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Computer Zone

Book - 7

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Preface

Computers have become the life line of today's high-tech world. There is no work, in our whole day, for which we are not dependent on computers or the technology products. The use of computers has overpowered our life and we have got addicted to computers to a great extent. Computers have actually brought a revolutionary change in the whole way, with which the education and the work culture are practised. Learning the basics of computers is highly important for the students to excel in their respective fields. Computers help students to learn better and learn the practical aspect of the subject.

Computer Zone-Book 7 is one of a series on computer science designed for all the categories of students of Nepal. The book 7 of this series is recommended for use in class 7.

This book is designed for the new generation of students who need to acquire knowledge on the theory, application and programming aspects of computing. Logical and scientific in its approach, the series covers the history of computer, its accessories, applications and programming in a step-by-step and graded manner. It has been prepared to focus creativity and encourage young children to explore and experiment with learning opportunities. The special features of this edition which highlights the important points covered in each chapter are given below:

a. Learning objectives
b. Expanding your Horizons
c. Facts Corner
d. Brainstorming Task
e. Trick Terms
f. Solved Exercises
g. Chapter Review
h. Lab Exercises/Project Work

A lot of research and meticulous attention to detail have gone into the making of this book. However, there is always scope for improvement. Constructive criticism and suggestions which could be incorporated in the future editions of this book, are welcome in my mailing address hari99_sapkota@yahoo.com.

We earnestly hope that the students would find the journey through this series an enjoyable experience and gain a sound working knowledge on the basic aspects of computing that lay the foundation for good and systematic programming.

-Author

Contents

Objectives

After completing this chapter, you will be able to:

- Define a computer and explain the basic operations of a computer.
- List out some major characteristics of a computer.
- List out some weaknesses of a computer.
- The IPO cycle
- Information System

1

Understanding Computer Technology

Concept-An automated Data Processor

After decades of slowly expanding behind the scenes, computer technology has suddenly exploded into public view and seems to be tightly woven into the fabric of our lives. It has made great inroads in our everyday life and thinking. It is also transforming the organization in which we work, the kinds of skills available, and the skills needed to succeed. In today's world of globalization, computer technology has made it possible to interconnect the entire world. Finally, computer technology is also helping people overcome challenges.

The word computer is derived from the Latin word "Computare" which means "to calculate". Computer is an electronic equipment designed to automatically accept and store input data, manipulate them and produce output results under the direction of a detailed step-by-step stored program of instructions. A set of instructions that performs a particular task is called a program. The instructions in the program direct the computer to perform input operations, process the data and output the results. A computer follows the I-P-O cycle.

expanding your horizons

QRIO ("Quest for Curiosity", originally named Sony Dream Robot or SDR) is a human-like robot developed and marketed by Sony. It is approximately 0.6 m tall and weighs 7.3 kg. QRIO is capable of voice and face recognition, making it able to remember people as well as their likes and dislikes. But he lacks human emotions. QRIO can run at 23 cm/s, and is credited in the Guinness World Records as being the first robot capable of running (which it defines as moving while both legs are off the ground at the same time). The 4th generation QRIO's internal battery lasts about 1 hour.

The basic operation of computer is:

i. ***Input***

The process of suppling the data and instruction to the computer for the processing is called input. The different input devices like keyboard, mouse,scanner, lightpen etc. are used to input the data and instruction to the CPU for the processing.

ii. ***Processing***

It is the process of converting the data supplied through the input device into meaningful information according to the instruction of a user. CPU(central processing unit) is a processing device. It controls and coordinates all the peripheral as well as the software so that is regarded as the brain of the computer. The processor controls the operation of the computer.

iii. ***Output***

The processing result is supplied to the user through the output device like monitor, speaker, printer, plotter etc. The job of an output is just reverse of that of an input. It supplies the information obtained from data processing, to the outside world. Hence, it links the computer with the external environment.

iv. ***Storage***

It is the extra operation of a computer. Storage is the blank space where different types of data, information, program, software etc. are stored. In a computer system to keep the data, programs temporarily as well as permanently, we need two different storage they are primary storage and secondary storage.

What's so special about computers?

All computers have certain common characteristics irrespective of their type and size. Computers are capable of doing complex activities and operations. Computers can be programmed to do complex tasks. Computers perform a wide variety of activities reliably, accurately and quickly. The power and usefulness of this machine are mainly due to its following strengths. They can:

a. Computer performs calculations at a very high speed.

b. The accuracy of a computer is very high.

c. Computer stores and retrieves a large amount of data in a fast and efficient manner.

d. Computer is an automatic machine because once a task is initiated, computer proceeds on its own till its completion.

e. Computer is capable of performing task repeatedly at the same level of speed and accuracy.

Computers exchange billions of data every second around the world according to computer programs created by humans. If computers became truly intelligent, they could start creating their own programs. They may start forming their own ideas and building their own robots. They could even capture us and turn us into slaves!

A look to Future

How clever are computers?

Do computers think? This depends on what we mean by 'think'. The human brain's processes, and the ways in which we think, make decisions and memorize information are still something of a mystery. A computer can be programmed to copy some of these processes, but no computer has so far come close to matching the full range of abilities and intelligence of a human brain. A computer has no brain of its own and hence cannot think. Anything it does is the result of human instructions.

Brainstorming task

Fill in the blanks. Choose the answer from the clue box.

input, automatic, Computare, speed, program

a. The word computer is derived from the Latin word……

b. A set of instructions that performs a particular task is called a…….

c. The process of suppling the data and instruction to the computer for the processing is called…….

d. Computer performs calculations at a very……..

e. Computer is an…… machine because once a task is initiated, computer proceeds on its own till its completion.

Information System

When you interact with computer technology you are not involved with a single piece of equipment, but with an ever expanding system of interconnected parts. A set of interconnected parts for collecting, processing, storing and distributing information for decision making and support is called an information system. The basis of an computer system is the sharing and processing of information and ideas. A computer system has the following parts: people, procedures, software, hardware, data and information

a. People

Qualified people are a vital part of any information system. It refers to all the personnel dealing with the computer systems and their management. They include development and operation managers, system analysts and designers, computer programmers and computer operators. In addition, workers in an organization must be trained to utilize the capabilities of information systems.

b. Procedures

Procedures are rules or guidelines for people to follow when using software, hardware and data. Typically, these procedures are documented in manuals written by computer specialists. Software and hardware manufacturers provide manuals with their products.

c. Software

Software is the basic component of a computer system. It is defined as instructions and associated data, stored in electronic format, that directs the computer to accomplish a task. It sets up a computer to do a particular task by telling the computer how to interact with the user and how to process the user's data. It enables the computer hardware to perform various activities and makes it so valuable as a problem-solving tool. It tells the computer system what to do and how to do it. It serves as the intermediary between the user and the computer hardware. It is the most important resources for a computer system to work at the most optimal level. Some of the examples of commonly used software packages are Microsoft Word, PageMaker and Macromedia Freehand.

Facts Corner

The first large-scale mechanical information system was Herman Hollerith's census tabulator. Invented in time to process the 1890 U.S. census, Hollerith's machine represented a major step in automation, as well as an inspiration to develop computerized information systems.

d. Hardware

Hardware is the physical equipment used for input, processing and output work in an information system. Such physical equipment may be electronic, mechanical or optical. These equipment work together with software to perform calculations, organize data and communicate with other computers. It consists of the computer processing unit itself and various input, output, and storage devices plus physical media used to tie information systems together.

e. Data and Information

Data are the raw materials of information systems. It consists of the raw, unprocessed facts, including text, numbers, images and sound. After data is processed through the computer, they form a desired output which serves some purpose. These resultant facts are known as information. Data becomes information when you understand what it means. Computers process data and people use information. The process of changing data into information is known as information processing cycle.

Project Work

1. *Draw a figure of computer and identify the difference between computer and people.*
2. *Collect the different figure of the computer parts and pest on a chart paper with their name and function.*
3. *Identify the difference between hardware and software with example.*
4. *Discuss the working principle of computer and prepare a chart.*
5. *Visit your school or local surrounding and mention the list for what purpose computers are used.*

Tricky Terms

Computer	An electronic equipment designed to automatically accept and store input data, manipulate them and produce output results under the direction of a detailed step-by-step stored program of instructions.
Program	A set of instructions that performs a particular task.
Information	The meaningful data that results from the processing of the unorganized data.
Software	Software is the basic component of a computer system. It is defined as instructions and associated data, stored in electronic format, that directs the computer to accomplish a task.

Let Us Revise

- Computer is an electronic equipment designed to automatically accept and store input data, manipulate them and produce output results under the direction of a detailed step-by-step stored program of instructions.
- The process of suppling the data and instruction to the computer for the processing is called input.
- The processing result is supplied to the user through the output device like monitor, speaker, printer, plotter etc.
- Storage is the blank space where different types of data, information, program, software etc. are stored.
- Procedures are rules or guidelines for people to follow when using software, hardware and data.
- Software is defined as instructions and associated data, stored in electronic format,that directs the computer to accomplish a task.
- A set of interconnected parts for collecting, processing, storing and distributing information for decision making and support is called an information system.

Solved Exercises

1. *Define computer.*

Ans: *Computer is a digital electronic processing device designed to accept input data, process them, produce output results and store results for future use.*

2. *What is input device?*

Ans: *Those device through which we supply data and instruction to the computer for the processing is called input device. Some of the common input devices are keyboard, mouse, lightpen, microphone, scanner etc.*

3. *What is output device?*

Ans: *Those devices through which we display or get the result after processing by the CPU is called output device. The common output devices are monitor, speaker, printer, plotter etc.*

4. *What is storage device?*

Ans: *The device which is used to store the data, information, program as well as software for the future reference is called storage device. Some of the common storage devices are hard disk, floppy disk, CD/DVD, pendrive, etc.*

5. *What is a program?*

Ans: *A set of detailed, step-by-step instructions that tells a computer how to solve a problem or carry out a task is known as computer program.*

6. *What is information system? What are the different parts of information system?*

Ans: *An information system is a set of interconnected parts for collecting, processing, storing, and distributing information for decision making and support. An information system has the following parts: people, procedures, software, hardware, data and information.*

7. *Write the difference between Hardware and software?*

Ans: *The difference between hardware and software are*

Hardware	Software
It is the physical parts of a computer.	It is the collection of program to perform a specific task.
It can be touch and feel.	It is the soul of computer so, it cannot be touch.
Example : Monitor, keyboard, mouse etc	Example: Windows, MS word, Ms Paint etc

8. *Write the difference between Program and software?*

Ans: *The difference between program and software are*

Program	Software
It is the collection of instruction to perform a specific task	It is the collection of program to perform a specific task.
A program is created by a programmer	Software is created by group of programmers as a team work.
Generally it is free in nature.	It is not free in nature.

Chapter Review

1. State whether the following statements are true or false.

a. Computer is transforming the organization in which we work, the kinds of skills available, and the skills needed to succeed.
b. A computer has no brain of its own and hence cannot think.
c. The collection of program is called software.
d. The physical part of a computer is called hardware.
e. The process of changing data into information is known as information processing cycle.
f. Procedures are rules or guidelines for people to follow when using software, hardware and data.
g. Microsoft Word, PageMaker and Macromedia Freehand etc are the examples of system software.
h. The process of changing data into information is known as information processing cycle.

2. Match each term with the statement that best describes it.

Input	monitor
Output	keyboard
Processing	hard disk
Storage	CPU

3. Circle the word or phrase that best completes each statement.

a. The raw materials of information systems is called .
   i. data ii. information
   iii. program iv. None of the above

b. The instructions that tell the computer how to process data into the form you want.
   i. program ii. procedure
   iii. hardware iv. None of the above

c. The physical equipment used for the input, processing and output work in an information system.
   i. hardware ii. software
   iii. program iv. None of the above

d. The physical part of computer is called……..
   i. Software ii. Program
   iii. hardware iv. None of the above

e. The meaningful data that results from the processing of the unorganized data.
   i. input ii. Information
   iii. Output iv. Both ii & iii.
f. …… is the example of storage device.
   i. Cable ii. Mouse
   iii. Hard disk iv. Keyboard
g. The word computer is derived from the Latin word……..
   i. Computare ii. Compute
   iii. Computers iv. Both I & II
h. ……. is the example of processing device.
   i.Keyboard ii. Mouse
   iii. Hard disk iv. CPU

4. Write the full form of the followings.

i. CPU ii.IPO iii. IS iv. RAM v. ROM

5. Give the appropriate technical term for each of the following statements.

a. An electronic equipment designed to automatically accept and store input data, manipulate them and produce output results under the direction of a detailed step-by-step stored program of instructions.
b. A set of instructions that performs a particular task.
c. The meaningful data that results from the processing of the unorganized data.
d. The collection of program.
e. The physical parts of computer.
f. The device through which we input data to the computer for processing.
g. The processing device of a computer.
h. Those device through which display the result after processing.

6. In your own words, briefly answer the following questions.

a. What is a computer? Explain the main characteristics of a computer.
b. What are the basic operations of a computer?
c. Define the term "hardware". Give any three examples of computer hardware.
d. What is computer software?
e. What is information system? Explain its parts.
f. What is the difference between data and information?
g. What are the characteristics of a computer?
h. Write the difference between hardware and software.
i. Write the 3-3 advantages and disadvantages of computer.

Objectives

After completing this chapter, you will be able to:

- Explain the historical background of computing.
- Describe the mechanical, electro-mechanical as well as electronic computer era.
- List the key dates of the invention of different divices.

2

Computer History

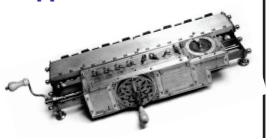
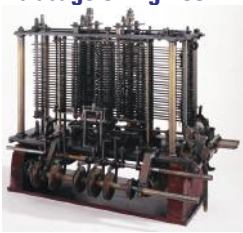
Historical Background

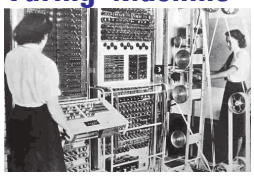
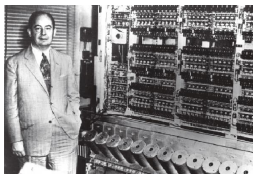
The start of modern computer science can be traced back to long ago when man dwelled in caves or in forests, and lived in groups for protection and survival from the harsh elements on the Earth. In ancient times, people used fingers to perform the calculations such as addition and subtraction. Even today, simple calculations are done on fingers. Soon, mankind realized that it would be easier to do calculations with pebbles as compared to fingers. Consequently, pebbles were used to represent numbers, which led to the development of sand tables They are known to be the earliest device for computation. A sand table consists of three grooves in the sand with a maximum of 10 pebbles in each groove. Afterwards, sand tables were modified extensively and these modifications resulted in a device known as abacus.

Invention	Description
Abacus 	Abacus was developed in Egypt in about 450 BC and was later perfected in China in the 12th century AD. It is the first known development in the world of calculating machines. It consists of a wooden frame having parallel wires with beads strung on them. It has two regions-heaven and earth separated by a mid-bar. There are two beads in the heaven and five beads on the earth. Calculations were done by sliding the beads towards the mid-bar.
Napier's Bones 	John Napier was a Mathematician from Scotland. He invented the system of Logarithm in 1614 AD which greatly assisted in arithmetic calculations. He also developed a small instrument made up of a set of rods known as Napier's Bones in 1617 AD. These bones were used to perform both multiplication, division and square roots. It also enabled the transformation of multiplication and division into simple addition and subtraction.
Slide Rule 	William Oughtred, an English Mathematician invented Slide Rule in 1620 AD. It was based on the principle that actual distance from the starting point of the rule is directly proportional to the logarithm of the numbers printed on the rule. It has two movable marked ruler kept side by side, one of which slides over the other. With the proper alignment of the two rulers, one could easily multiply and divide.

expanding your horizons

A British mathematician by the name of Alan Turing is one of the founding fathers on theory and development of Artificial Intelligence. In the 1950's he invented a test (aptly called the Turing Test) to prove if a machine exhibits artificial Intelligence. The test calls for a human evaluator to judge a natural language conversation with a machine.

Invention	Description
Pascaline 	Blaise Pascal, a French mathematician, invented the first mechanical adding machine called Pascaline in 1642. Blaise Pascal developed this device to assist his father, Étienne Pascal, in his work when he was 18 years old. It worked on clock work mechanism principle. It consists of eight dials, gears and wheels. The numbers were entered by dialing a series of numbered wheels, where the movement of the wheels started at 9 and moved to 0. An automatic carry over system was accomplished by rotating the adjacent wheel by one digit. This machine was capable of performing additions and subtractions only. A programming language "Pascal" was later named to honour his contribution.
Stepped Reckoner 	Gottfried Leibnitz, a German mathematician, extended Blaise Pascal's ideas and constructed a new machine called Stepped Reckoner in 1671 A.D. It consisted of additional sets of wheels that could perform addition, subtraction, multiplication, division and evaluate square roots by series of stepped additions. Leibnitz's machine used stepped cylinders, each with nine teeth of varying lengths.
Jacquard's Loom 	Joseph-Marie Jacquard, a French silk-weaver, invented a mechanical loom in 1801 A.D. He used punched cards to control weaving needles of looms. This suggested a method of storing information on punched cards. This era of storing and retrieving numbers started with the invention of punched cards.
Babbage's Engines 	Charles Babbage, an English mathematician, originated the idea of a programmable computer. He designed a 'Difference Engine' in 1823 and an 'Analytical Engine' in 1833 for the computation of mathematical tables. The basic plan proposed for the Analytical Engine by Charles Babbage completely matches with the input, process and output concept of the modern computers. That is why Charles Babbage is called the "Father of Computing". The project could not be built because of lack of money and inadequate engineering skills at that time.
Tabulating Machine 	Herman Hollerith, an American census statistician, developed a mechanical tabulating machine in 1887. Tabulating Machine used punched cards to store and tabulate census data. Hollerith established the Tabulating Machine Company in 1896 to manufacture his inventions. The company grew and prospered. This company later merged with other companies to form the giant International Business Machine (IBM) Corporation. IBM is the largest manufacturer of computers in the world today.

Turing Machine 	Alan Mathison Turing was a British mathematician and computer theorist. He had suggested a universal mathematical machine, called the Turing Machine. It became a prototype for the electronic computer. A few years later Turing was destined to be a key player in the design and creation of COLOSSUS, which was one of the world's earliest working programmable electronic digital computers.
Mark-I 	Howard Aiken, an American computer engineer and mathematician, in collaboration with engineers at IBM, undertook construction of an electro-mechanical computer called Mark I in 1937 A.D. This machine was 51 ft. long, 8 ft. tall and 3 ft. wide having 18000 vacuum tubes. This machine used instructions stored in paper tape and punched cards. The Mark-I was officially known as the Harvard-IBM Automatic Sequence Controlled Calculator (ASCC). The Mark-I was used for military purposes including development of the atomic bomb.
ABC 	Professor John Vincent Atanasoff and his graduate student Clifford Berry built the world's first electronic-digital computer called Atanasoff Berry Computer at Iowa State University during 1939–1942 A.D. This was the first machine to calculate using vacuum tubes. It was designed for solving systems of simultaneous linear equations. It was used by the military to compute ballistic data

Brainstorming task

Fill in the blanks. Choose the answer from the clue box.

Charles Babbage, William Oughtred, UNIVAC-I, Blaise Pascal, John Napier

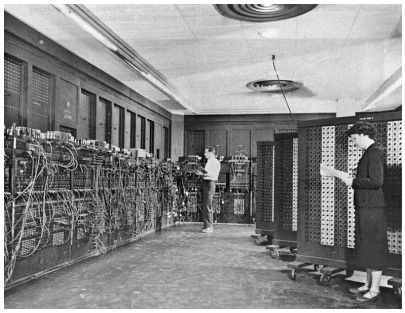
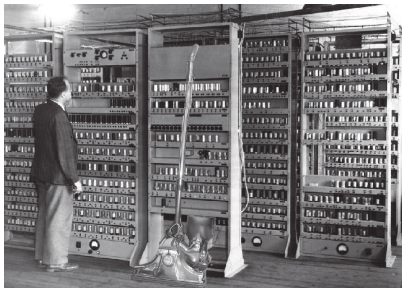
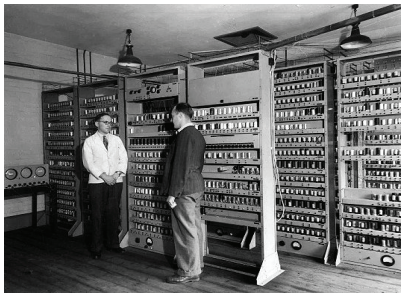
a. ……invented the system of Logarithm in 1614 AD.

b. ……, an English Mathematician invented Slide Rule in 1620 AD.

c. ……., invented the first mechanical adding machine called Pascaline in

d. ……, originated the idea of a programmable computer.

e. ……, an American census statistician, developed a mechanical tabulating machine in 1887.

Invention	Description
ENIAC 	John William Mauchly and John Presper Eckert Jr., at the Moore school of Electrical Engineering University of Pennsylvania, constructed the first general-purpose electronic computer, the Electronic Numerical Integrator and Calculator (ENIAC). It became operational in February 1946 A.D. and was used until October 1955 A.D. ENIAC used 18000 vacuum tubes to process data. It was 10 ft. tall, occupied 1500 ft2 of floor-space, weighed approximately 30 tons and consumed 150 kilowatts of electric power.
EDVAC 	John William Mauchly and J. Presper Eckert Jr. designed EDVAC (Electronic Discrete Variable Automatic Computer) in 1946 A.D and it came into existence in 1949 A.D. It contained approximately 4000 vacuum tubes and 12,000 diodes. It consumed 56 kilowatts of electric power. It covered 490 ft.^{2} (45.5 m^2) of floor and weighed 17,300 lb. (7,850 kg). It was built for the U.S. Army's Ballistics Research Laboratory at the Aberdeen Proving Ground by the University of Pennsylvania.
EDSAC 	Maurice Wilkes and his team at the University of Cambridge Mathematical Laboratory in England invented the first practical stored-program electronic computer, called Electronic Delay Storage Automatic Computer in May, 1949 A.D. The computer contained mercury delay lines for memory and vacuum tubes for logic. It had 3,000 vacuum tubes and used 30 kilowatts of electric power. It consisted of five units: arithmetical, central control, memory, input and output.
UNIVAC-I 	John William Mauchly and John Presper Eckert Jr. designed Universal Automatic Computer-I (UNIVAC-I). It was the first general-purpose electronic digital computer designed for commercial use. It was started in 1946 and completed in 1951. It consisted of magnetic tape for data input and output. It used 5,200 vacuum tubes, weighed 13 metric tons and consumed 125 kilowatts of electric power. The complete system occupied more than 35.5 m^2 of floor space.

Project Work

1. *Draw a picture of modern computer.*
2. *Make a chart table of different devices with their name and date of invention.*
3. *Have a wooden frame and make a concept of an Abacus.*

Tricky Terms

Abacus — Abacus was developed in Egypt in about 450 BC and was later perfected in China in the 12th century AD.

Napier's Bones — John Napier was a Mathematician from Scotland. He invented the system of Logarithm in 1614 AD which greatly assisted in arithmetic calculations.

Slide Rule — William Oughtred, an English Mathematician invented Slide Rule in 1620.

Pascaline — Blaise Pascal, a French mathematician, invented the first mechanical adding machine called Pascaline in 1642.

Babbage's Engines — Charles Babbage, an English mathematician, originated the idea of a programmable computer. He designed a 'Difference Engine' in 1823 and an 'Analytical Engine' in 1833.

Tabulating Machine — Herman Hollerith, an American census statistician, developed a mechanical tabulating machine in 1887.

UNIVAC-I — John William Mauchly and John Presper Eckert Jr. designed Universal Automatic Computer-I (UNIVAC-I). It was the first general-purpose electronic digital computer designed for commercial use.

Let Us Revise

- Pascaline machine was capable of performing additions and subtractions only.
- Joseph-Marie Jacquard, a French silk-weaver, invented a mechanical loom in 1801 A.D.
- The basic plan proposed for the Analytical Engine by Charles Babbage completely matches with the input, process and output concept of the modern computers. That is why Charles Babbage is called the "Father of Computing".
- Tabulating Machine used punched cards to store and tabulate census data.
- Mark I computer was 51 ft. long, 8 ft. tall and 3 ft. wide having 18000 vacuum tubes.
- John William Mauchly and John Presper Eckert Jr. designed Universal Automatic Computer-I (UNIVAC-I). It was the first general-purpose electronic digital computer designed for commercial use.

Solved Exercises

1. Define Abacus.

Ans: Abacus was developed in Egypt in about 450 BC and was later perfected in China in the 12th century AD. It is the first known development in the world of Calculating machines. It has two regions-heaven and earth separated by a mid-bar.

2. What is Napier's bone? Who invented it?

Ans: The Napier's bone is a set of graduated rods made up of wood, metal or heavy cardboard. A set consists of 9 rods corresponding to digits 1 to 9. These bones helped a lot in multiplication and division involving large numbers. John Napier, a Scottish mathematician, invented Napier's Bones in 1617.

3. Who is regarded as the father of computer? List his inventions with the year of inventions.

Ans: Charles Babbage is regarded as the father of computer as a result of his contributions to the basic design of the computer. He invented Difference Engine in 1822 and Analytical Engine in 1833.

4. Who built the world's first electronic- digital computer?

Ans: Professor John Vincent Atanasoff and his graduate student Clifford Berry built the world's first electronic- digital computer called Atanasoff Berry Computer at Iowa State University during 1939–1942 A.D. This was the first machine to calculate using vacuum tubes.

5. Which was the first general-purpose electronic digital computer designed for commercial use?

Ans: UNIVAC-I was the first general-purpose electronic digital computer designed for commercial use. It was started in 1946 and completed in 1951. It consisted of magnetic tape for data input and output.

6. Write short notes on:

i. Tabulating Machine

Ans: Herman Hollerith, an American census statistician, developed a mechanical tabulating machine in 1887. Tabulating Machine used punched cards to store and tabulates census data.

ii. UNIVAC-I

Ans: John William Mauchly and John Presper Eckert Jr. designed Universal Automatic Computer-I (UNIVAC-I). It was the first general-purpose electronic digital computer designed for commercial use.

iii. ABC

Ans: ABC stands for Atanasoff Berry Computer. It was the first electronic-digital computer. This was the first machine to calculate using vacuum tubes. It was designed for solving systems of simultaneous linear equations.

Chapter Review

1. State whether the following statements are true or false.

a. Abacus was developed in Egypt in about 450 BC and was later perfected in China in the 12th century AD.

b. Joseph-Marie Jacquard, a French silk-weaver, invented a mechanical loom in 2016 A.D.

c. Charles Babbage, an American census statistician, developed a mechanical tabulating machine in 1887.

d. ENIAC used 1000 vacuum tubes to process data.

e. IBM introduced its first personal computer.

2. Circle the word or phrase that best completes each statement.

a. …….. machine was capable of performing additions and subtractions only.

i.Pascaline ii. UNIVAC-I

iii. Mark I iv. None of them

b. ……., a French silk-weaver, invented a mechanical loom in 1801 A.D.

i.Pascaline ii. UNIVAC-I

iii.Mark I iv. Joseph-Marie Jacquard

c. …….. used punched cards to store and tabulate census data.

i. Tabulating ii. UNIVAC-I

iii.Mark I iv. Joseph-Marie Jacquard

d. …….. computer was 51 ft. long, 8 ft. tall and 3 ft. wide having 18000 vacuum tubes.

i.Mark I ii. ABC

iii. ENIAC iv. EDVAC

e. …….was the first general-purpose electronic digital computer designed for commercial use.

i.UNIVAC-I ii. EDSAC

iii. ENIAC iv. EDVAC

3. Fill in the blanks with the help of clue box.

Tabulating, Joseph-Marie Jacquard, Pascaline, UNIVAC-I, Mark I

a. …….. machine was capable of performing additions and subtractions only.

b. ……., a French silk-weaver, invented a mechanical loom in 1801 A.D.

c. …….. used punched cards to store and tabulate census data.

d. …….. computer was 51 ft. long, 8 ft. tall and 3 ft. wide having 18000 vacuum tubes.

e. …….was the first general-purpose electronic digital computer designed for commercial use.

4. Match each term with the statement that best describes it.

Charles Babbage

Abacus

Slide rule

Napier's bone

5. Give the full forms of the following abbreviations.

a. ASCC b. ENIAC c. EDSAC
d. UNIVAC-I e. EDVAC f. ABC

6. Give the appropriate technical term for each of the following statements.

a. The first counting device.
b. The device invented by English Mathematician William Oughtred.
c. The first machine to calculate using vacuum tubes.
d. The first general-purpose electronic digital computer designed for commercial use.
e. An electronic computing machine that uses the binary digits 0 and 1 to represent all forms of information internally in digital form.

