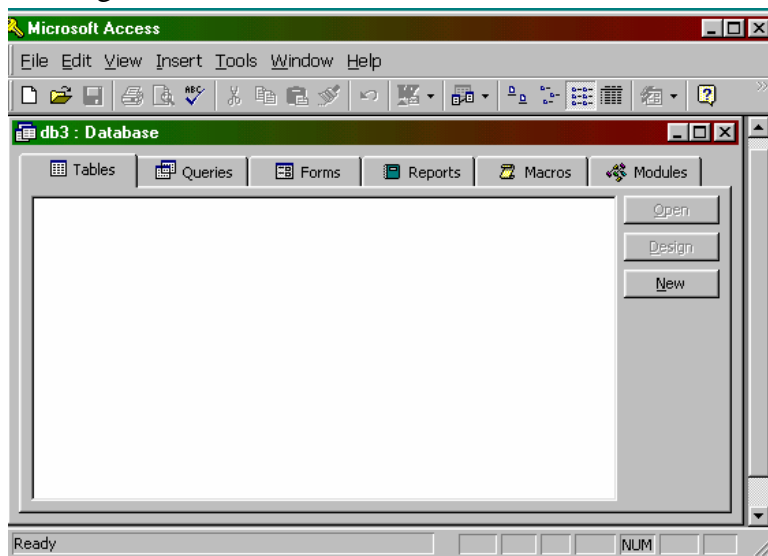
1. You may choose *Database wizard*
2. Option for a *Blank database*

The steps to create a database are

- Click on the Blank data base option
- Click on the Ok button

Then it may prompts to save the database with a name. It also chooses its own path. If you want to change the path, choose your own path in the save dialog box.

When the save button was pressed immediately you may see the following screen.

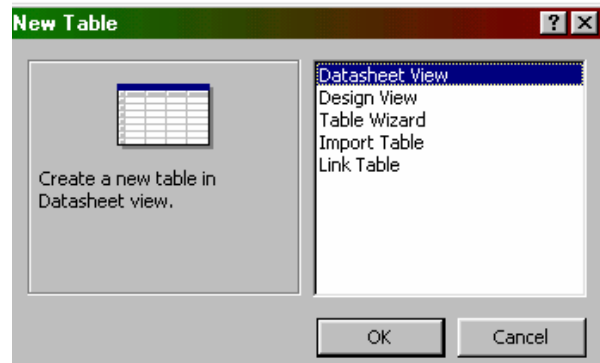


Creating a new table

Tables are the primary building blocks of any MS-Access database. All the data is stored in the tables. A database can contain any number of tables. In order to create a new table, we must first design the table, i.e., we may design the fields that can be included in the table and the associated data types.

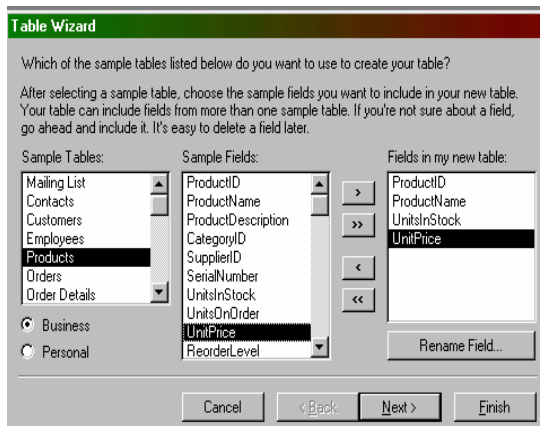
Creating a new table using the Table wizard

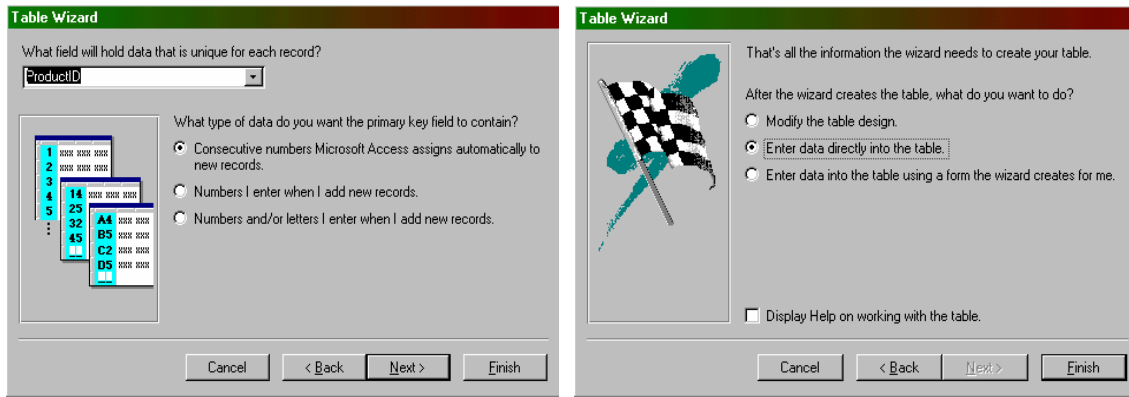
The **Table Wizard** helps you to start a new table and set up its fields. The wizard provides various sample fields that you might use to create a database for both business and personal usage.



To create a table using the Table Wizard

1. In the Database window, click on the **Tables** tab.
2. Click the **New** button
3. In the **New Table** dialog box choose **Table wizard** from the list
4. Click **OK**
5. In the first page of the table wizard, click Business or Personal to choose a database type. (In this, we will take an example, as business example here).
6. Click in the list of Sample Tables, and then double click a field in the list of sample fields to add the fields to your table. (In this we select the Product)
7. Continue adding other fields from the same sample table of other sample tables until you have all the fields you need, and then click on Next.
8. In the next page of the table wizard, enter a name for the table and let MS-Access set the primary key field or choose to do it yourself, and then click next.
9. In the next page of the Table Wizard, choose one option to create the new table, and click next. If you are establishing a new relationship or changing an existing one, in the relationships dialog box, choose one of the three options to define relationship between the two tables, and then click OK.





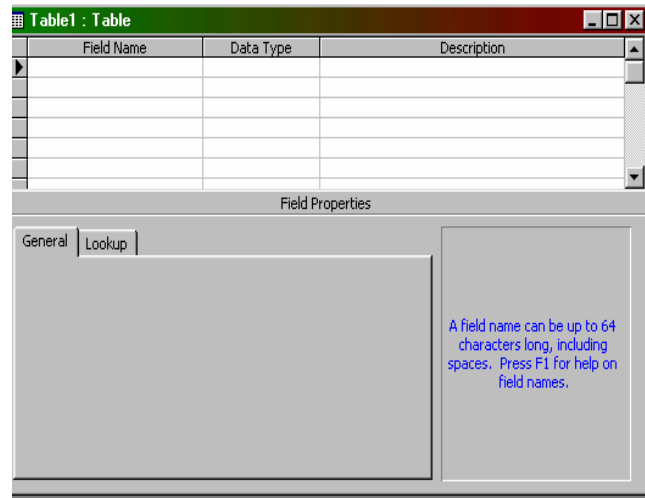
10. In the final page of the Table Wizard, choose to modify the design, start entering data, or enter data using a form that the wizard creates, and then click **Finish**.

Creating a Table using Date sheet View

1. In the Database window, click on the **Tables** tab.
2. Click the **New** button
3. In the **New Table** dialog box choose **Date sheet View** from the list
4. Click **OK**
5. In the new table window, double click in a field name and rename it.

Create a Table Using Design View

1. In the Database window, click on the **Tables** tab.
2. Click the **New** button
3. In the **New Table** dialog box choose **Design View** from the list
4. Click **OK**
5. Enter the field name and select a data type for each.
6. Add a description if you want.
7. In the table window, click a blank row in the field name column.
8. Enter the name and press the tab key to move to the next column.
9. Choose a data type from the dropdown list in the data type column.
10. Press tab key to move to next column and enter a description for the field in the description
11. Save the changes to the table design, let MS-Access set the primary key field or choose to do it yourself, and then click you choice.



Adding a field to the table in Design View

1. On the tables tab of the database window, choose a table and click the design button.
2. In the table window, click a blank row in the Field Name column.
3. Enter a field name and press the Tab key to move to the next column.
4. Choose a data type from the drop-down list in the Data Type column.

5. Press the Tab key to move to the next column and enter a description for the field in the database Description column.
6. Save the changes to the table design.

Field Size and format

If the field data type is text, you can set the number of characters allowed and specify formatting rules. If the field data type is a numeric value, you can choose the range of numbers to be accepted and the number of decimal places to be stored.

1. On the Tables tab of the database window, choose a table and click Design button.
2. In the table window, click the name of the field to format.
3. Click the Field size text box and then enter a number if the field is text, or choose from the drop down list of positions if the field is number or some other data types.
4. Click Format box and then, if the field is a text field, enter one of the symbols as mention below

Symbol

@

&

<

>

Result

A text characters is required in the field (either a character or a space)

A text character is not required.

All characters entered will become lowercase.

All characters entered will become uppercase.

5. Save the changes to the table design.
6. For a field, you can enter any field size between 0 to 255. The default is 50.
7. When you are setting the field size for a number field, choose the option that requires the fewest number of bytes but that is still suitable for your data.

Entering data in a Table

To fill a table with data, you enter the data record by record. To complete each record, you enter information into the fields of the record. You probably will want to use a form to enter data into a table, but you can also enter the data directly into the rows and columns of the table.

Sno	Sname	Datej	Tfee
100	Ravi	10/10/02	12000
101	Hari	10/10/02	12000
*	0		0

1. Click the Tables tab in the database window.
2. Double click on a table name. OR Select the table to add a record and click Open.
3. Click New Record button on the MS-Access tool bar to add a new record.
4. Enter data in the first field and then press tab to move to the next field.

5. If the field shows an arrow button, you can click the button to display the list and then select an entry in the list.
6. Press Tab or Enter key after you have entered the information to the last field in the record to move to the start of a new record. The record you have completed is saved automatically.
7. You do not need to do anything special to save each new record. When you move to the next record, the previous record is saved automatically.

Editing Data in a Table

You can easily change the information in any field of any record.

1. Click any field in the table to position an insertion point in the field. OR Double click any word or number in the field to select it.
2. Edit the entry as you would edit text in word.
3. Click a different record to save the changes.
4. To select any entire field, click anywhere in the field and press F2.
5. To move to the previous field for correction, press Shift + Tab.
6. To replace the entry in a field with the entry in the same field of the previous record, click in the field and press CTRL + '(apostrophe).
7. While you edit a field, the pencil symbol appears to the left of the record to indicate that your changes have not yet saved.

Saving a Table

After you create a table, you must save it.

1. From the File menu, Choose SAVE. OR Press Ctrl + S. OR Click the SAVE button on the MS-Access tool bar.
2. In the Save As dialog box, enter a name for the new table.
3. Click Ok. The new table is added to the list of tables in the database window.
4. To save a table as a form that you can use for data entry or a report that you can print, or to save it with a new name, select the table on the Table Tab in the database window and then choose Save As from the File menu.

Working with Forms

Introduction

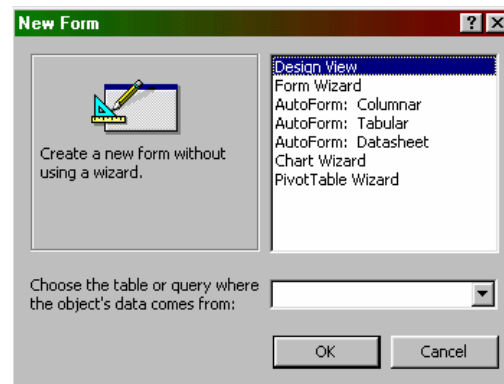
A form is used to enter and edit data in a table in a convenient way. The controls on a form are displayed when you are entering or editing a table using the form, and they are also printed when you print the form.

Creating a form using the Form wizard

The form wizard makes it easy for you to select controls for your form from more than one table or query.

To create a form using the Form Wizard

1. Click the Forms tab in the database window.



2. Click the New button on the database window tool bar.
3. In the New form dialog box, choose Form Wizard from the drop down list.
4. Click Ok.
5. In the first page of the form wizard, select a table or query and then double click each field you want to include. OR Click the >> button to include all fields.
6. Select another table or query and add further fields, if needed.
7. When you have finished adding fields, click Next.
8. In the next page of the Form wizard, choose a layout for the form, which can be either: Columnar, Tabular, Date sheet, or Justified. Then click Next.
9. In the next page of the Form Wizard, choose a form style and then click Next. You can click each button and inspect the sample in the dialog box.
10. 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 you can modify the form's design.
11. Click Finish. The form is automatically saved.

Creating a Form

You can create a form for every table in your database, and you can create forms that allow you to add data to more than one table or query at a time. Each time you make changes to the design of a table, you 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 form list.
4. If you choose one of the Auto forms, select a table or query from the pull-down list.
5. Click Ok. The Auto forms wizard creates a form in the default style, using all fields defined in the table.
6. In the Design View option the New Form dialog box displays a blank form in Design view, with the forms toolbar box available for adding controls.

Saving a Form

1. To save the form, Click the Save button on the MS-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 report or a form with another name, select the form on the Form tab and then choose Save As from the File menu.

Opening the Form in Design View

To modify a form, you 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 you are currently using the form to enter or edit data, click the View button on

the MS-Access tool bar and choose Design View from the drop down menu. OR From the View menu, choose Design view.

Entering Data in a Form

A form provides blank fields and other controls that allow you to add data to a table easily.

1. Click the Forms tab 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 tool bar.

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 MS-Access tool bar.
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.
6. Press tab after 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. You do not need to save each record. The completed record is saved automatically when you move to the next record.
10. If you want to see the records in a tabular manner, close this window and go to the Table panel and select the table and see all the information.

Viewing and Editing Records using a Form

You 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 Form tab of the Database window.
2. Use the Next or Previous button to move forward or backward through the database OR press Page Down or Page Up keys. OR From the Edit menu, choose GoTo, and then choose next or previous from the submenu.
3. Edit the entry as you would edit text in word.
4. Click a different record to save your changes.
5. To jump to the first or last record, click the First or Last button, press Ctrl + UP arrow or Ctrl + Down arrow, or choose First or Last from the GoTo menu.
6. To jump to a specific record number, select the current record number, type a replacement number, and press Enter.

Adding Labels

Each field on a new form has a label, but you can add labels to the form to provide a special instruction to the person using the form. For example, you can enter a label for a group or fields:

1. With the form open in Design view, make sure the toolbar is visible. If it's not visible, click the toolbox button on the MS-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 text.
5. Use the move and size handles to position the label.

6. Save the changes to the form design.

Formatting Labels

You can give a label any appearance you 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 tool bar.
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 MS-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 text.
6. To add a control, drag it from the field list and place it on the form.

Relationships

It is an association established between common fields (columns) in two tables. A relationship can be one-to-one, one-to-many, or many-to-many.

Creating relationships between tables

1. Close the Catalog View table and return to the database window.
2. Select Tools → Relationships from the main menu.
3. To add a table to the relationship window, select Relationships → Show Table from the menu or press the show table icon on the tool bar.
4. Add the tables you want to establish the relation ship by selecting the table and click on add. Click on Ok.

Referential integrity

One important feature of Access is that it allows you to enforce referential integrity at the relationship level. Essentially, referential integrity means that every record on the “many” side of a relationship has a corresponding record on the “one” side. Enforcing referential integrity means that you cannot, for instance, create a new record in the detailed table without having a valid record in the Masters table.

Working with Queries

Introduction

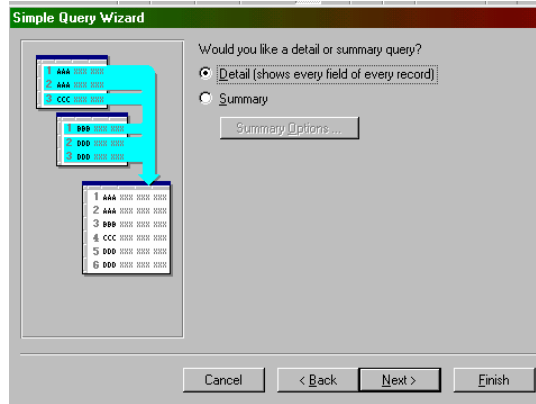
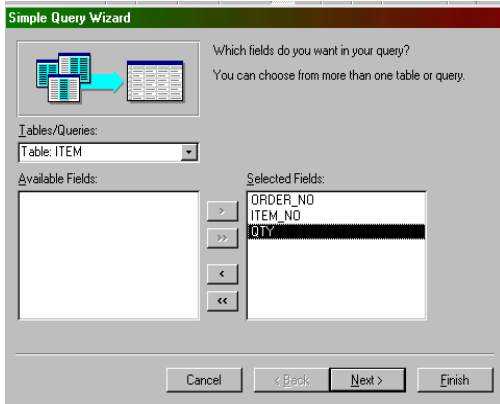
Queries are used to extract specific information from the database. It is like asking a question to the MS-Access and finding out the answer. You can even save the query to use it later stage too. Queries allow the user to join data from one or more tables, order the data in different ways, calculate new fields, and specify criteria to filter out certain records. The important thing is that the query itself contains no data. It merely reorganizes the data from the table (or tables) on which it is built without hanging the “underlying tables” in any way. Like in all other features queries are also created using Query Wizard.

Creating a Query using the Query Wizard

The query wizard helps you in making a simple query.

To start a query using the simple query wizard

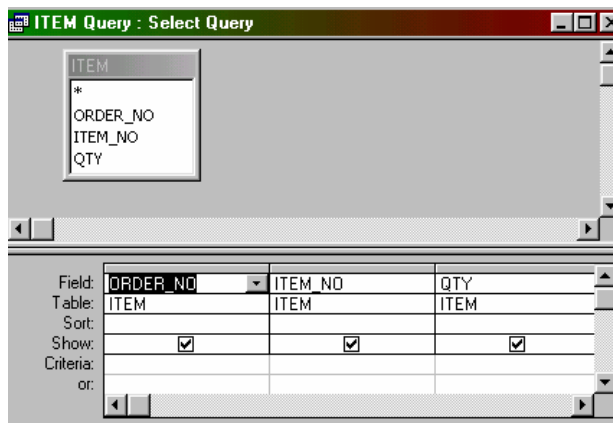
1. In the database window, click the Queries tab.
2. Click the New button on the database window tool bar.
3. In the New Query dialog box, select Simple Query Wizard.
4. Click Ok.
5. On the first page of the sample query wizard, select first one table, add the fields you want to include and then select additional tables and add the fields you need.
6. When you have finished adding tables and their fields, click Next.
7. On the next window, select Details or Summary and click next.
8. On the last page of the simple query wizard, type name for this query or accept the default name that MS-Access has assigned, choose whether to open the query or modify its design, and click Finish.
9. The query by the name as you specified appears in the design view.



Creating a Select Query

You can design a simple select query or use the query wizard to help you design a Query and then add criteria.

1. In the Database window, click the Queries tab.
2. Click the New button on the Database window toolbar.
3. In the New Query dialog box, select Design View.



4. Click Ok.
5. In the Show Table dialog box that opens, select tables you want to include in your query, click Add after selecting the table.
6. After you have added all the tables you want to include, Click Close.
7. Select a field from the pull down menu in a Filed cell in the query design grid, from the lower half of the Select Query dialog box. OR Double click a field in the field box in the upper portion of the Select Query box to add it to the query design grid. OR Click and drag a field in the table box to a column in the query design grid.
8. The show check boxes in the grid should be checked for all the fields that you want displayed in the resulting datasheet.
9. To sort the records in the resulting datasheet, click the Sort cell for the fields that you want to sort and then select Ascending or Descending from the drop down list.

Adding Criteria to a Query

As you design a query, you can add criteria to make the query more specific.