7. In your own words, briefly answer the following questions.

a. Who invented Slide Rule? On what principle does it work?
b. Who is known as the "father of computing"? Mention his contributions?
c. What did Herman Hollerith invent? What is the use of this machine?
d. Who invented Mark-I? What are the features of Mark-I?
e. Name the world's first electronic-digital computer? Who invented it?
f. Write short notes on:
   i. ENIAC ii. EDSAC
   iii. UNIVAC-I iv. EDVAC
g. Write the name of different computing devices with date of invention.

Objectives

After completing this chapter, you will be able to:

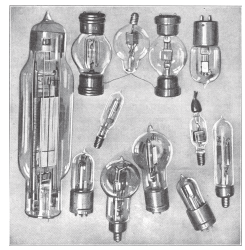
- Explain the Generation of digital computing.
- List the main component used in different Generation of Computer.
- List the computer name of different Generation of Computer.

3

Generation of Computer

There is no technological development in history, to date, that has progressed as fast as computer technology. The development of computers took place in five distinct stages, known as generations of computers. : "Generation" in computer talk is a step in Technology. It provides a framework for the growth of the computer industry. Originally, the term 'generation' was used to distinguish between varying hardware technologies. However, nowadays, it has been extended to include both hardware and software, which together make up an entire computer system. Each generation is marked by a significant advancement in circuit technology. They are classified in terms of speed, storage, size, reliability and the components used for manufacturing the machines.

First Generation (The Vacuum Tube Age)

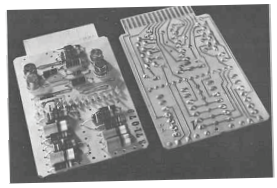


The first-generation of computers were developed in between 1945 to 1956. The development of vacuum tubes signaled the beginning of the first- generation. The vacuum-tube diode was first developed by the English physicist Sir John Ambrose Fleming. And the triode was invented in 1906 by the American engineer Lee De Forest. Vacuum tube is a fragile glass device used to control and amplify electronic signals. The examples of the first-generation computers were ENIAC, EDVAC, EDSAC, UNIVAC-I and IBM 650.

The features of first-generation of computers are listed below:

a. These computers were based on the vacuum tube technology.
b. They were very large, and required a lot of space for installation.
c. The operating speed was measured in milliseconds.
d. The power consumption was very high and they generated a large heat.
e. These computers had low level of accuracy and reliability.
f. They were mainly used in commercial and scientific applications.

Second Generation (The Transistor Age)



The second-generation of computers were developed in between 1956 to 1964. The invention of the transistor by three scientists of Bell Telephone Laboratories in 1947 greatly changed the computer's development. The three American physicists' of Bell Telephone Laboratories are Walter Houser Brattain, John Bardeen

expanding your horizons

Robotics is the branch of mechanical engineering, electrical engineering, electronic engineering and computer science that deals with the design, construction, operation, and application of robots, as well as computer systems for their control, sensory feedback, and information processing.

and William Bradford Shockley. Transistor is a device composed of semiconductor material that amplifies a signal or opens or closes a circuit. Transistor can replace 1000 vacuum tube. The examples of the second-generation computers were IBM 1620, IBM 1401, Control Data 3600, 400 series and IBM 7000 series.

Some of the key features of second-generation of computers are listed below:

a. These computers were based on the transistor technology.
b. They were relatively smaller in size, powerful and faster than the first generation computers.
c. Their speed of operation was measured in microseconds.
d. They required less electricity and produced less heat.
e. They were more reliable and accurate than first-generation computers.
f. Assembly language was used to program computers.
g. Magnetic tape and magnetic disks were the main secondary storage media.

Third Generation (The Integrated Circuit Age)

The third-generation of computers were developed during 1965 to 1971. Third-generation computers used Integrated Circuits. The first integrated circuit was developed in 1958 by Jack Kilby of Texas Instruments and Robert Noyce of Fairchild Semiconductor. Integrated Circuit (also called microchip) is a small electronic device made out of a semiconductor material. The examples of third-generation computers were IBM system/360, Honeywell 200 series, National Cash Register Century Series, ICL 1900 series and IBM 370 series.

Some of the key features of third-generation of computers are listed below:

a. These computers were based on the integrated circuit (IC) technology. These computers were smaller in size and more reliable than the previous generation of computers.
b. The speed of operation was measured in nanoseconds.
c. Monitors and keyboards were introduced for input and output of data.
d. Magnetic disks were used for secondary storage.
e. Extensive use of high-level languages became possible.

Fourth Generation (The Microprocessor Age)

The fourth-generation of computers were developed during 1971 to 1990.

These generations of computers are presently in use. The major technical advantage that characterizes the fourth generation is the tiny microprocessor. The first microprocessor called Intel 4004

Facts Corner *The first hard drive was created in 1979 and could hold 5MB of data.*

was developed by American Intel Corporation in 1971. The microprocessor is a digital electronic component with miniaturized transistors on a single semiconductor integrated circuit (IC). The examples of fourth-generation computers are IBM PC, Apple/Macintosh, IBM system/370 and the SUPERBRAIN.

The features of fourth-generation of computers are listed below:

a. These computers used LSI (Large Scale Integration) and VLSI (Very Large Scale Integration) technologies.
b. The computers are highly reliable and accurate.
c. The operating speed is excellent and has a large memory capacity.
d. Microcomputers are also introduced.
e. Magnetic disk is the common source of external storage.
f. Application software for microcomputers has become popular.

Fifth Generation (The Age of Connectivity)

The fifth-generation of computers are yet to arrive. The fifth-generation computer project conducted jointly by several Japanese computer manufacturers under the sponsorship of the Japanese government emphasized Artificial Intelligence. Artificial Intelligence is the branch of computer science concerned with making computers behave like humans. The term was coined in 1956 by John McCarthy at the Massachusetts Institute of Technology.

The features of the fifth-generation of computers are listed below:

a. These computers will be using Ultra Large Scale Integration (ULSI) technology.
b. These computers will have parallel processing (use of more than one CPU), leading to very high processing speed.
c. These computers will use intelligent programming and knowledge-based Artificial Intelligence.
d. They consume much less power than their predecessors.
e. They have faster and larger primary and secondary storage as compared to their predecessors.
f. Natural language will be used to develop programs.

Project Work

1. *Collect the figure of different generation computer and paste on chart paper.*
2. *Have a group discuss and make a list of differences between different generations of computer.*
3. *Make a list of programming language used in different generation of computer.*
4. *Have a group discussion and list the differences between vacuum tube and transistor used in first and second generation of computer.*

Tricky Terms

Vacuum Tube : Vacuum tube is a fragile glass device used to control and amplify electronic signals

Transistor : Transistor is a device composed of semiconductor material that amplifies a signal or opens or closes a circuit. Transistor can replace 1000 vacuum tube.

Integrated Circuit : Integrated Circuit (also called microchip) is a small electronic device made out of a semiconductor material.

Microprocessor : The microprocessor is a digital electronic component with miniaturized transistors on a single semiconductor integrated circuit (IC).

Artificial Intelligence : A branch of computer science that seeks to create a computer system capable of sensing the world around it, understanding conversations, learning, reasoning, and reaching decisions.

Let Us Revise

- The main component of first generation computer is vacuum-tube
- Vacuum tube is a fragile glass device used to control and amplify electronic signals.
- The main component of second generation computer is transistor.
- Transistor transfers electric signals across a resister. A signal transistor can replace 1000 vacuum-tube.
- Third-generation of computers used Integrated Circuit as a main component.
- Monitors and keyboards were introduced for input and output of data from third generation computer.
- The first microprocessor called Intel 4004 was developed by American Intel Corporation in 1971A.D.
- LSI and VLSI technology were used as a main component of fourth generation computer.
- Microcomputers like laptop, notebook, tablet PC, etc. are introduced from fourth generation computer.
- Fifth generation of computer will use Ultra Large Scale Integration (ULSI) technology as main component.
- Artificial Intelligence is the branch of computer science concerned with making computers behave like humans.

Solved Exercises

1. *What is computer Generation?*

Ans: *"Generation" in computer talk is a step in Technology. It provides a framework for the growth of the computer industry. Originally, the term 'generation' was used to distinguishe between varying hardware technologies. However, nowadays, it has been extended to include both hardware and software, which together make up an entire computer system. There are five generations of computer in present day.*

2. *Write down any four features of fourth generation of computer.*

Ans: *The four features of fourth -generation of computers are listed below:*

a. *These computers used LSI (Large Scale Integration) and VLSI (Very Large Scale Integration) technologies.*
b. *The computers are highly reliable and accurate.*
c. *The operating speed is excellent and has a large memory capacity.*
d. *Microcomputers are also introduced.*

3. *List the disadvantages of first generation computer.*

Ans: *The disadvantages of first generation computer are listed below:*

a. *They were huge in size so they occupy more space*
b. *They were difficult to maintain.*
c. *They consume more electricity and generate more heat.*
d. *They were not portable*

4. *Write any three differences between 2nd and 3rd generation of computer.*

Ans: *The differences between 2nd and 3rd generation of computer are given in table below:*

2nd generation of computer	3rd generation of computer
i. Their speed of operation was measured in microseconds.	i. The speed of operation was measured in nanoseconds.
ii. Assembly language was used to program computers.	ii. High level language was used to program computers.
iii. The examples of the second-generation of computers were IBM 1620, IBM 1401, Control Data 3600, 400 series and IBM 7000 series.	iii. The examples of third-generation of computers were IBM system/360, Honeywell 200 series, National Cash Register Century Series, ICL 1900 series and IBM 370 series.

5. *What is parallel processing?*

Ans: *The system of using more than one processor to solve a particular problem at the same time is known as parallel processing.*

6. *What is AI?*

Ans: *AI stands for Artificial Intelligence. It is a branch of computer science that seeks to create a computer system capable of sensing the world around it, understanding conversations, learning, reasoning, and reaching decisions.*

7. *Write short note on:*

i. Vacuum tube

Vacuum tube also called a electron tubes is a sealed glass or metal-ceramic enclosure used in electronic circuitry to control the flow of electrons between the metal electrodes sealed inside the tubes. The air inside the tubes is removed by a vacuum. Vacuum tubes are used for amplification of a weak current, rectification of an alternating current to direct current (AC to DC).

ii. Integrated circuit (IC)

An integrated circuit (IC), sometimes called a chip or microchip, is a semi-conductor wafer on which thousands or millions of tiny resistors, capacitors, and transistors are fabricated. The first integrated circuit was developed in the year 1958 by Jack Kilby of Texas Instruments and Robert Noyce of Fairchild Semiconductor Corporation.

iii. Transistor

Transistor is used as a main component of second generation computer. It is a device composed of semiconductor material that amplifies a signal or opens or closes a circuit. Transistor can replace 1000 vacuum tube. The Transistor was invented on 1947-12-23 at Bell Labs by William Bradford Shockley, John Bardeen, and Walter Houser Brattain.

Chart for the Generation of computer

	First Generation	Second Generation	Third Generation	Fourth Generation	Fifth Generation
Date	1945 to 1956	1956 to 1964	1965 to 1971	1971 to 1990.	Coming generation
Technology used	Vacuum Tube	Transistors	IC	LSI & VLSI	ULSI or Bio-Chips
Speed	Milli seconds	Micro second	Nano second	Pico second	Femto second
Example	ENIAC, EDVAC, EDSAC, UNIVAC-I and IBM 650.	IBM 1620, IBM 1401, Control Data 3600, 400 series and IBM 7000 series.	IBM system/360, Honeywell 200 series and IBM 370 series.	IBM PC, Apple/ Macintosh, IBM system/370 and SUPERBRAIN.	Unknown

8. *Write the features of fifth generation computer.*

Ans: *The features of fifth generation computer are*

a. *These computers will be using Ultra Large Scale Integration (ULSI) technology.*
b. *These computers will have parallel processing.*
c. *These computers will use intelligent programming and knowledge-based Artificial Intelligence.*
d. *They consume much less power than their predecessors.*
e. *Natural language will be used to develop programs.*

Chapter Review

1. State whether the following statements are true or false.

a. Vacuum tube was used in second generation computers.
b. Machine Level Language was used in first generation of computer.
c. Keyboard and mouse were introduced form second generation of computer
d. Forth generation computer of computers used LSI (Large Scale Integration) and VLSI (Very Large Scale Integration) technologies.
e. Fifth generation of computers are used at your school at present.

2. Match each term with the statement that best describes it.

Group- A	**Group-B**
First Generation	AI
Second Generation	VLSI & ULSI
Third Generation	Transistor
Fourth Generation	Vacuum Tube
Fifth Generation	IC

3. Circle the word or phrase that best completes each statement.

a. _____ used in first generation of computer.
i. AI ii. IC
iii. Vacuum Tube iv. None of the above

b. _____ language was used in second generation of computer.
i. Machine level ii. Assembly
iii. High level iv. None of the above

c. _____ generation computer will understand human language.
i. Fifth ii. Fourth
iii. Third iv. None of the above

d. The first microprocessor called Intel 4004 was developed by American Intel Corporation in _____ .
i. 1971 A.D ii. 1791 A.D
iii. 1981 A.D iv. None of the above

e. The keyboard and monitor were used as input and output devices of computer from _____ generation of computer.
i. 2nd ii. 3rd
iii.4th iv. None of the above

4. Give the full forms of the following abbreviations.

a. IC b. LSI c. AI
d. VLSI e. ULSI f. LSI

5. Give the appropriate technical term for each of the following statements.

a. A fragile glass device used to control and amplify electronic signals.
b. The main component used in second generation of computer.
c. The programming language used in first generation of computer.
d. The main component used in third generation of computer.
e. The branch of computer science concerned with making computers behave like humans.
f. The technology used in fourth generation computer.
g. The programming language that will be used in fifth generation computer.
h. The technology that will be used in fifth generation computer.

6. In your own words, briefly answer the following questions.

a. What is meant by computer generations? List the main component used in different generations of computer.
b. What are the characteristics of first generation of computers? Give examples of first generation of computers.
c. What are the special features of fifth generation that makes it different from the other generations?
d. Write the differences between 1st and 5th generation of computer.
e. Write down the different generation of computers with their duration and main component.
f. What is AI?
g. What is parallel processing?
h. Write short notes on:
   i. Vacuum tube ii. Transistor
   iii. IC iv. Microprocessor

Objectives

After completing this chapter, you will be able to:

- Define software and describe the different types of software.
- Explain the different types of system software.
- List out the major functions of an operating system.
- Describe the different types of translators. Explain the different types of application software.

4

Understanding Software Concepts

Concept: Putting Machine To Life

A computer cannot do anything on its own. Both hardware and software are necessary for a computer to do useful job. It must be instructed to do a desired job. Hence, it is necessary to specify a set of instructions, which a computer must perform to solve a problem. A set of instructions that perform a particular task is called a computer program. The instructions in a program direct the computer to perform input operations, process the data and output the results.

Software is a set of electronic instructions consisting of one or more programs that govern the operations of the computer and make the hardware operate. Computer software is what makes a computer so valuable as a problem-solving tool. Without the instructions provided by software, computer hardware is unable to perform any of the tasks we associate with computer.

The software is broadly classified into two types:

a. System software

b. Application software

expanding your horizons

Microsoft Corporation is the world's leading software-producing company, headquartered in Redmond, Washington, and founded by Bill Gates and Paul Allen in 1975. It develops, manufactures, licenses and supports a wide range of software products for computing devices. Its best selling products are the Microsoft Windows operating system and the Microsoft Office suite of productivity software.

System Software

System software is the chief manager of the computer system. It is a specialized software designed to manage the resources of the personal computer system and its overall operations. These programs are written to assist usage of the personal computer system. It serves as an intermediary between hardware and application software. It makes the operation of the computer system more effective and efficient. It is written by the computer manufacturer related to that computer's mechanism. System software are further classified into:

a. Operating systems
b. Language translators
c. Device drivers
d. Utility programs

Operating System Software

An operating system is the most important software that runs on a computer. It manages the computer's memory, processes, and all of its software and hardware. It also allows you to communicate with the computer without knowing how to speak the computer's "language." It acts as a medium between the hardware and the user or application program. Modern computer operating systems are becoming increasingly machine-independent, capable of running on any hardware platform. Microsoft Windows, Linux and Mac OS are some of the most popular operating systems.

The next major release of the Microsoft Windows operating system, Windows 8 officially debuted on October 26th, 2012 following a release to manufacturing on August 1st. According to Microsoft, Windows 8 is a completely redesigned operating system developed from the ground up with touchscreen use in mind as well as near-instant-on capabilities that enable a Windows 8 PC to load and start up in a matter of seconds rather than in minutes.

Knowledge Update

Utility Program

Utility program is a specialized program designed to make computing easier. It performs a specific task related to the management of computer functions, resources, or files, as password protection, memory management, virus protection and file compression. Many operating systems have utility programs built directly into the operating system itself. Other utility programs are sold separately Examples of utility software's include Disk defragmenters, System Profilers, Network Managers, Application Launchers and Virus Scanners.

Device Driver

Device driver is a computer program that allows other programs to interact with computer hardware. The driver communicates with the device through the computer bus or communications subsystem that the hardware is connected to. Drivers are hardware-dependent and need operating system software.

Translator Program

Translator program is a computer program that converts the programming instructions written in human convenient form into machine language codes that computers understand and process. The translating programs are loaded into the computer's memory at the time of translation process. There is one translating program for each programming language. There are three basic kinds of translator programs: assembler, compiler and interpreter.

Assembler

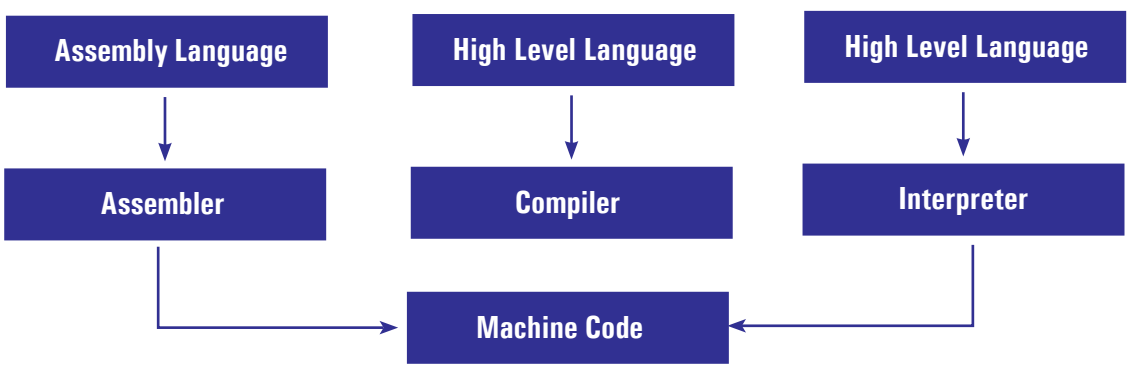
Assembler is a computer program which translates the program written in assembly language into machine language. The assembly language program is called source program and the machine language program is called object program.

Compiler

Compiler is a computer program that translates a high level language program into a machine language program at once. It reports all the errors of the program along with the line numbers. Some of the programming languages such as C, C++, and Fortran use compilers.

Interpreter

Interpreter is a computer program that translates and executes a program written in high level language, line by line. If an error is found on any line, it is immediately reported to the user and the execution of the program is stopped. The programming language BASIC normally uses an interpreter.



Application Software

Application software is a computer program designed to help the user in performing a certain type of work. It helps the user to work faster, more efficiently and more productively. Application software may be written by a large software house which distributes its products widely and addresses a general class of problems, or may be written by an individual and addresses a particular problem. Application software can further be subdivided into two categories: packaged software and customized software.

Packaged Software

Packaged software is a generalized set of programs that allow the computer to perform a specific data processing job for the user. These programs are user friendly and designed for use in more than one environment.Packaged software may be purchased from software vendors. Some of the most commonly used packaged software are Microsoft Word, Microsoft Excel, Microsoft Access and Microsoft Frontpage.

Customized Software

Customized software is a software designed to meet the user's specific needs. It can be very expensive. It is written on the demand of individual's need and serves only a single organization. It is written in high-level language such as Visual Basic or Visual C++. Some of the customized software are Inventory Management System, Payroll System, Financial Accounting and Library Information System.

Brainstorming task

Complete each statement in the spaces provided.

a. _____is a set of electronic instructions consisting of one or more programs that govern the operations of the computer and make the hardware operate.

b. _____is a specialized software designed to manage the resources of the personal computer system and its overall operations.

c. _____is a specialized program designed to make computing easier.

d. A_____is a generalized set of programs that allow the computer to perform a specific data processing job for the user.

e. _____is a software designed to meet the user's specific needs.

Tricky Terms

Software	The instructions that prepare a computer to do a task, indicate how to interact with a user, and specify how to process data.
Operating system	The software that controls the computer's use of its hardware resources.
Utility program	Program that performs maintenance work in the system.
Device driver	The software that provides the computer with the means to control a peripheral device.
Application software	Computer programs that help you perform a specific task.
Compiler	The software that translates a high level language program into a machine code in a single operation.

Let Us Revise

- Software is a set of electronic instructions consisting of one or more programs that govern the operations of the computer and make the hardware operate.
- System software is a specialized software designed to manage the resources of the personal computer system and its overall operations.
- Operating system is a software that controls the computer's use of its hardware system resources.
- Utility program is a specialized program designed to make computing easier.
- Device driver is a computer program that allows other programs to interact with computer hardware.
- Assembler is a computer program which translates the program written in assembly language into machine language.
- Compiler is a computer program that translates a high level language program into a machine language program at once.
- Interpreter is a computer program that translates and executes a program written in high level language, line by line.
- A packaged software is a generalized set of programs that allow the computer to perform a specific data processing job for the user.
- Customized software is a software designed to meet the user's specific needs.

Solved Exercises

1. What is software? Who creates computer software?

Ans: Software is a set of electronic instructions consisting of one or more programs that control the operation of computer hardware. Computer programmers write the instructions for the computer programs and support modules that become the components of a computer software product.

2. What is an operating system? What does an operating system do?

Ans: Operating system (abbreviated OS) is the master controller for all the activities that take place within a computer system.

The operating system performs the following important functions:

- *Manages the allocation of primary memory to specific jobs.*
- *Manages the storage and retrieval of data from disks.*
- *Manages the input to and output from a computer system.*
- *Easy interaction between users and computer.*

3. Define the term device driver.

Ans: A device driver is any computer program that allows other programs to interact with computer hardware.

4. What are the differences between an interpreter and a compiler?

Ans: The major differences between an interpreter and a compiler are:

i. Error correction is much simpler in the case of the interpreter because it is done in stages. Compiler produces an error list for the entire program at the end.

ii. Interpreters take more time for the execution of a program compared to compilers because a statement has to be translated every time it is read.

5. What is an application software? What are the two types of application software? Define each of them.

Ans: Application software is a computer program designed to help the user in performing a certain type of work.

There are two types of application software:

Packaged Software

A packaged software is a generalized set of programs that allow the computer to perform a specific data processing job for the user. These programs are user friendly and designed for use in more than one environment.Packaged software may be purchased from software vendors. Some of the most commonly used packaged software are Microsoft Word, Microsoft Excel, Microsoft Access and Microsoft Frontpage.

Customized Software

Customized software is a software designed to meet the user's specific needs. It can be very expensive. It is written on the demand of individual's need and serves only a single organization. It is written in high-level language such as Visual Basic or Visual C++. Some of the customized software are Inventory Management System, Payroll System, Financial Accounting and Library Information System.

Chapter Review

1. State whether the following statements are true or false.

a. The instructions in a program direct the computer to perform input operations, process the data and output the results.

b. System software is a specialized software designed to manage the resources of the personal computer system and its overall operations.

c. Examples of operating system software include Disk defragmenters, System Profilers, Network Managers, Application Launchers and Virus Scanners.

d. Assembler is a computer program which translates the program written in assembly language into machine language.

e. A customized software is a generalized set of programs that allow the computer to perform a specific data processing job for the user.

2. Match each term with the statement that best describes it.

Device driver	The software that controls the computer's use of its hardware resources.
Operating system	Program that performs maintenance work in the system.
Utility program	The software that provides the computer with the means to control a peripheral device.
Compiler	Computer programs that help you perform a specific task.
Application software	The software that translates a high level language program into a machine code in a single operation.

3. Circle the word or phrase that best completes each statement.

a. A set of electronic instructions consisting of complex codes that makes the computer perform tasks.

i. Hardware ii. Software
iii.None of the above iv Program

b. Any computer program that allows other programs to interact with computer hardware.

i. Device driver ii. Compiler
iii. Utility program iv. None of the above

c. A computer program that translates a high level language program into a machine code in a single operation.

i. Assembler ii. Compiler
iii. Interpreter iv. Both ii & iii

d. A complete, self-contained program designed to perform a specific task.

i. System software ii. Application software
iii. Tailored program iv. None of the above

e. A computer application consisting of one or more programs created to perform a particular type of work.

i. Packaged software
ii. Customized software
iii. 4GL
iv. 1GL

4. Give the appropriate technical term for each of the following statements.

a. A set of electronic instructions consisting of one or more programs that govern the operations of the computer and make the hardware operate.
b. A specialized program designed to make computing easier.
c. A computer program that allows other programs to interact with computer hardware.
d. A computer program that translates a high level language program into a machine language program at once.
e. A generalized set of programs that allow the computer to perform a specific data processing job for the user.

5. In your own words, briefly answer the following questions.

a. What is software? List the two categories of software.
b. What is a system software? List the different types of system software.
c. An operating system is a master controller of a computer system.
   i. State the three basic functions of an operating system.
   ii. Name any three popular operating systems developed by Microsoft Corporation.
d. What is utility software? Give examples.
e. What is a translator program? What are the three types of translator programs?
f. Define the following terms:
   i. Assembler
   ii. Compiler
   iii. Interpreter
g. What is a customized software? Give few examples of such software.
h. What is a packaged software? Give examples of a packaged software.

Objectives

After completing this chapter, you will be able to:

- Classify computer on the basis of working principle, size, brand, model and purpose.
- Describe analog, digital and hybrid computer.
- Describe Super, Mainframe, Mini and Microcomputer.
- Describe IBM PC, IBM Compatible, and Apple/Macintosh Computers.

5

Classification of Computer

Classification of Computers

A computer system is an electronic system capable of accepting and processing data in a fast, efficient and reliable manner. The different types of computers are in use today due to the continuing advances in computing technology. Computers are classified according to working principle, size, brand, model and purpose.

On the basis of Working Principle (Function)	On the basis of size and performance
- Analog Computer - Digital Computer - Hybrid computer	- Super computer - Mainframe computer - Mini Computer - Micro Computer
On the basis of Brand	**On the basis of Model**
- IBM PC - IBM Compatible PC - Apple/Macintosh computer	XT computer AT computer PS/2 computer
On the basis of Purpose(Use)	
- General purpose computer - Special purpose computer	

On the basis of Working Principle (Function)

Computers are broadly divided into three groups on the basis of computing techniques being used. These are analog, digital and hybrid computers.

Analog Computers

Analog computer is a machine having an electronic circuit designed to work on numerical data represented by some physical quantities (e.g. rotation or displacement) or electrical quantity (e.g. voltage or charge) which varies continuously. It works on the supply of continuous electrical signals and displays output in the form of readings on dials or graphs. It is a single problem oriented machine. They have been widely used in simulating the operation of aircraft, nuclear power plants and industrial chemical processes. Example of Analog computer is Presley

expanding your horizons

Tower model refers to a computer in which the power supply, motherboard, and mass storage devices are stacked on top of each other in a cabinet. This is in contrast to desktop models, in which these components are housed in a more compact box.

Examples of Analog devices are:

Thermometer	Automobile speedometer
	
An instrument for measuring and monitoring temperature of human body.	A device used to measure the travelling speed of a vehicle.

Digital Computers

Digital computer is an electronic computer in which the input is discrete rather than continuous, consisting of combinations of numbers, letters and other characters written in an appropriate programming language and represented internally in binary notation. These computers are multipurposed machines. They are used in business, banking system, engineering and many other fields. All modern general-purpose electronic computers are digital.

Examples:

IBM PC

Apple/Macintosh

Difference between Digital and Analog computer:

Digital computer	Analog computer
i. Digital computer works with digits.	i. Analog computer works with natural and physical values.
ii. It works upon discrete data	ii. It works upon continuous data
iii. It is general purpose machine	iii. It is special purpose computer
iv. Its accuracy is high	iv. Its accuracy is low
v. Desktop, laptop, etc. are the examples of digital computer.	v. Example of Analog computer is Presley.

Hybrid Computers

Hybrid computer is a computer which combines the best features of both analog and digital computers. The digital component normally serves as the controller and provides logical operations, while the analog component normally serves as a solver of differential equations. It is a special purpose machine. It can perform the tasks of an analog as well as digital computer.