1. On the Queries tab of the Database window, select a query and click the design button. OR Click the Design view button if the query is open.
2. In the Criteria cell for a field in the query design grid, enter the number or text to match.
3. For help in constructing an expression, right click in the Criteria cell for a field and choose Build from the short cut menu. OR Click in the Criteria cell for a field and click the build button on the MS-Access toolbar.
4. In the expression builder dialog box, you can type in the box at the top, click buttons to add the common operators, and click the Paste button to add items from the submenu in the button selection.
5. Click OK when you have finished building the expression.
6. Click the RUN button view the results.
7. Click the design view button to return to designing the query.
8. Save the query design.

Saving a Query

You can save a query and open it in Design view later to refine or change the criteria.

1. While the Query window is open, click the Save button. OR. Press Ctrl + S. OR. From the File menu choose Save.
2. In the Save As dialog box, enter a name for the query.
3. Click OK.
4. The new query now appears on the Queries tab.
5. To save a query as a form that you can use for data entry or as a report that you can print, or to save it with a new name, select the query on the Queries tab and then choose save as from the file menu.

Running a Query

1. Click the Run button on the MS-Access toolbar OR. Choose run form the Query menu. MS-Access displays the results of the Query in a datasheet.

2. Click the design view to return to designing the query.
3. If no queries are open, on the query tab of the database window double click a query to run it.

Print a Query

You can also print the results to obtain a result on a paper.

1. While the resulting datasheet of a query is open, click the Print button on the MS-Access Toolbar. OR Press Ctrl + P. OR. From the file menu choose Print.
2. Click Ok in the print dialog box.
3. You can choose Print Preview from the File menu to see how the query datasheet will look when it is printed. Then choose Page setup from the file menu to adjust the settings.
4. To print a query with out opening it, select the query on the Queries tab and then choose Print from the File menu.

Calculating Totals in a Query

When some of the data in the query datasheet is numeric, you might want totally the information in some way. You can easily sum and average the numbers in a query datasheet to determine and maximum values.

1. On the Queries Tab of the database window, select query and click the Design Button. OR. If the query is open, click the Design View button.
2. Click the Totals button. OR. From the View menu, choose Totals.
3. To group the data by the entries in a particular field, Choose Group By from the drop down list.
4. Select an option form the drop down list in each total cell of each field in the query window design grid.
5. Run the query.
6. Save the query.
7. The total cell of each field must contain an entry. If you do not want the total of a field, do not include the filed in the query.

Finding Duplicate Using Queries

MS-Access provides wizard that helps you find duplicate filed values in a table.

1. Click the New button on the queries tab of the database window toolbar.
2. In the New Query dialog box, select Find Duplicates Query Wizard.
3. Click Ok
4. Follow the wizard steps to select the table, choose the fields that might contain duplicate information and select the other fields you want to display.
5. On the first two dialog boxes of the wizard, select the options as required.
6. On the last page of the wizard, type a name for the query or accept the default name and click Finish.
7. Run the query.

Finding the Unmatched Records using Query

MS-Access provides you wizard that help you find records in one table with no related records in another table.

1. Click the New button on the Queries tab of the Database window Toolbar.
2. In the New Query dialog Box, select Find Unmatched query Wizard.
3. Click Ok.
4. Follow the wizard steps to select the first table, select the table with the related records, choose the fields in each record containing the same information, and select the fields you want to display.
5. On the last page, type a name for the query or accept the default name and click Finish.
6. Run the Query.

Updating Table Records Using an Update Query

This query updates or makes changes to all records in the selected fields of one or more tables.

1. Create a query containing the records you want to update in one or more tables, and select the fields you want to use for the criteria.
2. With the query open in design view, choose Update Query from the Query type pull down menu. OR. Choose Update Query form the Query menu.
3. Type information in the Criteria cell, if necessary.
4. Type an expression of a value in the Update To cell in the query design grid.
5. Click the datasheet view button to see the fields that will be updated.
6. Click the Design View button to return to Design View.
7. Run the Query.

Values will be changed in the tables. You can not undo the update action, but you can stop the query while it is running by pressing Ctrl + Break.

Deleting Table Records using a Delete Query

A delete Query is an action query that deletes records in the selected table.

1. Create a query containing the records you want to delete.
2. With the query open in Design View, choose Delete Query from the Query Type Pull down menu. OR. Choose Delete Query from Query menu.
3. Specify all (*) for each table from which you want records deleted (from) and then specify the field and the criteria for deletion (Where).
4. Click the datasheet view button to see the records that will be deleted.
5. Click the design view button to return to design view.
6. Run the query.

The records will be deleted. To check on relationship between tables, choose join properties from the View menu and use the Join properties dialog box to review and add relationships. You cannot undo the delete action, but you can stop the query while it is running by pressing Ctrl + Break.

Appending Table Records using an Append Query

An append query appends a group of records in one table to another table.

1. Create a new query, selecting the table containing the records you want to append to another table.
2. With the query in design view, choose Append Query from the query type pull down menu. OR. Choose Append Query from the Query menu.
3. In the Append dialog box, select the table to which the records will be added. You can specify a table in another database.
4. Click Ok.
5. Select the fields to be added, add criteria where necessary.
6. Click the data sheet view button to view the records that will be appended.
7. Click the Design View button to return to Design View.
8. Run the Query.

The records will be appended in the second table. You cannot undo the append action, but you can stop while it is running by pressing Ctrl + Break.

Creating a Table of Query Using a Make-Table Query

A make-table query creates a table containing the query results.

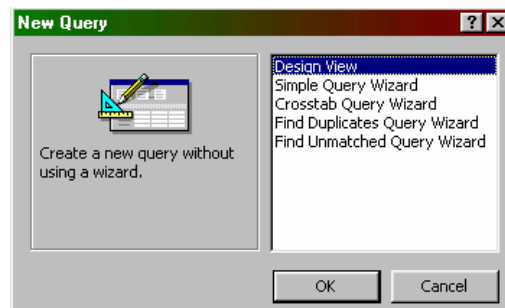
1. Create a new query, selecting the fields from one or more tables, and adding criteria as required. OR. Open an existing query.
2. With the Query open in Design view, choose Make table Query from the query type Pull-down menu. OR. Choose Make Table Query from the Query menu.
3. Type a name for the new table in the Make table dialog box.
4. Click Ok.
5. Click the datasheet View button to view the records that will be included in the new table.
6. Click the Design View button to return to Design view.
7. Run the query.

The new table is created. You cannot undo the make table action, but you can stop the query while it is running by pressing Ctrl + break. You can also delete the new table from the database.

Creating a Cross Tab Query

A cross tab query presents the information in spread sheet type format; you can select the field to use for rows and the field to use for the columns.

1. In the Database window, click the Queries tab.
2. Click the New button in the toolbar.
3. In the New Query dialog box, select Cross Tab Query wizard.
4. Click Ok.



- Follow the wizard steps, click Next on each page after filling the required information. Select the table or query containing the records, up to three fields for the row headings, a field for the column headings, and a calculation to include.

Crosstab Query Wizard

Which table or query contains the fields you want for the crosstab query results?

To include fields from more than one table, create a query containing all the fields you need and then use this query to make the crosstab query.

View: Tables Queries Both

Sample:

	Header1	Header2	Header3
TOTAL			

Buttons: Cancel, < Back, Next >, Finish

Crosstab Query Wizard

Which fields' values do you want as row headings?

You can select up to three fields. Select fields in the order you want information sorted. For example, you could sort and group values by Country and then Region.

Available Fields: ITEM_NO, QTY

Selected Fields: ORDER_NO

Sample:

ORDER_NO	Header1	Header2	Header3
ORDER_NO1	TOTAL		
ORDER_NO2			
ORDER_NO3			
ORDER_NO4			

Buttons: Cancel, < Back, Next >, Finish

Crosstab Query Wizard

Which field's values do you want as column headings?

For example, you would select Employee Name to see each employee's name as a column heading.

Sample:

ORDER_NO	ITEM_NO1	ITEM_NO2	ITEM_NO3
ORDER_NO1	TOTAL		
ORDER_NO2			
ORDER_NO3			
ORDER_NO4			

Buttons: Cancel, < Back, Next >, Finish

Crosstab Query Wizard

What number do you want calculated for each column and row intersection?

For example, you could calculate the sum of the field Order Amount for each employee (column) by country and region (row).

Do you want to summarize each row?
 Yes, include row sums.

Fields: QTY

Functions: Avg, Count, First, Last, Max, Min, StDev, Sum, Var

Sample:

ORDER_NO	ITEM_NO1	ITEM_NO2	ITEM_NO3
ORDER_NO1	Sum(QTY)		
ORDER_NO2			
ORDER_NO3			
ORDER_NO4			

Buttons: Cancel, < Back, Next >, Finish

Crosstab Query Wizard

What do you want to name your query?

ITEM_Crosstab

That's all the information the wizard needs to create the query. Do you want to view the query, or modify the query design?

View the query. Modify the design.

Display Help on working with the crosstab query.

Buttons: Cancel, < Back, Next >, Finish

ITEM_Crosstab : Crosstab Query

ORDER_NO	Total Of QTY	100	101	102	103
1	120	20	30	30	40
2	230	40	50	30	110

Record: 1 of 2

- On the last page, type a name for the query or accept the default name and click Finish.
- Run the query.

If you have not specified fields correctly and you receive an error message, you can use the wizard to begin again or you can work with the query in Design View.

Reports

Introduction

A report will print your database in a format which looks best on the paper using the printer attached to your computer. You can have the report displayed on the monitor too. These reports are generated by the queries using the information available in the tables. As usual MS-Access provides an easy way out in the form of Wizard called Auto Report. A report is a flexible way of viewing and printing summary information. It enables you to display information to the required level of detail. The information can be viewed or printed in any format.

Need for a Report

1. Presenting information in a customized way both on screen and on paper
2. Grouping and sorting data according to your needs and in the order you want
3. Calculating averages, field totals and drawing graphs

You can create the following kinds of reports in Access:

1. Tabular Reports

Tabular reports are similar to a table that displays data in a row-column format.

2. Columnar Reports

Columnar reports display data vertically. You can use this kind of report to display one record per page or to display data that is related in a one-to-many relationship.

3. Mailing Labels

You can create mailing labels from the data stored in a table.

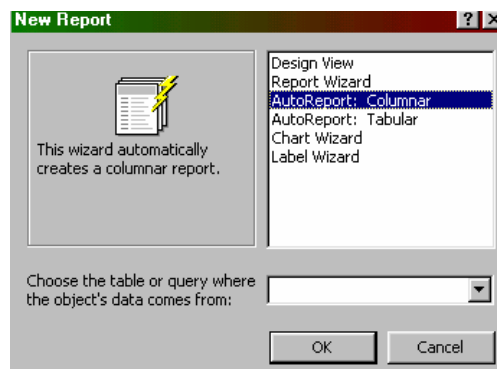
Creation of a Report

A report can be created by any of the following methods

1. Auto Report
2. Report Wizard
3. Design View

Creating a report using an Auto Report Columnar Report

1. On the Report tab of the design view window, click the New button.
2. On the New report dialog box, select Auto Report: Columnar and select a table or query on which to base the report.
3. Click Ok.



- Then the print preview was displayed.

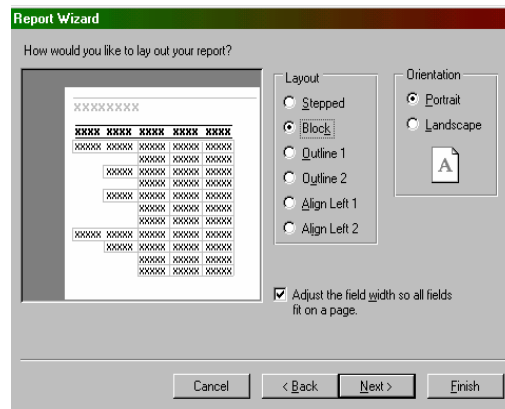
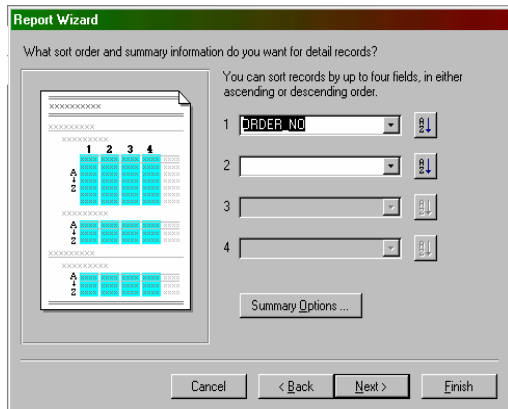
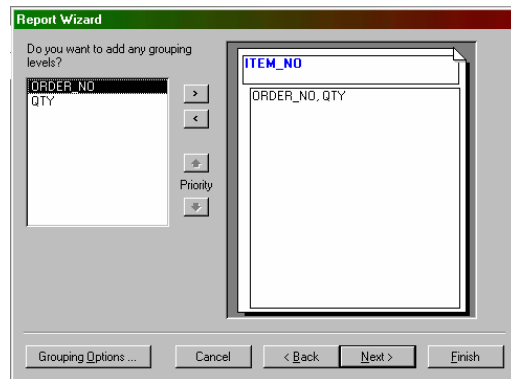
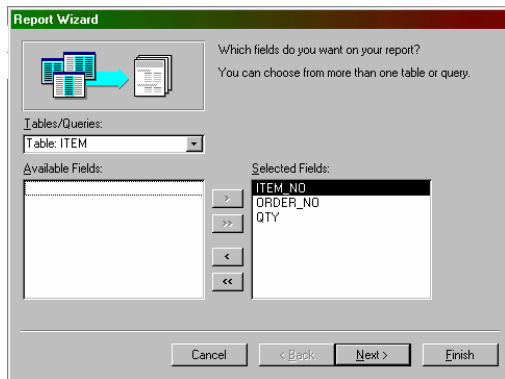
Tabular Report

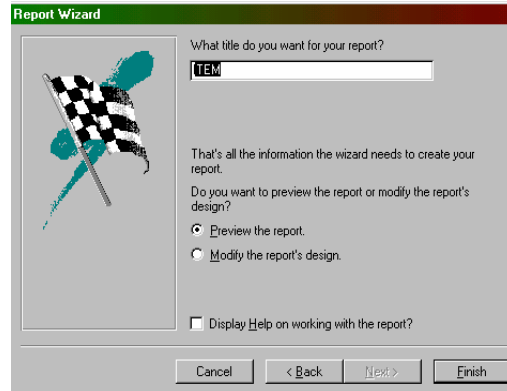
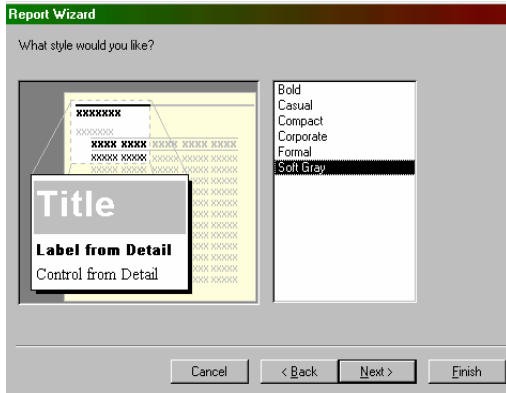
- On the Report tab of the Database window click the New button.
- In the new report dialog box, select Auto Report: Tabular and select a table or a query on which to base the report.
- Click Ok.
- The report is displayed in the Print Preview.

Creating a Report using the Report Wizard

You can choose to have a report by using Report Wizard and then change it if required.

- On the Reports tab of the Database window, click the New button.
- In the New Report dialog box, select Report Wizard.
- Click Ok.
- On the First page of the Report Wizard, select the table or Query on which to base the report, select the fields to display, and click Next to get the next dialog box.
- In this page select the fields which you want to put in the report and press next button to get the next page.
- In this page select the grouping levels and press next to go to the next page.





7. In this page select the grouping and summary options and press next to get the next page.
8. In this page, select the layout for printing and click Next to get the next page.
9. In this page, select the style you would like for your printing and press next to get the last page of the wizard.
10. Choose the specific name or set the default name for the print preview and press next.
11. The print preview of the report will be shown in the MS-Access window.

Auto format for the Report

You can choose AutoFormat for formatting your report. This way you can get a good looking report with out much of an effort.

1. With the report open in Design View, click the Auto Format button on the MS-Access toolbar.
2. In the AutoFormat dialog box, select a new format
3. You can apply all or some attributes only.
4. Click Ok.
5. You can customize an AutoFormat or add your own formatting as an AutoFormat. Click Customize in this AutoFormat dialog box to display the Customize AutoFormat Dialog box.
6. Be sure to save the report after you have revised it.

Viewing a Report

Each time you open a report to view or print it; the report reflects any changes made or the table or query on which it is based.

1. Click the Reports tab in the Database window.
2. Select a report and click preview to view a preview of the printed report.
3. Click the page buttons at the bottom of the print preview window to move from page to page of the report.
4. To close the report, click on the Close button on the MS-Access toolbar.

Print a Report

1. With the report open in Print Preview button on the MS-Access toolbar. Or. Press Ctrl + P. Or From the File menu, choose Print.

2. You 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.
3. Make sure that your Printer is turned ON to print the report.

Sorting and Grouping Records in a Report

A report can group together similar records and it can also sort the entries within groups.

1. With the report open in Design view, click the Sorting and grouping button on the MS-Access tool bar.
2. In the sorting and grouping dialog box, use the drop down menu to select the fields you want to group on. Or. Drag a field from the field list.
3. Select the sorting method for the grouping.
4. If you want, select a field to group on, within the first grouping.
5. Click a new row to save your changes.
6. Close the dialog box.

Creating Charts and Labels

You can create a report in chart format, which represents numeric information graphically, and you can also create a report that prints labels that can be used for sending a mailing to a mailing list.

1. On the Reports tab of the Database window, click the new button.
2. In the New Report dialog box, select Chart wizard and select a table or a query on which to base the report.
3. Click Ok.
4. In the first step in the chart wizard, select the fields which you want to include in your chart.
5. Click the Next button to get the next page of the chart wizard.
6. Here you have to select the type of the chart which you want to use.
7. Click next to go to the next page of the chart wizard.
8. Here you see the preview of the chart which is going to be created with an option to choose the layout which you want. Accept the one which you want and press next to go to the next page.
9. You have reached to the last page of the chart wizard. Here specify the name of the chart and press finish to end the chart wizard.

Macros

Introduction

A macro is an MS-Access object that executes certain tasks or a series of tasks. A macro can be defined as "A set of related commands or tasks applied through a user defined name called as a Macro".

Uses of Macros

Macros are used for repetitive tasks that you perform in your database. This is done to save both time and effort. You can use macros to do the following among other things.

1. Open the database in various forms like Tables, Forms, Queries, Reports, etc...

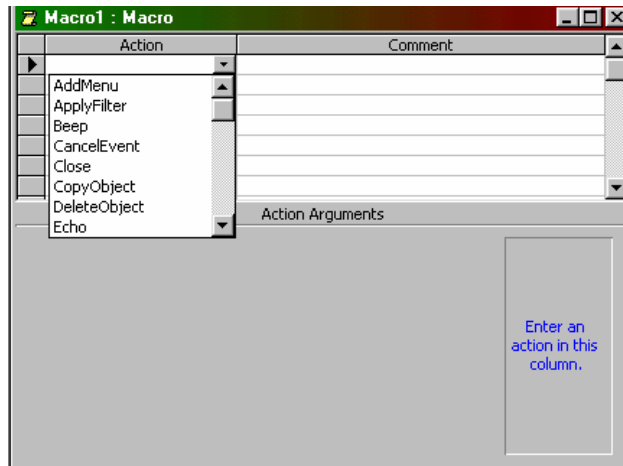
2. Close tables, forms, and reports or any other which is open.
3. Perform certain actions when you click a command button or press a key.
4. Run action queries.
5. Execute any command from different menus.
6. Display information such as warnings to the user.
7. Set or change most form and report properties and the properties of their control using macros.
8. Move, minimize, maximize, size or restore any window.
9. Move data between tables
10. Start other applications.

A Macro Window

It is a graphical design workspace which is used to create new macros. To open it do the following steps:

1. Click Macro tab in the Database window.
2. Select a macro from the List.
3. Click design button.

The lower section of the macro window specifies the arguments for each action. You need to provide information for most action before MS-Access can perform them.