It is generally used in scientific applications, aeroplanes and industrial control processes.
Characteristics of Hybrid computer:

- It is the combination of qualities of analog as well as digital computers.
- It can process both continuous and discrete data.
- It is the special purpose computer.
- It usually has high cost compared to analog and digital computer.

Purpose-wise digital computer

Purpose-wise digital computer is classified into two types. They are general purpose digital computers and special purpose digital computers.

i. General purpose digital computers

General purpose digital computers are the computers designed to meet the needs of many different users. They are used to perform various operations in fields of engineering, science, commerce and industry. They are able to perform according to the programs created to meet different needs. They are used to prepare sales reports, banking system, graphs and payroll.

ii. Special purpose digital computers

Special purpose digital computers are the computers designed for a specific task or a narrow range of tasks. These computers have limited memory and speed required for a particular job. The set of instructions required to perform particular task are incorporated into the internal memory of the computer. The common examples include the computer installed in automobiles to control fuel and braking system.

Brainstorming task

Complete each statement in the spaces provided.

a. Digital computer works with _____.
b. Analog computers work with _____ and _____ values.
c _____ computer combination of qualities of analog as well as digital computers.
d. _____ computers are the computers designed for a specific task or a narrow range of tasks.

Size and performance wise digital computers

Size and performance wise digital computers are classified into following types. They are supercomputer, mainframe computer, minicomputer and microcomputer.

Invention	Description

i. Supercomputer

Super computer are extremely powerful computers capable of manipulating huge amounts of data in a relatively short time. They are often housed in protective rooms with special cooling systems, power protection, and other security features. They have a large memory capacity and can perform complex scientific calculations

very rapidly. These machines have multiple processors, often functioning in parallel (simultaneously). The speed of a supercomputer is generally measured in "FLOPS" (FLoating Point Operations Per Second). Supercomputers are used primarily for scientific and engineering work. The examples of super computers are Blue Gene/L, NEC Earth Simulator and IBM ASCI White.

ii. Mainframe computer

Mainframe computers are the second largest, expensive and ultra-fast computers. They have a huge memory and extremely rapid processing power. They can support hundreds or thousands of connected users and execute many programs simultaneously. They act as the central host computer in distributed data processing systems. They are mainly employed in large organizations for various applications, including bulk data processing, process control, industry and consumer statistics, enterprise resource planning and financial transaction processing. The examples of mainframe computers are VAX 8842, CDC 6600 and IBM System z9.

iii. Minicomputer

Mini computers are a medium-scale built to perform complex computations. They have multiuser system where many users simultaneously work on the system. They have a slow operating speed, smaller backing storage, limited hardware and lesser memory capacity compared to a mainframe computer. They are used in medium sized organization for the processing of payrolls and financial accounts,

cost handling, sales analysis and production planning. They are commonly used as a server in network environment that handles the data-sharing needs of other computers on the network. The examples of minicomputers are PDP (Programmed Data Processor)-11, VAX (Virtual Address eXtension) 7500 and Interdata 8/32.

iv. Microcomputer

Micro computer is a small digital computer whose central processing unit consists of a microprocessor, a single semiconductor integrated circuit chip. It has a small memory and permits fewer peripherals to be attached. It has excellent graphic capabilities. It is designed for use by one person at a time but nowadays it has become a powerful tool for many businesses that, when networked together, can serve more than one user. It is designed for use in homes, schools and office settings. It is also called a personal computer. The two popular series of microcomputers are IBM PC and Apple Macintosh.

Wearable Computer

Wearable computer is a digital device that is either strapped to or carried on a user's body. It is composed of voice recognition, a head mounted display, wireless communications hardware and input device such as touchpad. It is used most often in research that focuses on behavioral modeling, health monitoring systems, IT and media development, where the person wearing the computer actually moves or is otherwise engaged with his or her surroundings. Poma and Timex Datalink are the examples of wearable computer.

Facts Corner

Tianhe-2 or TH-2 is a 33.86 petaflops supercomputer located in Sun Yat-sen University, Guangzhou. It is the world's fastest supercomputer according to the TOP500 list for June and November 2013.

In 1961, mathematician Edward O. Thorp designed the first modern-day wearable computer as an analog computer used to predict roulette wheels.

On the Basis of Brand

On the basis of brand Computers are classified into three groups they are:

i. IBM PC

IBM stands for the International Business Machine. It is one of the largest companies for manufacturing the computers. IBM PC is the original product of IBM Company. Each and every parts of IBM PC is manufactured from the IBM Company so it is also known as the "branded" or "original IBM PC". It is expensive, durable and IBM compatible PC.

ii. IBM compatible PC

IBM compatible PC is the duplicate form of IBM PC. This computer is developed by the companies other than IBM Company but uses the parts and principles of IBM. The examples of IBM compatible PC are HP, ACER, EPSON and DELL etc

iii. Apple/Macintosh Computer

Apple/Macintosh Computer is also known as Mac computer is developed by Apple Corporation. This company was established in 1976s. The internal architecture of these computers is totally different from the IBM. They have their own software.

On the basis of Model

On the basis of model, computers are classified into:

i. XT Computer

XT stands for extra or extended technology. It is the old technology model computer. It supports CUI (Character User Interface). Input/output devices were not flexible and very slow in processing. Processor like Intel 8080, 8086 etc were used.

ii. AT Computer

AT stands for Advanced Technology. It is advanced form of XT computer and can support both GUI (Graphical User Interface) and CUI. It uses a medium speed processor like 80286,80386, Pentium I, Pentium II etc.

iii. PS/2 Computer

It stands for personal system-2.It is the latest model of computer used in laptops with rechargeable and battery operated system with faster and flexible input/output devices.

Project Work

1. *Collect the figure of different types of computer based on size and identify the computers used in your school.*

Tricky Terms

Analog Computers : These computers are used for measuring purpose.

Digital Computers : These computers works with digits. Only two digits i.e. 0 and 1 are used to represent OFF and ON.

Hybrid Computers : These are the combine form of Analog and Digital computer.

Super Computers : Super computers are extremely powerful computers capable of manipulating huge amounts of data in a relatively short time.

Let Us Revise

- A computer system is an electronic machine capable of accepting and processing data in a fast, efficient and reliable manner.
- Analog Computer works on the supply of continuous electrical signals and displays output in the form of readings on dials or graphs.
- Hybrid computer is a computer which combines the best features of both analog and digital computers.
- Purpose-wise digital computer is classified into two types.
- Size and performance wise digital computers are classified into four types.
- Super computers are extremely powerful computers capable of manipulating huge amounts of data in a relatively short time.
- Mainframe computers are the second largest, expensive and ultra-fast computers.
- Micro computers is a small digital computer whose central processing unit consists of a microprocessor, a single semiconductor integrated circuit chip.
- Wearable computer is a digital device that is either strapped to or carried on a user's body.

Solved Exercises

1. *How are computers classified into different types?*

Ans: Computers are classified according to working principle, size, brand and purpose.

2. *What are the classifications of computer on the basis of working principle?*

Ans: The classifications of computer on the basis of working principle are:

i. Analog computer

Analog computers are special purpose computers which are designed to measure the continuous physical values such as speed, pressure, humanity, temperature, etc.

ii. Digital Computer

Digital computers are general purpose computers which work on binary digits by accepting discontinuous data.

iii. Hybrid Computer

Hybrid computer is a computer which combines the best features of both analog and digital computers.

3. *List the characteristics of hybrid computer.*

Ans: The characteristics of hybrid computer are:

- It is the combination of qualities of analog as well as digital computers.
- It can process both continuous and discrete data.
- It is the special purpose computer.
- It usually has high cost compared to analog and digital computer.

4. *What are the types of digital computer based on size and performance?*

Ans: The types of digital computer based on size and performance are:

i. Super Computer ii. Mainframe Computer

iii. Mini computer iv. Micro Computer

5. *Write down the difference between IBM PC and IBM Compatible computer.*

Ans: The differences between IBM PC and IBM Compatible computer are given in table below:

IBM PC	IBM Compatible
i. IBM Computer is developed by IBM company itself.	i. IBM Compatibe computer is developed by the company other than IBM but based on the principle developed by IBM.
ii. It is generally called "branded" or "original PC".	ii. It is generally called as assembled or duplicate PC.
iii. It is generally expensive.	iii. It is generally cheaper.

Chapter Review

1. State whether the following statements are true or false. Rewrite each false statement to make it a true statement.

a. Micro computers are digital computer.
b. Laptop computers are not portable computer.
c. All the computers are general purpose computer.
d. Hybrid computer is used in hospital.
e. Super computer is very slow in processing as compared with microcomputer.

2. Match the following.

Column A	Column B
Hybrid Computer	These computers are used for measuring purpose.
Super Computer	These computers work with digits. Only two digits i.e. 0 and 1 are used to represent OFF and ON.
Analog Computer	Combine form of Analog and Digital computer.
Digital Computer	Super computers are extremely powerful computers capable of manipulating huge amounts of data in a relatively short time.

3. Select the best answer from the list of choices.

a. IBM b. PDP c. VAX d. PC e. FLOPS

4. Give the appropriate technical term for each of the following statements.

a. The computer which posses continuous data
b. The device which converts analog signal to digital and vice versa.
c. The computers that uses microprocessor as their CPU.
d. The computers which are used in school for general purpose.
e. The very powerful computer.
f. The digital device that is either strapped to or carried on a user's body.

5. In your own words, briefly answer the following questions.

a. What is analog computer? How does it differ from digital computer?
b. What is hybrid computer? Write any 3 characteristics of hybrid computer.
c. What is super computer?
d. Write the difference between super and micro computer.
e. List the different types of micro computer.
f. What are main frame computers? Where are they mainly used?
g. What is wearable computer?
h. Classify the computer on the basis of size.

Objectives

After completing this chapter, you will be able to:

- Discuss the major functions of operating system.
- Define Windows 7 and eplain the different components of Windows 7 desktop.
- Define window and explain its components.
- Explain the concept of files and folders in Windows 7
- Explain the files and folders management in Windows.

6 Operating System Concepts

Introduction

Every general-purpose computer must have an operating system to run other programs. It is the core software component of a computer. It is software, consisting of programs and data, that runs on computers, manages computer hardware resources, and provides common services for execution of various application software. It acts as an interface between the hardware and the user or an application program. Without it, the computer system cannot function. It is also called an "executive" or a "supervisor". The most popular operating systems used on personal computers are Microsoft Windows, Mac OS X, GNU/Linux and Unix.

Some of the important functions are listed below:

- Provides the instructions to display the on-screen elements with which you interact. Collectively, these elements are known as the user interface.
- Loads programs (such as word processing and spreadsheet programs) into the computer's memory so that you can use them.
- Controls the flow of data into and out of the computer, as well as to and from peripheral devices.
- Responsible for managing the data stored on the secondary storage.
- Provides security by preventing unauthorized access to the computer's resources.

expanding your horizons

Windows 8 is a personal computer operating system developed by Microsoft as part of Windows NT family of operating systems. The operating system was released to manufacturing on August 1, 2012, and was released for general availability on October 26, 2012.

Windows 7

Windows 7 is an operating system that was produced by Microsoft for use on personal computers. It is a GUI-style operating system produced by US-based Microsoft, the world's largest software company. It is the operating system designed for businesses of all sizes and for advanced home computing. Windows 7 made its official debut to the public on October 22, 2009.

It provides the following advantages:

- It is easier for a new user to learn and use the computer.
- It has the ability to run more than one program at the same time on the same computer.
- It manages computer's memory and storage, enhancing their performance and extending their capabilities.
- It enables to exchange information between different applications.

Facts Corner *Windows 8 is a personal computer operating system developed by Microsoft as part of Windows NT family of operating systems.*

Windows Desktop

The Windows Desktop is the opening screen for Windows and is the place where you begin your work using the computer. It is called the Desktop because windows uses your whole screen in a way that is similar to the way you use the top of your desk. The different components of Windows 7 Desktop are listed below:

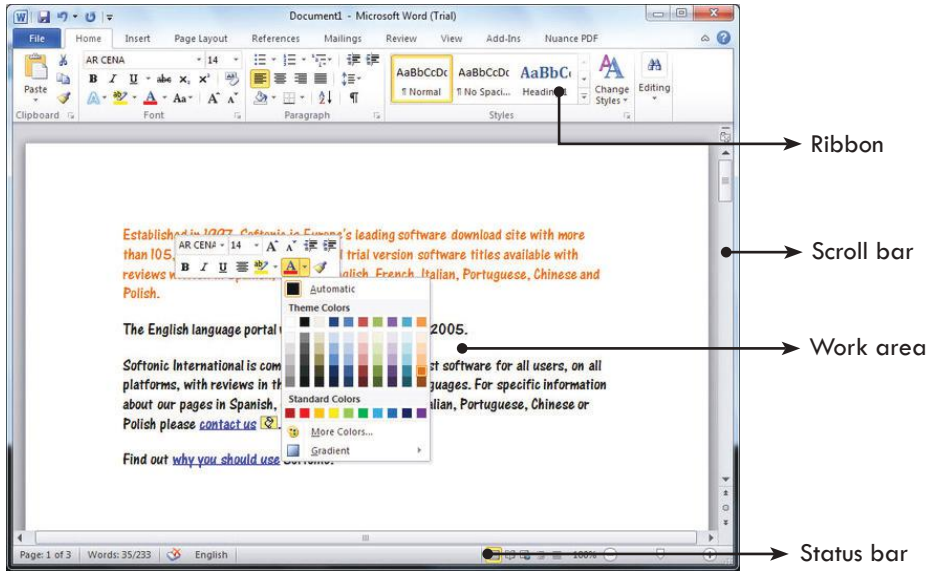
The different components of Windows Desktop are listed below:

Components of the Desktop	Explanation
Icons	Small pictures that represent commands and programs in Windows.
Taskbar	The bar at the bottom of the Windows screen where active applications appear along with the system clock.
Start button	The button at the left of the taskbar that allows you to open or to use several other Windows programs.

Window and its Elements

Window is an enclosed, rectangular area on a display screen. Most modern operating systems and applications have GUI that let you divide your display into several windows. Within each window, you can run a different program or display different data.

Windows are particularly valuable in multitasking environments, which allow you to execute several programs at once. By dividing your display into windows, you can see the output from all the programs at the same time. To enter input into a program, you simply click on the desired window to make it the foreground process



Mouse Pointer

The mouse cursor, or mouse arrow, or mouse pointer is often shaped like an arrow or a small hand with the index finger pointing towards the top of the display device. The mouse pointer moves as the user moves his or her mouse and is used as a reference point to where the mouse is located on the display screen. Where the mouse pointer is located on the screen can determine how and where the user can press a button on the mouse to input text or execute a command. The default mouse pointer on a computer usually is shaped like an arrow or a hand. Graphical user interfaces employ arrows to indicate a mouse's position on the display screen.

Facts Corner *GUI (pronounced GOO-ee) is a program interface that takes advantage of the computer's graphics capabilities to make the program easier to use.*

Concept of File

A file is a complete, named collection of information, such as a program, a set of data used by a program, or a user created document. It is the basic unit of storage that enables a computer to distinguish one set of information from another. A file is the "glue" that binds a conglomeration of instructions, numbers, words, or images into a coherent unit that a user can retrieve, change, delete, save or send to an output device.

Each file on a disk has a name. This name has two parts: a filename and an extension.

- Filename is the identifier of a file on a disk.
- Extension is a set of characters added to a filename that serves to extend or clarify its meaning or to identify a file as a member of a category. computer as per your requirement.

The different types of files with their extensions are discussed below:

File Types	Explanation
Text File (.txt)	The .txt is the file extension that indicates ASCII text files. In most cases, a document with a .txt extension does not include any formatting commands, so it is readable in any text editor or word processing program.
Executable File (.exe)	The .exe is the file extension that indicates an executable program. To run an executable program, the user types the filename without the .exe extension at the prompt and presses Enter.
Backup File (.bak)	The .bak is the file extension used in a backup file. This indicates that the file has the contents of the named file and is created as a separate copy for safety purpose. In case the original file is deleted or gets corrupted, you can open the backup file.
Help File (.hlp)	The .hlp is the help file that contains information to provide help to the user in learning the specific command displayed by a software.
Batch File (.bat)	The .bat is the file extension that indicates a batch program file. In MS-DOS, .bat files are executable files that contain calls to other program files.
System File (.sys)	The .sys is the file extension for system configuration files.

Concept of Folder or Directory

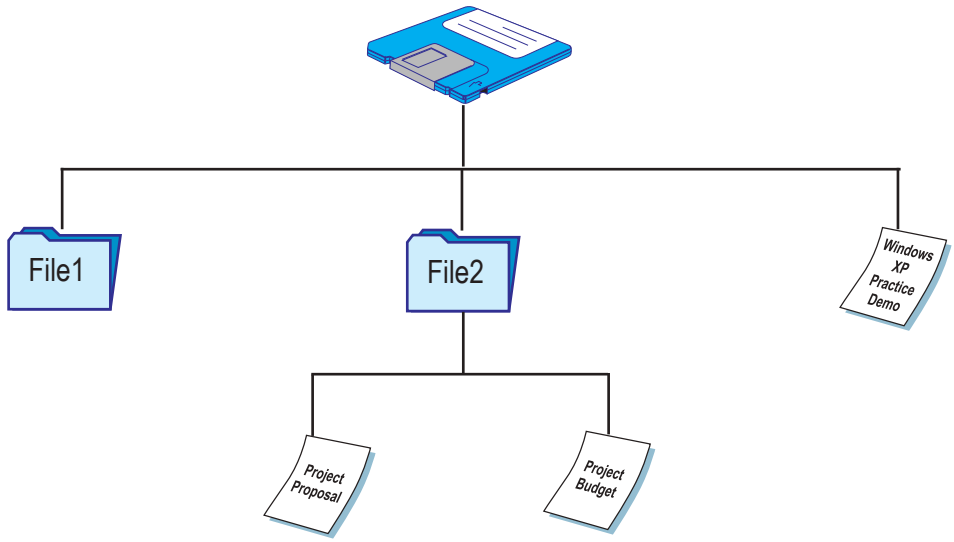
In computing, a directory, also referred to as a folder is a virtual container within a digital file system, in which groups of computer files and possibly other directories can be kept and organized.

Files are kept organized by storing related files in the same directory. In a hierarchical filesystem (that is, one in which files and directories are organized in a manner that resembles an inverted tree), a directory contained inside another directory is called a subdirectory. The terms parent and child are often used to describe the relationship between a subdirectory and the directory in which it is cataloged, the latter being the parent. The top-most directory in such a filesystem, which does not have a parent of its own, is called the root directory. The directory the user is in, at any point of time, is called the working directory.

Directory Structure

The directory structure is the organization of files into a hierarchy of folders. It should be stable and scalable; it should not fundamentally change, only be added to. Computers have used the folder metaphor for decades as a way to help users keep track of where something can be found.

Folders are very limited as an organizational structure, however. There must be one top-level organizational construct, which can only be subdivided in a limited way before the system becomes too cumbersome and breaks down. Which is most important to divide by: date, client, project, subject matter, rating, or usage?

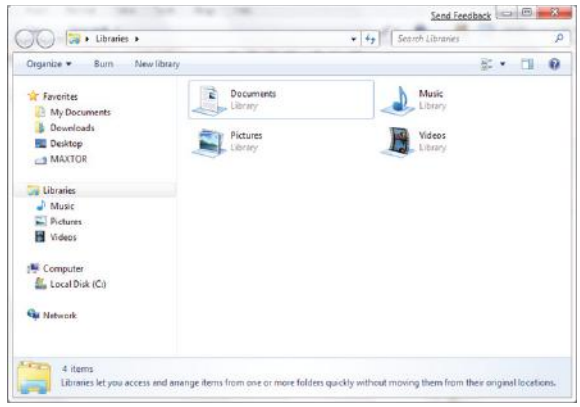


Windows Explorer

Windows Explorer is an application program included with Windows 7. It allows you to efficiently manage files and folders present in the computer's disk and view the contents of the computer. It is divided vertically into two sections. The left side displays the disk drives and folders in the form of a folder tree and the right side displays folders and files you have chosen from the left pane.

To view files using Windows Explorer, do the following:

1. Click on the Start button (or press CTRL+ESC) to see the Start menu.
2. Choose All Programs | Accessories | Windows Explorer.



3. Click the plus sign (+) next to the first folder that you want to investigate on the left side of the Windows Explorer window.
4. Keep clicking the plus signs until you arrive at the folder you are looking for.
5. Click the folder's name or icon to see its folders and files on the right side of the window. When you have found the folder you want, click a folder or file on the right side of the window and delete or copy or rename it.

Creating a New Folder

You can create a new folder to organize the information stored on your computer. Creating a folder is like placing a new folder in a filing cabinet. We can create a folder on the desktop so as to have quick and easy access to it.

To create a new folder, do the following:

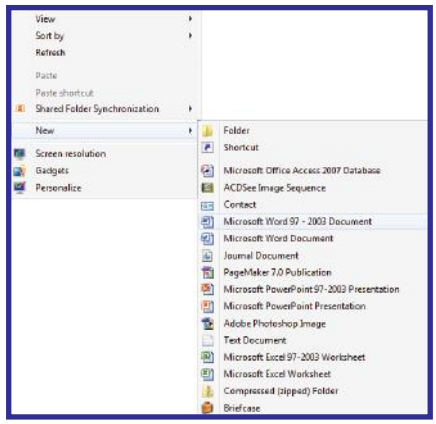
1. Right-click an empty area of the desktop. A menu appears:
2. Click on New.
3. Click on Folder on the submenu. Type a name for the new folder and then press Enter key.

Creating a file

A file is a collection of related records of data. You can instantly create, name and store a new file in the location you want.

To create a file, do the following:

1. Right-click an empty area on the desktop. A menu appears:
2. Click on New.



3. Click on the type of the file that you want to create. Type a name for the new file and then press Enter key.

Renaming a File or Folder

Windows 7 allows you to give a file/folder a new name to better describe the contents of the file. Renaming a file/folder can make the file easier to find.

To rename files and folders, do the following:

1. Right-click the file/folder which you want to rename. A menu appears:
2. Click Rename on the shortcut menu.
3. Type a new name for the file or folder.
4. Press Enter key.

Moving or Copying Files or Folders

Windows 7 offers different techniques for copying and moving files and folders stored on your computer to new locations. The most common techniques are menu command, and drag and drop.

To move or copy files and folders, do the following:

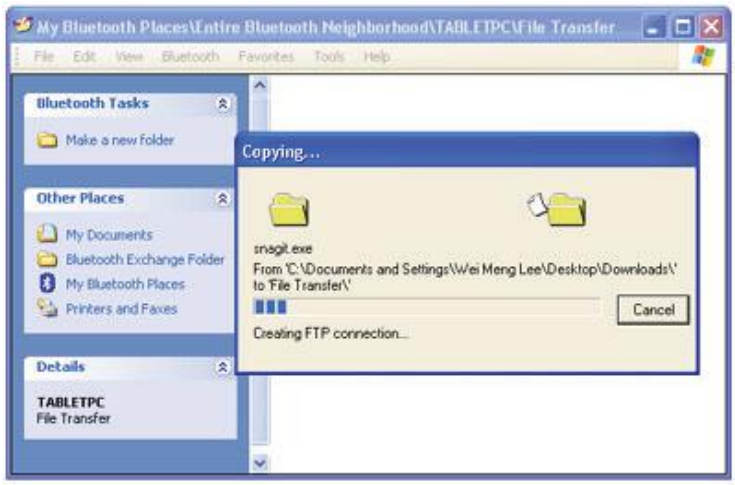
1. Right-click the file/folder which you want to move or copy.

2. Click Cut on the shortcut menu to move the files or folders.

Or

Click Copy on the shortcut menu to copy the files or folders.

3. Display and double click the folder that is to receive the files or folders.
4. Right-click and then select Paste on the shortcut menu.

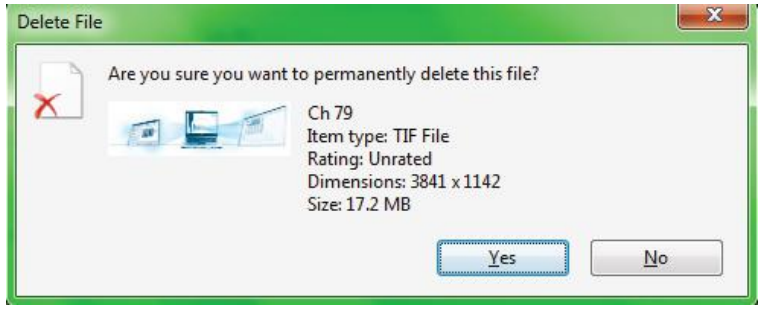


Deleting Files and Folders

Windows 7 allows you to delete files or folders that you no longer need. There are many ways to delete files and folders from My Computer and Windows Explorer windows, as well as from the Windows 7 desktop.

To delete files or folders, do the following:

1. Select the file or folder that you want to delete.
2. Press the Delete key. The Confirm File Delete dialog box appears.



3. Click Yes to delete the file. The file disappears.

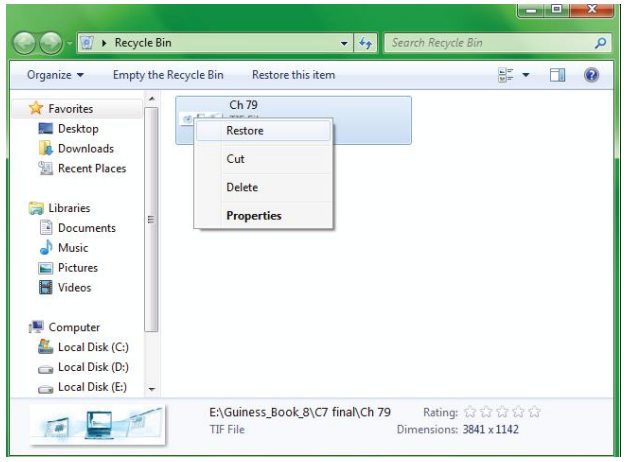
Windows places the file in the Recycle Bin in case you later want to restore the file.

Restoring or Emptying a Deleted Files and Folders

The Recycle Bin stores all the files you have deleted. Except for files deleted from removable disks, such as removable disks, Windows stores items you delete in the Recycle Bin, where they can be restored to their original locations, if needed.

To restore files or folders, do the following:

1. Double-click the Recycle Bin on the desktop. The Recycle Bin opens.
2. Examine the files and folders that you want to restore.
3. Select the files and folders you want to restore.



4. Right-click an item you've selected and choose Restore from the shortcut menu. The items you restore will be placed in the same old folders.

To empty the Recycle Bin, do the following:

1. Right-click the Recycle Bin icon on the desktop.
2. Choose Empty Recycle Bin from the shortcut menu.

Brainstorming task

Complete each statement in the spaces provided.

a. The_____is the master control program that manages the resources of the computer system and its overall operations.

b. _____is a type of operating system that allows only one user to run one program at a time.

c. _____is the process of starting or resetting a computer.

Tricky Terms

Operating System	A set of system programs that control and coordinate the operation of a computer system.
Desktop	An on-screen work area that uses icons and menus to simulate the top of a desk.
Windows 7	An operating system that is produced by Microsoft for use on personal computers.
Icon	A representation of an element in Windows.
Window	A rectangular area on the screen that contains its own data.
Taskbar	A long horizontal bar located at the bottom of the screen when you start Windows for the first time.

Let Us Revise

- Operating system is software, consisting of programs and data, that runs on computers, manages computer hardware resources, and provides common services for execution of various application software.
- Windows 7 is an operating system that was produced by Microsoft for use on personal computers, including home and business desktops, laptops and media centers.
- Windows 7 Desktop is the main background area on a Windows screen where you start the work.
- An icon is a graphic image, a small picture or object that represents a file, program, web page, or command.
- Taskbar is a long horizontal bar located at the bottom of the screen when you start Windows for the first time.
- A mouse pointer, or a cursor, is a visible indicator displayed on a computer screen.
- A file is a complete, named collection of information, such as a program, a set of data used by a program, or a user created document.
- In computing, a directory, also referred to as a folder is a virtual container within a digital file system, in which groups of computer files and possibly other directories can be kept and organized.
- Windows stores items you delete in the Recycle Bin, where they can be restored to their original locations, if needed.