Adding Actions

You can enter the actions name directly in the Action column of the macro window. You can also select an action from the drop-down list box in the Action Column.

Running Macros

You can run macros once you have created them in MS-Access. You can run it from Macro design window by clicking the Run button on the toolbar. Its icon is like an Exclamation Mark.

Events

Another way of running macros is to base the activation of a macro on an event, which is the result of some user action. An event can occur when a user clicks a button in a form, closes a report, moves between records in a form, and many other cases. MS-Access has 8 different groups of events.

1. Data events

Data events occur when data is entered, or changed, or when the focus moves from one record to another record.

2. Error and timing events

Error and timing events are used for error-handling and synchronizing the data.

3. Filter events

Filter events occur when form or control loses or gains focus or become active or inactive.

4. Keyboard events

Keyboard events occur when you type on the keyboard or when you send key strokes using the Send Keys action.

5. Mouse events

Mouse events occur when a mouse action happens.

6. Print events

Print events occur when a report is printed.

7. Window events

Window events occur when you open, resize, or close a form or report.

8. Focus events

Focus events occur when a form or a control losses or gains focus or become active or inactive.

You can trigger a macro when a user performs any of the approximate 50 events that MS-Access recognizes, which it does through the use of special properties in forms, reports and controls.

Running a Macro

1. Create a new macro as mentioned earlier.
2. Add a single action.
3. Close the macro window, saving the new macro with a name.
4. Create a new blank form using the Design button on the forms tab of the Database window. Add a command button to the form.
5. Right click the command button and select Properties from the short cut menu. On the properties window, go to event tab.
6. Click it on.
7. Drop down the list box for property and scroll until you find the name which you had given in step 3.
8. Switch to the from view and click the button. The action you had asked for in step 2 will be executed.

Self Executing Macros

The most common self executing macro is the Autoexec macro, which is automatically executed every time you open the Database. To create the AutoExec macro, simply create a macro that you want to run every time you open the database. Save the macro and name it as AutoExec. So the next time you open the database, this macro will be executed. You can by pass it by pressing Shift key while opening the database in the Open Database dialog box.

Self check 4.3

1. _____ is the software used to organize and maintain the database.
2. _____ events occur when form or control loses or gains focus or become active or inactive.
3. _____ are used for repetitive tasks that you perform in your database.
4. _____ is like asking a question to the MS-Access and finding out the answer.
5. _____ is a structured collection of records or data.
6. One of the following is not a DBMS.
 - a. Oracle
 - b. Ms-Access
 - c. Ms-Excel
 - d. Informix
7. From the following one is not a feature of ms-access.
 - a. Wizard and Builders
 - b. Built-in security
 - c. Macros
 - d. None

UNIT SUMMARY

Word processing is the ability to create documents using a *word processor*. A word processor is a computer application used for the production (including composition, editing, formatting, and possibly printing) of any sort of printable material. Ms-Word is the most commonly used word processing application software.

A spreadsheet is a computer application that simulates a paper worksheet. It displays multiple cells that together make up a grid consisting of rows and columns, each cell containing either alphanumeric, text or numeric values. A spreadsheet cell may alternatively contain a formula that defines how the contents of that cell is to be calculated from the contents of any other cell (or combination of cells) each time any cell is updated. Spreadsheets are frequently used for financial information because of their ability to re-calculate the entire sheet automatically after a change to a single cell is made. Ms-Excel is the most commonly used spread sheet program.

A database is a structured collection of records or data. The software models the database structure in what are known as database models. The model in most common use today is the relational model. Database management systems (DBMS) are the software used to organize and maintain the database. These are categorized according to the database model that they support. Ms-Access is the most commonly used database management system.

EXERCISE

Short Answer Question (Word)

1. What is word processing?
2. Write the difference between save and save as?
3. What is the difference between endnotes and footnotes?
4. What is macro?
5. What is drop cap?
6. What is mail merge?
7. What is spread sheet?
8. Explain what is Database?
9. Explain the Terms Table, Forms, Queries, and Reports?
10. What do you mean by indexing?
11. How would you delete records using delete query?
12. What do you understand by Sorting and Grouping Records? Explain?
13. Describe the various uses of Macros in ms-access?
14. Define the following?
 - I. Data
 - II. Information
 - III. DBMS
 - IV. RDBMS
15. Create a database using Ms-Access, with at least 15 records. The table structures are

Table-1: Student

Rno	Number	PK
Name	Text (20)	
DOB	Date/time	
Gender	Text (1)	
Class	Text (10)	

Table – 2 : Marks

SUB1	Number	
SUB2	Number	
SUB3	Number	
SUB4	Number	
SUB5	Number	
RNO	Number	FK

Maintain the relationship between them.

Prepare the following Queries

- a) The Query that shows the information about the students.
- b) The Query that shows the marks gained by the students.
- c) The Query that shows the Name, Marks in 5 subjects, total and average marks.
- d) The Query that shows the RNO, NAME, GENDER, TOTAL, AVERAGE.

Prepare the following Reports.

- a) The Report that shows the details of the student.
- b) The Report that shows the details of student with Total, Average marks.
- c) The Report that shows the Rno, Name, Total, and Average marks.

17. Create a data base using Ms-Access, with at least 15 records. The table structures are

Table-1: Emp

ECODE	NUMBER	PK
ENAME	TEXT (20)	
AGE	NUMBER	
GENDER	TEXT (1)	
DOB	DATE/TIME	

Table – 2: Salary

ECODE	NUMBER
BASIC	CURRENCY

Maintain the relationship between them.

Prepare the following Queries.

- a) The Query that shows the information about the employee.
- b) The Query that shows the salary details.
- c) The Query that shows the Name, TA, DA, HRA, PF, GROSS.
- d) The Query that shows the Ecode, Netpay

Prepare the following Reports.

- a) The Report that shows the details of the employee.
- b) The Report that shows the salary details.
- c) The report that shows the Ecode, Net salary.

Chapter Three

COMPUTER SYSTEM

Unit Objective

In this unit you will learn about the computer system. You identify the different components of the computer system and how these components are interrelated.

At the end of this unit you should be able to:

- ⇒ **Define hardware and software components of a computer system.**
- ⇒ **Describe the major components of computer hardware.**
- ⇒ **Identify the two types of software.**
- ⇒ **Define what a CPU is and its function.**
- ⇒ **Identify computer languages.**

3.1 COMPUTER HARDWARE

Hardware is the term used to describe the actual (physical) parts attached to the computer. i.e., all the internal and external parts or devices connected to the computer to communicate with the computer like input and the output etc. (The parts visible in the block diagram of computer)

Computer hardware falls into four categories. These are:

- Input devices
- Output devices
- Processor
- Secondary storage devices

Input / Output Devices

Computer must have some way to put programs and data into for processing and to get results out. i.e., there must be some way to communicate with the computer. Input / Output devices have been developed for the purpose. Input devices feed information or Data into the computer. Output Devices are used to retrieve information from the computer memory for human use. The devices used to achieve computer input / outputs are different.

3.1.1. INPUT DEVICES

Keyboard

This is the most commonly used input device which resembles the typewriter keyboard. This is the oldest input device used right from the invention of the computer. This is used to enter any type of data into the computer it may be text, numbers or any symbolic notations. Normally the keyboard contains 102 keys. Nowadays as the software industry is growing rapidly accordingly many changes are brought in the layout to satisfy the needs of the soft wares. The communication between the keyboard and the system unit is brought with the help of a cable which transfers the bits through the bus (Group of wires carrying the bits) parallels or consecutively.

Nowadays addition to the above keys there are many other keys are included making the keyboard as 105, 108 and so on.

Pointing Devices

Data input also involves entering commands and selecting options. Mouse, trackball, and joystick were all developed to make this easy. Each of these devices allows the user to identify and select the necessary command or option by moving the cursor to a certain location on the screen or tablet and sending signal to the computer. They are used in menu-driven programs – that is, programs that offer varying levels of means or choices to the user to lead him or her through the program functions.

I. Mouse - The mouse is a handheld device connected to the computer by a small cable. As the mouse is rolled across the desktop, a ball inside the mouse that contacts the desktop moves the cursor across the screen. When the cursor reaches the desired location, the user usually pushes mouse button once or twice to signal a menu selection or a command to the computer. Mouse technology is often used with graphics-oriented microcomputers and software's like Windows. With special software for graphics, the mouse can be used like a pen or a paintbrush to create figures and pattern directly on the video display screen. The keyboard still is used to type in characters and issue some commands, depending on the software.

II. Trackball - trackballs have all the functionality of a mouse, but they don't need to be rolled around on a desktop. The ball is held in a socket on top of the stationary device, and the user moves the ball with his or her fingers. Trackballs have become popular in offices where crowded desktops are the norm. Pocket –sized track balls are available for laptop computers, eliminating the need for a flat work surface, which is required to use a mouse.

III. Joystick - A lever that moves in different directions controls the movement of a pointer or other display symbols. A joystick is similar to a mouse, except that with a mouse the cursor stops moving as soon as you stop moving the mouse. Here the pointer continues to move in the direction the joystick is pointing. Most joysticks include two buttons called triggers. These are mostly used for computer games, also used occasionally CAD/CAM systems and other applications.

Scanner

It is an input device that can read text or illustrations printed on the paper and translate the information into a form that the computer can use. It works by digitizing the image by dividing it into a grid of boxes and representing each box with either zero or one, depending on whether the box is filled in. the resulting matrix is called bit map, can be stored in a file. These do not distinguish text from other figures; they represent all images as bit maps. So, to edit text read by an optical scanner, an optical character recognition (OCR) system to translate the image into ASCII characters is required (which usually come with the latest scanners).

Digital Camera

Images can be put into a computer using a digital camera. These images can be manipulated in many ways using various imaging tools. This takes a still photograph, stores it and then sends it as a digital input into the computer, stored as digital files.

3.1.2. OUTPUT DEVICES

Monitor

This is called by different names like screen, VDU (Visual display unit), console etc. The monitors are classified into mainly 2 categories:

1. *Monochrome* – actually displays two colors, one for background usually black, one for foreground normally white.
2. *Color* - can display from 16 to 1 million different colors. They are sometimes referred as RGB as they accept three separate signals – Red, Green and Blue. This consists of vacuum tube with three electron guns, one for each color at one end and the screen at the other end. The three electron guns fire electrons at the screen, which contains phosphorus coating. When the electron beams excite the phosphors, they glow. Depending on the beam, three beams should converge for each on the screen so that pixel (*picture element*) is the combination of three colors.

The display on the screen mainly depends on the resolution bandwidth and refresh rate of the screen.

Resolution indicates how densely the pixels are packed. Graphics monitors display pictures by dividing the display into millions of pixels, arranged in rows and columns. They are so close that they appear connected. Number of bits used to represent each pixel determines how many colors or shades can be displayed. (8-bit color monitor uses 8 bit for each pixel i.e., $2^8 = 256$ colors or shades). The quality of monitor depends on its resolution, how many pixels it can display, how many bits are used to represent each pixel (details given in the table). In general, the more the number of pixels (expressed in DPI) the sharper the image.

Bandwidth is the amount of data that can be transmitted in a fixed amount of time. The bandwidth is usually expressed in bits or bytes per second.

Refresh rate is the rate at which the monitors are refreshed per second i.e., display redrawn. Refresh rate also called as vertical refresh rate is measured in hertz. The faster the refresh rate the less monitor flickers.

Video standards

Standard	Resolution (pixels)	Colors (Simultaneous)
VGA	640 X 480	16
	320 X 200	256
SVGA	800 X 600	16
	1024 X 768	256
	1280 X 1024	256
	1600 X 1200	256
XGA	640 X 480	65536
	1024 X 768	256

Printers

Printer is a device that prints on the paper (hard copy). There are different types of printers depending on the technology used.

a. Dot-Matrix Printers

Also called as serial printers, were developed with 2 objectives, i.e., greater speed and more flexibility. The images formed are by a print head that is composed of a series of little print hammers that look like the heads of pins. These print hammers strike the ribbon individually as the print mechanism moves across the entire print line in both directions. They can produce variety of type styles and graphics without requiring an operator to stop the printer.

The print-head of a dot matrix printer usually has 9 pins. High-quality printers have print heads with as many as 24 pins, which allow a much more precise image to produce about 360 dpi(Dots per (square) inch)

In general 9-pin Printers

- Can print between 40 to 130 cps(characters per second) – between one or two pages per minute
- Are best used for quick draft printing, generating forms and printing jobs that don't require a high-quality image.

Most 24-pin printers

- Can print between 80 to 260 cps- between one to four pages per minute.
- Produce a much more precise image than 9-pin printers about 360 dpi.
- Are best used in a heavy volume environment in which speed and quality are required.

b. Ink – Jet Printers

Ink-jet printers work in much the same fashion as dot-matrix printers in that they form images or characters with little dots. However, the dots are formed, not by hammer-like pins, but by tiny droplets of ink. And the text these printers produce is letter quality (rather than near- letter-quality, which is produced by Dot –matrix printers). These printers can almost match the speed of dot-matrix printers-between one and four pages per minute (ppm) – and they produce less noise. Hewlett-Packard's Desk Jet plus prints 2ppm. Several manufacturers produce color ink-Jet printers. Some of these printers come with all their color inks in a cartridge. These printers are a better choice if one use one color predominantly. Innovative type of ink-jet printer can generate up to 256,000 colors at once (216 dpi). Industry observers are expecting color ink-jet printers with 300 dpi resolution to appear in the near future.

c. Laser Printers

Laser printer technology is much less mechanical than impact printing (that is, no print heads move, no print hammers hit), resulting in much higher speeds and quieter operation. This resembles the operation of a photocopier machine a laser beam is directed across the surface of a light-sensitive drum and fired as needed to record an image in the form of a pattern of tiny dots. The image is then transferred to the paper – a page at a time – in the same fashion as a copy machine, using a special toner.

The major advantages of these printers are:

- Very high speed.
- Low noise level.
- Low maintenance requirements.

- Very high image quality
- Excellent graphics capabilities.
- A variety of type sizes and styles.
- On large, high-speed laser printers, forms can be printed at the same time data is recorded in them.

When high-speed laser printers (also called page printers) were introduced, they were very expensive. Their cost could be justified only in large data processing organizations where a print speed capability of between 10,000 and 20,000 lines (about 300 pages) per minute was required. However, recent laser printer technology has made desktop versions available at very reasonable prices. A small desktop laser printer can produce between 4 and 8 ppm. With printers in this range, 300 dpi images are common. The printers are appropriate in a networked environment where many users are sharing one printer. Most laser printers are capable of outputting a specific set of type fonts and sizes. Laser printers that include a built-in page description language on a board inside the printer provide greater flexibility by enabling users to generate fonts in any size and to produce special graphics effects. The desktop laser printer has become a very popular output device for micro computer-based systems. Many practitioners of desktop publishing prefer desktop laser printers because of the high-quality images they produce. Laser Printers are very popular in the business community.

Plotters

A plotter is a specialized out put device designed to produce high-quality graphics in a variety of colors. There are two basic types of plotters: those that use pens and those that don't, Drum plotters and flatbed plotters both use pens. Electrostatic plotters do not.

- ❖ In a drum plotter, the paper is mounted on the surface of a drum. The drum revolves and the plotter pens (which are similar to felt-tip pens) are horizontally positioned over the target area. When the paper has rotated to the correct point, the pens are dropped to the surface and moved left and right under program control across the paper as the drum revolves. When the image is complete, the pens are raised from the surface.
- ❖ Flatbed plotters are designed so that the paper is placed flat and one or more pens move horizontally and vertically across the paper.
- ❖ Electrostatic Plotters use electrostatic charges to create images out of very small dots on specially treated paper. The paper is run through a developer to allow the image to appear. Electrostatic Plotters are faster than pen plotters and can produce images of very high resolution.

3.1.3 THE PROCESSOR

Recall that a computer is an electronic device. At the center of the computer system the processor which is commonly referred to as the **Central processing unit (CPU)**.

Central Processing Unit (cpu)

The central processing unit (CPU) is the heart of the computer system. Among other things, its configuration determines whether computer is fast or slow in relation to other computers. The CPU is the most complex computer system component, responsible for directing most of the computer system activities based on the instructions provided. As one computer

generation has evolved to the next, the size of the CPU has become smaller and smaller, while its speed and capacity have increased tremendously. Indeed, these changes resulted in the microcomputer that is small enough to fit on the desk or the lap. The CPU circuitry of a microcomputer – called a microprocessor – fits on a chip about the size of the thumbnail, or even smaller.

The CPU has two main parts: (1) the control unit and (2) the arithmetic-logic unit. The parts of the CPU are usually connected by an electronic component referred to as a bus, which acts as an electronic highway between them. To temporarily store data and instructions, the CPU has special-purpose storage devices called *registers*.

A. Control unit

The control unit, a maze of complex electronic circuitry, is responsible for directing and coordinating most of the computer system activities. It does not execute instructions itself; it tells other parts of the computer system what to do. It determines the movement of electronic signals between main memory and the arithmetic-logic unit, as well as the control signals between the CPU and input-output devices.

A computer is useless without software instructions. When we use software, we are working with high-level (human language-like) instructions that are to be carried out by the control unit. These instructions are converted by a language processor into a low-level form of instructions the computer can work with – machine language, the only language that the CPU can understand is machine language, data and instructions are represented in binary form (0's and 1's), and each type of computer microcomputer, minicomputer, or mainframe-responds to a unique version. Once the instructions have been converted into this form, they can be retrieved from main memory and interpreted by the control unit (sometimes referred to as decoding). According to each specific instruction, the control unit issues the necessary signals to other computer system components as needed to satisfy the processing requirements. This could involve, for example, directing that data be retrieved from a disk storage device, "telling" the printer to print the letter you just wrote, or simply directing the arithmetic-logic unit to add two numbers.

B. Arithmetic - logic unit (ALU)

Without the arithmetic-logic unit (ALU), computers would not be able to do most of the tasks that are useful. The ALU performs all the arithmetic and logical (comparison) functions- i.e., it adds, subtract, multiply, divide, and does comparisons. These comparisons, which are basically "less than", "greater than", and "equal to", can be combined into several common expressions, such as: "greater than or equal to" The objective of most instructions that use comparisons is to determine which instructions should be executed next.

The ALU controls the speed of calculations and so receives a great deal of attention from computer engineers trying to meet the need of the fast-paced business world. Older microcomputers speeds are usually measured in milliseconds – 1 millionth of a second. Larger, powerful computer's speeds are measured in nanoseconds- 1 billionth of a second- or picoseconds-1 trillionth of a second.

Other elements to be considered in ALU are:

a) Registers

These are special temporary storage locations within the CPU, some in Control unit and others in ALU. Registers accept, store and transfer data and instructions that are being used immediately. To execute an instruction, the control unit of the CPU retrieves it from the main memory and places into the register.

Two operations take place:

- (i) Instruction cycle - refers to retrieval of an instruction from main memory
- (ii) Execution cycle - refers to execution of instructions and subsequent storing of the results in the register.

b) Bus

Refers to an electrical pathway through which bits are transmitted between the various computer components. Depending on the design of the system, several types of buses may be present. Data Bus – carries data through the CPU & Address Bus – carries the address of the memory location where the data is stored through the CPU.

The wider the bus, the more data it can carry at one time and thus greater the processing speed of the Computer. The data bus of Intel 8088 processor is 8 bits wide- can carry 8 bits (1 character) at a time. The data bus of Intel 80386 processor is 32 bits wide – can move four times the data through its data bus than Intel 8088 bus. Some supercomputers contain buses with 128-132 bits wide.

3.1.4. PRIMARY AND SECONDARY STORAGE DEVICE

1. Main memory (Primary Storage Device)

Main memory also called as *Primary storage*, *Memory* and *RAM* is the part of the processing hardware that temporarily holds data and instructions needed shortly by the control unit.