Solved Exercises

1. *What is an operating system? What purpose does the operating serve to the computer and the user?*

Ans: *An operating system is a software that controls the operation of a computer, directs the input and output of data, keeps track of files, and controls the processing of computer programs. The operating system narrows the gap between the user and the computer by receiving and interpreting user's request and then getting the required work done through the hardware.*

2. *What is Microsoft Windows XP? What are the advantages of Microsoft Windows XP?*

Ans: *Windows XP is an operating system that is produced by Microsoft for use on personal computers, including home and business desktops, laptops, and media centers. It provides the following advantages:*

- *It is easier for a new user to learn and use the computer.*
- *It has the ability to run more than one program at the same time on the same computer.*
- *It manages computer's memory and storage, enhancing their performance and extending their capabilities.*
- *It enables to exchange information between different applications.*

3. *What is a desktop? What are the main elements of Windows desktop?*

Ans: *Desktop is an on-screen work area that uses icons and menus to simulate the top of a desk. The main elements of Windows desktop are: My Documents, My Computer, Recycle Bin and My Network Places.*

4. *What is an icon?*

Ans: *Icon is a graphical representation of an element in Windows, such as a disk drive, folders, application, documents and other computers.*

5. *What is a mouse pointer?*

Ans: *A mouse pointer on the screen is controlled by moving the device called mouse, which has one or more push-buttons that transmit instructions to the computer.*

6. *What is a Window?*

Ans: *Window is an enclosed, rectangular area on a display screen.*

7. *What is a file?*

Ans: *A file is a complete, named collection of information, such as a program, a set of data used by a program, or a user created document.*

8. *What is a folder?*

Ans: *In computing, a directory, also referred to as a folder is a virtual container within a digital file system, in which groups of computer files and possibly other directories can be kept and organized.*

Chapter Review

1. State whether the following statements are true or false.

a. Operating System is the core software component of a computer.

b. Taskbar is a graphic image, a small picture or object that represents a file, program, web page, or command.

c. Windows are particularly valuable in multitasking environments, which allow you to execute several programs at once.

d. The directory the user is in, at any point of time, is called the sub-directory.

e. Windows Explorer helps you to organize and control the files and folders of different storage systems on your computer.

2. Match the following.

Group A	*Group B*
Window	A set of system programs that control and coordinate the operation of a computer system.
Icon	An on-screen work area that uses icons and menus to simulate the top of a desk.
Desktop	A computer environment that simplifies the user's interaction with the computer by representing programs, commands, files, and other options as visual elements.
Graphical User Interface	A representation of an element in Windows.
Operating System	A rectangular area on the screen that contains its own data.

3. Select the best answer from the list of choices.

a. An _____ is a graphic image, a small picture or object that represents a file, program, web page, or command.

i. button ii. icon

iii. picture iv. None of the above

b. _____ is a system folder that displays and allows you to browse shared resources on other computers.

i. My Computer ii. My Documents

iii. My Network Places iv. None of the above

c. A _____ is a complete, named collection of information, such as a program, a set of data used by a program, or a user created document.

i. File ii. Directory

iii. Folder iv. None of the above

d. _____is the file management program that helps you to organize and control the files and folders of different storage systems on your computer.

i. Desktop ii. Screen Saver

iii. Windows Explorer iv. None of the above

4. Write the full form of the followings.

i.OS ii.GUI iii. CUI iv.DOS

5. Give an appropriate technical term for each of the following.

a. A software that consists of programs and data, that runs on computers, manages computer hardware resources, and provides common services for execution of various application software.

b. The main background area on a Windows screen where you start the work.

c. A small picture or object that represents a file, program, web page, or command.

d. A virtual container within a digital file system, in which groups of computer files and possibly other directories can be kept and organized.

e. A program that helps you to organize and control the files and folders of different storage systems on your computer.

6. In your own words, briefly answer the following questions.

a. What do you understand by the term operating system?

b. List any five advantages of Microsoft Windows XP.

c. What is Windows 7 desktop? Why is it called desktop?

d. What is an icon? List some of the icons present in Microsoft Windows 7 desktop.

e. What is a taskbar? What are the components of taskbar?

f. What is a window? What are the different elements of a window?

g. What is a file? What are the two parts of a file? Define each of them.

h. What is a folder?

i. What is a directory structure? Explain with the help of a diagram.

j. What is a windows explorer?

k. Write the steps to perform the following tasks.

i. Create a new folder

ii. Delete a file

Lab Exercises

Lab Exercise 1

a. Create two new folders on the desktop, one named "My School" and another named "Computer".

b. Use WordPad to create a letter inviting parents for the school essay competition, then save it as "Essay Competition" in the My School folder.

c. Use WordPad to create a new document that lists the five new hardware in computer technology, then save it as "Hardware" in the Computer folder.

d. Use Paint to create a simple logo for the school, save it as a "Logo.bmp", then place it in the My School folder.

e. Create new folder named "General" and copy all the files present in My School folder.

Lab Exercise 2

a. In My Document folder on your hard drive, create one folder named Personal files and a second named Work files.

b. Use MS-WORD to create a letter inviting parents for the school essay competition, then save it as Essay Competition in the Personal files folder.

c. Copy the Essay Competition letter from the Personal files folder to the Work folder. Rename the file "Invitation".

d. Copy both the folders "Personal files" and "Work files" to desktop.

e. Delete both the folders "Personal files" and "Work files".

f. Double-click Recycle Bin icon on the desktop.

g. See the details of the files that have been deleted.

h. Empty the Recycle Bin.

Lab Exercise 3

a. Change a Screen Saver with the following features:

   i. Text should be moving right to left of the screen.

   ii. Use Arial font, text size - 48, font style - Bold.

   iii. Background color - blue.

   iv. Wait period of 1 minute.

b. Change the wallpaper of the desktop to "Bubbles".

c. Set the screen saver to "3D FlowerBox (OpenGL)" and the waiting timings to five minutes.

Objectives

After completing this chapter, you will be able to:

- Define Word Processing and explain its advantages.
- Explain the different ways of applying character formatting.
- Define font and explain the steps to format font.
- Define indentation and explain the steps to indent paragraphs.
- Define table and explain how to create a table in a word document.

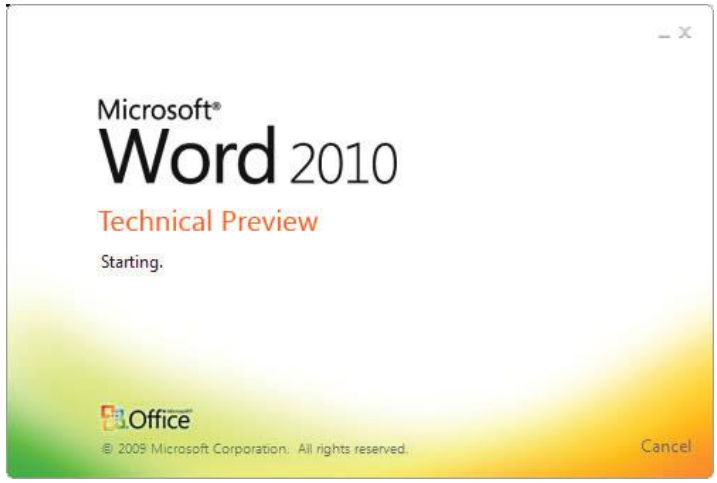
7

Microsoft Office Word 2010

Concept: Word Processing

Word processing software is one of the most widely used application software programs. Word processing is an application software that provides extensive tools to create, view, edit, format, store and print text materials for human communication. There are many word processing software packages available for use with personal computers. Some of the popular word processing software are Word Star, Word Perfect and Microsoft Word.

Microsoft Office Word 2010 is a full-featured word processing program that allows you to create professional looking documents. It is one of the products under the MS-Office packages developed by Microsoft Corporation, USA.



Microsoft Office Word 2010 has the following advantages:

- Word allows to edit a document.
- Word has many features that controls the appearance or format of the document.
- Word provides tools that enable you to create Web pages with ease.
- Word provides you with powerful desktop publishing tools to use as you create professional looking brochures, advertisements, and newsletters.
- The drawing tools in Word allows you to design impressive 3-D effects by including shadows, textures and curves.

expanding your horizons

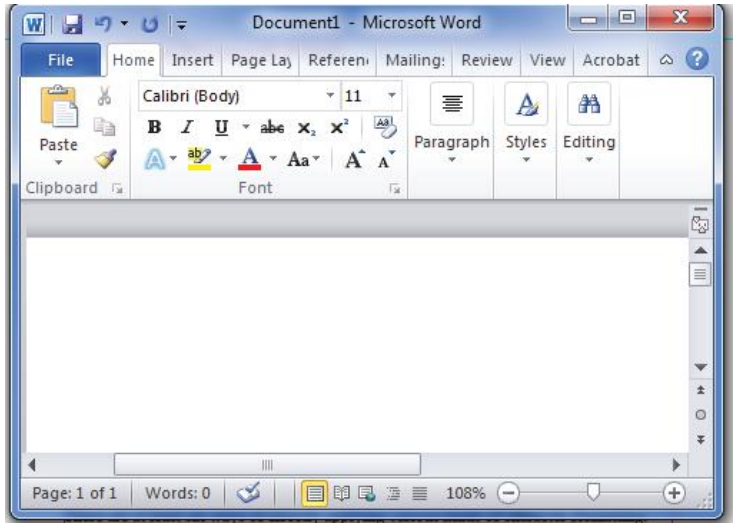
Microsoft Office 2013 (formerly Office 15) is a version of Microsoft Office, a productivity suite for Microsoft Windows. It is the successor of Microsoft Office 2010 and includes extended file format support, user interface updates and support for touch among its new features.

Launching Microsoft Word

Microsoft Word can be opened in the same way as you open any other office application.

To load Microsoft Word, follow these steps:

- Click on Start menu |Programs |Microsoft Office|Microsoft Office Word 2003. The Microsoft Word program window opens up with the components as shown below:



Character Formatting

There are at least six ways of directly applying various kinds of character formatting.

- Using the Font group on the Home tab of the Ribbon.
- Using the Font dialog box (CTRL+D or CTRL + SHIFT + F, or click the Font Dialog Box launcher).
- Using the Mini tool bar (hover the mouse over selected text)
- Using shortcut keys
- Using the Font groups or components placed on the Quick Access Toolbar (QAT)
- Using the Language tool on the status bar.

Formatting Techniques

To apply character formatting, you have three basic options:

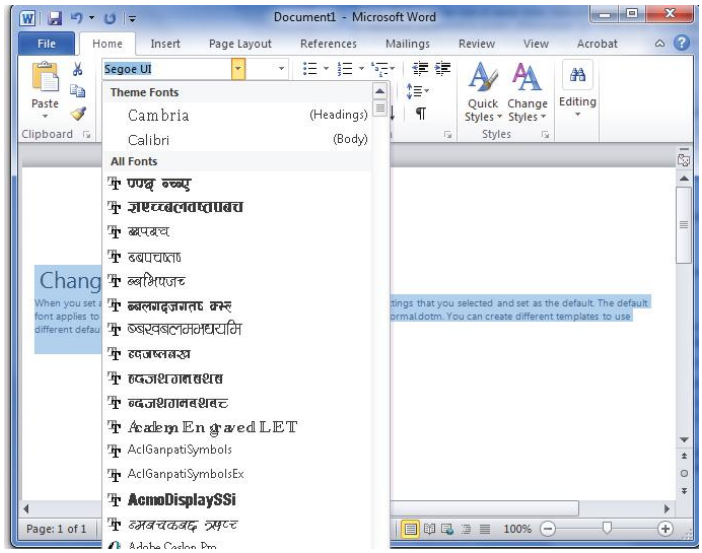
- Stream Method-Apply formatting before you start typing a word or passage, and then turn it off when you're done. For example, click the Bold tool, type a word, and then click the Bold tool again.
- Selection Method-Select the text you want to formatted and then apply the formatting.
- Whole-Word Method-Click anywhere in a word and then choose the desired formatting.

Formatting Font

A font, also commonly referred to as a typeface, is a set of characters with a specific design. Each font has one or more sizes. Size is the height and width of the character and is commonly measured in points, abbreviated "pt". One point equals about 1/72 inch, and the text in most documents is 10 pt or 12 pt. Microsoft Word provides a huge variety of fonts to improve the appearance of your document. The default font in Word is Times New Roman.

To format font, follow these steps:

1. Open an existing Word document or start a new document and type your text.
2. If you'd like to change a portion of the text to a different font, it will need to be selected or highlighted first. When the mouse pointer is moved over a text area, it will change from an arrow to a 'text select' or 'I-beam' icon.3.Move the mouse pointer over the various fonts. A live preview of the font will appear in the document.
3. Select your text so that it's highlighted.
4. To change the font style, click the arrow next to the font style in the ribbon at the top of your document.
5. Choose your font style from the drop-down list given.

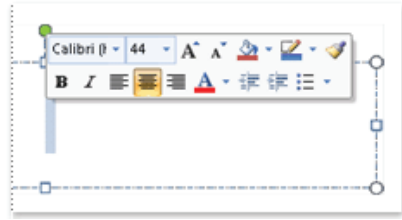


6. Next to the font style box is a box containing a number and an arrow. This changes the size of the font. Click on the arrow.
7. Choose the size of font from the drop-down list of options.
8. If you'd like the same size and style of font set up every time you start a new document, you can set a 'default font'. Click on the 'Font' arrow just above the main screen.

9. A dialogue box will pop up. In this, choose your font size and style from the options.
10. Click Set As Default in the bottom left-hand corner of the dialogue box.
11. Another dialogue box will pop up asking if you're sure you want to change the font for all Word documents. Click Yes. Now, whenever you open a new document in Word, the default font will be used.
12. If you want to change the default font in an earlier version of Word, click Format at the top of your document to open the 'Format' menu. Choose Font from the menu list. Then follow steps 9 to 11.

The MiniBar or Mini Toolbar in MS Word 2010

Another feature in Word 2010 is the MiniBar, more formally known as the Mini Toolbar. The MiniBar is a set of formatting tools that appears when you first select text. It is not context-sensitive, and always contains an identical set of formatting tools. There is no MiniBar for graphics and other non-text objects.



When you first select text, the MiniBar appears as a ghostly apparition. When you move the mouse pointer closer to it, it becomes more solid, as shown in Figure 1-13. If you move the mouse pointer far enough away from it, it fades away completely.

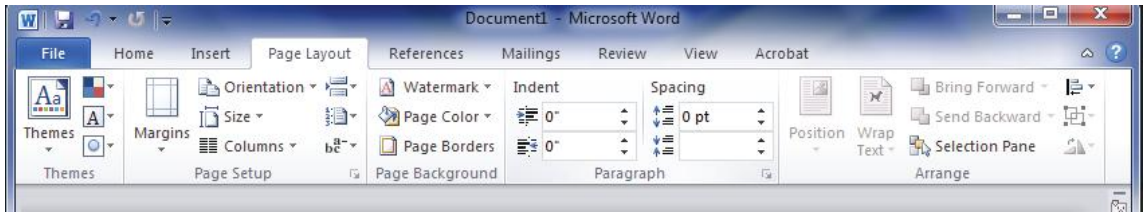
Character-Formatting Shortcut Keys

The table provides a quick reference of keyboard shortcuts related to character formatting.

Command	Keystroke
All Caps	Ctrl+Shift+A
Small Caps	Ctrl+Shift+K
Bold	Ctrl + B, Ctrl + Shift + B
Copy Formatting	Ctrl + Shift + C
Font Dialog box	Ctrl + D, Ctrl + Shift + F
Highlighting	Alt + Ctrl + H
Italics	Ctrl + I
Underline	Ctrl + B
Font Size	Ctrl + Shift + P

Formatting Paragraphs

Formatting paragraphs allows you to change the look of the overall document. You can access many of the tools of paragraph formatting by clicking the Page Layout Tab of the Ribbon or the Paragraph Group on the Home Tab of the Ribbon.



Indentation

Indentation is the distance between text boundaries and page margins. By default, a paragraph's left and right indents are set equal to the document's left and right margins. However, a document's left and/or right indents can be modified without changing the document's margins. There are four types of indent you can use to stylize your documents. They are:

First Line: Controls the left boundary for the first line of a paragraph

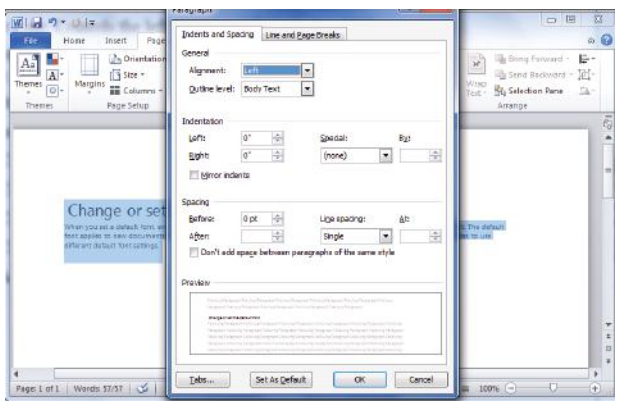
Hanging: Controls the left boundary of every line in a paragraph except the first one

Left: Controls the left boundary for every line in a paragraph

Right: Controls the right boundary for every line in a paragraph

To indent paragraphs, follow these steps:

1. Click the Indent buttons to control the indent.
2. Click the Indent button repeated times to increase the size of the indent.
3. Click the dialog box of the Paragraph Group
4. Click the Indents and Spacing Tab
5. Select your indents.

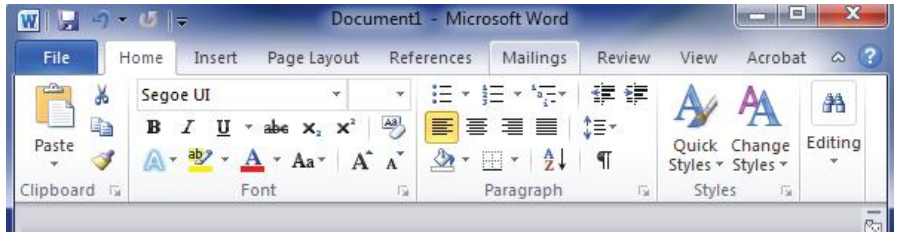


Paragraph Alignment

The paragraph alignment allows you to set how you want text to appear. Text starts out positioned evenly along the left margin, and uneven, or ragged, at the right margin. Left-aligned text works well for body paragraphs in most cases, but other alignments vary the look of a document and help lead the reader through the text. Right-aligned text, which is even along the right margin and ragged at the left margin, is good for adding a date to a letter. Justified text spreads text evenly between the margins, creating a clean, professional look, often used in newspapers and magazines. Centered text is best for titles and headings.

To change the alignment, follow these steps:

1. Click the Home Tab
2. Choose the appropriate button for alignment on the Paragraph Group.
3. Align Left: the text is aligned with your left margin
4. Center: The text is centered within your margins
5. Align Right: Aligns text with the right margin
6. Justify: Aligns text to both the left and right margins.



They can be set with CTRL+L, CTRL + R, CTRL + E and CTRL + J.

Changing the Line Spacing

Line spacing is the amount of white space between lines of text in a paragraph. It is measured in lines or in points. It is set to a single line spacing by default in Microsoft Word. The line spacing affects all lines of the text in the selected paragraph or the paragraph that contains the cursor.

To change the line spacing, follow these steps:

1. Select the paragraph or paragraphs you wish to change.
2. On the Home Tab, Click the Paragraph Dialog Box
3. Click the Indents and Spacing Tab
4. In the Spacing section, adjust your spacing accordingly

Paragraph Decoration

A second kind of paragraph formatting is something that might be termed paragraph decoration. This includes shading, boxes, bullets, and other semi-graphical elements that help the writer call attention to particular paragraphs, or that help the reader understand the text better.

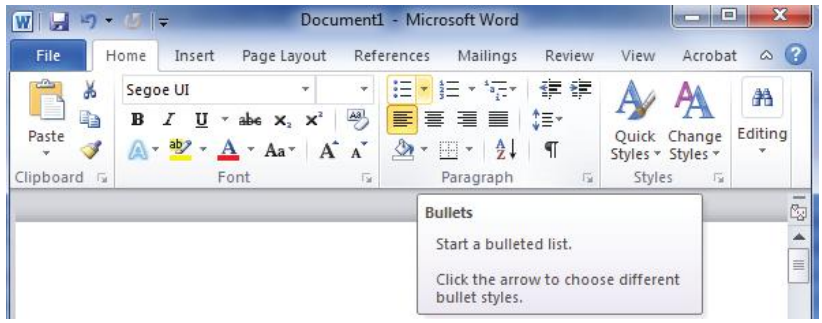
Changing a Bulleted and Numbered Lists

A bulleted list displays one of several styles of bullets before each item in the list. A numbered list displays numbers or letters before the text. Bulleted and numbered lists are used to organize information and to make your writing clear and easy to read. A list can be used whenever you present three or more related pieces of information. By default, Microsoft Word uses a simple black dot as a bullet.

To create a bulleted and numbered list, follow these steps:

1 Select the items that you want to add bullets or numbering to.

2. On the Home tab, in the Paragraph group, click Bullets or Numbering.



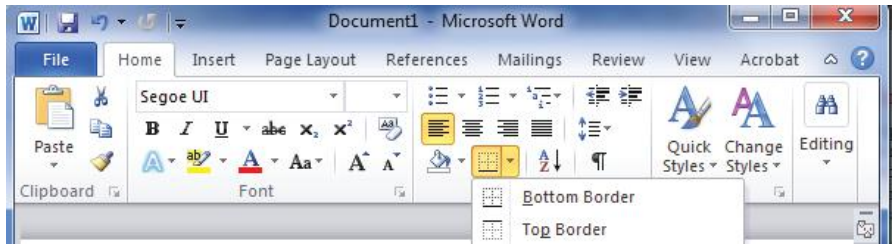
Adding Borders and Shading

Word lets you add borders and shading to the text in your document to make it look attractive. You can apply a border to selected text or to individual paragraphs. To surround a paragraph with a border, click anywhere in the paragraph. To surround only specific text, such as a word, with a border, select the text. By default, MS-Word applies a 1/2 pt (point) black solid line border around all table cells.

To add borders to text, follow these steps:

1. Select the text or paragraph to which you want to add border. You can use any of the text selection method to select the paragraph(s).

2. Click the Border Button to display a list of options to put a border around the selected text or paragraph. You can select any of the option available by simply clicking over it.



3. Add different borders like left, right top or bottom by selecting different options from the border options.
4. To delete the existing border, simply select No Border option from the border options.

Note

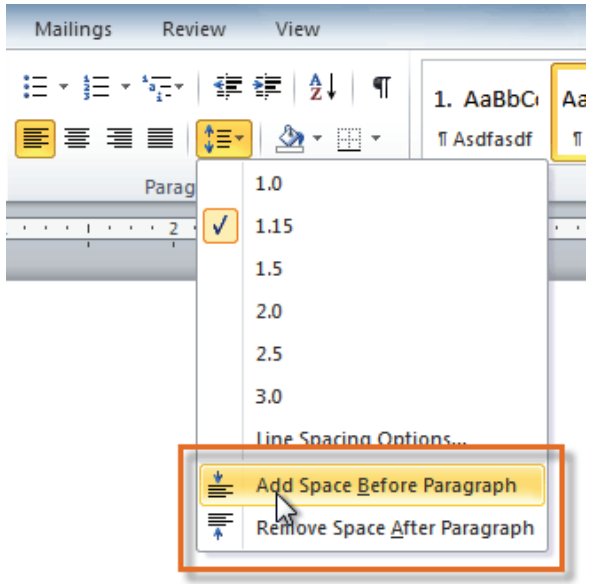
You can add a horizontal line by selecting Horizontal Line option from the border options.

Spacing between Paragraphs

The appearance of your documents improves if some blank spaces are left between the end of one paragraph and the start of the next. You can accomplish this by pressing Enter twice at the end of a paragraph. By using paragraph dialog box, you can have greater control over your paragraph spacing and save time, too.

To change spacing between paragraphs, follow these steps:

1. Click the Line and Paragraph Spacing command on the Home tab.
2. Select Add Space Before Paragraph or Remove Space After Paragraph from the drop-down menu.



Adding a Drop Cap

Drop cap is a large, uppercase character with the top part of the letter even with the line and the rest of the letter extending into the paragraph below it. The character is changed to a graphic object in a frame and the text wraps to the side of the object. The drop cap effect emphasizes the beginning of the paragraph and makes the columns appear more like those in a magazine.

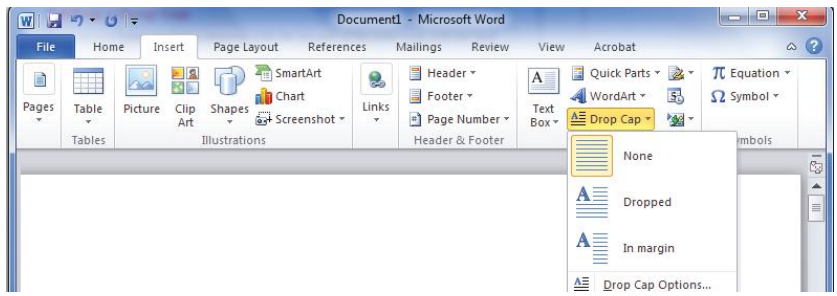
To add a drop cap, follow these steps:

1. Click in the paragraph that you want to begin with a drop cap.

   The paragraph must contain text.

2. On the Insert tab, in the Text group, click Drop Cap.

3. Click Dropped or In margin.



Changing the Case of Letters

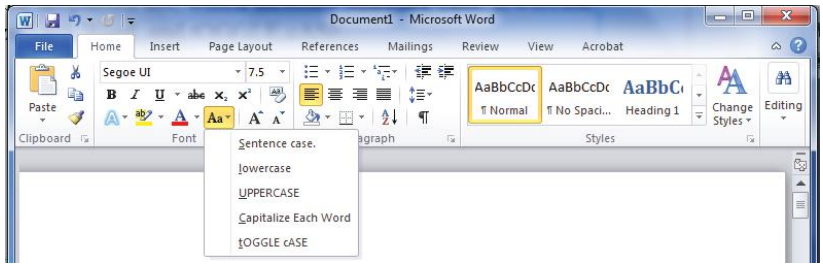
Microsoft Word provides facilities to change the case of the text in a document. There are five case options in Microsoft Word. They are: Sentence case, Lowercase, UPPERCASE, Title Case and tOGGLE cASE.

To change the case of letters, follow these steps:

1. Select the text that you want to change to a bold font. You can use any of the text selection method to select the text.

2. On the Home tab, in the Font group, click Change Case.

3. Choose an option from the dropdown list, which includes Sentence case, lowercase, UPPERCASE, Capitalize Each Word, and tOGGLE cASE.

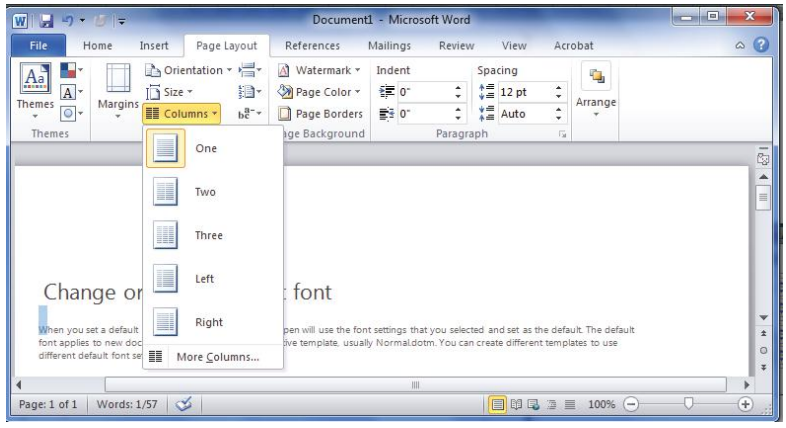


Add Columns to a Document

Columns can help to separate sections of your document and make them look more inviting to read. The length of a line of text inside the columns is shortened, therefore making it easier to read. Columns are a good way to separate sections of your document on one page. For example, when creating a newsletter or bulletin, columns will give a more professional look.

To add columns to a document, follow these steps:

1. Select the text you want formatted in columns, or place your cursor where you want columns to begin.
2. On the Page Layout tab, in the Page Setup group, click Columns.



3. Click More Columns.
4. Click the number of columns that you want.
5. In the Apply to list, click Selected text or This point forward.

Set Watermark

A watermark is a picture that shows up faintly behind the text on a word document page. When you drafting a document, you can watermark the document with Draft Copy stamp, or you can watermark a duplicate document with Duplicate stamp.

To set standard watermark, follow these steps:

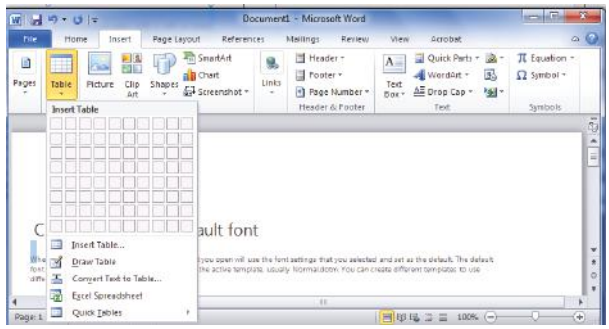
1. Open a word document in which you want to add a watermark.
2. Click the Page Layout tab and then click Watermark button to display a list of standard watermark options.
3. You can select any of the available standard watermarks by simply clicking over it. This will be applied to all the pages of the word. Assume we select Confidential watermark.