The earliest form of main memory was based on the vacuum tubes that were large in size and had a very little capacity of about some bytes to store or hold. Today memory can contain 256 K- 1 Mega on a single memory chip. The main memory in today's computer on Semiconductor technology, which involves coating silicon chip with a material that can take on two different states (on / off); the material either conducts or will not conduct electricity. Chips are very small and relatively inexpensive to manufacture and they do not consume as much power as older forms of main memory. The use of chips has increased memory capacity of computers. Earlier computers had the memory capacity in KB's, whereas today's computer memory can have capacity in MB's and more.

Function of main memory – to act as a buffer between the CPU and the rest of the computer system components. The CPU can utilize only those instructions and data that are stored in main memory. The main memory is RAM - name is derived with its usage as the data can be stored and retrieved at random from anywhere on the chip in approximately the same amount of time. It is in a volatile state i.e., when computer is off RAM is empty, When it is on, capable of receiving and holding copy of the instructions and data necessary for processing

Because of its volatile nature, user's work is often saved on to nonvolatile secondary storage devices such as diskettes (Floppy or Hard). Thus functions of memory can be listed as below:

- i. Storage of a copy of the main software program that controls the general operation of the computer (such as operating system). This copy is loaded into memory when computer is turned on (booted) and stays there as long as the computer is on.
- ii. Temporary storage of a copy of application program instructions (like Word, Excel) to be retrieved by the CPU for interpretation and execution.
- iii. Temporary storage of data that are inputted from Keyboard or other input devices until instructions call for the data to be transferred into the CPU for processing.
- iv. Temporary storage of the data that has been produced as a result of processing until instructions call for the data to be used again in the subsequent processing or to be transferred to an output device such as screen, printer or disk storage device.

A. R A M (Random Access Memory)

RAM is termed as Main memory of computer. If the capacity is RAM is much large, then it can

- Receive and use much larger programs.
- Hold copies of more than one program to support the sharing of the computer by more than one user
- Operate faster and more efficiently.
- Hold images for creating graphics and animation.
- Work and manipulate more data at one time.

A bank of 1 K RAM chip can store 1024 bytes. Similarly 64 K RAM chip can store 64 K or 65,536 or 1024 X 64 bytes of data i.e., each RAM capable of storing a column of 65,356 bits.

B. R O M (Read Only Memory)

Instructions to perform the operations (that are to be carried out as soon as the computer is turned on and to check the hardware components to see they have been connected correctly) which are critical to the operation of computer are stored permanently on a ROM chip installed by the manufacturer inside the computer. The ROM chip, also called as firmware retains instructions in a permanently accessible, nonvolatile form. The instructions stored in ROM are not lost even after the power in the computer is turned off. ROM chip also contains additional software instructions. Three additional kinds of nonvolatile memory are used in some computer systems namely *PROM*, *EPROM*, *EEPROM*.

C. PROM

It stands for **Programmable Read-Only Memory** functions in the same way a regular ROM component does, with a difference that these chips are custom-made(customer determines what data and instructions are recorded on them) for the user by the manufacturer. The disadvantage of these chips is that if data is recorded on them once, can't be changed.

D. Erasable programmable Read-Only Memory (EPROM)

These chips were developed as an improvement over PROM chips. EPROM is beneficial over PROM in the manner that with the help of a special device, using ultraviolet rays the data and instructions on it can be erased in approximately 15 minutes. Then the device called as PROM burner is used to reprogram the chip. To change the instructions on

EPROM chip, the chip must be taken out of the machine and then put back when changes have been made. This is seldom used by the computer users instead replace the EPROM with a new programmed one.

E. Electrically Erasable Programmable Read-Only Memory (EEPROM)

It avoids the inconvenience of having to take the chips out of the computer to change data and instructions. Instead, changes can be electrically made under the software control. The data recorded on them can be easily updated. The only disadvantage of these chips is that their costs are substantially more than the regular ROM's.

F. Cache memory

It is used to increase the speed of transfer of instructions and data from secondary storage to the processor. This is also a high-speed temporary storage area for the program instructions and data. This is about 10 times faster than RAM and 100 times more expensive. As the storage capacity is smaller than the RAM's capacity, it holds only those instructions and data that processor needs immediately.

G. Flash memory

It is a special type of EEPROM that can be erased and reprogrammed in blocks instead of one byte at a time. Many modern computers have their BIOS stored on flash memory chip so that it can be easily updated if necessary. Such BIOS is sometimes called flash BIOS.

2. Secondary Storage Device

The term primary storage refers to the main memory of a computer, where both data and instructions are held for immediate access and use by the computer's central processing unit. Most primary storage is considered a volatile form of storage, meaning that the data and instructions are lost when the computer is turned off.

- Secondary storage (or auxiliary storage) is any storage device designed to retain data and instructions (Programs) in a more permanent form.
- Secondary storage is nonvolatile, meaning that the data and instructions remain intact when the computer is turned off.
- The information is stored in files. A file is made up of a group of related records. A record is defined as a collection of related characters or bytes of data. Field is defined as a collection of related characters or bytes of data and a byte or character of data is made up of 8 bits.

There are different types of secondary storage devices available. They are also in some context termed as input output devices as we store as well as retrieve data from them. Some were used during the earlier generations of computers. Nowadays diskettes, CD-ROM's and small magnetic tapes are familiar storage devices.

A. Punched cards

Key punch machines are used to input information from a keyboard onto punched cards.

They punch holes into the card using standard code system. One card can hold 80 characters in a row. There are 12 rows on the standard punched card and a unique combination of 1, 2, or 3 punches represents a letter, number or a symbol. These cards use either BCD or Hollerith code-system. Once cards are punched and verified, they can be input in the computer system through a card reader. Card readers interpret the holes in the punched cards and translate those holes into digital signals for the CPU.

Disadvantages are:

- Reading speed is slow
- Business records are longer than 80 characters which cannot be fit in the cards.
- Once punched cannot be changed.
- Storage is bulky for large volumes of data.

B. Magnetic tape

Magnetic tapes are particularly popular form of secondary storage because of their high data density (number of bytes of information per inch of tape). They are made of Mylar-based plastic film which can be magnetized. Information is stored on magnetic tape by running the tape over an electromagnetic read/write head. Magnetic tapes typically have seven or nine tracks.

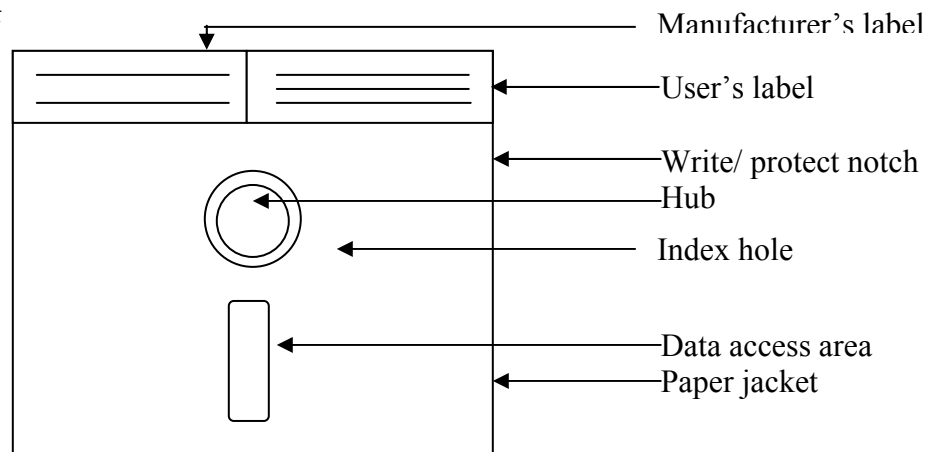
Disadvantages are:

- While accessing information, the entire tape must be read sequentially which results in slow access time.
- Sensitive to distortion by environmental influences such as dust, humidity and temperature variations.

C. Magnetic Disks

Magnetic disks are metal disks coated with ferrous oxide. They allow for random access of information and overcome the slow access time found in tapes. Disks are usually grouped together into a disk pack separated by small air spaces to allow access for read/write heads. These are numbered from 0 to 199 starting from the perimeter of the disk. Tracks of the same number on all adjacent disks are referred to as a cylinder of the disk. The disk pack is mounted on a magnetic disk drive which rotates the disk at speed up to 1000 revolutions per second. Because of the more sophisticated hardware and software is required to access information directly cost of magnetic disk is greater than magnetic tape.

I. Floppy Disk



A double-sided, double-density 5 ¼ -inch diskette (labeled “DSDD” or “2S/2D”) has a storage capacity of 360 K. A double-sided, quad-density diskette has a capacity of approximately 1MB. The following table shows the capacities of some popular diskettes

Types of Disks	Bytes	Tracks	Sectors / Track	Bytes / Sector	
5 ¼ -inch diskette					
	D S D D	360 K	40	9	512 (½ K)
	D S Q D	1.2 M	80	15	512
3 ½ -inch diskette					
	D S S D	720 K	80	9	512
	D S D D	1.44 M	80	18	512

II. Hard disks

Hard disk is a magnetic disk on which you can store data. The term hard is used to distinguish it from the soft disk.

- ✓ Hard disks hold more data and are faster than floppy disks. A hard disk, can store from 10 to several Gigabytes.
- ✓ Hard disks usually consists of several platters, each platters requires 2 read / write heads, one each side.
- ✓ All heads are attached to single access arm, thus cannot move independently.
- ✓ Each platter has same number of tracks and all the tracks at the same location are termed as cylinders. for eg., a typical 84 megabyte hard disk might have two platters (4 sides) and 1053 cylinders
- ✓ Hard disks are less portable than floppies, even though they are removable.

D. Optical Disks

Optical disk is a faster kind of mass storage. This type of storage involves the use of high-power laser beam to burn microscopic spots in a hard disk’s surface coating. Data is represented by the presence (binary 1) and the absence (binary 0) of holes of storage locations. The patterns of spots detected by the laser during the read operation are converted into electrical signals used by the computer.

Here one can store at most 100 GB for a single 12-inch disk. This type of large storage is especially required where images must be stored, as images take up much more storage space than the text or numerical data. The data recorded on optical media is not damaged by stray magnetic fields and surface problems like fingerprints, dust, scratches and so on.

The main kinds of optical disks are:

1. **CD-ROM** (Compact Disk- Read Only Memory) This optical disk’s data is imprinted by the disk manufacturer. The user cannot erase it, change it or write on the disk. The user can only “read” the data. This type of optical disk is used primarily for making huge amounts of prerecorded data, such as government statistics. Encyclopedias, medical reference books, dictionaries and legal libraries – immediately available to the user.

2. **WORM** (Write Once, Read Many) WORM disks are also imprinted by the manufacturer, but the buyer can determine what is written on the disks. Once the disks have been written on, however, they can only be read from then on, no changes can be made.
3. **Erasable optical disks-** Erasable optical drives are an alternative to large capacity hard disks. They store from 21 to 3200 MB of data. In contrast to CD –ROM and WORM disks, erasable disks can be written on and erased. The removable cartridges provide convenience and security along with huge storage capacity. Optical disks can also be used to back up fixed hard disks.
4. **CD-R & CD-RW drive** – CD-R stands for compact disk-recordable drive, is a type of disk drive that can create CD-ROMs. To create this CDs one should have the CD-R software package. These drives can also read CDs and play audio CDs.
- CD-RW disk is short for CD-Rewritable disk and this enables to write onto it multiple sessions. This drives and disks, one can treat the optical disk like a floppy or hard disk, writing data on it multiple times.
5. **Magneto-optical (MO) drives** – This is a type of disk drive that combines magnetic disk technologies with CD-ROM technologies. MO disks can be read and written. They are also removable like floppies. Their storage capacity is more than 200 MB and in terms of data access they are faster than floppies and CD-ROMs, not fast as hard disk drives.

Self Check 3.1

1. Which one of the following different from the other.

a. Keyboard	c. Monitor
b. Mouse	d. Scanner
2. Differentiate the one which is different for the other.

a. Scanner	c. Joystick
b. Mouse	d. Trackball
3. _____ is a specialized output device designed to produce high quality graphics in a variety of colors.

a. Color printer	c. Monitor
b. Laser printer	d. Plotter
4. _____ are special purpose storage device used by the CPU to store data temporarily.

a. Address	c. Registers
b. Memory	d. Hard drive
5. From the following which one is different from the other?

a. Punched card	c. Magnetic disk
b. Magnetic tape	d. ROM

3.2. COMPUTER SOFTWARE

Computer Software is essential complement to computer Hardware. Software is a fundamental to make the innate power of the hardware available to the user. Software can be defined as “A Program or set of programs to perform a task using the capabilities of the Hardware”.

3.2.1. TYPES OF SOFTWARE

There are mainly two classes of software

- (i) Application software and
- (ii) Systems software.

Application software is designed to perform tasks for specified areas. These includes number of programs along with operating instructions, documentation etc., Examples are the Payroll packages, word processor packages, database management systems, and so on.

System software is the program that control the way the computer operates. These include the operating systems, Translators, General–purpose routines and utilities. (Operating system is the program that controls the overall performance of the computer.)

3.3. COMPUTER LANGUAGE

A language is a systematic set of rules for communicating ideas. A programming language is a language for communication between a person and a computer. The content of communication is known as a program. Programs are set of instructions which enable the computer to perform a required task. These instructions can be any of the following type:

- (i) *Input/Output Instructions* – Implement the transfer of data between peripherals and memory or between the peripherals and accumulators.
- (ii) *Arithmetic and logical instructions* – These instructions implement the arithmetic operations (Add / Subtract / multiply / Divide) and Logical operations (And / Or / Not)
- (iii) *Transfer of control or branch Instructions* – are used to transfer program control. These will only occur on the result of a test or sequence of tests.
- (iv) Storage or retrieval instructions - are used to transfer data between accumulator and the memory. i.e., copy data from one storage location to the other

Types of Languages - There are basically 3 types of programming languages

3.3.1. MACHINE LANGUAGE

This is the language the computer directly understands. This is termed as Low-Level Language. The instructions in machine language are in the form of strings (Group) of binary numbers and are called machine instructions. A machine instruction has 2 parts First, Function code or Operation code, which specifies the functions performed and the second is the operand address, which specifies the locations of data or other instructions.

Programmers who use machine language translate instructions directly into the machine instructions. This is not only tedious, which requires remembering code numbers for the functions and keeping track of the storage locations of data and instructions, but also makes maintenance difficult.

3.3.2. ASSEMBLY LANGUAGE

To reduce the burden of the programmer, mnemonic codes were developed. This language is termed as Middle-Level Language. These describe the machine instructions with a group of letters or symbols. For example, for addition we use ADD A B as instruction (which adds B to A and stores result in A). These instructions must be translated again in machine

language. This translation is done by assemblers. This is machine dependent language like a machine language since the features of each language depend on the particular machine on which it is being used. Examples – assembly languages used with different microprocessors like 8085, 8086, 8088, Z-80.

3.3.3. HIGH LEVEL LANGUAGE

The development of assembly language was an improvement over the machine language. However, coding in assembly language is still time consuming and it is a machine dependent. Programs written in these might have to be re-written if a different make of computer is used. These problems led to the development of third generation languages (3GL) which are usually called as High level languages, which used English-like structures in their instructions. Advantages of High level language are –

- They are easier to learn and understand as they look like English language.
- They require less time to write and are easier to maintain.
- Programs once written may be used with different machines (Computers) with little or no modifications.

Examples of some High Level Languages are-

- (1) BASIC – **B**eginners **A**ll-purpose **S**ymbolic **I**nstruction **C**ode
- (2) PASCAL – Named after the French Mathematician Blaise **Pascal**.
- (3) FORTRAN – **F**ORmula **T**RANslation.
- (4) COBOL – **C**OMmon **B**usiness **O**riented **L**anguage
- (5) C – A powerful language which is used in par with the High Level as well as Middle Level (Assembly level).

3.4. TRANSLATION AND EXECUTION

The language understood by the computer is only machine. Any program written either in assembly or High level should be translated to the machine code before processing.

A program written in an assembly or high level is called source program and the translated machine code program is called the object program.

A Translator is a program that converts one language to another language. There are 3 types of translators Assembler, Compiler and Interpreter.

3.4.1. ASSEMBLER, COMPILER, INTERPRETER

Assembler is a program that translates a source program in assembly language into its equivalent object program. All the above mentioned assembly languages use assemblers for their translation.

Compiler is a program used to translate a source program in High level language into its equivalent object program in machine language. Compiler translates the whole source program into object prior to loading into main memory for execution. Examples PASCAL, C, FORTRAN, COBOL etc.,

Interpreter is a program used to translate a source program in High level language into its equivalent object program in machine language. Interpreter translates and executes each instruction or source statement before going to the next instruction. Example: BASIC.

Comparison

	Compiler	Interpreter
1.	The source program need only be translated once unless the source program itself is modified	Program is translated every time the program is executed.
2.	They require some time before an executable program is developed.	They can execute the program immediately
3.	Compiler software's are mostly used ones	Interpreters are seldom used only with the basic languages and some packages

Besides producing the object program, Translator detects and indicates invalid source language instructions. The program is created and processed by the computer in 4 stages

First stage – Program is written by the programmer with the help of Editor (Editor is a software which provides the programmer a page on the screen where he can type or enter his program code)

Second stage – Compiling or interpreting the source program into object program.

Third stage - The object program is loaded into main storage by the Loader (Loader is a software which prepares object program for the next stage, where the separate program units (if exist) are linked together to form a complete executable program.)

Fourth stage – consists of execution where the coded Instructions (Machine code) are performed and the results of compilation are available.

The time during which the compiler compiles the source program is known as *compile time*. The time during which the object program is executing is known as *run time*.

3.5. OPERATING SYSTEM

3.5.1. INTRODUCTION

The operating system is the most important computer software. An operating system is a set of programs that controls the overall operation of the computer. It directs all processing activities within the computer, calling in other systems software when needed, scheduling jobs, and allocating storage facilities, activating input and output devices and many other tasks to ensure the proper and efficient use of hardware by application programs. The operating system sits between the hardware and the other software. This view is shown in figure below.



That part of an operating system which controls the activities and operations of the other components of the operating system are called executive (or supervisor or kernel). On small microcomputers the kernel is normally called a monitor which is stored permanently in

ROM and starts execution as the computer is turned on. On most other modern computers the supervisor or monitor is loaded into main storage usually from a disk by booting up the system.

Types of operating system

Operating systems can be divided into different classes.

a) *Single user operating system*

Normally allows only one user to access the system at a time. Operating system of this type is used by many microprocessor systems. Examples of single user operating system include MSDOS (Micro Soft Disk Operating System) produced by Microsoft.

Advantage

Since only one user process is being executed at any time all the resources are available to the process. So its execution speed is good.

Disadvantage

A number of resources are present in a computer system and only one of these resources being utilized by the process, all other resources remain idle. So there is a low degree of resource utilization. It is serial processing system.

b) *Batch-mode operating system*

Batch processing refers in general to a computer system in which jobs (programs + data) are entered and then run one or more at a time under the control of the operating system. Batch operating system is the oldest operating system. In this system, the operating system schedules the submitted jobs according to required resources and priority of the jobs and produces the result at some time later. A major disadvantage of batch processing is that no corrections are possible during processing. If there is any error, the programmer after obtaining the print out corrects and submits back the job for processing.

c) *Multi programming Operating System*

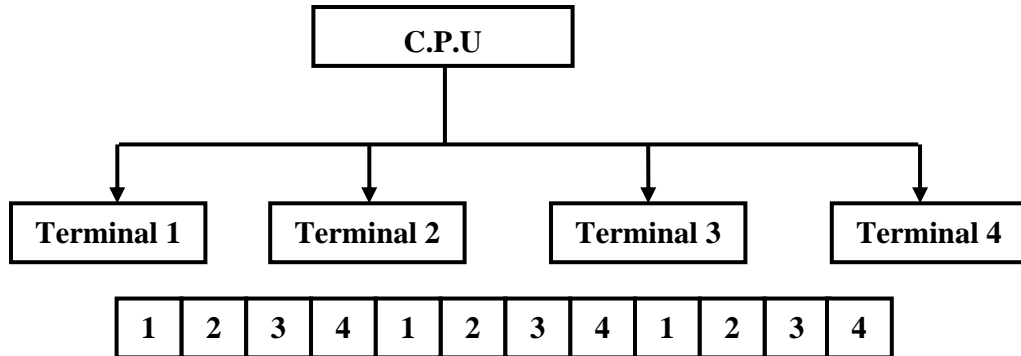
The most important aspect of the job scheduling is the ability to multiprogramming. A single user can not keep either the C.P.U or the Input, Output devices busy all times. Multiprogramming is an attempt to increase C.P.U utilization by always having something for the C.P.U. to execute. The operating system picks one of the jobs in the job pool and begins to execute it. The job may have to wait for some thing such as a tape to be mounted, a command to be typed from keyboard (or) an input, output operation to be completed. In a serial operating system the C.P.U would sit idle. In a multi programming system the C.P.U will switch to another job and executes when that first job will have finished waiting and will get back the C.P.U. As long as there is some job to execute, the C.P.U will never be idle. In multiprogramming operating system all jobs, which are ready to execute, must be kept in memory at a time. The C.P.U scheduling will decide which job is to run among the available ready jobs.

Advantages

Increased C.P.U utilization and higher total job through put (through put is the amount of work done in a time period).

d) Time-sharing operating system

When a single computer system is used by a no. of users then a time sharing operating system is advantageous. Such a system has a number of terminals i.e. key boards with visual display units attached to it (called dumb terminals), so that many users can do their work simultaneously. System allocates the C.P.U or processor to each terminal in rotation. If system has N terminals then C.P.U time is divided into N equal time slots one for each terminal.



Each user of a time-sharing system thinks that the computer is dedicated to his task (process) only. This is accomplished by the operating system scheduling each user for a small time slice on the CPU and then proceeds to devote its momentary attention to the next user. When the final user has completed his time slice, the operating system returns to the first user and repeats the sequence again. UNIX is the most popular Time-sharing operating system.

Advantages

Many users can work on the system simultaneously with out having to wait for the system to become free.

The difference between time sharing and multiprogramming

Multiprogramming	Time-sharing
All processes that are to be executed should be available in the memory	No need to all processes that are to be executed available in main memory
CPU is switched to another job so that the CPU will not be idle	CPU will share the time between the users so that it will not be idle
As long as there is some job to execute the CPU will never be idle	As long as there is some user using the CPU will never be idle
CPU scheduling will decide which job to run among the available ready jobs	CPU scheduling will decide which job to run among the available ready jobs

e) Real-Time operating system

This system is capable of processing data so quickly that the results are available to influence the activity currently taking place. Examples include seat reservations for Airplane, Trains and Buses. An operating system for such a system is called Real-Time. Its primary characteristic is that it responds to an event within a well-defined time. Consider the reservation itself once a seat is reserved by the customer the operating system should update and give the decreased number of seats in the plane immediately so that the next customer will know the status of the availability of seats.

Self Check 3.2

1. From the following one is not a computer programming language.

a. Ms – window	c. Assembly language
b. Machine language	d. High-level language
2. _____ is program used to translate a source program in high level language into its equivalent object program in machine language.

a. Compiler	c. Interpreter
b. Assembler	d. Complimentor
3. A program that translates a source program in assembly language into its equivalent object program is called _____.

a. Interpreter	c. Compiler
b. Converter	d. Assembler
4. From the following one is different from the others.

a. PASCAL	c. COBOL
b. Windows	d. C
5. Which one of the following is not a class of an operating system?
 - a. Single user operating system
 - b. Batch-mode operating system
 - c. Time-sharing operating system
 - d. Multi programming Operating System
 - e. None

3.5.2. WINDOWS

Windows is a single user, multi-tasking operating system. The window operating system provide graphical user interface. The latest version of windows is windows 2006. Earlier versions were: windows 2000, windows 98, windows 95, etc.

Components of windows interface

Windows use the following elements in communicating with the user

1. **Desktop**:-when you start windows, the large area you see is called the desktop on which icons, windows and application are displayed.
2. **Icon**: - are small pictures which are used to represent or identify certain function or perform (application) on the screen.
3. **Mouse**: - is a device used to speed and ease work on windows.
4. **Taskbar**: - is a bar located at the bottom of the desktop which contains start button, any opened application, the time, etc.

5. **Start button:** - displays a menu with which you can start program or open a document file.
6. **Menu:** - list of commands and options.
7. **Window:** - is a rectangular area of the screen through which you can see application.

Using the mouse

A mouse is a pointing device that is used in windows environment. The pointer that moves on the surface of the screen as the mouse is moved is called the mouse pointer. There are usually two buttons- the right and left buttons and the middle rotating structure is used to move the scroll bar up and down.

Techniques of the Mouse

1. **Pointing:** - is positioning or moving the mouse cursor over icons.
2. **Left click:** - is pointing the mouse pointer on an icon or button, press and realize the left button once.
3. **Right click:** - is pointing the mouse pointer on icon, button, or any part of the window screen press and release the right button once.
4. **Double click:** - is pointing the mouse pointer on an icon and press the left button twice in rapid succession and release.
5. **Dragging:** - is pointing the mouse cursor and m on any icon or bar press and hold the left button of the mouse and moving the cursor to somewhere else on the screen. This takes the icon or window to the destination of the cursor.

Different shapes of the Mouse pointer (cursor)

The shape of the mouse pointer changes to indicate different things.

1. **Hour glass:** - the mouse cursor changes to this shape indicating the computer is busy. So wait until it finishes.
2. **I- bar:** - the mouse cursor indicates that text editing can now be performed or text editing program has been started.
3. **Resizing:** - in this case the mouse pointer changes to double arrow (two headed arrow) and used to resize a window.

The start menu

The bar we see at the bottom of the screen is called the task bar. It is a bar that contains the start button which you can use to start program.

1. Click the start button.
2. Point the mouse pointer to the program.
3. Select and click on a program list you want.

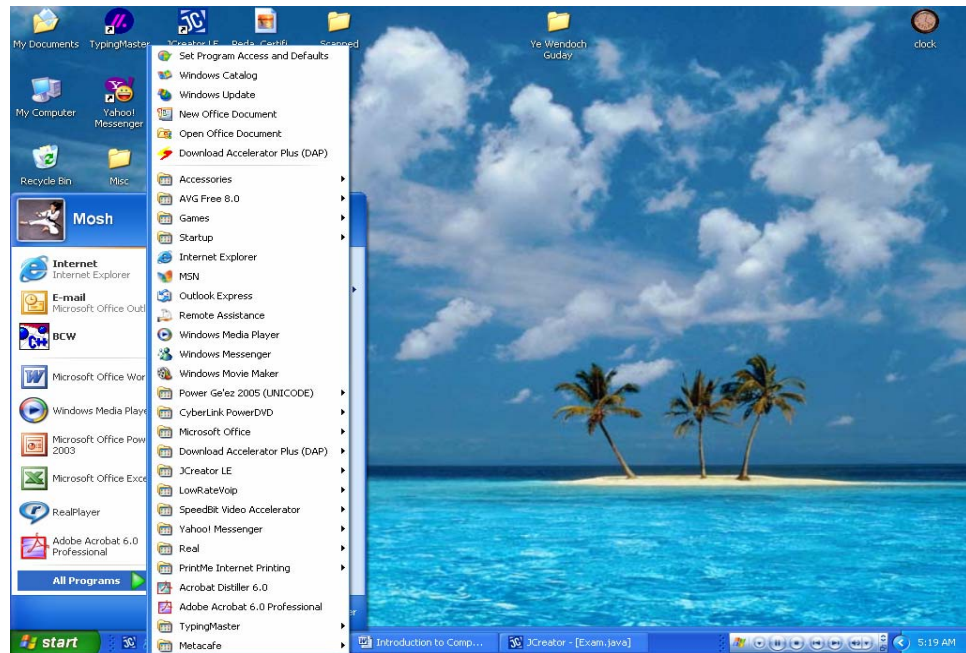


Figure 3.1 The start menu

Functions of each item:

Program- display a list of programs you start

Documents – displays a list of documents that you created previously.

Settings—Displays a list of system components for which you can change settings.

Search (finds):- enables you to find a folder, file, shared or neighbor computer or mail message.

Run—starts a program or opens a folder when you type the name of the program and the path where the program is located.

Shut down__ shut down or restarts your computer or logs you off.

Working in Windows Environment

When you switch-on your computer, windows will load itself into the RAM (computer's temporary memory).

Desktop: - is the first window screen that you see when you see when you switch-on your computer. A desk top: - is a computer screen in windows environment.

Window: - is a rectangular area on your desk top screen when you run a program, open files, type text, draw pictures, and view contents of a folder.

Elements of Windows

1. **Title bar:** - contains the window name, control menu button, minimize button, maximize button, restore button and close button.
2. **Menu bar:** - contains menu with related commands and options that enable you control the window and its contents. E.g. file, edit, view, insert.

3. **Control menu button:** - it is found at the top corner of the window left contain commands that help you manage the window itself.
4. **Tool bar:** - Contain graphical tool buttons that represent shortcut icons for frequently used commands.
E.g. *The standard toolbar:* - *this* is a bar that holds short cut for frequently used commands.

Formatting toolbar: - this is a bar that contains shortcut icons for changing the appearance of a document.

5. **Minimize button:** - It minimize and hides the window in the task bar.
 6. **Maximize button:** - enables us to maximize a window.
 7. **Restore button:** - decreases the size of a window.
 8. **Close button:** - helps to exit or close the opened window.
 9. **Status bar:** - is a located at the bottom of the window and shows the present status of the window.
 10. **Scroll bar:** - These are vertical and horizontal bars used to show the hidden files.
- ❖ *The elements of window will be discussed graphically in MS- word section.*

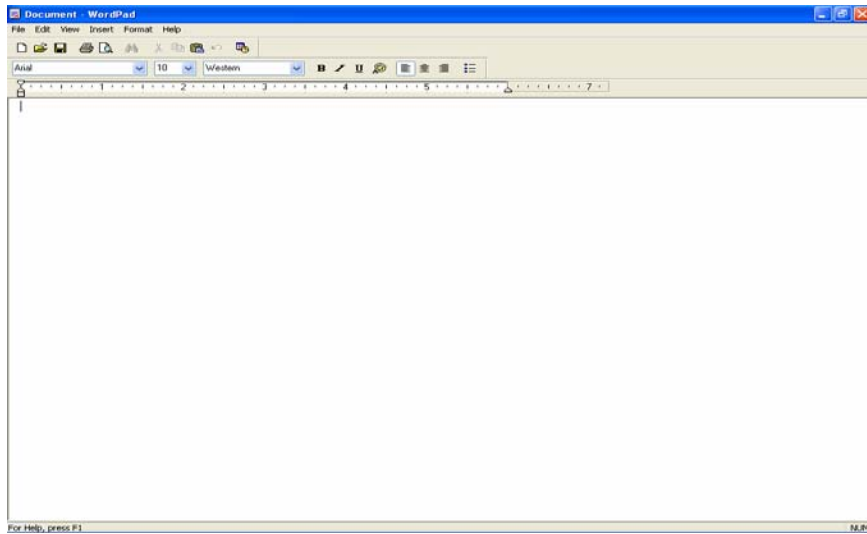


Figure 3.2 The Word pad window

Scrolling window

To scroll a window in a small increment, click on its up, down, left or right scroll arrows. To scroll quickly to a desired location, drag its scroll box.

Using my computer to view folders and files

My computer is used to view your computers content and manage your files.

Steps to view disk folders and files using my computer icons:

1. Double click my computer icon on the desk top.
2. Double click the desired disk drive icon.
3. Double click the folder icon until you get the desired file icon.

Tip: - by right-clicking on the C: drive and by choosing properties you can see the available disk space of the hard disk (C :)

Shutting down my your computer

1. Close all opened windows using close button.
2. Click on start button and click on the shut down command at the bottom of the start menu. A dialog box appears.

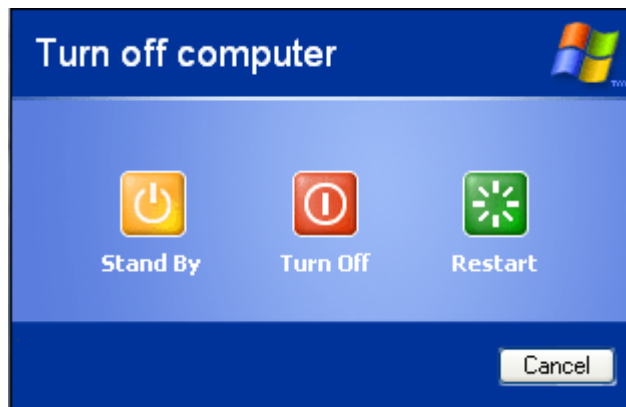


Figure 3.3. The shut down dialog box

Click on OK button on the dialog box

3. Wait until the message “POWER SAVING” disappears, then put off only the monitor. Do not touch the system unit.

Running Application

Most of us work in more than one application at a time. One of the advantages of windows-2000 is that it enables us to start and run multiple applications at the same time. The capability to switch between applications increases productivity and facilities in the sharing of information between applications.

Starting Applications

To start application:

1. Click on the start button. This opens the start menu. A right pointing triangle to the right of **programs Documents, setting, and search** indicate that another menu will open when you select that item.
2. Move the mouse pointer up the menu to highlight **programs**. Moving the mouse pointer moves a selection bar through the options on the start menu. When you highlight programs, a list of program folders and shortcuts appear.
3. Move the mouse pointer to the right to place the selection bar on **Accessories** program folder. Moving a selection bar to a program folder opens a pop-up list of its contents. When you select *Accessories*, a list of programs folders and short-cuts under accessories will appear.

4. Move the mouse pointer to the paint option; then click the left mouse button. This starts the paint program which opens a window on the desktop. A button for the paint program appears on the taskbar (in short, *start->programs->Accessories->paint*).

5. Repeat the above procedure i.e.

Start->programs->Accessories, and click on word pad this opens a word pad window in front of the paint window on the desktop. A button for the word pad program appears on the taskbar. Now we opened two windows--- paint and word pad.

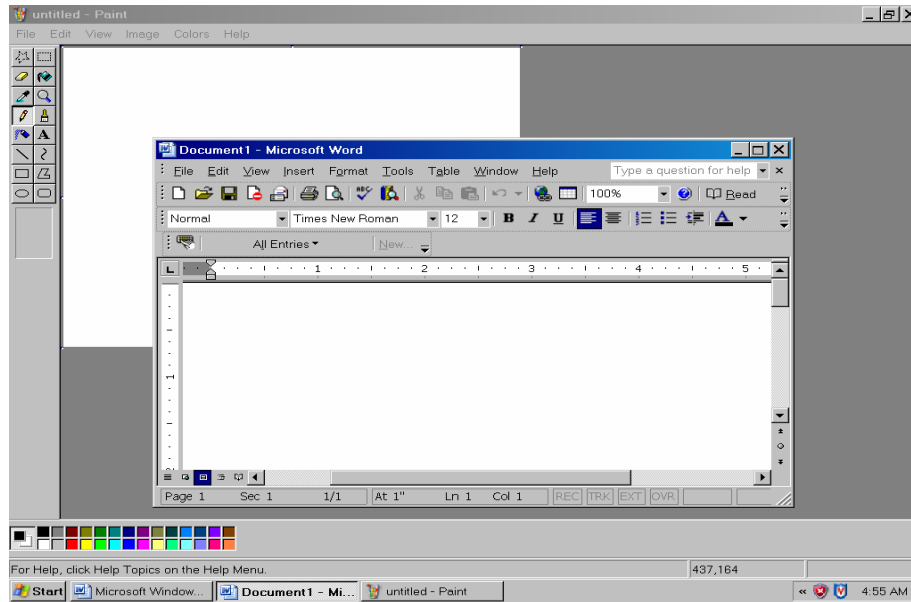


Figure 3.4 Word pad and Paint windows

Switching between applications

Windows-2000 makes it very easy to switch between opened applications. There are several methods to switch between windows. The fastest way is to click on the program button on the task bar. Now let's see some of the other methods to switch between windows:

1. Click on the paint button on the task bar at the bottom of the window. This brings the paint window on the top of the word pad window. The paint window is now the 'active' window. Notice that the title bar of the word pad window is gray i.e. it is inactive window. The title bar of the active window is blue.
2. Click on the word pad button on the task bar. This brings the word pad window in front of the paint window. Press **Alt + Esc** tighter. This helps to alternate between the two windows. These keyboard shortcuts cycle through the open application windows one by one. The active window moves to the front its title bar becoming *blue*.
3. Press and hold down **Alt** key and press the **Tab** key (**Alt + Tab**). This opens a small window in the middle of the screen. Icons for the application are shown; the active application's icon has a blue box around it. The window displays the name of the open (active) application.

4. While still holding **Alt**, press **Tab** a couple of times. This moves the blue box from icon to icon. When the box encloses the icon for the program you want, release **Alt**.
5. When the word pad icon is selected, release Alt key.
6. Click any part of the paint window to switch to it.

Arranging application windows

Changing the size and position of a window enables us to see more than one application window, which makes copying and pasting data between programs much easier. You can also moving application windows; you can arrange your work on the windows desktop just as you arrange papers on your desk.

To size and move window manually

1. Move the mouse pointer to the border to the left side of the word pad window. When the mouse pointer is correctly positioned, it changes to a two headed arrow. The two-headed arrow indicates the direction to which you can size a window. If you start on a top or bottom border, you can size the window up or down. This is done as follows;
 - ❖ *When the mouse pointer change two-headed arrow, press and hold the left mouse button and drag to the direction the arrow indicates.*
2. Move the two-headed arrow to the left to make the window wider. When you drag a window border, an outline of border appears as a guide so that you can see how large or small the window will be when you release the mouse button.
3. Move the two-headed mouse pointer to the right and then release the mouse button. This action makes the window smaller. When you release the mouse button, the window resize to a new dimension.
4. Place the mouse pointer to the upper left corner of the window. The mouse pointer will change to a diagonal two-headed arrow.
5. Drag the mouse pointer up and to the left to expand the window; then release the mouse button. When you drag a window corner, you can change the size of the two sides at the same time. In this case both the top and left sides of the window move together.
 - ❖ *Dragging the diagonal two-headed arrow in the window in the window shrinks the window.*
6. Move the mouse pointer to the word pad title bar press the left mouse button, hold and drag. This move the window to any place on the desktop.
7. Click and drag the title bar (The blue bar at the top of the word pad window) to move the window to the upper left corner of the desktop. This action moves the word pad window to the upper left corner of the desktop. When you move a window an outline of the entire window appears so you can see where the window will be positioned when you release the mouse button.
8. Release the mouse button. This “drops” the window in the next location. Although these methods give you more flexibility, the task bar menu has three commands that will arrange your application windows for you. Next you learn how to use these commands to arrange your application windows.

To arrange windows automatically

1. Point to a blank space on the task bar. Make sure that the mouse pointer doesn't change its shape.
2. Click the right mouse button. This opens a taskbar context menu. If you point to the clock, our context menu also has an option for adjusting the date and time on it.
3. Choose **cascade**. The cascade command displays all open application windows with the title bars cascading downward.

One application window is on top; the others hidden behind. You can identify each window by its title bar. To switch back and forth, between the application windows, just click any where in the window (in the bar, document window, or scroll bar).

4. Right click a blank space on the task bar. Choose *Tilt Horizontally*. This application window divides the desk top evenly among the open programs and the sizes the windows to fit one above the other, because two applications are open, each application window takes up half of the space on the desk top.
5. Right click a blank space on the task bar and choose *tile vertically*. This arranges the window side by side and makes it easy to see information in several programs at once. This allows copying information between programs. The tile vertically option is popular. Leave the windows arranged as they are now for the next lesson.

Maximizing, minimizing and restoring a window

When you minimize an application window, it shrinks the window to a button in the task bar. Even though you can't see the window anymore, the application system loaded in the computer's memory, Minimize an application instead of the closing means you don't have to reload program to use again.

Minimize windows is like putting documents you want to use later in a folder off to the side of your desk. When you need the documents you open the folder instead of searching through you file cabinet again.