Creating a Table

A table is a structure of vertical columns and horizontal rows with a cell at every intersection. Each cell can contain text or graphics, and you can format the table in any way you want. Usually top row in the table is kept as a table header and can be used to put some informative instruction.

To create a table in a word document, follow these steps:

1. Click the Insert tab, and click Table button. This will display a simple grid. When you move your mouse over the grid cells, it makes a table in the table which appears in the document. You can make your table having desired number of rows and columns.
2. Click the square representing the lower-right corner of your table, which will create a actual table in your document and word goes in table design mode giving lots of options to work with table as shown below.



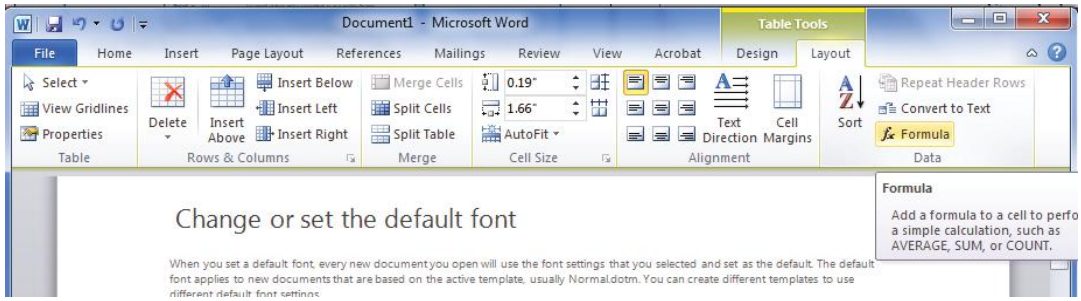
3. Click Table Styles button to display a gallery of table styles. When you move your mouse over any of the styles, it shows real time preview of your actual table.
4. To select any of the styles, just click over the built-in table style and you will see that selected style has been applied on your table.

Add Formula to a Table

Microsoft Word allows you to use mathematical formula in table cells which can be used to add numbers, to find average of numbers, or find the largest or smallest number in table cells you specify. There is a long list of formulas from which, a formula can be used based on the requirement.

To add formula to a table, follow these steps:

1. Consider the following table where we will have total of the rows. Click in a cell that should contain the sum of a rows.
2. Now click the Layout tab and then click Formula button which will display a Formula Dialog Box which will suggest a default formula, which is =SUM(LEFT) in our case. You can select a number format using Number Format List Box to display the result or you can change the formula using Formula List Box.



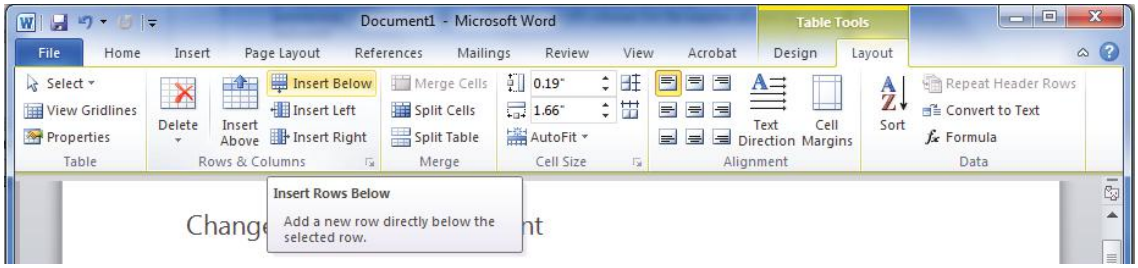
3. Now click OK to apply the formula and you will see that left cells have been added and its sum has been put in the total cell where we wanted to have it. You can repeat the procedure to have sum of other two rows as well.

Adding Row and Column

A table is a structure of vertical columns and horizontal rows with a cell at every intersection. A Word table can contain as many as 63 columns but the number of rows is unlimited.

To add row and column, follow these steps:

1. Click a row where you want to add an additional row and then click Layout tab to display the following screen.



2. Now use Row & Column group of buttons to add any row below or above to the selected row. If you click Insert Below button, it will add a row just below the selected row as follows.

   If you click Insert Above button, it will add a row just above the selected row.

3. Now use Row & Column group of buttons to add any column left or right to the selected column. If you click Insert Left button, it will add a column just left to the selected column as follows.

   If you click Insert Right button, it will add a column just right to the selected column.

Tricky Terms

Word processing	The use of a computer and specialized software to write, edit, format, print and save text.
Formatting	The process of enhancing the appearance of a document to make it more readable or attractive.
Indentation	The distance between text boundaries and page margins.
Line spacing	The amount of white space between lines of text in a paragraph.
Drop cap	A large, uppercase character with the top part of the letter even with the line and the rest of the letter extending into the paragraph below it.

Let Us Revise

- Word processing is an application software that provides extensive tools to create, view, edit, format, store and print text materials for human communication.
- A font, also commonly referred to as a typeface, is a set of characters with a specific design. Each font has one or more sizes.
- Indentation is the distance between text boundaries and page margins.
- The paragraph alignment allows you to set how you want text to appear.
- Line spacing is the amount of white space between lines of text in a paragraph.
- Word lets you add borders and shading to the text in your document to make it look attractive.
- Drop cap is a large, uppercase character with the top part of the letter even with the line and the rest of the letter extending into the paragraph below it.
- A watermark is a picture that shows up faintly behind the text on a word document page.
- A table is a structure of vertical columns and horizontal rows with a cell at every intersection.
- Microsoft Word allows you to use mathematical formula in table cells which can be used to add numbers, to find average of numbers, or find the largest or smallest number in table cells you specify.
- A Word table can contain as many as 63 columns but the number of rows is unlimited.

Solved Exercises

1. *What is word processing software? Give examples.*

Ans: *Word processing refers to the use of a computer and specialized software to write, edit, format, print, and save text. It has various functions that allow a person to revise text without retyping an entire document.*
Some of the popular word processing software are Word Star, Word Perfect and Microsoft Word.

2. *What are the advantages of Microsoft Office Word?*

Ans: *The advantages of Microsoft Office Word are listed below:*

- *Word allows to edit a document.*
- *Word has many features that controls the appearance or format of the document.*
- *Word provides tools that enable you to create Web pages with ease.*
- *Word provides you with powerful desktop publishing tools to use as you create professional looking brochures, advertisements, and newsletters.*
- *The drawing tools in Word allows you to design impressive 3-D effects by including shadows, textures and curves.*

3. *What is a font? What is the default font of MS-Word?*

Ans: *A font, also commonly referred to as a typeface, is a set of characters with a specific design. The default font in Word is Times New Roman.*

4. *What is a paragraph alignment? What are the four types of paragraph alignment?*

Ans: *Paragraph alignment refers to the way text is set with respect to the margins. There are four types of paragraph alignment style. These styles are: left alignment, right alignment, center alignment and justified.*

5. *What is indentation? What are the four types of indents you can use to stylize your document?*

Ans: *Indentation is the distance between text boundaries and page margins. There are four types of indent you can use to stylize your documents. They are: left, right, first line and hanging.*

6. *What is drop cap?*

Ans: *Drop cap is a large, uppercase character with the top part of the letter even with the line and the rest of the letter extending into the paragraph below it.*

7. *What is watermark?*

Ans: *A watermark is a picture that shows up faintly behind the text on a word document page.*

8. *What is line spacing? How is it measured?*

Ans: *Line spacing is the amount of white space between lines of text in a paragraph. It is measured in lines or in points.*

Chapter Review

1. State whether the following statements are true or false.

a. The default font in Word is Times New Roman.

b. First Line controls the left boundary of every line in a paragraph except the first one.

c. The line spacing affects all lines of the text in the selected paragraph or the paragraph that contains the cursor.

d. Tables can help to separate sections of your document and make them look more inviting to read.

e. Microsoft Word allows you to use mathematical formula in table cells which can be used to add numbers, to find average of numbers, or find the largest or smallest number in table cells you specify.

2. Match the following.

Group A	*Group B*
Font	A word processing feature that automatically determines where to end a line and wrap text to the next line.
Word wrap	A set of characters with a specific design.
Drop cap	The distance between text boundaries and page margins.
Line spacing	A large, uppercase character with the top part of the letter even with the line and the rest of the letter extending into the paragraph below it.
Indentation	The amount of white space between lines of text in a paragraph.

3. Select the best answer from the list of choices.

a. _____refers to the use of a computer and specialized software to write, edit, format, print, and save text.

i. Spreadsheet ii. Wordprocessing

iii. Presentation iv. None of the above

b. _____refers to the way text is set with respect to the margins.

i. Paragraph alignment ii. Indentation

iii. Line spacing iv. None of the above

c. _____allows you to specify a custom minimum line spacing in the At text box that can accommodate larger font sizes or graphics that would not otherwise fit within the specified spacing.

i. 1.5 lines ii. Double

iii. At least iv. None of the above

d. _____is a large, uppercase character with the top part of the letter even with the line and the rest of the letter extending into the paragraph below it.

i. Drop cap ii. Column

iii. Line Spacing iv. None of the above

4. Give an appropriate technical term for each of the following.

a. The use of a computer and specialized software to write, edit, format, print and save text.

b. A set of characters with a specific design.

c. A large, uppercase character with the top part of the letter even with the line and the rest of the letter extending into the paragraph below it.

d. A picture that shows up faintly behind the text on a word document page.

e. A structure of vertical columns and horizontal rows with a cell at every intersection.

5. Answer the following questions.

a. What is word processing? Name any three word processing software.

b. What is Microsoft Office Word? State any three advantages of Microsoft Office Word.

c. What is a font? What are the different font style options available in Microsoft Word?

d. What is indentation? Name the four types of indents.

e. What is meant by :

i. Paragraph alignment

ii. Line spacing

iii. Drop cap

f. What is a table? How do you create a table in a word document?

Lab Exercises

Lab Exercise 1

a. Start MS-Word.

b. Type in the following text given below:

Namaste

The traditional form of salutation in Nepal is called 'Namaste' or 'Namaskar'. The word Namaste comes from the Sanskrit language. Namaste could be an amalgam of Namsya (or Namaha) meaning obeisance and 'Te' which means you or to you. Thus Namaste as an amalgam of Namasyate could be translated as obeisance to youc. Correct any spelling or grammar errors.

c. Format the heading "Namaste" to 16 point bold and centered.

d. Format the entire document to the Arial black.

e. Format the important words of your text to italics.

f. Set the character spacing to expanded and check the effect.

g. Change the alignment as justified.

h. Change the line spacing into 1.5 lines.

i. Save the document as Lab1.

Lab Exercise 2

a. Start MS-Word.

The Power of Positive

All of our feelings, beliefs and knowledge are based on our internal thoughts, both conscious and subconscious. We can be positive or negative, enthusiastic or dull, active or passive. Our present attitudes are habits, built from the feedback of parents, friends, society and self, that form our self-image and our world-image.

b. Bold and center the title.

c. Change the title font to Arial (or a font of your choice), 16 pt.

d. Add a colour of your choice to the title text.

e. Format the entire document to the Courier New.

f. Copy and paste the paragraph into the document four times.

g. Format the first paragraph as left justified, second paragraph as right justified, third paragraph as centered and fourth paragraph as fully justified.

h. Insert any suitable clipart at the top of the page.

i. Add border and shading to the above heading.

j. Save the document as Lab2.

Objectives

After completing this chapter, you will be able to:

- Define an electronic spreadsheet and list out some of the popular spreadsheet software.
- List out some important advantages of Microsoft Excel.
- Define workbook and worksheet.
- Define cell and explain how to select cell.
- Explain how to use formula and function in Microsoft Excel.
- Explain how to create chart in Microsoft Excel.

8

Microsoft Office Excel 2010

Concept: Spreadsheet Software

An electronic sheet is a 'soft' document that organizes information into columns and rows that are defined by a software. The data provided can be added up using formulas provided to obtain a total sum. The electronic sheet is able to summarize content that is obtained from many sources in one area and present it in a given format. The popular electronic spreadsheet software are LOTUS 1-2-3, Quattropro and Microsoft Excel.

Microsoft Excel 2010 is an electronic spreadsheet program that can be used for storing, organizing and manipulating data. Microsoft Excel is developed by Microsoft Corporation for computers using the Microsoft Windows operating system. It is a part of the suite of Office package. The current versions are 2013 for Windows.

Microsoft Office Excel has the following advantages:

- Create budgets, analyze survey results, and perform just about any type of financial analysis you can think of.
- Create a wide variety of highly customizable charts.
- Use the row and column layout to store lists efficiently.
- Import data from a wide variety of sources.
- Summarize a large amount of business information in a concise format.

expanding your horizons

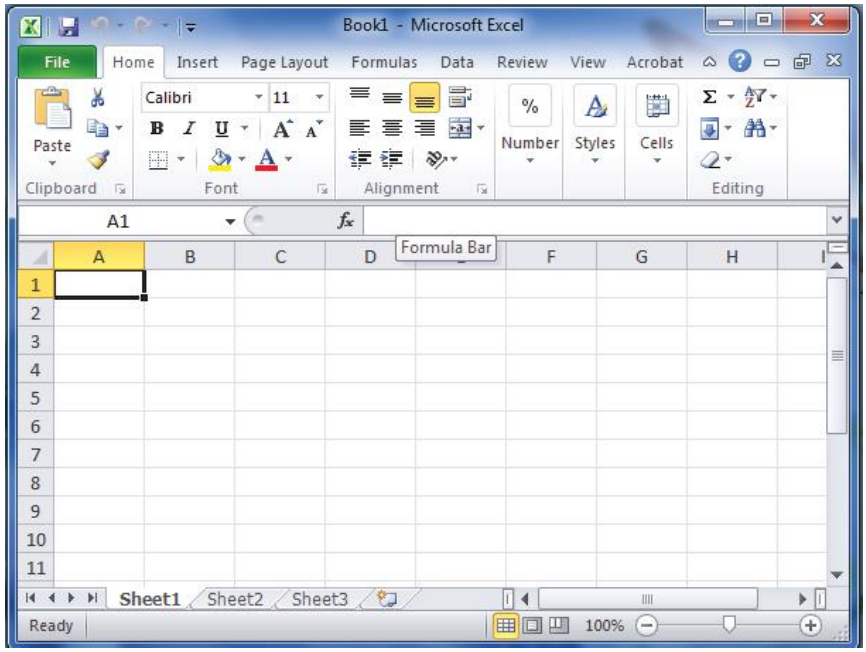
VisiCalc was the first spreadsheet computer program, originally released for the Apple II. It is often considered the application that turned the microcomputer from a hobby for computer enthusiasts into a serious business tool, and is considered the Apple II's killer app. Dan Bricklin and Bob Frankston invented VisiCalc.

What's New in Excel 2010?

Excel is a spreadsheet program that allows you to store, organize, and analyze information. Microsoft Office Excel 2010 provides several methods for starting and exiting the program. You can open Excel by using the Start menu or a desktop shortcut. When you want to exit Excel, you can do so by using the File tab, the Close button, or a keyboard shortcut.

To starting Excel 2010 from the Start menu, do the following:

To start Excel 2010 from the Windows Start menu, choose Start→All Programs→Microsoft Office→Microsoft Excel 2010. A new, blank workbook appears, ready for you to enter data.



Exiting Excel 2010

When you're ready to quit Excel, you have several choices for shutting down the program:

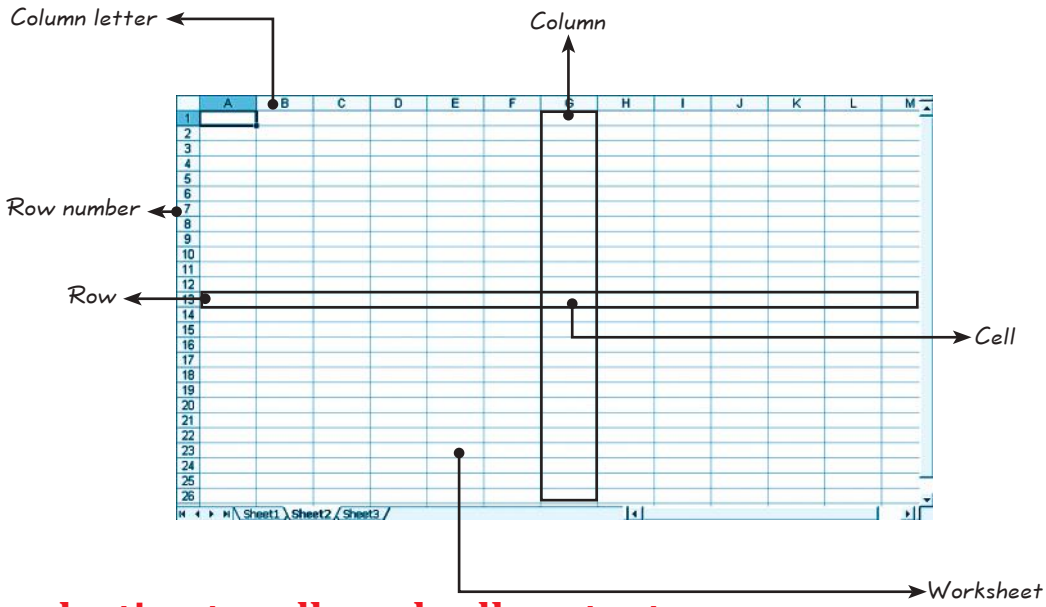
- Choose File→Exit.
- Press Alt+F4.
- Click the Close button (the X) in the upper-right corner of the Excel 2010 program window.

If you try to exit Excel after working on a workbook and you haven't saved your latest changes, Excel displays an alert box asking whether you want to save your changes. To save your changes before exiting, click the Save button. If you don't want to save your changes, click Don't Save.

Understanding Workbooks and Worksheets

The work you do in Excel is performed in a workbook file, which appears in its own window. You can have as many workbooks open as you need. By default, Excel 2010 use an .xlsx file extension.

Each workbook comprises one or more worksheets, and each worksheet is made up of individual cells. Each cell contains a value, a formula, or text. A worksheet also has an invisible draw layer, which holds charts, images, or diagrams. Each worksheet in a workbook is accessible by clicking the tab at the bottom of the workbook window. In addition, workbooks can store chart sheets. A chart sheet displays a single chart and is also accessible by clicking a tab.



Introduction to cells and cell content

Cells are the basic building blocks of a worksheet. Cells can contain a variety of content such as text, formatting attributes, formulas, and functions. To work with cells, you'll need to know how to select them, insert content, and delete cells and cell content.

The cell

Each rectangle in a worksheet is called a cell. A cell is the intersection of a row and a column. Each cell has a name, or a cell address based on which column and row it intersects. The cell address of a selected cell appears in the Name box. Here you can see that C5 is selected. You can also select multiple cells at the same time. A group of cells is known as a cell range. Rather than a single cell address, you will refer to a cell range using the cell addresses of the first and last cells in the cell range, separated by a colon. For example, a cell range that included cells A1, A2, A3, A4, and A5 would be written as A1:A5.

To select a cell:

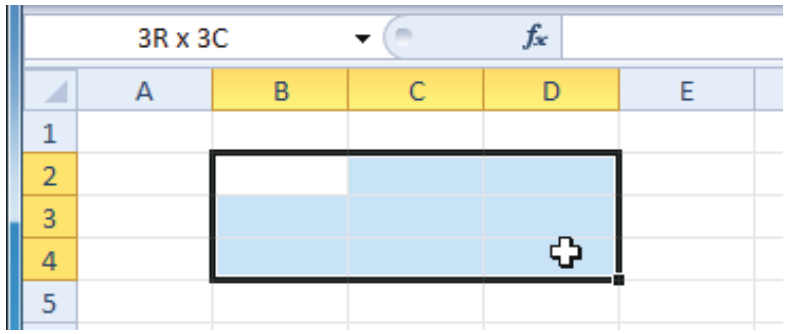
1 Click on a cell to select it. When a cell is selected, you will notice that the borders of the cell appear bold and the column heading and row heading of the cell are highlighted.

2. Release your mouse. The cell will stay selected until you click on another cell in the worksheet.

   You can also navigate through your worksheet and select a cell by using the arrow keys on your keyboard.

To select multiple cells:

1. Click and drag your mouse until all of the adjoining cells you want are highlighted.



2. Release your mouse. The cells will stay selected until you click on another cell in the worksheet.

Cell content

Each cell can contain its own text, formatting, comments, formulas, and functions.

Text

Cells can contain letters, numbers, and dates.

Formatting attributes

Cells can contain formatting attributes that change the way letters, numbers, and dates are displayed. For example, dates can be formatted as MM/DD/YYYY or M/D/YYYY.

Comments

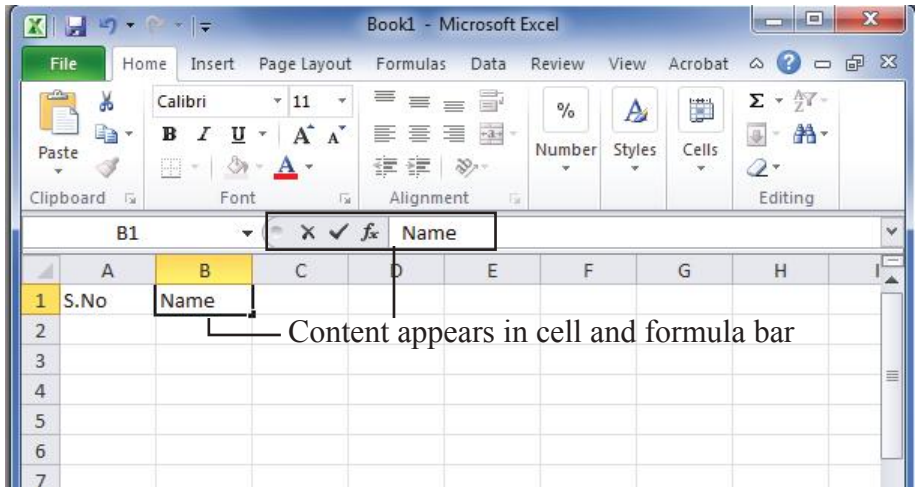
Cells can contain comments from multiple reviewers.

Formulas and functions

Cells can contain formulas and functions that calculate cell values. For example, SUM(cell 1, cell 2...) is a formula that can add the values in multiple cells.

To insert content:

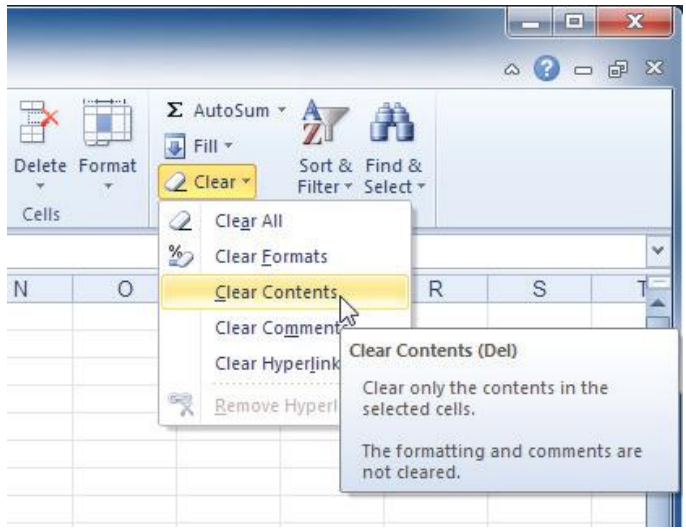
1. Click on a cell to select it.
2. Enter content into the selected cell using your keyboard. The content appears in the cell and in the formula bar. You also can enter or edit cell content from the formula bar.



To delete content within cells:

1. Select the cells containing content you want to delete.
2. Click the Clear command on the Ribbon. A dialog box will appear.
3. Select Clear Contents.

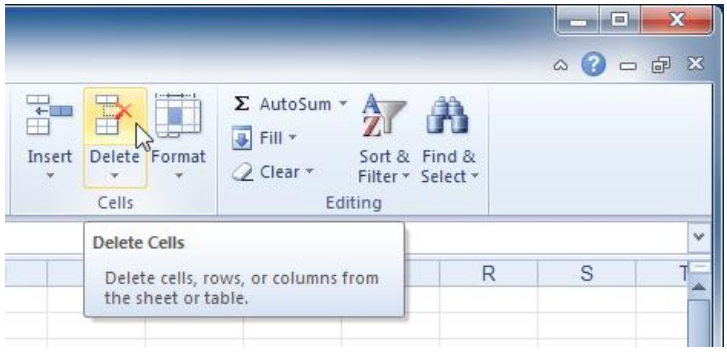
   You can also use your keyboard's Backspace key to delete content from a single cell or the Delete key to delete content from multiple cells.



To delete cells:

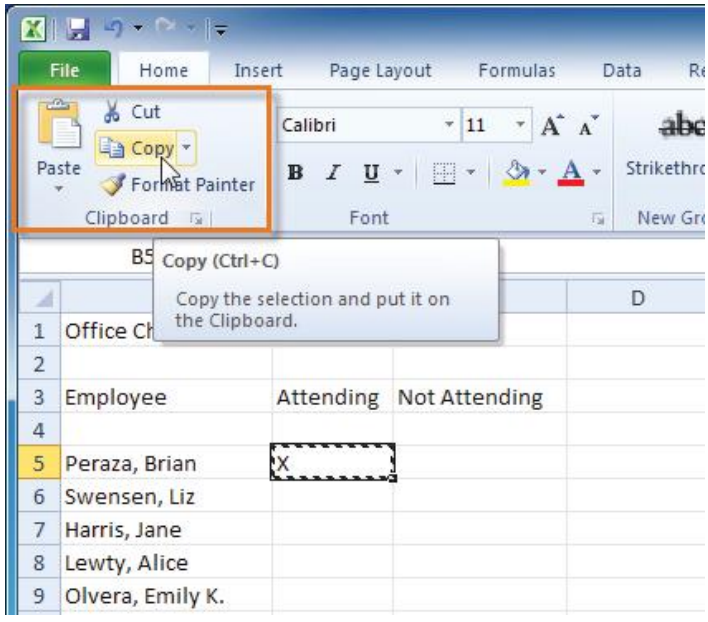
1. Select the cells you want to delete.
2. Choose the Delete command from the Ribbon.

   There is an important difference between deleting the content of a cell and deleting the cell itself. If you delete the cell, by default the cells underneath it will shift up and replace the deleted cell.



To copy and paste cell content:

1. Select the cells you wish to copy.
2. Click the Copy command. The border of the selected cells will change appearance.

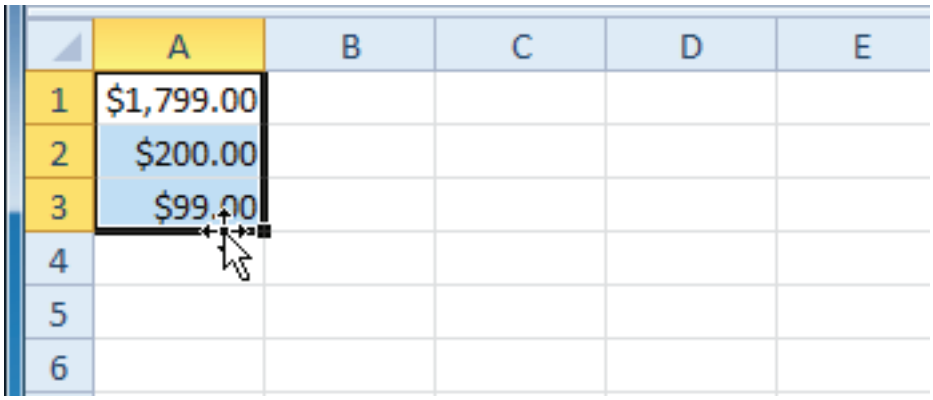


3.. Select the cell or cells where you want to paste the content.

4. Click the Paste command. The copied content will be entered into the highlighted cells.

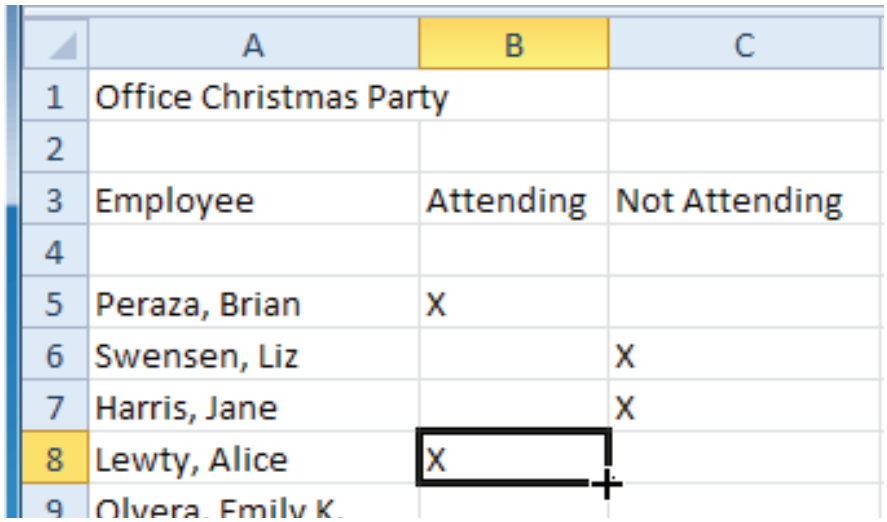
To drag and drop cells:

1. Select the cells you want to move.
2. Position your mouse on one of the outside edges of the selected cells. The mouse changes from a white cross to a black cross with 4 arrows.
3. Click and drag the cells to the new location.
4. Release your mouse, and the cells will be dropped there.