You can also maximize a window so it fills the entire screen. If you want to see the largest area of the document (e.g. spreadsheet, letter, or drawing), you might have noticed in the earlier lessons that the paint and word pad windows do not take up the entire screen. You can't maximize both of these windows at the same time.

To Maximize, minimize and restore window

1. Click the word pad title bar. This selects the word pad window. Click on the **maximize** button () at the upper right corner of the window (the middle one). This expands the word pad to a full screen size completely covering the desktop. At this time the maximize button turns to a restore button which has two stacked small windows on it. Notice that maximizing a window still leaves a room for the task bar.
2. Click on **restore** button () in the word pad window. This restores the previous size of the window i.e. the size before you maximized it.

Restoring full-screen program down to windows lets you see (and work with) more than one program at a time.

3. Click **minimize** button () in the word pad window. This shrinks the word pad window to a word pad button on the taskbar. Window use special effort to illustrate

graphically the shrinkage or expanding of window when a window is minimized or maximized.

Even though you can no longer see the word pad window, the program is still running. You should always click the task bar button to re-open an application window, don't start a second copy of the program.

4. Click on the word pad button on the taskbar. This opens the word pad window. Notice that the window automatically returns to the state it was in when you minimize it.
5. Click the maximize button in the paint window, this maximizes the window to a full-screen size. Then restore it and practice this again and again.
6. Resize and move the word pad and paint windows back to their original position before you used the tile command.

Managing Files

Windows Explorer

You can use windows explorer to see all the folders and files on your computer. In windows explorer you can see both the hierarchy of folders on your computer and all the files and folders in each selected folder. This is especially useful for copying and moving files. Moreover it is useful to view, create and delete files and folders.

Methods to start windows Explorer

There are two methods to start window:

I. Click on start button and point to

Programs→ accessories→ windows explorer. OR

II. Right-click on start button and select **Explore**. This opens explorer window.

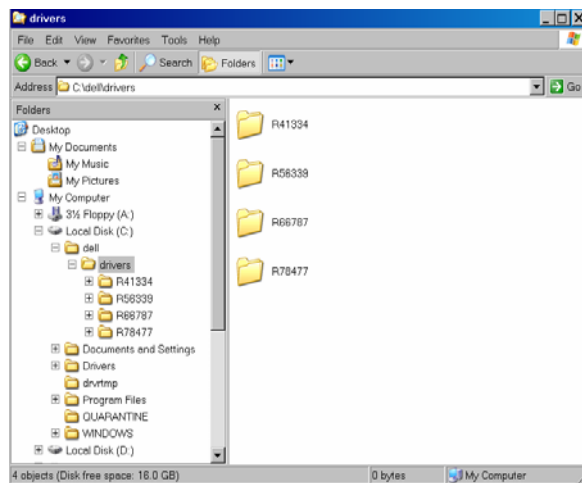


Figure 3.5. The windows explorer

Window explorer has two parts:

- Tree pane – the left part of the window explorer.
- Content pane- the right side of window explorer.

Creating Folder

Steps:

1. Select drivers or folders.
2. Click on file menu.
3. Point on new.
4. Click on folder from submenu.
5. Type the name of the new folder.
6. Press enter key twice.

OR right click inside the content pane. Then new → folder.

Then write something on word pad window and save under your new folder.

Copying and Moving a Folder or Files

Copy: - is simply duplicating files.

Cut: - move a folder/file and place it in a new location and remove the original file or folder from the old location.

There are seven methods to copy and move a file or folder

Method -1: Using menu bar:

1. Select the folder to be copied or moved.
2. Click on **edit** on menu bar and select **copy** from the drop down menu.
3. Select the destination folder and click on edit and then **paste**.

Method -2: Using drag and drop:

1. Select the folder or file to be cut or copied. Click and drag it to the destination folder.
2. Press **ctrl** to copy and press shift key to move.

Method -3: Using right drag:

1. Select the folder/file to be cut or copied.
2. Right drag to the destination.
3. Select copy-here to copy and cut-here to cut.

Method -4: Using right click:

1. Select the file /folder to copied or cut.
2. Right-click on the selected file/folder.
3. Select or click copy or cut.
4. Right click on the destination folder/file and select paste.

Method-5: Using keyboard:

1. Select the file/folder to be copied or move.
2. Press ctrl + C to copy and press ctrl +X to cut.
3. Select the destination folder and ctrl + V to paste.

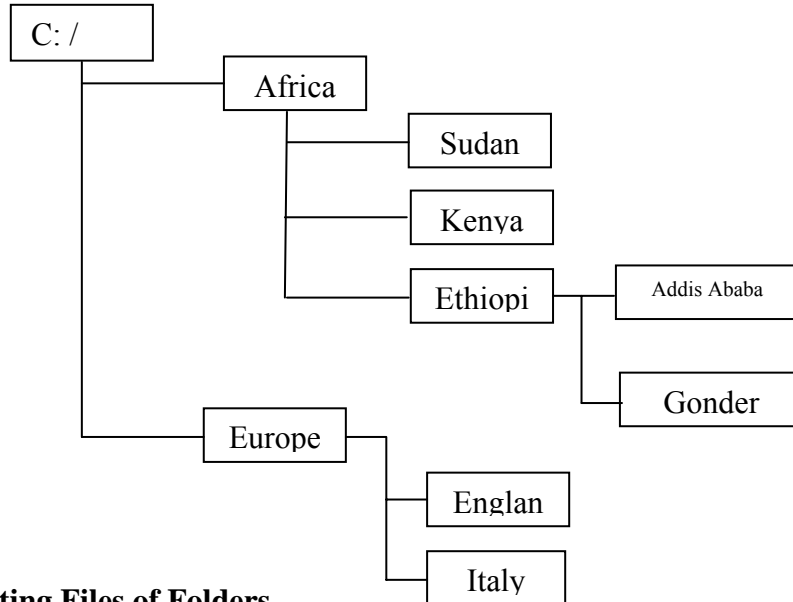
Method-6: Copying file/folder to a floppy disk

1. Insert the floppy disk in the floppy disk driver.
2. In the windows explorer, select the file/folder you want to copy.
3. On the file menu, point to send to and then click the floppy disk.

E.g.

1. Create the following under drive C:

2. Open the word pad and write few sentences about your self and save it under Gonder directory by the file name personal.txt.
i.e.: \A word\Africa\Ethiopia\Gonder\personal.txt.
3. Copy the file personal.txt to the directory Italy and to Sudan directory.
4. Move the file personal.txt from Italy directory to Kenya directory.



Deleting Files of Folders

We have two methods to delete a file/folder.

Method 1: Using standard tool bar

1. Select the file/folder to be deleted.
2. Click on delete button.
3. Click on yes button.

Method 2: Using menu bar

1. Select the file/folder to be deleted.

Method 3: Using key board:

1. Select the file/folder to be deleted.
 2. Press delete key on the key board.
- ❖ A dialog box to confirm will be displayed.

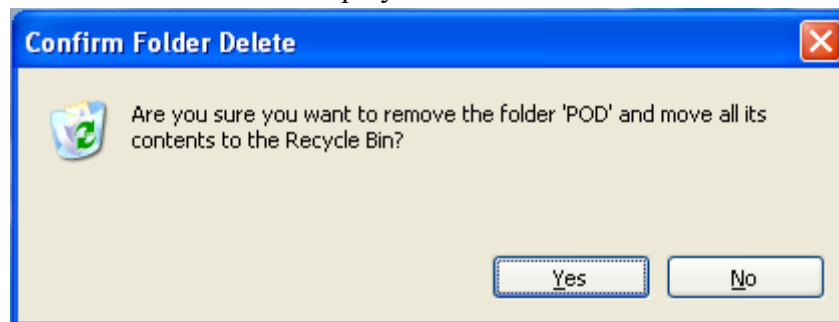


Figure 3.6. Confirm dialog box.

3. Click yes button.

Recovering Deleted Files

You May delete file and then realize later that you really need it. In some case you can do the **undo delete** command to recover a file. However, if you have formed another file action such as renaming or moving a file, the undo delete command is no longer available. The undo commands reverse only the last action taken on a file.

When this happens, you can recover the deleted file from the recycle bin. The recycle bin is a holding area for files you deleted from the hard drive. When you delete a file, windows move the file to the recycle bin. So the file is not actually deleted from the hard drive until you clean the recycle bin.

Steps to recover a deleted file

1. Double-click the recycle bin icon on the desk top.
2. Click on the file you want to restore.
3. On the file menu, click restores.

To empty the recycle bin

Emptying the recycle bin increase the free space of your hard disk. The steps are:-

1. Double-click the recycle bin on the desk top.
2. On the file menu, click empty recycle bin.

Note: - if you delete a file at the command prompt or from a floppy disk, it doesn't go the recycle bin.

Renaming a folder or a file

There two methods to rename a folder or a file

I. Using menu bar

1. Select the folder to rename
2. From the file menu click on rename.
 - The old name will be enclosed in a blue box.
3. Write the new name and then press **Enter** key.

II. Using a right click

1. Right-click on the file to be renamed.
2. Choose rename command.
3. Write the new name and then press **Enter** key.

Formatting a Disk

1. Insert your floppy diskette in the drive.
2. Double click my computer icon on the desk top.
3. Click the icon of floppy diskette. i.e. floppy A
4. On the file menu click format command.
 - The format dialog box appears.
5. Choose format type.
 - **Quick:** - Use this for a disk that has been already formatted.
 - **Full:** - Use this for new unformatted disk or for a disk with errors.
6. Click start on the dialog box. Wait until you see results on the dialog box and then close.

Note: - 1. Formatting a disk removes all information from the disk.
2. You can't format a disk if there are files open on that disk.

Finding Files or Folders

When you are looking for a particular folder or file, you can use the find or search command on the start menu instead of opening numerous folders to find it. The Find/Search command let's you quickly search a specific file or folder from your entire computer.

Steps to find /search a folder

1. Click the start button point and click to find /search. the find dialog box appears
2. In the name text box, type\ Wright the name of the folder\file you want to find.
3. Click the look- in down arrow or click brose to specify where to search.
4. Click finds now\search now. After a moment the result of the search appears

You can also use windows explorer to find a folder\file using the following procedure

1. Click star→ program →widows explorer. If it is available in your computer. Otherwise ,right click start and select explorer
2. From the menu bar, select tools point to find\search and click files or folders
 - The find\search dialog box appears. Then follow the same procedure as stated above.

Using Help

Online help is essential to learn and use windows. There are two kinds of help.

- Help about a specific procedure and
- Help that give you information about what you see on your screen

To get help, click on start button and click help. The list of help topic appears. You can then search for specific help using contents, index or find tabs. When you open help using a start menu, you see help windows for in general

If you see the help menu in a program, such a word pad, paint, ms-word... the help you get is specific for that program.

Steps to find help

If you don't know how to do something, you can look it up in help. The steps are

1. Click start button and click help
2. Click the contents tab to brose through topic by category. Click the index tab to see a list of index entities, either type the word you are looking for or scroll through the list. Click search\ find tab to search for words or phrase that may be contented in the help topic.

Customizing Windows

One of the advantages of working in the windows -2000 is that you can customize many areas of the program to meet your needs. Some of the changes you can make are purely aesthetic, but others can help you improve your productivity. This session focuses on the areas most often customized.

You learn how to change the screen saver, wallpaper and pattern for the desktop. You also learn how to reset the system clock and how to fine- tune the mouse setting.

Changing the Screen saver

A screen saver is a utility program that changes the screen display to prevent your computer from being damaged by images that are continually displayed.

On screen when your computer remains idle for a period of time, some thing appears on the screen.

To change a screen saver

1. Right click on the empty space of the desk top and chose properties. This displays the 'properties' dialog box.

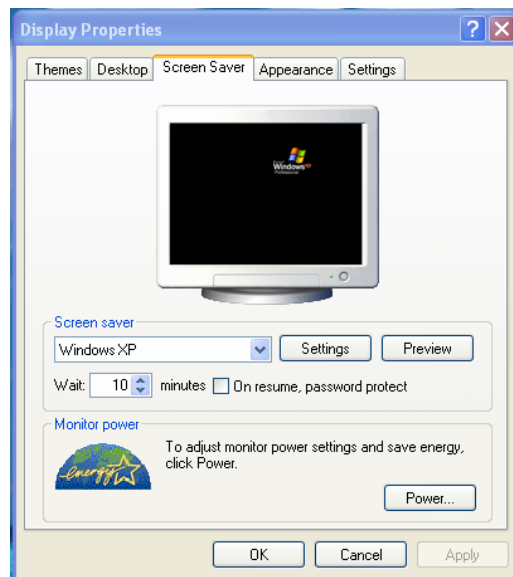


Figure 3.7. The display properties dialogs box

The four tabs at the top of the dialog box identify the difference pages in the dialog box

2. Click the screen saver tab. This makes the **screen saver** page move to the front.
3. Click the **screen saver** drop down list arrow. This opens a list of screen saver that come with window-2000.
4. Choose one from the list. The screen saver list box now displaces the selected screen saver the sample screen shows you how the selected screen saver is currently set up. You can change the setting and the color to suit you.
5. Click the up or downs scroll arrow button in the **wait** box to choose the minutes. This is the delay time i.e. the amount of time the keyboard or the mouse has to be ideal before the screen comes on.
6. Choose **settings**. This opens the option for the selected text (if 3, D text) type your own short message now.
7. Select the text in the '**text**' text box and type the message you want. The message will scroll across your screen while you are away from your computer.

8. Choose **ok** this saves your change and takes you back to the display properties dialog box. The sample screen now shows your message scrolling across the desktop.
9. Click the previous button. This activates the screen saver so that you can see how it works. Click any key to return the display dialog box.
10. Finally click *Apply* and then *ok*.

Customizing the Desktop

If you don't like the solid color on your desktop when you open window-2000, you can customize the appearance of the desktop by changing the pattern or wallpaper, using a graphic or a picture as the windows desktop is a nice personal touch.

Furthermore windows-2000 comes with a collection of graphics for the desktop.

To customize the desktop

1. In the display properties dialog box, click the background tab. This tab switches to the background page. This is the page you see first when you open this dialog box.
2. Scroll through the pattern list and choose the paradise. The sample screen will show what this pattern will look like on your desktop.
3. Make sure that (None) appears in the Wallpaper list box. If you have wallpaper options do not take up the entire desktop, so they can have a pattern behind them.
4. Choose Apply. This changes the background pattern so you can see what it will look like without choosing the dialog box first. Another way to customize the appearance of your desktop background is to add wallpaper to it or change the wallpaper currently displayed.
5. In the Pattern list box choose none. This gives you a 'clean state' to work with so you can see how the wallpaper alone will look on the desktop.
6. Choose blue lace 16 in the wallpaper list box. The sample screen shows a rough approximation of how this wallpaper will look on your desktop.
7. Click Title in picture display option button. This tiles the pattern across the screen so that it fills the screen completely.
8. Choose Apply. This titles the wallpaper across the desktop so that you can see if you like the new wallpaper.

Resetting the Desktop

Your computer's internal clock keeps track of the date and time, which are then recorded with every file you save. In folder windows, you can see the date and time a file was saved. You can insert the date in the header or footer of a document.

The current time is displayed at the right corner of the task bar. Obviously it is important that the date and time are correct.

1. Click start and choose setting and then click control panel.
2. Double click the Date/Time icon in the control panel window. Or right-click on the click (time) icon on the task bar. The date and time page of the Date/Time properties dialog box appears.

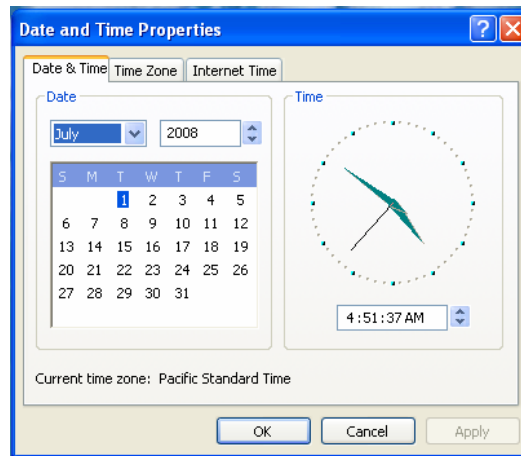


Figure 3.8 The date and time dialog box.

The left side of the dialog box shows you a calendar with the current date selected. The right side has both analog and digital indicator of the current time.

3. Click the drop down list arrow next to the current the current month; then choose February for instance. These changes the current month to February.
4. Click the up scroll arrow next to current year to choose 2004, for example.
5. In the monthly calendar click number 1 for example. This change the day to Sunday the first of February. Now reset the system time back.
6. Double click the hour and type 1, for instance. This sets the current hour to 1 o'clock.
7. Double click the minute and type 50 for instance. The current time will set to 1:50. If you want you can also set the second on the clock, but it isn't necessary.

You can change the AM/PM setting if necessary, by double clicking AM/PM (whatever is currently displayed), then clicking the up or down scroll arrow.

8. Change the date and time back to the correct setting. This gives you a chance to practice the skill you learned in this lesson as you reset the time.
9. Click on the **apply** button and click **ok**. This closes the date/time property dialog box and save your change.

Then leave (close) the control panel window and open for the next lesson in which you learn about the mouse setting.

Changing the Mouse Setting

You can change the mouse setting to make your mouse easier to work with. For instance, you can modify the double click speed so windows 2000 recognize your double clicks. If your computer recognizes your double click, your double click as to single clicks, you can change the speed of the clicks so it recognizes them as double clicks. If you are left handed you might want to change your primary mouse button to make it easier to use.

To change mouse settings

1. In control panel window double click the mouse icon. This brings the mouse properties dialog box.
2. Click and drag the slider on the **double click speed** bar to the left. This action shows down the double click speed. In other words, you don't have to double click as quickly to have windows 2000 distinguish a double click from to single clicks.

- Click and drag the slider on the **double click speed** bar to the left. This action shows down the double click speed. In other words, you don't have to double click as quickly to have windows 2000 distinguish a double click from to single clicks.

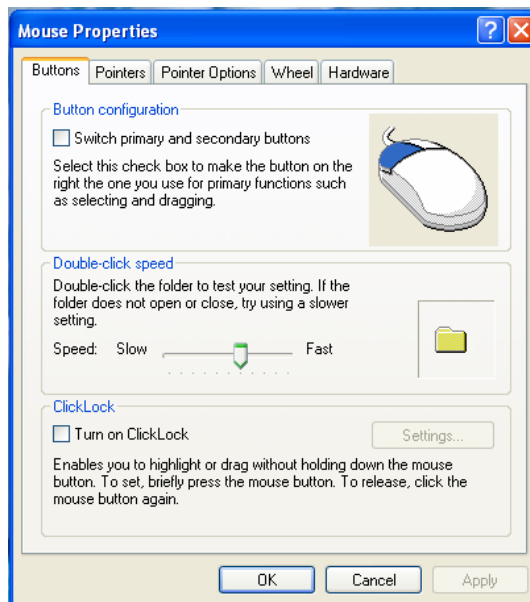


Figure 3.9 The mouse properties dialog box.

- Double click the **taste area** box. You can taste the new speed in the box. If you double click at the correct speed, the jack-in –the box comes in and out of the box. Continue adjusting the double click speed until you are satisfied with the response
- Click the **left-hand** option button. This swaps the left and right mouse buttons so that a left handed person can use the right button as a primaries button. Notice that the sample mouse shows that the buttons are swapped. For now, swapped the buttons back to original position.
- Click **right-handed** option button and choose **ok**. This closes the mouse-properties dialog box and saves this settings finally close the control panel window.

Printing a File

For windows 2000 applications, the steps for printing a document are similar. Also the exact steps to follow might varies slightly, depending on which software package you are using, learning to print in one application make it easy for to print in another in this lesson you print a file from the word pad application.

To print a file

- Use the start button to open the *word pad* application.
- Wright one sentence on the *word pad*.
- Choose *file* menu and then *print* command. This brings the **print** dialog box. The name of the default printer-the printer to which windows automatically print is displayed in the print dialog box. Choosing ok at this point sends the entire document to the print queue. This allows you continue working while your file is bing printed. Take a look at the other options available the print dialog box now.

4. Click the name drop-down list arrow. This brings a list of printers that have being installed in windows appears. To switch to a different printer, click the printer name in the list.
5. Click the **name** drop- down list arrow again clicking this drop-down arrow again closes the list of printers with out selecting a different printer.
6. Click the properties button. The properties dialog box for the default printer appears.
7. Click in the legal icon in the paper size window. The legal page is now highlighted Notice that several page size and several envelope sizes are available.
8. Click the letter page in the paper size window. You need to change the page size back to letter: - other wise your document will print as if you had legal paper in your printer.
9. Choose ok. This returns you to the printer dialog box. As previously mentioned, choosing ok in the print dialog box sends the entire document to the print queue.
10. Choose cancel. This closes the print dialog box with out sending a document to the printer. This lesson is just for practice, so it isn't necessary to actually print a document.

Self Check 3.3

1. _____ is located at the bottom of the window and shows the present status of the window.
 - a. Taskbar
 - b. Title bar
 - c. Status bar
 - d. Tool bar
2. _____ is the mouse cursor indicating the computer is busy.
 - a. Resizing
 - b. I- bar
 - c. Hour glass
 - d. None
3. Which of the following window components used to minimize the size of the window?
 - a. Minimize button
 - b. Restore button
 - c. Maximize button
 - d. Close button
4. To shut down your computer properly which button you going to use?
 - a. Log Off button
 - b. Turn Off button
 - c. Stand by button
 - d. Restart button
5. Which action you perform to open folders?
 - a. Click the folders twice
 - b. Double Click the folders
 - c. Right click the folder and select open button
 - d. All except A.
6. Among the following options which is used to move a folder/file and place it in a new location and remove the original file or folder from the old location.
 - a. Copy/Paste
 - b. Paste
 - c. Cut/Paste
 - d. Delete
7. Which of following used to copy and move a file or folder?
 - A. Using drag and drop
 - B. Right click the folder and select copy option.
 - C. Right click the folder and select send to different option.
 - D. ALL

UNIT SUMMARY

In this unit you learned about the computer system in brief. The computer system is basically divided into two: the hardware and the software. The hardware is the physical device and the software is the set of instructions that tell the computer what to do. The hardware again has four components. These are the input device, the output devices, the central processing unit and the storage device that in turn can be grouped into primary and secondary storage.

There are two types of software: system software and application software. System software consists of programs that are used to manage the hardware resources of a computer and perform required information processing task. Application software, on the other hand, is a set of instructions (program) that help the user to process information based on their preference.

Both systems and application software are written using computer programming languages evolved through time like evolution of computers. The first language to emerge was the machine language that uses the binary digits (1s and 0s). The machine language was followed by assembly languages and then high-level languages like FORTRAN, COBOL, BASIC, Pascal, and C emerged.

EXERCISE

1. Define the terms hardware and software.
2. What are the four major components of the computer hardware?
How are these parts related to one another?
3. Write at least three input devices and explain what they do.
4. What do you mean by the central processing unit (CPU)? What are its major components?
5. What the difference between the control unit and the arithmetic/logic unit? Which one is related to the human brain and how?
6. What are the two phases of the machine cycle? What steps are included in each phase?
7. What is the difference between ink-jet and laser-jet printer?
8. What are the two types of storage devices and how are they different from one another?
9. Explain the difference between magnetic tape and magnetic disk storage devices.
10. Explain the difference between compilers and interpreters.
11. What does systems software do? Give examples of system software.
12. What are the different types of operating system that are used on computers? Explain the difference.

Chapter Five

HOW THE INTERNET WORKS

Unit Objective

In this unit you will learn about and how the internet works. And also you will learn the services an internet provides.

After completing this unit, you should be able to:

- ⇒ **Define computer networks**
- ⇒ **Differentiate between LAN and WAN**
- ⇒ **List the different network components**
- ⇒ **Define network topology**
- ⇒ **Define DNS**
- ⇒ **Define E-mail, WWW**

5.1. NETWORKING FUNDAMENTALS

5.1.1. INTRODUCTION

You might have heard through media or otherwise that computers communicate with each other. Why should computers communicate with each other? Computers communicate with each other for the same reason that people communicate with each other, that is, for resource sharing and efficiency improvement. The communication among computers is made possible by connecting them together. An interconnected set of computers is called a *computer network* or simply a *network*. With a network you can do the following:

- perform file management tasks, share file and transfer file
- share applications
- share peripheral devices like printers, scanners, etc
- interact with other users on the network such as sending messages

In a network, computer systems that have several interconnected processors, which are physically dispersed, can operate together. Each processor can have its own local peripherals (disks, printers, terminals) in addition to any peripherals attached to some central processor. Such a system which looks a single complete system to its users is more accurately described as a distributed system. A computer that is not connected to other computers is called a *standalone system*. Figure 5.1 depicts an example of a distributed system.

In figure 5.1, sys1, sys2 ... sysN are computer systems that are located at different sites, probably within few meters apart or several thousand kilometers apart. The main computer is usually called the *host* because it serves all systems connected to it just like you serve your guest in your home

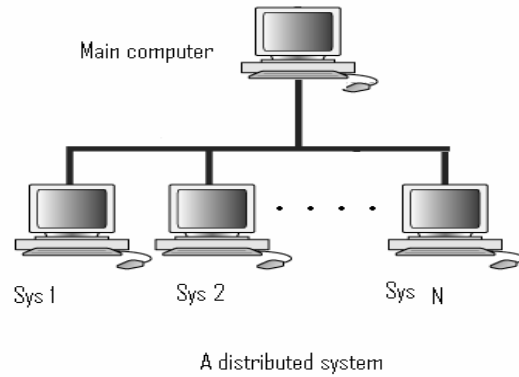


Figure 5.1 A distributed system

A distributed system offers a number of advantages which include:

- Short response time: since processing is done at the various locations, the response is much better than processing centrally and sending back the result to the various locations. Unlike a centralized system, a distributed system is not overloaded with requests from users which cause delay.
- Reduced cost: since processing is done locally, transmission costs such as leased lines, dial-up services and so are substantially reduced.
- Increase reliability: unlike in a centralized system, in a distributed system failure in one site does not disrupt the entire system.
- Resource sharing: it is possible to use resources located anywhere on the network.
- Timely communication: distributed systems permit organizations with dispersed personnel to distribute information quickly to the right people, thereby aiding decision making.

Distributed systems are not without problems too. Some of the drawbacks include the following:

- More components and dependence on communication means more points of failure.
- Data inconsistency: since data is distributed, there is an increased risk of data redundancy and therefore data inconsistency.
- It may be difficult to provide system maintenance swiftly at every distributed site.

5.1.2. Types of Computer Network

Computer networks can be roughly divided into two categories: local area network (LAN) and wide area network (WAN).

LANs are used to connect computers on the same site. LANs vary greatly in size. You can make a LAN out of two computers sitting across from each other in the same room or several computers in the same building.

WAN is used to connect computers on separate sites possibly in cities or in different countries. WANs are collection of LANs. WANs use communication links such as telephone network and satellite.

5.1.3. Network Components

A network consists of four basic components as depicted in figure 5.2.

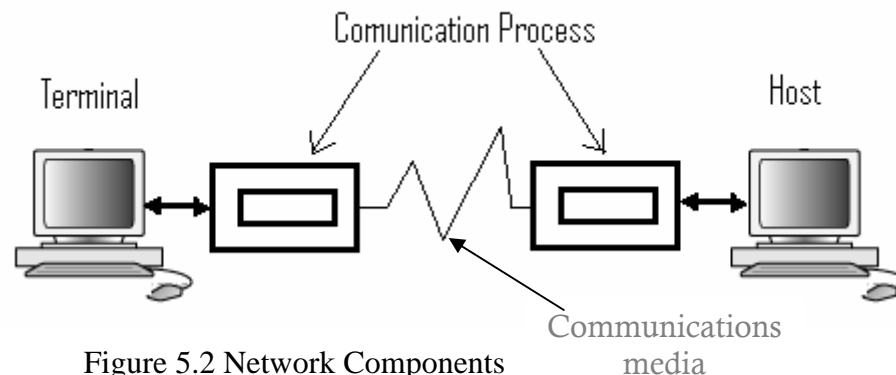


Figure 5.2 Network Components

- Terminals include video display terminals and other end user workstations.
- Communication processors are devices that enhance data transmission and reception between two points in a network. These devices include: modems, multiplexers, message switchers, terminal controllers, and front-end processors.
 - Modems are devices that convert digital signals to analog signals and vice versa.
 - Multiplexers are devices that collect messages from various terminals, put them in order, and transmit them along a broadband channel at very high speed to the host. Like modems, multiplexers are usually used in pairs so that the signals from lines that are combined at one end of the system can be demultiplexed or sorted back out at the other end of the system.
 - Message switchers are devices that receive data messages from terminals, determine their destination, and route them one at a time to the CPU. They distribute the messages coming from the CPU to the appropriate terminal.
 - Terminal controllers are devices that connect groups of terminals to a single communications channel. Unlike multiplexers, terminal controllers are not used in pairs since they communicate directly with the host.
 - Front-end processors are processors placed in front of the host computer to relieve the central computer as many of the communications tasks, leaving the host free for processing applications programs.
- Host/server is a powerful computer that typically provides other terminals or devices on the network with computing power, and application programs. The host computer also contains communications software that controls and supports communications in a network.
- Communications media are the means by which data is transmitted between the sending and receiving devices in a network. These include twisted-pair cable, coaxial cables, fiber optic cables, microwaves and radio waves.

Three terminologies: server, client/workstation and resource, do deserve explanations.

A. Server

Servers are high capacity computers that provide a link to the resources necessary to perform a task. The link could be to a resource existing on the server itself or on a client

computer. Servers can be used to distribute processes for balancing the load on the computer so as to increase the speed and performance.

Servers can be categorized by tasks they perform. For instance, servers that host file services for users are called *file servers*. Likewise, servers that provide printing services for users are called *printer servers*. Servers that provide mailing services are also called *mail servers* and so on.

Another way of categorizing servers is whether they are dedicated or non-dedicated servers. Dedicated servers provide only specific applications or services such as file servers. Non-dedicated servers can provide one or more network services and local access. A non-dedicated server can be used as a server as well as a workstation. Non-dedicated servers are more flexible than dedicated servers but have less performance than dedicated servers. Networks use a network operating system (NOS) to control the communication with resources and the flow of data across the network. Some of the popular network operating systems include Microsoft Windows NT server, UNIX and Novell Netware. The network operating system runs on a server.

B. Clients/workstations

Clients are the computers that users on a network do their work on, such as work processing and other tasks. As clients they are allowed to communicate with the servers in the network to use the resources on the network.

C. Network Resources

A network resource is anything that can be used on a network. The most important ones include.

- Files
- Printers and other devices
- Applications
- Disc storage

5.1.4. Network Resource Access Model

Generally, there are two types of network resource access model:

- Peer-to-peer network
- Server-based network

A. Peer-to-Peer model

In a peer-to-peer model, computers on the network serve as both workstations and servers. This type of resource model is good for small, simple and inexpensive networks.

B. Server-Based model

In a server-based network model, there is central computer which is in charge of the other computers on the network. The central computer is called a *server/host* while the others are called *clients*. The clients request the server for service and the server provides them with the requested service.

Following are some of the points regarding the two models:

- Server-based networks are infinitely expandable whereas peer-to-peer may not work well beyond 15 nodes.
- Server-based networks have better security than peer-to-peer networks.
- Peer-to-peer networks are cheaper than server-based networks.
- Server-based networks are administrated by an administrator whereas; each user is their own administrator in peer-to-peer networks.
- It is easier to set up peer-to-peer networks than server-based networks.

5.1.5. Network Topologies

The topology of a network describes the way in which the devices of the network are linked together. It shows the geometric arrangement of computers in a network. Topologies can be overall configuration how it looks like and where every node on the network lies physically. The logical topology describes how information travels along the network.

There are six major topologies in use today:

- Bus topology
- Ring topology
- Star topology
- Tree topology
- Mesh topology
- Hybrid topology

Each topology is used for specific network types, although some network types can use more than one topology. For example, Ethernet networks can be laid out in a bus, star, or tree topology, or any combination of the three. Token ring is physically laid out in a star, but electrically behaves like a ring. To properly understand each network type requires first understanding the basic topologies.

A. Bus topology

In a bus topology, there is one main cable that runs from computer to computer with a terminator at each end as depicted in figure 5.3. Whatever anyone on the bus says, everyone hears. All the nodes on the network can see the data, but if it's not addressed to them, they ignore it and pass it down until it reaches its destination.

In a bus topology, a collision might occur when a number of nodes transmit their messages simultaneously. When a collision occurs, the first node to detect the collision sends out a signal to all other nodes to stop sending information. At this point, each node waits a random amount of time and then tries broadcasting again.

Advantages of bus topology are that it:

- Is easy to connect a computer or peripheral to a bus.
- Requires less cable length than a star topology.

Disadvantages of a bus topology:

- Entire network shuts down if there is a break in the main cable.
- Difficult to identify the problem if the entire network shuts down.

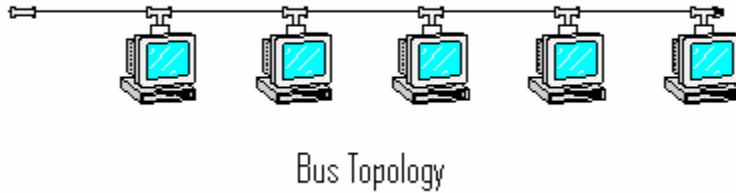


Figure 5.3 Bus topology

B. Star topology

In a star topology, everything goes through a central node called a *hub* as depicted in figure 5.4. A hub is a device that provides a meeting location for all the cables. Any device attached to the hub has physical access to any other device that is connected to the hub.

Unlike in bus topology, the network does not stop if one node is down in the network. If a node does not work, troubleshooting is easy as you need only to check the problem between the node and the port of the hub. The network stops only when the server is down.

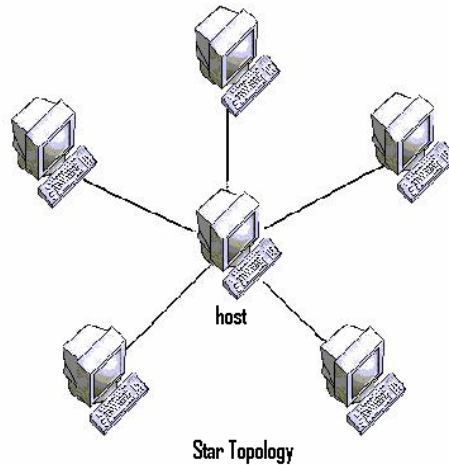


Figure 5.4 Star topology

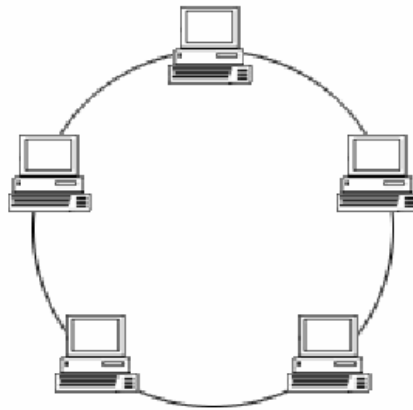
In a star topology:

- No disruptions occur to the network when connecting or removing devices.
- It is also easy to detect faults and to remove parts.

C. Ring topology

In a ring topology, the nodes are connected together in the form of a ring as depicted in figure 5.5. Unlike bus topology, a ring is a one way system. Each node receives a message from its neighbors and passes it onto its other neighbors. Unlike bus topology, there is no collision in a ring topology since only one node can send information across the network at any given time. When a node needs to send a message to another, it looks for an empty

carriage, puts the message in the carriage and tells it what node to get off at. Unlike star topology, ring topology stops if one node is removed from the network.

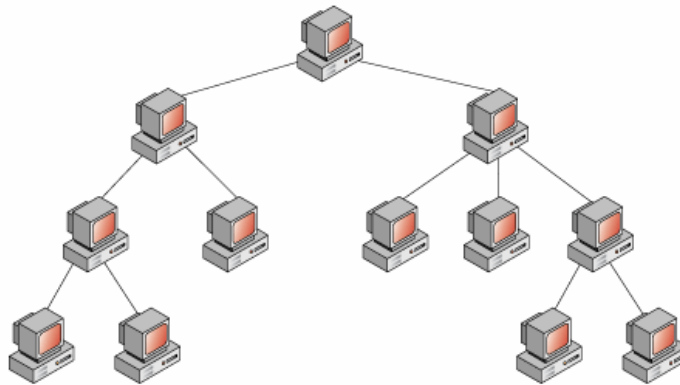


Ring Topology

Figure 5.5 The ring topology

D. Tree topology

A tree topology can be thought of as being a “star of stars” network. In a tree network, each device is connected to its own central node or host in the same manner as in a star topology. However, hosts are connected together in a hierarchal manner (see figure 5.6).



Tree Topology

Figure 5.6 Tree topology

E. Mesh topology

In a mesh topology, each device is connected to every other device on the network as depicted in figure 5.7. Its physical design is the most complex of the other topologies and this makes it very expensive to install and maintain. The advantage you get from it is its high fault tolerance.

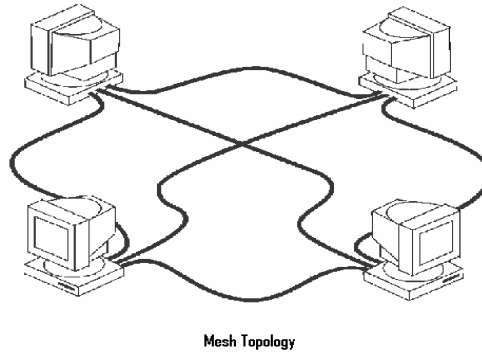


Figure 5.7 The mesh topology

F. Hybrid topology

As the name implies, a hybrid topology is the mix of the other topologies. Even though this topology might be very expensive, it makes use of the best feature of the other topologies making it popular second to the star topology.

Self Check 5.1

- _____ is a type of network that is used for large geographical area.
 - LAN
 - Bus topology
 - WAN
 - Local area network.
- _____ topology is known by its unique features that every computer in the network is connected to each other.
 - Star topology
 - Ring topology
 - Hybrid topology
 - Mesh topology
- If we have 10 computers in our organization and there is no need to expand the network, which network is advisable?
 - server-based model
 - peer to peer model
 - Depend on our choice
 - Client- server model
- _____ are the means by which data is transmitted between the sending and receiving devices in a network.
 - Nodes
 - Communications media
 - Clients
 - Servers
- _____ are high capacity computers that can be used to distribute processes, provide link to a resources for balancing the load on the computer.
 - Clients
 - Servers
 - Host
 - B and C

5.2. UNDERSTANDING THE INTERNET

5.2.1. INTRODUCTION

The internet has evolved out of need, not out of any particular plan. The late 1960s marked its birth when the department of defense, USA, produced a distributed computer communication system called the advanced research projects agency network (ARPANET). The main objective of the ARPANET was to be able to survive a nuclear attack during the hottest period of the cold war.

The 1970s saw the internet grow through its youth into an international network presence. It was in this decade that many groups were motivated to get things rolling regarding the evolving internet. For instance, the sketch of gateway architecture and the design of a transmission protocol among other things were started during the decade.

The 1980s was a significant decade for the evolving internet. It was in that period that the transmission control protocol/internet protocol (TCP/IP) suite came into existence. The domain name system (DNS) was also introduced in the 1980s era. Another important development in that period was the creation of the national science foundation network (NSFNET). This steadily increased the number of networks connected and by the end of the decade thousands of computers were connected through the NSFNET. By then, the NSFNET has become just a component of a much larger network of networks appropriately named the internet. The 1990s was the period of global acceptance, explosive growth and commercialization of the internet. While ARPANET ceased to exist, World Wide Web (WWW) came into existence in that era. WWW is discussed in section 5.2.5.