To use the fill handle to fill cells:

1. Select the cell or cells containing the content you want to use. You can fill cell content either vertically or horizontally.
2. Position your mouse over the fill handle so the white cross becomes a black cross .



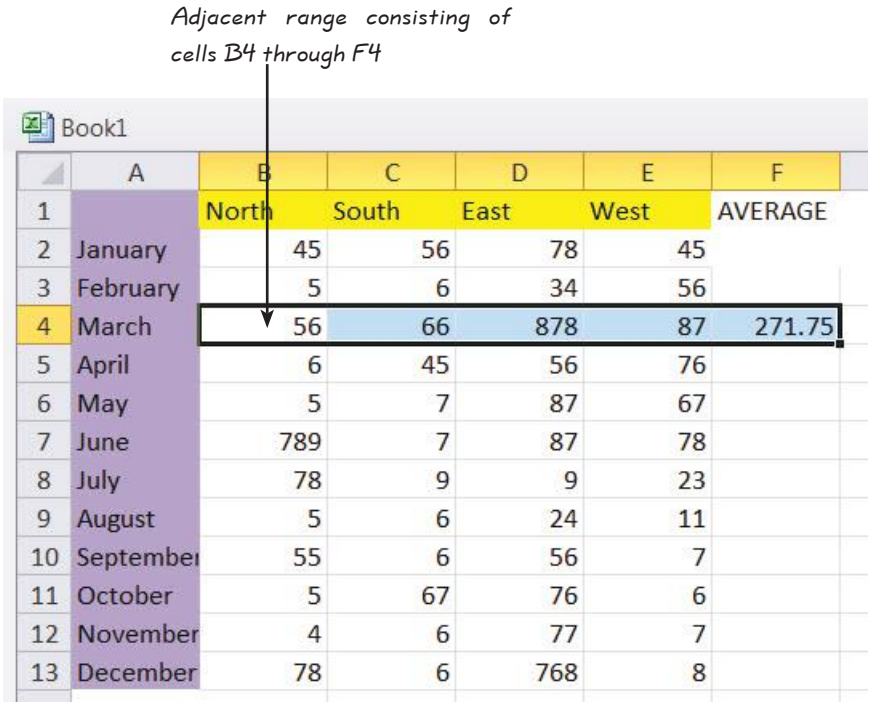
3. Click and drag the fill handle until all of the cells you want to fill are highlighted.
4. Release the mouse, and your cells will be filled.

Understanding Range

A cell range in an Excel worksheet refers to a group or a block of cells which have been selected or highlighted. When cells have been selected they are surrounded by a black outline or border. Normally there is only one cell in the worksheet with a black outline. This is the active cell. Whatever command is executed by Excel affects the active cell. Using the mouse, keyboard or Name Box, more than one cell can be selected to create a range, and commands executed by Excel will affect the entire range.

To select a cell or range using the mouse, do the following:

- To select a single cell, click it.
- To select adjacent cells (a range), click the upper-left cell in the group and drag down to the lower-right cell to select additional cells.
- To select nonadjacent cells, press and hold the Ctrl key as you click individual cells.
- To select an entire row or column of cells, click the row or column header.
- To select adjacent rows or columns, drag over their headers.
- To select nonadjacent rows or columns, press Ctrl and click the header for those you want to select.



	A	B	C	D	E	F
1		North	South	East	West	AVERAGE
2	January	45	56	78	45	
3	February	5	6	34	56	
4	March	56	66	878	87	271.75
5	April	6	45	56	76	
6	May	5	7	87	67	
7	June	789	7	87	78	
8	July	78	9	9	23	
9	August	5	6	24	11	
10	Septembe	55	6	56	7	
11	October	5	67	76	6	
12	Novembe	4	6	77	7	
13	December	78	6	768	8	

Understanding Formula Basics

A formula consists of special code entered into a cell. It performs a calculation of some type and returns a result, which is displayed in the cell. Formulas use a variety of operators and worksheet functions to work with values and text. The values and text in formulas can be located in other cells, which makes changing data easy and gives worksheets their dynamic nature. For example, you can see multiple scenarios quickly by changing the data in a worksheet and letting your formulas do the work.

A formula can consist of any of these elements:

a. Mathematical operators, such as + (for addition) and * (for multiplication)

b. Cell references (including named cells and ranges)

c. Values or text

d. Worksheet functions (such as SUM or AVERAGE)

The table given below shows the examples of formulas.

Formula	Description
=150*.05	Multiplies150 times 0.05. This formula uses only values, and it always returns the same result. Alternatively, you could enter the value 7.5 into the cell.
=A1 + A2	Adds the values in cells A1 and A2.
=SUM (A1:A12)	Adds the values in the range A1:A12

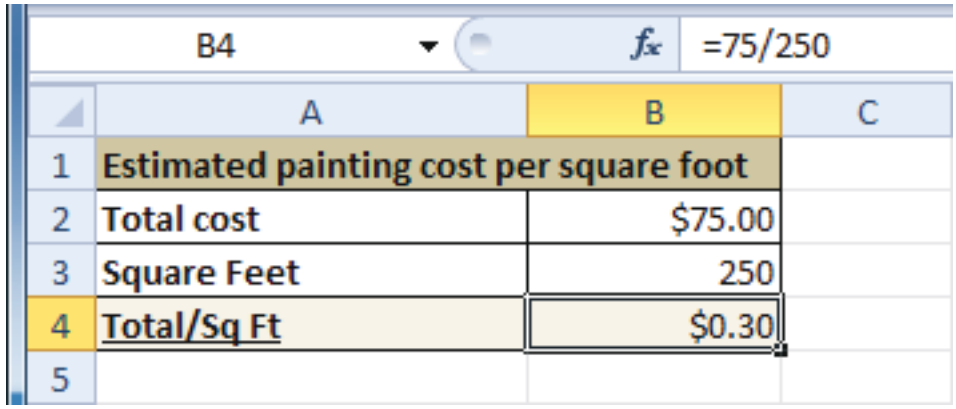
To enter a formula, do the following:

a. Select the cell in which you want the formula's calculation to appear.

b. Type the equal to sign (=).

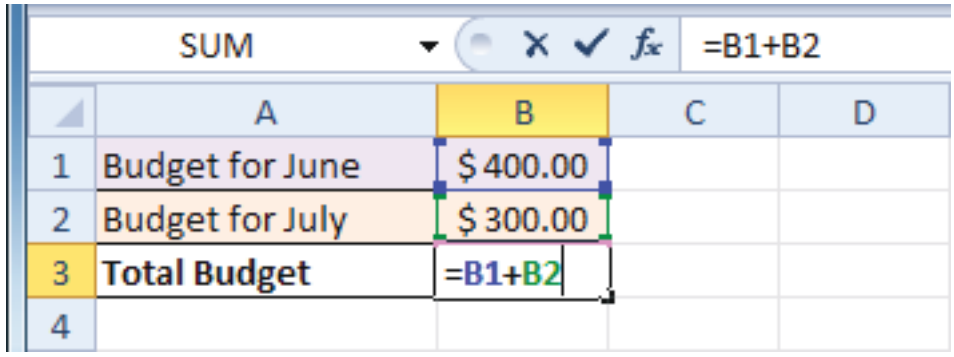
c. Type the formula. The formula appears in the Formula bar.

d. Press Enter to complete the formula.



To create a formula using cell references, do the following:

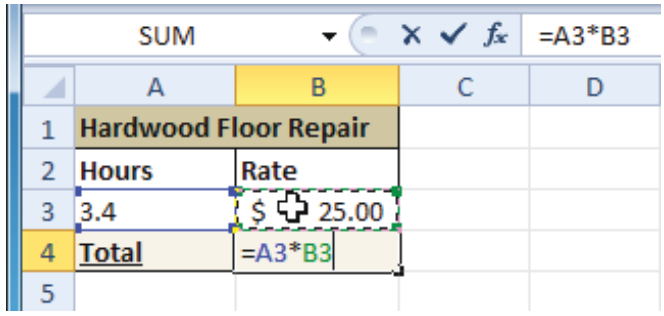
1. Select the cell where the answer will appear (B3, for example).
2. Type the equal sign (=).
3. Type the cell address that contains the first number in the equation (B1, for example).
4. Type the operator you need for your formula. For example, type the addition sign (+).
5. Type the cell address that contains the second number in the equation (B2, for example).



6 Press Enter. The formula will be calculated, and the value will be displayed in the cell.

To create a formula using the Point and Click method, do the following:

1. Select the cell where the answer will appear (B4, for example).
2. Type the equal sign (=).
3. Click on the first cell to be included in the formula (A3, for example).
4. Type the operator you need for your formula. For example, type the multiplication sign (*).
5. Click on the next cell in the formula (B3, for example).



6. Press Enter. The formula will be calculated, and the value will be displayed in the cell.

Performing Calculations with Functions

A function is a predefined formula that performs calculations using specific values in a particular order. The basic syntax to create a formula with a function is to insert an equals sign (=), a function name (SUM, for example, is the function name for addition), and an argument. Arguments contain the information you want the formula to calculate, such as a range of cell references.

=Function name(argument1, argument2,...)

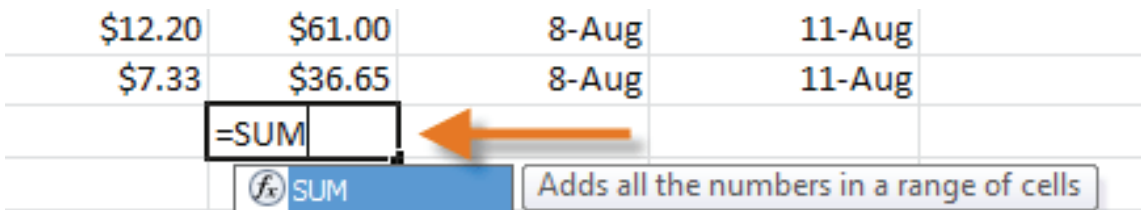
The function name identifies the type of calculation to be performed. Most functions require that you enter one or more arguments following the function name. An argument is the data the function uses to perform the calculation. The type of data the function requires depends upon the type of calculation being performed. Most commonly, the argument consists of numbers or references to cells that contain numbers. The argument is enclosed in parentheses, and multiple arguments are separated by commas.

Excel has many built in functions for specific categories of applications. Some of the common Excel functions are listed below:

Function	*Purpose*
SUM	Adds all the numbers in a range of cells.
AVERAGE	Returns the average (arithmetic mean) of the arguments.
MAX	Returns the largest value in a set of values.
MIN	Returns the smallest number in a set of values.
COUNT	Counts the number of cells that contain numbers and numbers within the list of arguments.
IF	Returns one value if a condition you specify evaluates to True and another value if it evaluates to False.
AND	Returns True if all its arguments are True; returns False if the arguments are False.

To create a basic function in Excel, do the following:

1. Select the cell where the answer will appear (F15, for example).
2. Type the equals sign (=) and enter the function name (SUM, for example).

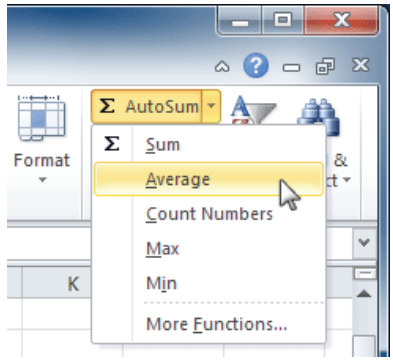


3. Enter the cells for the argument inside the parentheses.
4. Press Enter and the result will appear.

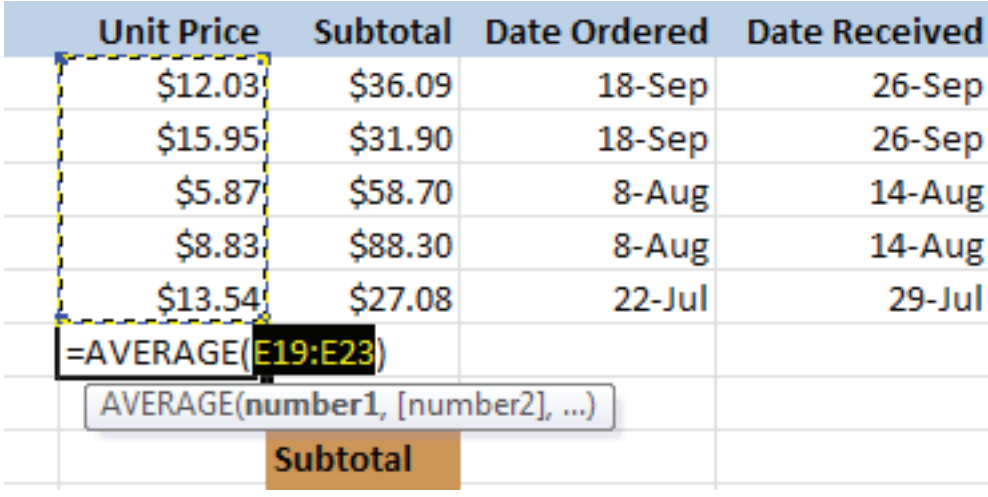
Using AutoSum to select Common Functions, do the following:

The AutoSum command allows you to automatically return the results for a range of cells for common functions like SUM and AVERAGE.

1. Select the cell where the answer will appear.
2. Click on the Home tab.
3. In the Editing group, click on the AutoSum drop-down arrow and select the function you desire (Average, for example).



4. A formula will appear in the selected cell E24. If logically placed, AutoSum will select your cells for you. Otherwise, you will need to click on the cells to choose the argument you desire.



5 .Press Enter and the result will appear.

Charts in Excel

Charts are the pictorial representations of data. Charts are easier to read and understand. They help you to analyze the data. They also help to extract information quickly from the data. A chart can be created in a separate chart sheet or it can be embedded as a graphic object in a worksheet. Both the embedded graphic object and the chart sheets are linked to worksheet data. They are updated when the worksheet data changes.

Parts of an Excel 2010 Chart

The typical chart (or graph) in Excel 2010 comprises several distinct parts, including the chart area, data series, axes, legend, plot area, gridlines, data markers, and more. The following list summarizes the parts of a typical Excel chart, some of which appear in the illustration.

A typical column chart containing a variety of standard chart elements.

- **Chart area**

  Everything inside the chart window, including all parts of the chart (labels, axes, data markers, tick marks, and other elements listed here).

- **Data marker**

  A symbol on the chart that represents a single value in the worksheet. A data marker (or data point) may be a bar in a bar chart, a pie in a pie chart, or a line on a line chart. Data markers with the same shape or pattern represent a single data series in the chart.

- **Data series**

  A group of related values, such as all the values in a single row in the chart. A chart can have just one data series (shown in a single bar or line), but it usually has several.

- **Axis**

  A line that serves as a major reference for plotting data in a chart. In two-dimensional charts there are two axes — the x-axis (horizontal/category) and the y-axis (vertical/value). In most two-dimensional charts (except bar charts), Excel plots categories (labels) along the x-axis and values (numbers) along the y-axis. Bar charts reverse the scheme, plotting values along the x-axis. Pie charts have no axes. Three-dimensional charts have an x-axis, a y-axis, and a z-axis. The x- and y-axes delineate the horizontal surface of the chart. The z-axis is the vertical axis, showing the depth of the third dimension in the chart.

- **Tick mark**

  A small line intersecting an axis. A tick mark indicates a category, scale, or chart data series. A tick mark can have a label attached.

- **Plot area**

  The area where Excel plots your data, including the axes and all markers that represent data points.

- **Gridlines**

  Optional lines extending from the tick marks across the plot area, thus making it easier to view the data values represented by the tick marks.

- **Chart text**

  A label or title that you add to the chart. Attached text is a title or label linked to an axis such as the Chart Title, Vertical Axis Title, and Horizontal Axis Title that you can't move independently of the chart. Unattached text is text that you add with the Text Box command button on the Insert tab of the Ribbon.

- **Legend**

  A key that identifies patterns, colors, or symbols associated with the markers of a chart data series. The legend shows the data series name corresponding to each data marker (such as the name of the blue columns in a column chart).

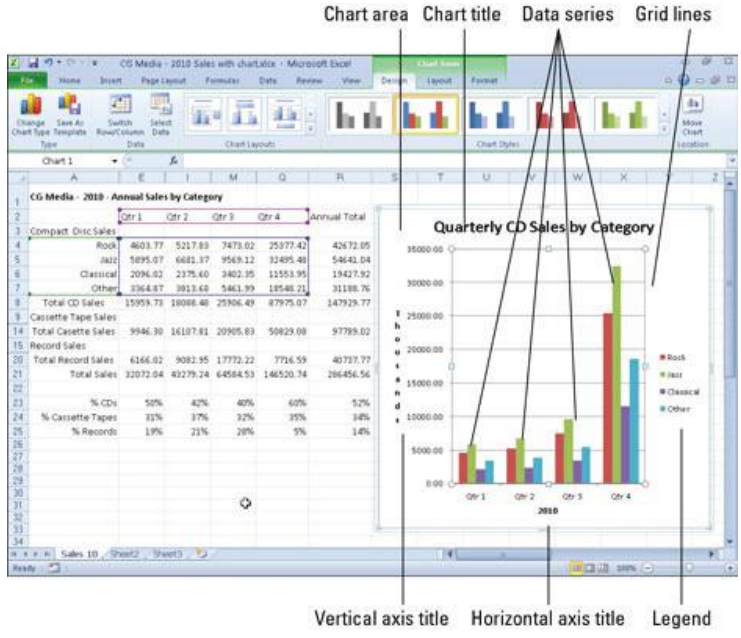
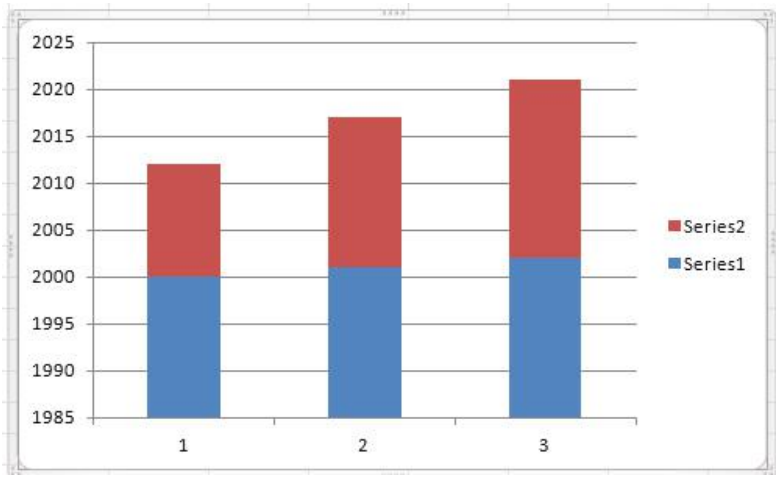


Chart Types

Charts and graphs are a great way of representing your data. Microsoft Excel 2010 offers almost every chart type and makes it easier to draw them so that your data can quickly understood in a graphical format. The chart or graph type will depend on the data for which you are going to plot the chart. The most commonly used types include Column Chart, Line Graphs, Pie Chart, Bar Graph, Area Chart, Scatter Graphs, Stock Chart, and Surface Chart, among many others.

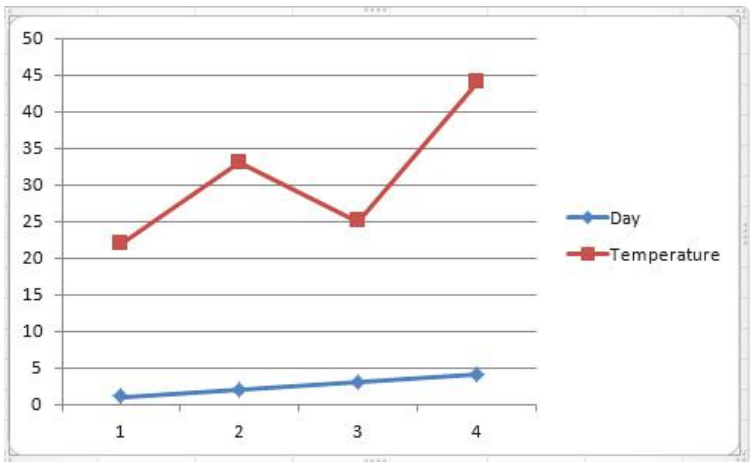
Column Chart

The Column chart is one of the most commonly used chart type and is used to show the changes in data over a period of time or illustrate comparisons among items.



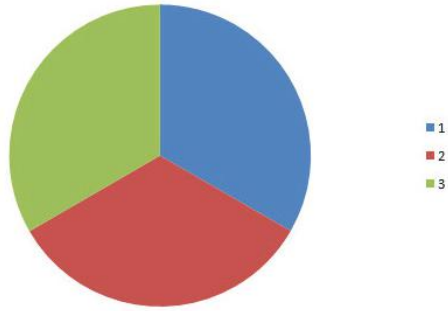
Line Graphs

Line Graphs are mainly used to plot changes in data over time. The best example of this chart type can be the weekly change in temperature.



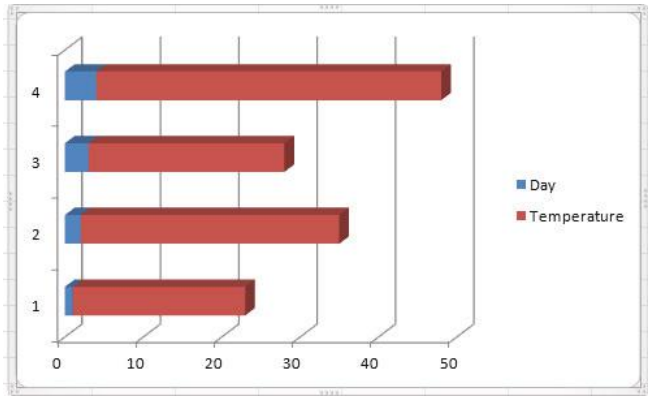
Pie Chart

The Pie Chart is very useful when you wish to emphasize on a significant element in the data. It represents data in the form of a pie.



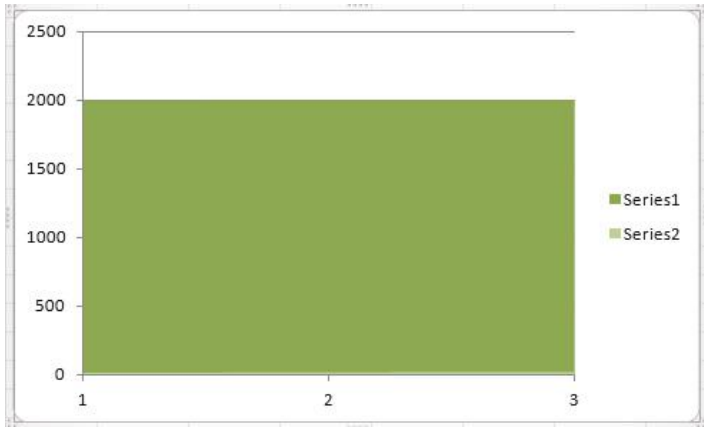
Bar Graph

A bar graph illustrates comparisons among individual items.



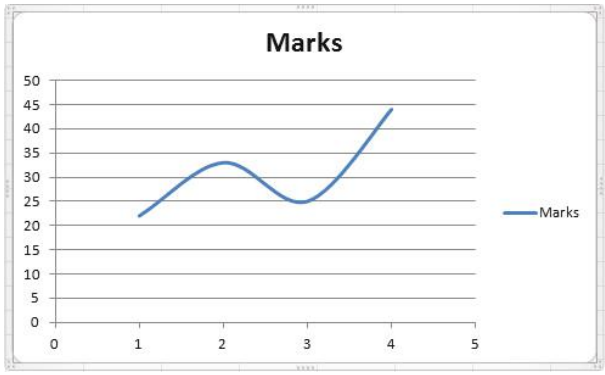
Area Chart

An area chart displays the magnitude of change over time.



Scatter Graphs

The Scatter Graph and Line chart are almost similar, but the scatter graph is displayed with a scribble line whereas the line graph uses connected lines to display data.



Surface Charts

A surface chart comes in handy if you are to determine the optimum combination between two sets of data.

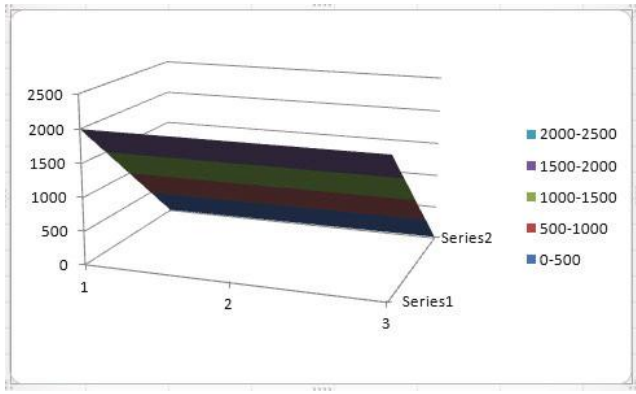


Chart Plot Area

The area that is covered by a specific chart is called the chart plot area. By default Excel draws charts according to the default configuration, but its very easy to edit the plot area, simply right-click the chart and choose the Format Plot Area option. Now you will see a dialogue box which lets you set the chart's fill style, borders, Glow and soft Edges, and 3-D effects.

Embedded Charts and Chart Sheets

You can create a chart on it's own chart sheet or on a worksheet. In both ways the chart is linked to the source data on the worksheet, which means the chart is updated when you update the worksheet data. In order to set the chart to change while the values of some particular cells changes, right-click the chart and choose the Select Data option, and then select, and add the fields that you wish to include in this process.

To create a chart, do the following:

1. On the worksheet, arrange the data that you want to plot in a chart.

   The data can be arranged in rows or columns-Excel automatically determines the best way to plot the data in the chart. Some chart types (such as pie and bubble charts) require a specific data arrangement.

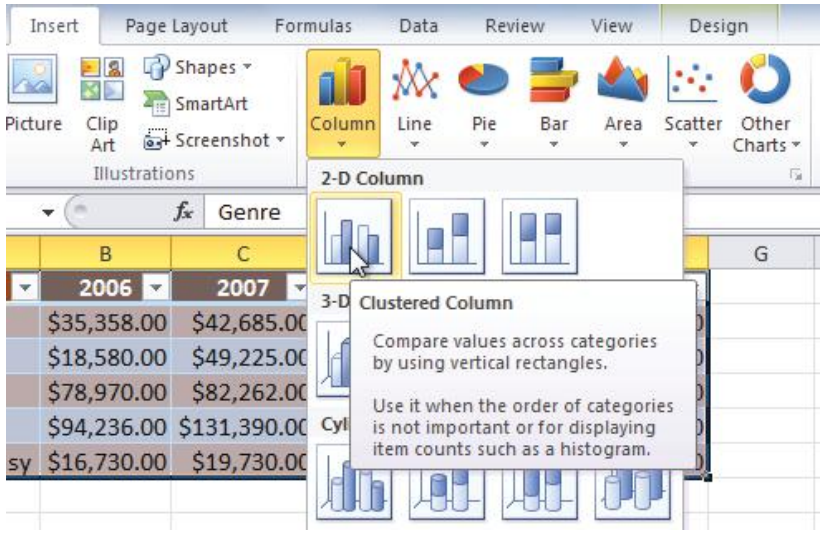
2. Select the cells that contain the data that you want to use for the chart.

   Tip

   If you select only one cell, Excel automatically plots all cells that contain data that is adjacent to that cell into a chart. If the cells that you want to plot in a chart are not in a continuous range, you can select nonadjacent cells or ranges as long as the selection forms a rectangle. You can also hide the rows or columns that you do not want to plot in the chart.

3. On the Insert tab, in the Charts group, do one of the following:

   Click the chart type, and then click a chart subtype that you want to use.



   To see all available chart types, click Button Image to launch the Insert Chart dialog box, and then click the arrows to scroll through the chart types.

   Tip

   A ScreenTip displays the chart type name when you rest the mouse pointer over any chart type or chart subtype. For more information about the chart types that you can use, see Available chart types.

4. By default, the chart is placed on the worksheet as an embedded chart.

Tricky Terms

Cell	The smallest unit of worksheet, formed by the intersection of a row and a column.
Chart	A pictorial representation of data in a worksheet.
Workbook	A basic file in a spreadsheet where the user stores data.
Worksheet	A grid of cells made up of horizontal rows and vertical columns.
Workspace	The area of the Excel window where workbook windows are displayed.
Range	A selection consisting of two or more cells in a worksheet.