5.2.2. ACCESSING THE INTERNET

Accessing the internet involves simply connecting your computer to a computer that is already connected to the internet. This can be achieved in two ways: dial up or permanent access. Dial up access is much cheaper than the permanent/leased internet access.

5.2.3. HOW DOES INFORMATION TRAVEL ACROSS THE INTERNET?

How does information travel across the internet? Is a frequently asked question. The process of sending information across the internet involves the following:

- The transmission control protocol (TCP) first breaks the information into packets.
- Your computer sends those packets to your local network, internet service provider (ISP) through dialup or online service.
- From there, the packets travel through many levels of network, computers, and communications lines before they reach their final destination, next door or around the world.

The internet works on the client/server model of information delivery. In this model, a client computer connects to a server computer on which information resides; the client depends on the server to deliver information. Whenever you use the internet, you're connected to a server computer and requesting the use of that server's resources. Typically, the client is a local computer and the server also known as the host is usually a more powerful computer that houses the data or information. A number of clients can access the same server.

5.2.4. DOMAIN NAME SYSTEM (DNS)

To communicate with each other, every computer must have a unique address, known as IP address. It is not difficult to imagine what could happen if every computer does not have a unique address. Every IP address is a series of four numbers separated by periods, called *dots*, such as 149.87.128.52. It is difficult to remember and keep track of these numeric addresses. It was to overcome this problem that a system known as the *domain name system* was developed in the early 1980s. The system replaces the numbers by easily recognizable letters and words, such as AWTI@telecom.net.et. The DNS establishes a hierarchy of domains, which are groups of computers on the internet. When information is sent over the internet, it goes to computers called *name servers* where the alphanumeric address is converted to the numeric IP address. Name servers contain tables that match alphanumeric internet address to numeric IP address.

An internet address has two major parts separated by an @, called *at*, sign as in the above example. The first part to the left of the @ sign is the user name. The second part of the address, to the right of the @ sign, is the hostname or domain name, which specifies the specific computer where the person has an internet account. The rightmost portion of the domain section of the address specifies the largest domain which can be an organization, a country or etc. for instance, in the internet address: AWTI@telecom.net.et, *AWTI* is the user name, *telecom.net.et* is the domain name and *.et* is the top or rightmost domain name. Table 5.1 shows common rightmost names:

Domain name	Meaning
.com	Commercial
.edu	Education
.org	Organization
.gov	Government
.net	Network
.et	Ethiopia
.it	Italy

Table 5.1 common domain names

As an example of how the DNS and domain names work, revisit AWTI@telecom.net.et. The top domain is *.et*, which stands for Ethiopia. The domain just below that is *.net*, which is the network internet service provider (ISP) domain. Then below that, *.telecom* is Ethiopia's ISP computer network.

5.2.5. INTERNET SERVICES

Although using the internet gets easier, it is still not quite as easy as turning on your television set or reading a news paper. A variety of tools is needed to tap into the huge resources of the internet. This section looks at how the most common internet tools work. These tools include: Email, Usenet, Internet Chat, WWW, FTP, Telnet, and search Engines/Services.

A. Electronic mail (Email)

Email is an electronic form of regular mail and is probably the most heavily used service of the internet. Emails are sent the same way as most internet data. The TCP protocol breaks your messages into packets, the IP protocol delivers the packets to the proper location, and then the TCP reassembles the message on the receiving end so that it can be read. A typical email has four/five parts.

The first part is to the line in which you type the mail address of the person to whom you're sending a message. Such an address has two parts separated by @ sign. The text to the left of the @ sign is your login name and the text to the right is your domain name. For instance, hawi@hotmail.com is an example of email address. If you are sending a message to multiple primary recipients, separate their address with semicolons. The second part is the from line where your email address will appear.

If you want to send the same copy to other people then type their email addresses on the third part, the Cc/Bcc (Cc stands for carbon copy; Bcc stands for blind carbon copy) line, separating them with semicolons.

The subject line is the fourth part where you type in the subject of your message.

The fifth part is the body of your message which is typed in the next spaces following the subject. You can attach a file or multiple files along with your message.

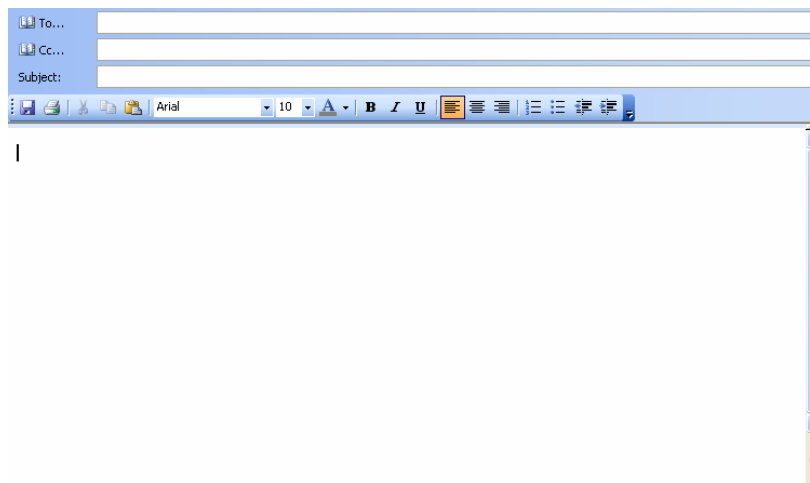


Figure 5.7 Typical E-mail format.

To use email:

- Make an internet connection.
- Launch your mailer-software that will help you handle your mails
- Manipulate your mail: compose, read, delete, etc.

All your incoming mails are kept in the inbox folder.

B. Usenet

Usenet, the world's largest electronic discussion forum, provides a way for messages to be sent among computers across the entire internet. It is a global bulletin board and discussion area. People from all over the world participate in discussions and thousands of topics in specific areas of interest called newsgroups on every conceivable topic. The newsgroups have names which are classified hierarchically by subject. In a newsgroup name, each component is separated by a period. For instance, rec.crafts.metalworking is a recreational group devoted to the craft of metalworking. The leftmost portion represents the largest hierarchical category, and the name gets more specific from left to right.

To participate in news groups, you will need special software to read and respond to them. A good newsgroup reader will let you view the ongoing discussions as threads. Threads are ongoing conversations that are grouped by topic. There are moderated and unmoderated newsgroups. In a moderated newsgroup, each message goes to a human moderator to be checked for its appropriateness. If they are appropriate, they are posted. Posting is the term used to refer to replying to a newsgroup article or sending a message to a newsgroup. In an unmoderated newsgroup, messages are automatically posted. When messages are posted, Usenet servers distribute them to other sites that carry the newsgroup.

C. Internet chat

Internet chat allows you to communicate live with people around the world on the internet. It doesn't mean that people talk to each other but it means that they hold live keyboard conversations with other people – that is, they type words on their computers and other people on the internet can see those words on their computers immediately, and vice versa. Each different topic to chat on is called a *channel*. A number of ways are available to chat, but one of the most popular ones is called *net meeting*. When you want to chat, you make a connection to internet and start your client software.

D. World Wide Web (WWW)

The World Wide Web is a globally connected network and the fastest growing part of the internet. You can use it to get up to date information about almost any subject. The web contains a number of interactive web pages that incorporate text, graphics, sound animation and other multimedia elements. Pages are connected to one another using hypertext that allows you to move from any page to any other page by clicking on a hyperlink. A hyperlink can be text or an image, and it is usually underlined and in a color that is different from normal text. The term home page often refers to the first or top page in a collection of pages that make up a web site. It acts as a table of contents to organize the site and help users find information available on the site. One of the tools that are used to create a web page is called ***Hypertext Markup Language*** (HTML).

Every web page has its own address, called *uniform resource locator* (URL). A URL contains three parts:

- The first part that contains http:// identifies the internet protocol. Here, http stands for hypertext transfer protocol which defines the way a web browser and a web server communicate with each other.

- The second part after// starting with WWW until the first slash symbol (/) identifies the computer that contains the web site.
- The final part which can be longer identifies a specific directory and a home page, document, or other internet object.

For instance, <http://www.addis.com/home.htm> is a hypothetical URL which says that a file or a page called home.htm is located on the computer www.addis.com. As another example, consider the following URL:

<http://www.bbc.co.uk/1/hi/english/world/africa/default.htm>. This says that a page called default.htm is found in a subdirectory called Africa which is found in a subdirectory world, which in turn is found in subdirectory called English which is contained in a subdirectory called hi and which is contained in directory 1 on the computer www.bbc.co.uk.

To use a web:

- Make an internet connection.
- Launch a web browser.
- Type the URL or click on a link that will send you to the desired location.

Web browsers

The web operates on a client/server model in which the client software known as a web browser runs on a local computer. The server software runs on a web host. The client contacts a web server and requests information or resources. The web server locates and then sends the information to the web browser, which displays the result. We will give you bird's-eye view on the two most popular browsers: the Netscape communicator and Microsoft's internet explorer.

Netscape communicator

Netscape communicator is a complete suite of internet applications, not merely a web browser. Communicator includes:

- An email component called Netscape messenger to help you handle your emails.
- A newsgroup component for participating in a discussion.
- A component for audio conferencing.
- A component for searching for whatever you to look on the internet.

Internet explorer

The internet explorer is also a complete suite of internet applications, not merely a web browser. Among other things, it has a component for:

- Keeping track of your favorites.
- Handling emails and news.
- Listening to radio over the internet
- Returning to where you were-known as history list.
- Saving and printing a page.
- Searching for almost anything on the internet.

E. File transfer protocol (FTP)

The internet is full of any conceivable information which may not be available at your disposal. You can make these at your disposal by downloading your desired files, that is, you can transfer files from a computer on the internet to your computer. The tool that can just do that for you is called *file transfer protocol(ftp)* which is the standard TCP/IP file transfer protocol used for moving text and binary files between computers on the internet.

F. Telnet

This is an old tool and is still in widespread use. Telnet allows you to take over the resources of a distant computer, usually called host, while sitting at your own computer. You type the commands at your keyboard, they are carried out at the remote computer and the results are displayed on your screen. To use telnet, you have to know the IP address of the host to log onto it.

G. Search engines

So much information is available on the internet on any conceivable topic. How can you then get information on a topic of your interest? You can get the information by using the most popular techniques known as search engines which are massive databases that cover almost any information, you can think of search engines are constantly updated to present the most up-to-date information. Each search engine returns results in a different way. The most popular search engines include:

- Yahoo (www.yahoo.com)
- Lycos (www.lycos.com)
- Excite (www.exite.com)
- AltaVista (www.altavista.com)
- Google (www.google.com)

To use any search engine:

- Make an internet connection.
- Launch a browser; select or enter the URL of an engine you want to use.
- Type key word(s), phrases or criteria in the search box or select a category.

H. Shopping on the internet

More and more, the internet is influencing the way we live and work, and it will become more so with each passing year. At work, for entertainment, to get information, and to shop, the internet is increasingly becoming a part of our daily life. The internet is being used to market, sell and buy products. The general term for internet shopping is known as *ecommerce*. Online shopping is made possible through the use of encryption techniques. Such techniques have the ability to scramble information as it's sent through the internet so that no one can read it except the intended recipient. Encryption is used to scramble credit cards information, the primary way that people pay when buying online.

I. Multimedia on the internet

The internet began as a way of sharing text-based information among people. Today, however, the technology has tremendously advanced. You can listen to music, sound clips, interviews, radio stations and much more from your computer. You can watch video clips of

the news and other events. You can have live video conferences in which you talk with someone and see them live on your computer

Self Check 5.2

1. _____ is responsible for breaking down the information into packets to be sent by the internet.
 - a. TCP/IP
 - b. DSN
 - c. ISP
 - d. URL
2. What is the function of DNS/ Domain Name system?
 - a. It gives IP address
 - b. It assigns the IP address in a number format.
 - c. It assigns the IP address in to easily understandable letters and words.
 - d. All
3. Which one of the following is the function of Usenet?
 - a. Allows us to communicate live with people around the world.
 - b. Allows us to take over the resources of a distant computer like we own it.
 - c. Allow us to discuss or send messages among computers
 - d. Allow us to shop on the internet.
4. We use internet to _____.
 - a. Share resources
 - b. Share computer/printer
 - c. Send email
 - d. All
 - e. A and C
5. Which one of the following is the right DNS used to represent governmental sites?
 - a. .com
 - b. .gov
 - c. .edu
 - d. .org

UNIT SUMMARY

The communication among computers is made possible by connecting them together. An interconnected set of computers is called a computer network or simply a network. A computer that is not connected to other computers is called a standalone system. In a networked environment computers are located at different sites, probably within few meters apart or several thousand kilometers apart and sometimes this is called as distributed system. The main computer is usually called the host because it serves all systems connected to it.

Computer networks can be roughly divided into two categories: local area network (LAN) and wide area network (WAN). A network consists of four basic components. This are: terminals, communication processors, host/server, and communications media. Servers are high capacity computers that provide a link to the resources necessary to perform a task. Clients are the computers that users on a network do their work on, such as work processing and other tasks. A network resource is anything that can be used on a network. Generally there are two types of network resource access model: a peer-to-peer model, and a server-based network model. The topology of a network describes the way in which the devices of the network are linked together. It shows the geometric arrangement of computers in a network.

Accessing the internet involves simply connecting your computer to a computer that is already connected to the internet. This can be achieved in to two ways: dial up or



permanent access. To communicate with each other on a network, every computer must have a unique address, known as IP address. Email is an electronic form of regular mail and is probably the most heavily used service of the internet. Emails are sent the same way as most internet data. Usenet, the world's largest electronic discussion forum, provides a way for messages to be sent among computers across the entire internet. Internet chat allows you to communicate live with people around the world on the internet. The World Wide Web is a globally connected network and the fastest growing part of the internet. You can use it to get up to date information about almost any subject.

The web operates on a client/server model in which the client software known as a web browser runs on a local computer. Telnet allows you to take over the resources of a distant computer, usually called host, while sitting at your own computer.

Exercise

1. What is computer network?
2. What do you mean by standalone system?
3. Define network topology. Explain the different types.
4. How do we access the internet?
5. Discuss with your friends on how information travel across the internet.
6. Write at least three domain names with their meaning.
7. Write the different services that an internet performs.
8. What is a web browser? Give example.
9. What is WWW?
10. What do you mean by internet chat?

ASSIGNMENT QUESTIONS

1. Write the main difference between third generation and fourth generation of computers.
2. Describe the idea behind the stored program concept.
3. Describe the basic units of a digital computer.
4. Convert the following numbers to decimal form. (Show the steps clearly)
 - a) 1011.11_2
 - b) 10011_2
 - c) $1B.A_{16}$
5. Convert (Show the steps clearly)
 - a) 68 to binary
 - b) 68.65 to binary
 - c) 1663 to hexadecimal
6. Convert (Show the steps clearly)
 - a) 1011_2 to octal
 - b) ABC_{16} to octal
 - c) 1101.0111_2 to hexadecimal
 - d) 102_8 to binary
7. Write the functions of RAM and ROM? And explain the difference between them.
8. Describe the main difference between EPROM and EEPROM?
9. What is the difference between ROM and PROM?
10. Open WordPad and write few sentences about your mother and save it under **Mom** directory by creating it in C drive and give it file name **mother**. Create directory **Family** in My document and copy **Mom** directory you have created above. 
11. Print the file you have created in question number nine above.
12. What is a document map?
13. Describe the use of tab in Microsoft word.
14. What is a template?
15. What is an excel function? List the different groups with example.
16. Prepare the following table in Microsoft excel. 

Introduction to Computer (Comp200) Mark sheet						
Id_No	Name	Asst (10%)	Mid (30%)	Final (60%)	Total (100%)	Grade
FBE/213/00	Ayele Merga	9	21	43		
FBE/224/00	Hanna Abebe	4	11	20		
FBE/189/00	Jemal Abdela	9	27	53		
FBE/200/00	Zelalem Mekuria	6	17	30		
FBE/210/00	Zerihun Amede	5	15	26		

17. Calculate the Total and Grade for the above table. 

Where:-

$$\text{Total} = \text{Asst} + \text{Mid} + \text{Final}$$


$$\text{Grade} = \text{A if Total} \geq 80$$

$$\text{B if Total} \geq 65 \ \& \ < 85$$

$$\text{C if Total} \geq 50 \ \& \ < 65$$

$$\text{D if Total} \geq 40 \ \& \ < 50$$

F Otherwise

18. Prepare a chart for the following table. 

AMU - FBE	
<i>Distance Education</i>	
Year	No. of Students
1996	67
1997	84
1998	92
1999	84
2000	112

Title: Number of Enrolled Students

Category (X) axis: Year

Value (Y) axis: No. of Students

19. What is referential integrity?

20. Create a database using Ms-Access, with at least 10 records. 

The table structures are

Table-1: Student

Rno	Number	PK
Name	Text (20)	
DOB	Date/time	
Gender	Text (1)	
Class	Text (10)	

Table – 2 : Marks

SUB1	Number
SUB2	Number
SUB3	Number
SUB4	Number
SUB5	Number
RNO	Number FK


Maintain the relationship between them.

Prepare the following Queries

- The Query that shows the information about the students.
- The Query that shows the marks gained by the students.
- The Query that shows the Name, Marks in 5 subjects, total and average marks.
- The Query that shows the RNO, NAME, GENDER, TOTAL, AVERAGE.

Prepare the following Reports.

- The Report that shows the details of the student.
- The Report that shows the details of student with Total, Average marks.
- The Report that shows the Rno, Name, Total, and Average marks.

 - indicates assignments that are submitted in soft copy, viz Floppy, CD or Flash Disk.

ANSWER TO SELF CHECK QUESTIONS

Self Check 1.1

1. b
2. a
3. d
4. a
5. c

Self Check 2.2

1. d
2. a
3. c
4. d
5. b

Self Check 3.2

1. a
2. a
3. d
4. b
5. e

Self Check 4.1

1. Word Processor
2. Ms-Word
3. Normal View
4. Ms-words macro
5. c
6. d

Self Check 4.3

1. DBMS
2. Filter Events
3. Macros
4. Queries
5. Database
6. c
7. d

Self Check 5.2

1. a
2. c
3. c
4. e
5. b

Self Check 2.1

1. e
2. b
3. d
4. b
5. a

Self Check 3.1

1. c
2. a
3. d
4. c
5. d

Self Check 3.3

1. c
2. c
3. b
4. b
5. d
6. c
7. d

Self Check 4.2

1. a
2. d
3. a
4. b
5. b

Self Check 5.1

1. c
2. d
3. b
4. b
5. d

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Basic Computer Skills



ARBA MINCH UNIVERSITY



INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

ASSIGNMENT FOR FACULTY OF BUSINESS AND ECONOMICS (DISTANCE)

Basic COMPUTER Skills (30%)

Prepared By Abel Adane

ANSWER THE FOLLOWING QUESTION AS YOU ARE ASKED

1. Define the term computer and why we are using it? (2 point)
2. How computers are working in: (4point)
 - A. Banking
 - B. Finance
 - C. Business
3. Discuss the following terms: (2point)
 - A. Ergonomics
 - B. Telecommuting
4. Discuss historical background of computer in details :(4point)
5. Write the following in detail with the best examples: (3 point)
 - A. Simplex-Transmission
 - B. Half-duplex Transmission
 - C. Full-duplex Transmission
6. What type of equipment do you need for computercommunication? (3 point)
7. Write the difference between internet and network? (2 point)
8. Why we are categorized programming languages as :((2point)
 - A. Machine languages
 - B. Assembly languages
 - C. High level languages

Basic Computer Skills

9. Convert the following numbers into their binary equivalent (2 point)

- A. 5216(8)
- B. 443(16)
- C. 93(10)
- D. ABCF(16)

10. Convert the following numbers into their octal equivalent (2 point)

- A. BCD(16)
- B. CDA(16)
- C. 1111001010101(2)
- D. 23.45(8)

11. What do we mean by computer program? (1 point)

12. What measurement you are going to take to save your computer? (2 point)

13. Define the term 1's compliment and 2's compliment and give at least three examples. (2point)