Let Us Revise

- An electronic spreadsheet is a program that accepts data in a tabular form (in rows and columns) and allows user to manipulate, calculate and analyze data in the desired manner.
- The popular electronic spreadsheet software are LOTUS 1-2-3, Quattropro and Microsoft Excel.
- Microsoft Excel is the popular Windows spreadsheet software developed by Microsoft Corporation.
- A workbook is an Excel file that stores the information you enter using the program.
- Worksheet is the primary document that you use in Microsoft Excel to store and work with data.
- Each worksheet has a total of 65,536 rows and 256 columns.
- Cell is the smallest unit of worksheet, formed by the intersection of a row and a column.
- Cell pointer is a highlighted cell boundary that specifies which cell is active at that moment.
- Formula is an entry that performs a calculation using numbers or data contained in other cells. Every formula must begin with an equal to sign (=).
- A range is a rectangular group of connected cells. It is defined by the address of two opposite or diagonally paired corner cells separated by a colon (:).
- Charts are the pictorial representations of data.

Solved Exercises

1. *What is Microsoft-Excel? List any three features of Microsoft-Excel.*

Ans: *Microsoft Excel is the popular Windows spreadsheet software developed by Microsoft Corporation.*

The important features of Microsoft Excel are listed below:

a. *It helps to create well-designed spreadsheets that produce accurate results.*
b. *The built-in functions in Microsoft Excel make calculations easy and fast.*
c. *It helps to produce a visual display of the data in the form of graphs or charts.*
d. *It recalculates the result of a mathematical formula automatically if you make a change in a value or number in a cell.*
e. *It helps to open and use multiple spreadsheet files at the same time.*

2. *Define a worksheet. How many rows and columns are there in an MS-Excel worksheet?*

Ans: *Worksheet is the primary document that you use in Microsoft Excel to store and work with data. In Excel 2010, the maximum size of a worksheet is 1,048,576 rows by 16,384 columns.*

3. *Define a workbook. How many rows and columns are there in an MS-Excel worksheet?*

Ans: *A workbook is an Excel file that contains one or more worksheets. Each of the workbook's worksheets are in separate tabs on the bottom of the Excel window. By default, a new Excel workbook will contain three worksheets. You can switch between worksheets by clicking on the worksheet's tab on the bottom of the Excel window. In Excel 2010 the number of worksheets in a workbooks is limited only by your computer's available memory.*

4. *What do you mean by a range of cells? How is it defined?*

Ans: *A range of cells is a rectangular block of two or more cells. A range is defined by the address of two opposite or diagonally paired corner cells separated by a colon (:).*

5. *What is a formula? Which sign is used before giving any formula?*

Ans: *Formula is an entry that performs a calculation using numbers or data contained in other cells. An equal to sign (=) is used before giving any formula.*

6. *What are functions?*

Ans: *Functions are pre-written formulas that perform certain types of calculations automatically.*

7. *What is a chart? Name some chart types available in MS-Excel.*

Ans: *A chart is a pictorial representation of data. Some of the basic chart types are line chart, column chart, bar chart and pie chart.*

Chapter Review

1. State whether the following statements are true or false.

a. Microsoft Excel is the popular Windows spreadsheet software developed by Microsoft Corporation.

b. A workbook is an Excel file that stores the information you enter using the program.

c. Worksheet is the primary document that you use in Microsoft Excel to store and work with data.

d. Each worksheet has a total of 256 rows and 65,536 columns.

e. Cell pointer is the smallest unit of worksheet, formed by the intersection of a row and a column.

2. Match the following.

Group A	*Group B*
Cell	A pictorial representation of data in a worksheet.
Chart	The area of the Excel window where workbook windows are displayed.
Workbook	A grid of cells made up of horizontal rows and vertical columns.
Worksheet	The smallest unit of a worksheet, formed by the intersection of a row and a column.
Workspace	A basic file in a spreadsheet where the user stores data.

3. Select the best answer from the list of choices.

a. A spreadsheet program that allows you to store, organize, and analyze information.

i. Word ii. Excel iii. PowerPoint

b. A group or a block of cells which have been selected or highlighted.

i. cell range ii. cell iii. cell pointer

c. A predefined formula that performs calculations using specific values in a particular order.

i. formula ii. function iii. chart

d. A symbol on the chart that represents a single value in the worksheet.

i. Chart area ii. Data marker iii. Axis

e. The chart type used to show the changes in data over a period of time or illustrate comparisons among items.

i. Line Graph ii. Column chart iii. bar graph

4. Give an appropriate technical term for each of the following.

a. A 'soft' document that organizes information into columns and rows that are defined by a software.

b. The area of the Excel window where workbook windows are displayed.

c. A cell range in an Excel worksheet refers to a group or a block of cells which have been selected or highlighted.

d. A function is a predefined formula that performs calculations using specific values in a particular order.

e. A symbol on the chart that represents a single value in the worksheet.

5. Answer the following questions.

a. What is a spreadsheet? Give two examples of spreadsheet software.

b. What are the advantages of Microsoft Excel 2010?

c. Define the following:

i. Workbook

ii. Worksheet

iii. Cell range

d. What are the different types of data that MS-Excel recognizes?

e. What is a formula?

f. What are functions? Give the usage and syntax of SUM function.

g. What is a chart? Name some chart types available in MS-Excel.

h. What are the different parts of an Excel 2010 chart? Define each of them.

i. What is a column chart?

j. Write the steps to create chart in Excel 2010.

Lab Exercises

Lab Exercise 1

a. Create the following worksheet.

Departmental Store

S.No	*Item*	*Quantity*	*Rate*	*Total*	*Discount*	*Payable*
1	Pen	100	250	?	?	?
2	Books	500	300	?	?	?
3	Shirts	100	550	?	?	?
4	Shoes	600	1000	?	?	?
5	Caps	200	300	?	?	?

b. Compute the total amount of every item in column E.

c. Compute the discount which should be 15% of the total amount of every items.

d. Compute the payable amount in column G.
(Hint: Payable=Total - Discount)

e. Assign default currency sign to all the values which lie in the range C3 to G7.

f. Format all the values in the worksheet with five decimal places.

g. Save the workbook file as Worksheet1.

Lab Exercise 2

a. Create a new worksheet and type the following data:

Regional Sales and Expenses

Region	*Sales*	*Expenses*
North	164	157
South	185	190
East	180	140
West	120	175
Central	167	200

b. Plot a line chart using the ChartWizard for the above data.

c. Add legend (Sales and Expenses) to the chart.

d. Enter the chart title as Regional Sales and Expenses.

e. Give appropriate category and value axis titles.

f. Save the workbook file as Worksheet2.

Objectives

After completing this chapter, you will be able to:

- Define presentation software.
- Explain the major advantages of Microsoft Office PowerPoint.
- Explain how to create new presentation.
- Explain the different layouts of a slide.
- Explain how to add new slide to a presentation and add content to a slide.
- Explain how to add transitions and animations to a presentation.

9

Microsoft Office PowerPoint 2010

Concept: Presentation Software

A presentation software is a computer software package used to display information, normally in the form of a slide show. A slide is the presentation output that contains text, charts, graphics, audio and video. The incorporation of graphics, audio and video makes the topic more interesting and effective. It helps the speaker with an easier access to his ideas and the participants with visual information which complements the talk. Some most popular graphics, multimedia and presentation packages are Coreldraw, Macromedia Director and Microsoft PowerPoint.

Microsoft Office PowerPoint 2010 is a complete presentation graphics program developed by Microsoft Corporation, USA. It allows you to produce professional-looking presentations.

Microsoft Office PowerPoint has the following advantages:

- It can create paper printouts of the individual slides, outlines and speaker notes.
- It gives you the flexibility to make presentations using a projection device attached to a personal computer.
- It helps you to quickly create presentations for many purposes, including lectures, research reports, meeting handouts and agendas, speaker introductions, and other events.
- It allows to animate objects and add narrations, video or music to the presentation.

expanding your horizons

Microsoft PowerPoint is a slide-based presentation program developed by Microsoft. It was officially launched on May 22, 1990, as a part of the Microsoft Office suite. Originally designed for the Macintosh computer, the initial release was called "Presenter", developed by Dennis Austinand Thomas Rudkin of Forethought, Inc

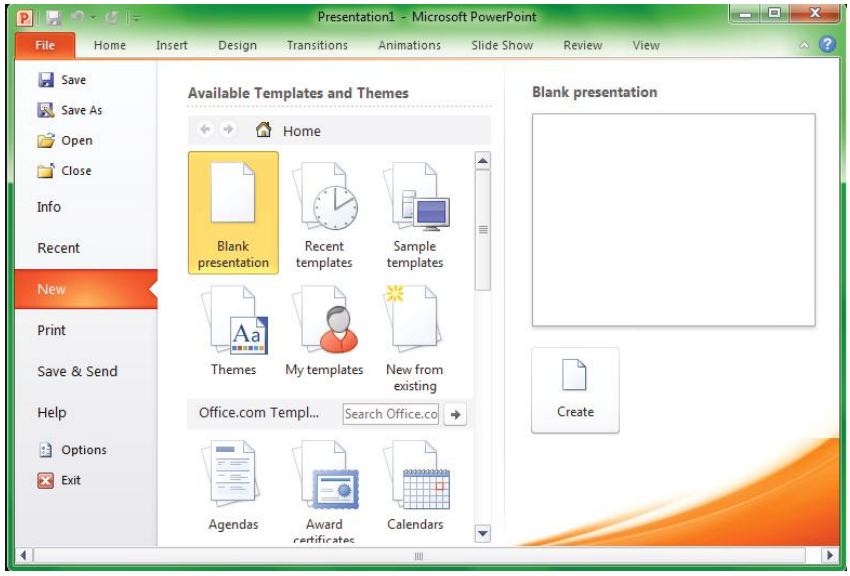
Starting a New Presentation

You can start a blank presentation from scratch, or you can base the new presentation on a template or on another presentation. Using a template or existing presentation can save you some time. However, if you have a specific vision you're going for, starting a presentation from scratch gives you a clean canvas to work them.

When you start PowerPoint, a new blank presentation begins automatically with one slide. Just add your content to it, add more slides if needed, change the formatting and go for it.

To create a new blank presentation at any time, do the following:

1. Click on the File tab and choose New on the left-hand side of the screen.
2. Ensure Blank Presentation is selected and then click on the Create button.



You will see the default opening screen is actually composed of three parts:

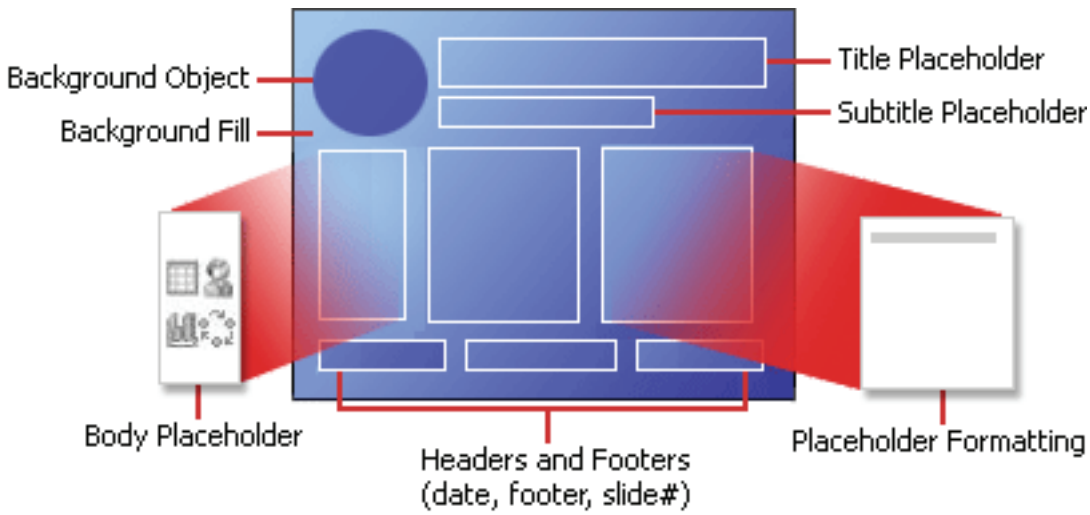
1. Each page of the working area of the presentation is called a slide. New presentations open with a Title slide in Normal view ready for editing.
2. This area toggles between Slides view and Outline view. Slides view shows a tiny picture of all the slides in your presentation. Outline view shows the hierarchy of the text in your slides.
3. The area to the right is the Task pane . Its contents vary depending on the current task. Initially, PowerPoint recognizes that you are just starting this presentation and lists appropriate options for you. To give yourself more room to work on your slide close this pane by clicking on the small X in the upper right corner.

Slide Basics

PowerPoint is an excellent tool for presentations of any kind, either in the classroom or at a conference. A PowerPoint presentation is made up of a series of "slides" that can be projected (displayed electronically) or printed in a variety of handout formats. A slide is a single page of a presentation created with software such as PowerPoint or OpenOffice Impress. A presentation is composed of several slides. The best presentations use approximately ten to twelves slides to get the message across.

Overview of slide layouts

Slide layouts contain formatting, positioning, and placeholders for all of the content that appears on a slide. Placeholders are the containers in layouts that hold such content as text (including body text, bulleted lists, and titles), tables, charts, SmartArt graphics, movies, sounds, pictures, and clip art (clip art: A single piece of ready-made art, often appearing as a bitmap or a combination of drawn shapes.). And a layout contains the theme (colors (theme colors: A set of colors that is used in a file. Theme colors, theme fonts, and theme effects compose a theme.), fonts (theme fonts: A set of major and minor fonts that is applied to a file. Theme fonts, theme colors, and theme effects compose a theme.), effects (theme effects: A set of visual attributes that is applied to elements in a file. Theme effects, theme colors, and theme fonts compose a theme.), and the background) of a slide as well.



PowerPoint includes nine built-in slide layouts, or you can create custom layouts that meet your specific needs, and you can share them with other people who create presentations by using PowerPoint.

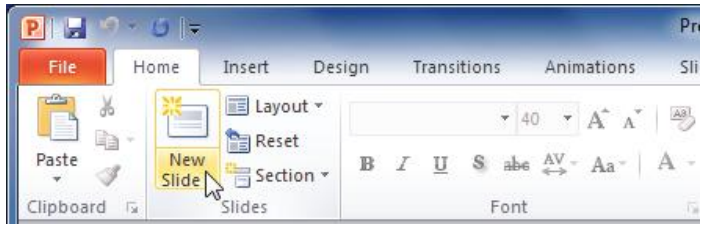
When you open a blank presentation in PowerPoint, the default layout called Title Slide (shown below) appears, but there are other standard layouts that you can apply and use.

Adding a New Slide to a Presentation

The standard, built-in layouts available in PowerPoint 2010 are similar to those available in PowerPoint 2007 and earlier versions. When you open a blank presentation in PowerPoint, the default layout called Title Slide appears, but there are other standard layouts that you can apply and use. Some placeholders allow you to double-click the placeholder and then access other objects, such as media clips, charts, diagrams and organization charts.

To add a new slide to a presentation, do the following:

1. From the Home tab, click the bottom half of the New Slide command to open the menu of slide layout options.



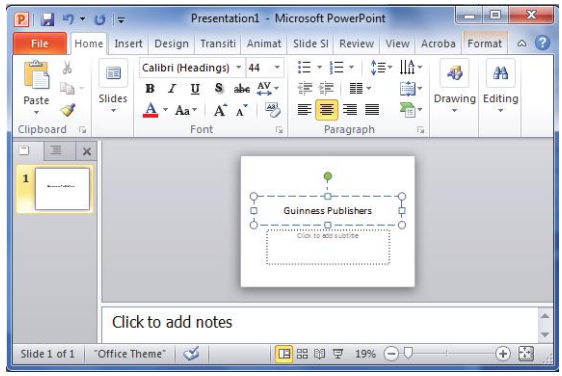
2. Select the slide you want to insert.
3. A new slide will be added your presentation.

Adding content

To add text, click in any box that says Click to add text and start typing. If there is a bullet, push Enter on the keyboard to get a new bullet; to get a sub point, push Tab on that blank line and the text will indent further and become smaller.

To add graphics, charts, etc., click on the appropriate icon (before you type text in the box) and choose the file you would like on the slide. Notice that it will re-size to fit into the box.

Also note that when you add one type of content, the other options disappear. You can always go to the Insert Ribbon to add more images, text boxes, etc.

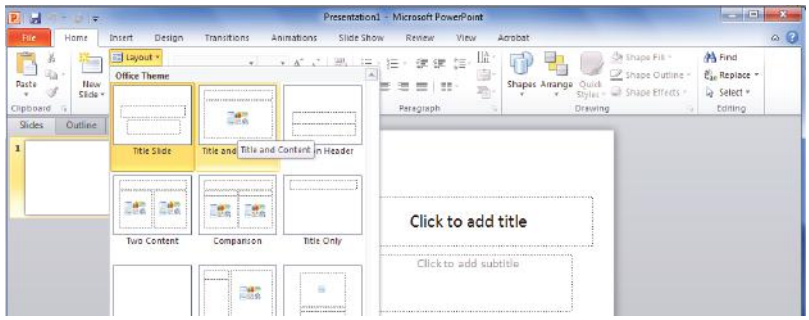


Apply a new layout to a slide

PowerPoint includes nine built-in slide layouts, or you can create custom layouts that meet your specific needs, and you can share them with other people who create presentations by using PowerPoint. The slide layout arranges your content using different types of placeholders, depending on what kind of information you might want to include in your presentation.

To change the layout of an existing slide, do the following:

1. On the View tab, in the Presentation Views group, click Normal.
2. In Normal view, in the pane that contains the Outline and Slide tabs, click the Slides tab.
3. Click the slide that you want to apply a layout to.
4. On the Home tab, in the Slides group, click Layout, and then select the layout that you want.



PowerPoint Views

A powerpoint view is the mode in which the presentation appears on the screen. Each view provides you a different look and capabilities. Microsoft PowerPoint has three main views: normal view, slide sorter view and slide show view. You can select a view, based on these main views, to be your default view in PowerPoint.

PowerPoint views are found in two places:

- On the View tab, in the Presentations Views and Master Views groups.
- On an easy to use bar at the bottom of the PowerPoint Window where the main views (Normal, Slide Sorter, Reading, and Slide Show) are available.

Views for editing your presentation

There are many views in PowerPoint that can help you create a professional presentation.

Normal

Normal is set to be the default presentation view (but you can change default view) and you will be working on this view most of the time when making any changes to the current slide. Normal view is the main editing view, where you write and design your presentations.

Slide Sorter

Slide Sorter view gives you a view of your slides in thumbnail form. This view makes it easy for you to sort and organize the sequence of your slides as you create your presentation, and then also as you prepare your presentation for printing. It also allows users to navigate easily between different slides. You can add sections in Slide Sorter view as well, and sort slides into different categories or sections.

Master views

The master views include, Slide, Handout, and Notes view. They are the main slides that store information about the presentation, including background, color, fonts, effects, placeholder sizes and positions. The key benefit to working in a master view is that on the slide master, notes master, or handout master, you can make universal style changes to every slide, notes page, or handout associated with your presentation.

Views for delivering your presentation

There are many views in PowerPoint that can help you in delivering your presenttion.

Slide Show view

Slide Show view is used to deliver your presentation to your audience. Slide Show view occupies the full computer screen, exactly the way your presentation will look on a big screen when your audience sees it. You can see how your graphics, timings, movies, animated effects, and transition effects will look during the actual presentation.

Presenter view

Presenter view is a key slide show-based view that you can use while delivering your presentation. By using two monitors, you can run other programs and view speaker notes that your audience cannot see.

Reading view

Reading view is used to deliver your presentation to someone viewing your presentation on their own computer. Or, use Reading view on your own computer when you want to view a presentation in a window with simple controls that make the presentation easy to review. You can always switch from Reading view to one of the other views if you want to change the presentation.

Change the order of your slides

When you create a presentation, you may want to change the order of your slides.

1. In the pane that contains the Outline and Slides tabs, click the Slides tab.
2. On the Slides tab, select the slide thumbnails that you want to move, and then drag them to their new location.

   Tip

   To select multiple sequential slides, click the first slide, and then hold CTRL while you click the other slides that you want.

Overview of backgrounds and watermarks

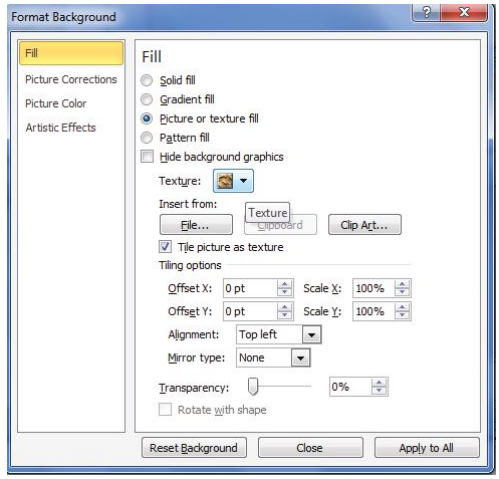
You can insert a picture behind your entire slide as a background or behind part of your slide as a watermark (watermark: A semi-transparent image often used for letters and business cards. You can also insert a color behind your slide as a background. By adding a picture as a background or watermark to one or all of your slides, you can make your PowerPoint presentation unique or clearly identify your presentation sponsor.

To use a picture as a slide background, do the following:

1. Click the slide that you want to add a background picture to.

   Tip

   To select multiple slides, click a slide, and then press and hold CTRL while you click the other slides.
2. On the Design tab, in the Background group, click Background Styles, and then click Format Background.
3. Click Fill, and then click Picture or texture fill.



4. Do one of the following:

   To insert a picture from a file, click File, and then locate and double-click the picture that you want to insert.

   To paste a picture that you copied, click Clipboard.

   To use clip art as a background picture, click Clip Art, and then in the Search text box, type a word or phrase that describes the clip (clip: A single media file, including art, sound, animation, or movies.) that you want, or type all or part of the file name of the clip.

5. Do one of the following:

   To use the picture as a background for the slides that you selected, click Close.

   To use the picture as a background for all of the slides in your presentation, click Apply to All.

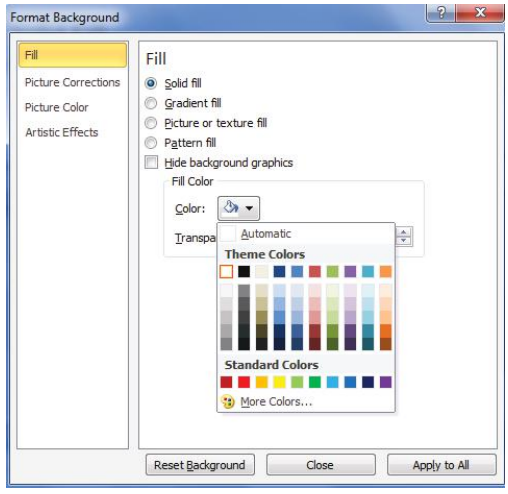
Use a color as a slide background,do the following:

1. Click the slide that you want to add a background color to.

   Tip

   To select multiple slides, click a slide, and then press and hold CTRL while you click the other slides.

2. On the Design tab, in the Background group, click Background Styles, and then click Format Background.
3. Click Fill, and then click Solid Fill.
4. Click Color, and then click the color that you want.



5. Do one of the following:

   To apply the color to the slides that you selected, click Close.

   To apply the color to all of the slides in your presentation, click Apply to All.

Use a picture as a watermark, do the following:

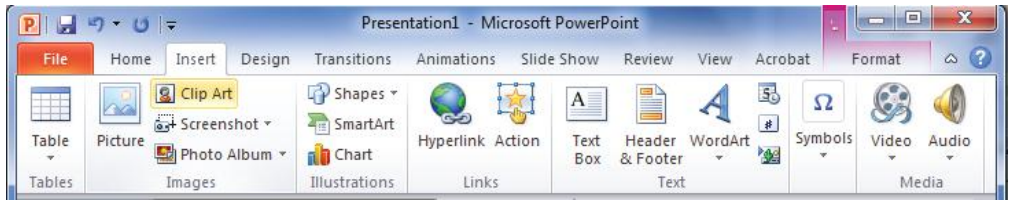
1. Click the slide that you want to add a watermark (watermark: A semi-transparent image often used for letters and business cards. In currency, a watermark is visible when you hold a bill up to the light.) to.

   To add a watermark to all of the slides in a blank presentation, on the View tab, in the Master Views group, click Slide Master.

2. On the Insert tab, in the Images group, do one of the following.

   To use a picture as a watermark, click Picture, locate the picture that you want, and then click Insert.

   To use clip art as a watermark, click Clip Art.



3. To adjust the size of the picture or clip art, right-click the picture or clip art on the slide, and then click Size and Position on the shortcut menu.
4. In the Size pane, under Scale, increase or decrease the settings in the Height and Width boxes.

   Tips

   To maintain proportional height and width of the picture or clip art when scaling, select the Lock aspect ratio check box.

   To center your picture or clip art on the slide, select the Scale relative to original picture size check box.

5. To move the picture or clip art on the slide, click the Position tab, and then enter the settings for the positions that you want in the Horizontal and Vertical boxes.
6. Under Picture Tools, on the Format tab, in the Adjust group, click Color, and then under Recolor, click the color fade that you want.

   Tip

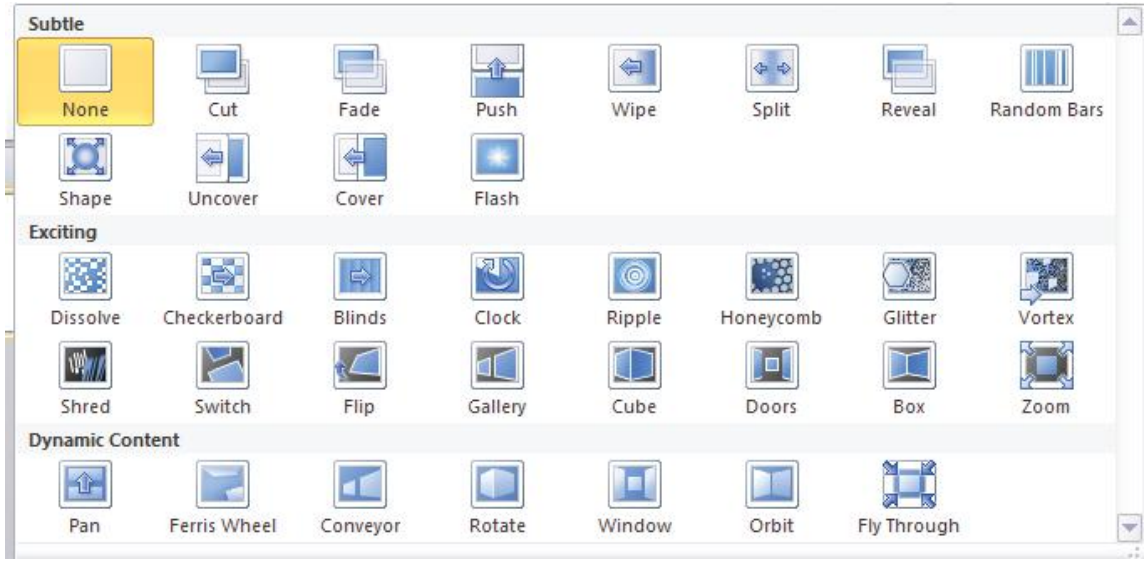
   If you do not see the Picture Tools or Format tabs, make sure that you have selected a picture.

7. Under Picture Tools, on the Format tab, in the Adjust group, click Correction, click Picture Corrections Options, and then under Brightness and Contrast, select the brightness percentage that you want.
8. When you finish editing and positioning the watermark and are satisfied with its appearance, to send the watermark to the back of the slide, under Picture Tools, on the Format tab, in the Arrange group, click the arrow next to Send Backward, and then click Send to Back.

Adding Transitions

Transitions are special effects used to introduce a slide during the slide show. You can choose the transitions you want, and you can vary the speed of each transition. There are three categories of unique transitions to choose from, all of which can be found on the Transitions tab:

- Subtle (slight transitions)
- Exciting (strong transitions)
- Dynamic Content (strong transitions that affect only the content, such as text or images)



To apply a transition, do the following:

1. Select the slide you wish to modify.
2. On the Transitions tab, in the Transition to This Slide group, click the transition you want.
3. Click Effect Options, and select any options for the chosen effect transition as desired.
4. In the Timing group, mark or clear the check boxes for:
   a. On Mouse Click - Transitions when you click the mouse
   b. Automatically - Transitions alter a specified amount of time has passed. (Enter the time, in seconds, in the associated text box).
5. (Optionally) Adjust the duration setting to specify how quickly the transition effect will occur.
6. (Optionally) If you want a sound associated with the transition, select it from the sound drop-down list.
7. (Optionally) If you want these same transition settings to apply to all slides in the presentation, click Apply to All.

To preview a transition, do the following:

You can preview the transition for a selected slide at any time, using either of these two methods:

1. Click the Preview command on the Transitions tab.

2. Click the star Play Animations icon. The icon appears on the Slides tab in the left pane beside any slide that includes a transition.

To add sound, do the following:

1. Select the slide that includes the transition you wish to modify.
2. Click the Sound drop-down menu in the Timing group.

3. You will hear the sound and see a live preview of the transition as you hover over each sound.
4. Click a sound to apply it to the selected slide.

To remove a transition, do the following:

1. Select the slide you wish to modify.
2. Choose None from the gallery in the Transition to This Slide group.
3. Removing a transitionRemoving a transition
4. Repeat this process for each slide you want to modify.

To remove transitions from all slides, select a slide that uses None, and click the Apply to All command.

Adding Animation

In PowerPoint you can animate text and objects such as clip art, shapes, and pictures. Animation is a special visual effect that you can add to parts of the slides that enable the presenter to focus on important points as they are being presented. Animation, or movement, on the slide can be used to draw the audience's attention to specific content or to make the slide easier to read.

To apply an animation to an object, do the following:

1. Select an object.
2. Click the Animations tab.
3. In the Animation group, click the More drop-down arrow to view the available animations.

4. Select the desired animation effect.
5. The object will now have a small number next to it to show that it has an animation. Also, in the Slide pane, the slide will now have a star symbol next to it.

Viewing the Presentation in Slide Show View

The Slide Show view allows you to show a presentation using a computer. The computer acts like a slide projector, displaying each slide on a full screen. The full-screen slide hides the toolbars, menus, and other PowerPoint window elements. When making a presentation, you use slide show view. You can start slide show view from normal view or slide sorter view.

To view the presentation, do any of the following:

1. In the Start Slide Show group on the Slide Show tab, click either From Beginning or From Current Slide.
2. Click the Slide Show View button in the bottom-right corner of the screen (to begin from the current slide).
3. Press F5 (to begin from the beginning).
4. Press Shift + F5 (to begin from the current slide)

Tricky Terms

Animation	Special sound or visual effects that can be added to objects on a slide.
Slide	The individual page of PowerPoint presentation.
Placeholder	The box with dotted outlines that appear when you create a new slide.
Presentation	The process of presenting a topic to an audience.
Transitions	The special effects used to introduce a slide during the slide show.
Powerpoint view	The mode in which the presentation appears on the screen. Each view provides you a different look and capabilities.

Let Us Revise

- A presentation software is a computer software package used to display information, normally in the form of a slide show.
- A slide is the presentation output that contains text, charts, graphics, audio and video.
- Microsoft Office PowerPoint 2010 is a complete presentation graphics program developed by Microsoft Corporation, USA. It allows you to produce professional-looking presentations.
- PowerPoint is an excellent tool for presentations of any kind, either in the classroom or at a conference.
- Slide layouts contain formatting, positioning, and placeholders for all of the content that appears on a slide.
- PowerPoint includes nine built-in slide layouts, or you can create custom layouts that meet your specific needs, and you can share them with other people who create presentations by using PowerPoint.
- A powerpoint view is the mode in which the presentation appears on the screen.
- Normal view is the main editing view, where you write and design your presentations.
- Transitions are special effects used to introduce a slide during the slide show.
- In PowerPoint you can animate text and objects such as clip art, shapes, and pictures. Animation is a special visual effect that you can add to parts of the slides that enable the presenter to focus on important points as they are being presented.
- The Slide Show view allows you to show a presentation using a computer.

Solved Exercises

1. What is a presentation software?

Ans: A presentation software is a computer software package used to display information, normally in the form of a slide show.

2. What is Microsoft Office Powerpoint 2010?

Ans: Microsoft Office PowerPoint 2010 is a complete presentation graphics program developed by Microsoft Corporation, USA. It allows you to produce professional-looking presentations.

3. What are the advantages of Microsoft Office PowerPoint?

Ans: Microsoft Office PowerPoint has the following advantages:

- *It can create paper printouts of the individual slides, outlines and speaker notes.*
- *It gives you the flexibility to make presentations using a projection device attached to a personal computer.*
- *It helps you to quickly create presentations for many purposes, including lectures, research reports, meeting handouts and agendas, speaker introductions, and other events.*
- *It allows to animate objects and add narrations, video or music to the presentation.*

4. What is a slide

Ans: A slide is an individual page of a presentation. It is the container of information present in the form of text, pictures, diagrams, charts, etc.

5. What is a PowerPoint view? What are the different types of view in PowerPoint?

Ans: PowerPoint view is the mode in which the presentation appears on the screen. The different views available in PowerPoint are Normal view, Slide Sorter view, Master views, Slide Show view, Presenter view and Reading view.

6. What is a reading view?

Ans: Reading view is used to deliver your presentation to someone viewing your presentation on their own computer.

7. What are transitions?

Ans: Transitions are special effects used to introduce a slide during the slide show.

8. What is animation?

Ans: Animation is a special visual effect that you can add to parts of the slides that enable the presenter to focus on important points as they are being presented. Animation, or movement, on the slide can be used to draw the audience's attention to specific content or to make the slide easier to read.

Chapter Review

1. State whether the following statements are true or false.

a. A word processing software is a computer software package used to display information, normally in the form of a slide show.

b. A slide is the presentation output that contains text, charts, graphics, audio and video.

c. Master view is the main editing view, where you write and design your presentations.

d. Presenter view is a key slide show-based view that you can use while delivering your presentation.

e. Animations are special effects used to introduce a slide during the slide show.

2. Match the following.

Group A	*Group B*
Slide Show view	The main editing view, where you write and design your presentations.
Transitions	Used to deliver your presentation to your audience.
Presenter view	The special effects used to introduce a slide during the slide show.
Reading view	A key slide show-based view that you can use while delivering your presentation.
Normal view	Used to deliver your presentation to someone viewing your presentation on their own computer.

3. Select the best answer from the list of choices.

a. A computer software package used to display information, normally in the form of a slide show.

i. Word processing
ii. Presentation software
iii. Spreadsheet software
iv. None of the above

b. The main editing view, where you write and design your presentations.

i. Normal view
ii. Slide sorter view
iii. Slide show view
iv. Reading view

c. A key slide show-based view that you can use while delivering your presentation.

i. Slide Show view
ii. Reading view
iii. All of the above
iv. None of the above

d. A special visual effect that you can add to parts of the slides that enable the presenter to focus on important points as they are being presented.

i. Transitions
ii. Animation
iii. All of the above
iv. None of the above

e. The special effects used to introduce a slide during the slide show.

i. Transitions
ii. Animation
iii. Slide Show
iv. None of the above

4. Give an appropriate technical term for each of the following.

a. Special sound or visual effects that can be added to objects on a slide.
b. The individual page of PowerPoint presentation.
c. The box with dotted outlines that appear when you create a new slide.
d. The process of presenting a topic to an audience.
e. The special effects used to introduce a slide during the slide show.
f. The mode in which the presentation appears on the screen. Each view provides you a different look and capabilities.

5. Answer the following questions.

a. What is a presentation software?
b. What is Microsoft Office PowerPoint 2010?
c. State any three advantages of Microsoft Office PowerPoint 2010?
d. What do you understand by PowerPoint view? What are the main views of Microsoft Office PowerPoint 2010?
e. What is normal view? Name the three working areas of normal view.
f. What is the difference between slide view and slide shorter view?
g. What is meant by animation?
h. What is meant by transition?
i. Write the steps to apply transition to a slide.
j. Write the steps to apply animation to a slide.

Lab Exercises

Lab Exercise 1

a. Create a new presentation using the design template.

b. Use the Title Slide AutoLayout for the first slide. The title should read: World Records. The subtitle should display your name.

c. Add a new slide using the Bulleted List AutoLayout. The bullet slide Title should read: Heaviest Apple.

   The following bullet should read: The heaviest apple weighed 1.849 kg (4 lb 1 oz) and was grown and picked by Chisato Iwasaki at his apple farm in Hirosaki City, Japan October 24, 2005.

d. Add a clip art image to the slide, and then resize and move the image as needed.

e. Use the WordArt style and add the following text: World Records

f. Change the WordArt font to Impact and the Font size to 48.9.

g. View the slide show.

h. Save the presentation as World Records.

i. Spell check, proofread, and resave the presentation.

Lab Exercise 2

a. Open the World Records presentation.

b. Add a blank slide at the end of the presentation and remove the slide's graphic elements, if any.

c. Set a 4-second timing to the new slide.

d. Add any motion clip from the data disk to the blank slide (last slide) and include the word "World Records" done in WordArt Lucinda Casual font (or the font of your choice), 72 pts.

e. Set up a continuously, self-running presentation for a kiosk.

f. Save the presentation as PowerPoint with Custom Effects.

g. View the slide show.

h. Print the presentation as a six-slides per page handout, and then close it.

Objectives

After completing this chapter, you will be able to:

- Define computer ethics and list the ten commandments of computer ethics.
- Define Information and Communication Technology.
- Explain the positive impacts of ICT.
- Explain the negative impacts of ICT.

10 Ethical Issues in Computing, ICT & Cyber Law

Concept: Ethical Issues

Because of its constantly changing nature, the area of computer technology is one that is difficult to assign a specific set of moral codes, although it is necessary that ethics be considered when making decisions in this area. Computing creates a whole new set of ethical problems, unique unto itself. Such problems include:

"…the unauthorized use of hardware, the theft of software, disputed rights to products, the use of computers to commit fraud, the phenomenon of hacking and data theft, sabotage in the form of viruses, responsibility for the reliability of output, making false claims for computers, and the degradation of work."

These problems engender a whole new set of ethical questions, including:

- is copying software really a form of stealing"
- are so-called 'victimless' crimes… more acceptable than crimes with human victims"
- does information on individuals stored in a computer constitute an intolerable invasion of privacy?"

expanding your horizons

Computer crime, or Cyber crime, refers to any crime that involves a computer and a network. The computer may have been used in the commission of a crime, or it may be the target. Net crime refers to criminal exploitation of the Internet

Ethical Issues in Computing

In the industrialized nations of the world, the "Information Revolution" has significantly altered many aspects of life. Advances in computer technologies have placed tremendous new capabilities in the hands of everyday people. As computer technology gives us wonderful new powers, we are faced with many ethical dilemmas.

Computer ethics is set of moral principles that regulate the use of computers. Some common issues of computer ethics include intellectual property rights (such as copyrighted electronic content), privacy concerns, and how computers affect society. As technology advances, computers continue to have a greater impact on society. Therefore, computer ethics promotes the discussion of how much influence computers should have in areas such as artificial intelligence and human communication. As the world of computers evolves, computer ethics continues to create ethical standards that address new issues raised by new technologies. The computer ethics institute in Washington DC, has proposed the ten commandments of computer ethics. They are:

- Do not use a computer to harm other people.
- Do not interfere with other people's computer work.
- Do not copy or use proprietary software for which you have not paid.
- Do not snoop around in other people's computer files.
- Do not use a computer to steal.
- Do not use a computer to bear false witness.
- Do not use other people's computer resources without authorization or proper compensation.
- Do not use other people's intellectual output.
- Always think about the social consequences of the program you are writing or the system you are designing.
- Always use a computer in ways that demonstrate consideration and respect for your fellow humans.

Flat and wide screens will come, and probably go. The next stage may be TV with pictures in three dimensions and no screen. Instead, a small box containing a hologram projector will shine laser beams into the air, to make moving, 3D colour images that you can walk round. You could view a whole sports stadium in miniature, watch the action from any viewpoint and cheer on your favourite team - all in the privacy of your own bedroom.

A look to Future

Information and Communication Technology

ICT stands for Information and Communication Technology. It is the study or business of developing and using technology to process information and aid communications. It involves any communication application or device, encompassing: television, radio, satellite systems, cellular phones, computer hardware and software. ICT are widely used in health care, schools and libraries.

Positive Impacts

1. ***Security***

   Information communication technology has proved helpful security wise in the creation of devices such as hidden cameras, webcam etc which is used in offices, organizations, homes. These devices monitor places and the activities of people in such a way that crime is detected at its inception.

2. ***Faster communication speed***

   In the past, it took a long time for any news or messages to be sent. Now with the internet, news or messages are sent via e-mail to friends, business partner or any one efficiently.

3. ***Effective sharing of information***

   People can share and exchange opinions, news and information through discussion groups, mailing list and forums on the internet. This enable knowledge sharing which will contribute to the development of the knowledge based society.

4. ***Paperless environment***

   ICT technology has created the term paperless environment. This term means information can be stored and retrieved through the digital medium instead of paper. Online communication via email, online chat and instant messages also helps in creating the paperless environment.

5. ***Mass communication***

   As the name implies, mass communication involves communicating to a large audience. Schools and businesses make use of electronic communication to facilitate the activities of their institutions e.g. e-mail and e-newspapers to communicate to a large number of people at the same time.

6. ***Storing information***

   Information technology has created electronic storage systems to protect valuable records. Storage systems, such as virtual vaults, keep information safe by only allowing authorized company staff or individuals can have access, withdraw, add or change the documents. In times of technological disaster, IT security engineering systems protect electronic information from being hacked or wiped out.

Negative Impacts

1. *Nuclear weapons*

Destructive weapons and equipment have been created through ICT and these weapons have been used to claim the lives of many innocent people.

2. *Frauds*

ICT paved the way for fraud as people from one country can defraud others in different parts of the world. The internet has facilitated the activities of fraudsters who from the comfort of their homes can dupe people far and near.

3. *Job less*

Manual operations have been replaced with automation which has economic and social effects such as loss of income and status.

4. *Reduced personal interaction*

Being able to work from home is usually regarded as being a positive effect of using ICT, but there can be negative aspects as well. Most people need some form of social interaction in their daily lives and if they do not get the chance to meet and talk with other people they may feel isolated and unhappy. of course, it is possible to overcome the lack of social interaction, but this usually involves deliberate planning and the active pursuit of relationships which might otherwise dwindle away.

5. *Reduced physical activity*

Another negative effect of ICT is that users may adopt a more sedentary lifestyle. This can lead to health problems such as obesity, heart disease, and diabetes. Many countries, including the UK, have workplace regulations to prevent problems such as repetitive strain injury or eyestrain, but lack of physical exercise is rarely addressed as a specific health hazard.

6. *Cost*

Many ICT hardware and software are expensive both to purchase and to maintain. It is true that Information Communication Technology is present in almost every facet of our daily lives yet the cost of acquiring them is still relatively high.

7. *Society*

ICT has negatively affected our society by causing a digital divide between those who can access information and those who cannot reduce education and understanding due to the vast amount of misleading and incorrect information.

8. *Loss of Privacy*

Users of social networking run the risk of lack of privacy in the sense that known and unknown people can assess their accounts or sites where they can get their personal private and sensitive information.

Concept: Cyber Law

The internet is the most powerful, global data communications system making it the greatest invention of science because of its wide range of benefits and uses in the world today. It has made information available in a quick and easy manner, publicly accessible and within easy reach. Internet is growing rapidly, Cyberspace is becoming the new preferred environment of the world.

With the spontaneous and almost phenomenal growth of cyberspace, new and ticklish issues relating to various legal aspects of cyberspace began cropping up. In response to the absolutely complex and newly emerging legal issues relating to cyberspace, CYBER LAW or the law of Internet came into being.

Cyber law is the area of law that deals with the Internet's relationship to technological and electronic elements, including computers, software, hardware and information systems (IS). Cyber law is also known as Cyber Law or Internet Law for controlling the criminal activities done through the digital media.

Cyber laws prevent or reduce large scale damage from cyber-criminal activities by protecting information access, privacy, communications, intellectual property (IP) and freedom of speech related to the use of the Internet, websites, email, computers, cell phones, software and hardware, such as data storage devices.

Cyber Crime

Cyber crime is one of the fastest growing areas of crime. Cyber crime is criminal activity done using computers and the Internet. These include attacks against computer data and systems, identity theft, internet auction fraud, the penetration of online financial services, as well as the deployment of viruses and various email scams such as phishing.

Brainstorming task

Complete each statement in the spaces provided.

a. _____ is the area of law that deals with the Internet's relationship to technological and electronic elements, including computers, software, hardware and information systems (IS).

b. ICT stands for_____

c. _____Law for controlling the criminal activities done through the digital media.

d. _____ is criminal activity done using computers and the Internet.

Cyber Law of Nepal

Cyber law of Nepal commonly known as the Electronic Transaction and Digital Signature Act-Ordinance was enacted in Nepal in 2061 BS (2004). The cyber law in Nepal was formulated after making a thorough discussion of the IT Acts already implemented in other countries. It was formulated mainly to legalize the different trading activities through the global computer network and to give a boost to the e-goverance activities. It contains a strong provision of punishment against cyber crimes according to the nature of the crime. The different cyber mentioned in the law include hacking, damage to computer source code, breach of privacy and faking digital signatures. As per the provisions of law, the government is fully authorized to punish cyber criminals - both an individual and an institution with imprisonment and fine.

The major aspects of the act are listed below:

- Provides a legal framework to facilitate and safeguard electronic transactions in the electronic medium.
- Provides a detailed provisions for the Controller of Certifying Authorities to regulate Certifying Authorities.
- Provides provision of an Appellate Judicial body to listen to complaints, cases and cyber- related crime.
- Provides punishment to a hacker who

i. Downloads, copies or extracts data from a database without permission of the owner.
ii. Introduce computer virus into any computer or computer network.
iii. Damages programs or data residing in a computer or network or illegally copies them.
iv. Disrupts a computer or network.

- Provides legal status for various banking transactions through electronic media, which will be instrumental in boosting economic activities throughout the world via Internet.

Tricky Terms

Hacking	The practice of modifying the features of a system, in order to accomplish a goal outside of the creator's original purpose.
Viruses	A program or piece of code that is loaded onto your computer without your knowledge and runs against your wishes.
Computer ethics	A set of moral principles that regulate the use of computers. Some common issues of computer ethics include intellectual property rights (such as copyrighted electronic content), privacy concerns, and how computers affect society.
ICT	The study or business of developing and using technology to process information and aid communications.
E-Mail	The transmission of messages over communications networks.

Let Us Revise

- Computer ethics is set of moral principles that regulate the use of computers.
- ICT is the study or business of developing and using technology to process information and aid communications.
- ICT involves any communication application or device, encompassing: television, radio, satellite systems, cellular phones, computer hardware and software.
- ICT are widely used in health care, schools and libraries.
- Information communication technology has proved helpful security wise in the creation of devices such as hidden cameras, webcam etc which is used in offices, organizations, homes.
- People can share and exchange opinions, news and information through discussion groups, mailing list and forums on the internet.
- Information technology has created electronic storage systems to protect valuable records.
- Destructive weapons and equipment have been created through ICT and these weapons have been used to claim the lives of many innocent people.
- ICT paved the way for fraud as people from one country can defraud others in different parts of the world.
- Many ICT hardware and software are expensive both to purchase and to maintain.

Solved Exercises

1. *What is computer ethics?*

Ans: *Computer ethics is a branch of practical philosophy which deals with how computing professionals should make decisions regarding professional and social conduct.*

2. *What are the ten commandments of computer ethics?*

Ans: *The ten commandments of computer ethics are:*

- *Do not use a computer to harm other people.*
- *Do not interfere with other people's computer work.*
- *Do not copy or use proprietary software for which you have not paid.*
- *Do not snoop around in other people's computer files.*
- *Do not use a computer to steal.*
- *Do not use a computer to bear false witness.*
- *Do not use other people's computer resources without authorization or proper compensation.*
- *Do not use other people's intellectual output.*
- *Always think about the social consequences of the program you are writing or the system you are designing.*
- *Always use a computer in ways that demonstrate consideration and respect for your fellow humans.*

3. *What is Information and Communication Technology?*

Ans: *Information and communications technology is the study, development and application of computer-based information systems using telephones, televisions, radios, mobiles, computers and computer software to convert, store, process, protect and transmit information.*

4. *Why is a ICT tool? Name the different ICT tools?*

Ans: *ICT tools are the tools that has an input,output and we must be able to process with it. The different ICT tools are multimedia projector, teleconferencing, communication devices, presentation program, multimedia software and graphics software.*

5. *What are the positive impacts of ICT?*

Ans: *The positive impacts of ICT are listed below:*

a. *Information communication technology has proved helpful security wise in the creation of devices such as hidden cameras, webcam etc which is used in offices, organizations, homes.*
b. *ICT technology has created the term paperless environment.*
c. *Information technology has created electronic storage systems to protect valuable records.*
d. *People can share and exchange opinions, news and information through discussion groups, mailing list and forums on the internet.*

Chapter Review

1. State whether the following statements are true or false.

a. Advances in computer technologies have placed tremendous new capabilities in the hands of everyday people.

b. ICT involves any communication application or device, encompassing: television, radio, satellite systems, cellular phones, computer hardware and software.

c. You must use snoop around in other people's computer files.

d. Online communication via email, online chat and instant messages also helps in creating the paperless environment.

e. Destructive weapons and equipment have been created through ICT and these weapons have been used to claim the lives of many innocent people.

2. Match the following.

Group A	*Group B*
Hacking	The practice of modifying the features of a system, in order to accomplish a goal outside of the creator's original purpose
Viruses	A program or piece of code that is loaded onto your computer without your knowledge and runs against your wishes
Computer ethics	A set of moral principles that regulate the use of computers. Some common issues of computer ethics include intellectual property rights (such as copyrighted electronic content), privacy concerns, and how computers affect society.
ICT	The study or business of developing and using technology to process information and aid communications.
E-Mail	The transmission of messages over communications networks.

3. Write the full form of the following abbreviations.

i. E-Mail ii. ICT iii. IT

4. Select the best answer from the list of choices.

a. A set of moral principles that regulate the use of computers.

i. Cyber Ethics ii. Cyber law iii. None of the above

b. The practice of modifying the features of a system, in order to accomplish a goal outside of the creator's original purpose.

i. Cyber laundering ii. Cyber theft iii. Hacking

c. A program or piece of code that is loaded onto your computer without your knowledge and runs against your wishes.

i. Malware ii. Computer virus iii. None of the above

d. The study or business of developing and using technology to process information and aid communications.

i. ICCT ii. ITC iii.ICT

e. The transmission of messages over communications networks.

i. Chat ii. E-Mail iii. All of the above

5. In your own words, briefly answer the following questions.

a. What is a computer crime?

b. What do you understand by the term computer ethics?

c. What are the ten commandments of computer ethics?

d. Define the following terms:

i. E-Mail

ii. Hacking

iii. Computer virus

e. What is Information and Communication Technology?

f. Explain any three positive impacts of Information and Communication Technology.

g. Explain any three negative impacts of Information and Communication Technology.

Objectives

After completing this chapter, you will be able to:

- Define computer virus and explain how computer viruses spread.
- Explain the different types of computer viruses.
- Enumerate some symptoms of a virus infection.
- List some precautions that must be observed to avoid virus infection.
- Define antivirus software.

11

Computer Viruses

Concept: Biggest Threat

One of ongoing problems in the computer field is the introduction to computer viruses by antisocial users. A computer virus is a program containing code that can generate multiple copies of itself. Viruses have the potential to destroy and disrupt computer systems and computer networks. It may or may not damage data or other programs residing in the computer system. Viruses are made to do many different things like making innumerable copies of themselves, erasing storage devices, data corruption, data loss and displaying messages or graphics. It is the intellectual creation of a computer programmer. Computer viruses are written to affect your computer adversely without your knowledge. Viruses can easily hide within a system by attaching themselves to other files or programs because they are small in size. The ability of a virus to replicate enables it to infect files and programs.

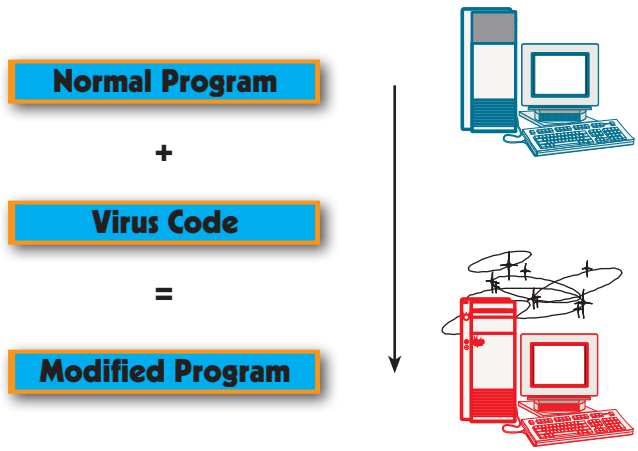
Some of the features of a computer virus are listed below:

a. The computer virus may cause problems immediately.

b It may count specific occurrences, for example, how many times it is copied, and then cause damage.

c. It may look at the computer's clock and cause damage on a specific date.

d. It may reproduce itself and then cause damage.



expanding your horizons

Brain is the industry standard name for a computer virus that was released in its first form in January 1986, and is considered to be the first computer virus for MS-DOS. It infects the boot sector of storage media formatted with the DOS File Allocation Table (FAT) file system. Brain was written by two brothers, Basit Farooq Alvi and Amjad Farooq Alvi, from Lahore, Punjab, Pakistan.

How do Computer Viruses spread?

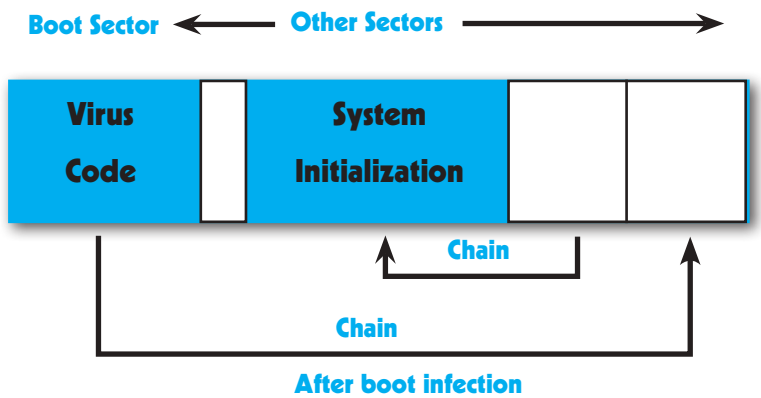
Computer viruses are designed to infect and potentially damage files on a computer that receives it. They are usually activated when the program or file to which it is attached is executed or accessed. Viruses can spread by using infected physical storage devices, such as floppy disks, pen drives and CDs. They also spread by getting attached to e-mail messages or by downloading virus-infected files or software from the Internet. The way in which a virus replicates and spreads from one computer to another depends upon the way it is programmed to behave. Different viruses behave in different ways. Some stay active in memory until the computer is shut down. Other viruses stay active only as long as the infected application is running.

Types of Computer Virus

Computer viruses come in a wide variety. The level of destructiveness of viruses varies widely. Virus behaviour can range from annoying to destructive. Computer viruses are categorized by their infection targets. They are of the following types: boot sector viruses and file infecting viruses.

Boot Sector Virus

Boot sector viruses are designed to infect the boot sector of the disk. The boot sector is the first sector of a disk which directs the computer to the location of the operating system. It contains instructions to boot the computer. It either replaces or modifies the instruction in the boot sector by some different code. This prevents the hardware from loading system software when the computer is turned on. A boot sector virus activates only when you turn on or restart your computer. Disk Killer, Stoned and Michelangelo are the examples of boot sector viruses.



Facts Corner *Stoned is the name of a boot sector computer virus created in 1987.*

File Infecting Viruses

File infecting viruses are designed to infect executable program files having extensions .exe, .com, or .dll. These viruses either overwrite or modify the contents of executable files. When these infected files are executed, other files on the computer also get infected. File viruses can spread by using floppy disks, pen drives and CDs. Friday the 13th, Enigma and Nemesis are the examples of file infecting viruses.

Ill-Effects of Virus Infection

Different viruses can affect a computer system in different ways. The impact of a computer virus infection can range from disruption in work by flashing messages on a computer screen to causing serious damages worth millions of dollars to an organization. In order to detect a virus attack on the computer, you must observe the computer for signs of changes or strange behaviour that may be the symptoms of a virus attack.

Some of the symptoms of virus infection are discussed below:

- Unwanted message appears on the screen.
- It takes long time to load the program.
- It slows down the performance of the computer.
- The computer runs very slowly.
- The computer displays pop up messages.
- The computer system hangs or freeze frequently.

Tips for Safe Computing

Today, we are more dependent on computers and the information that they store than ever before. From spyware, viruses, and Trojans to identity theft and computer hardware malfunctions-any disruption can have a huge impact on our lives The spread of computer virus infections can be stopped through the practice of safe computing. The following are a list of some recommendations for safe computing:

- Always check a removable disk for viruses before using it.
- Install software from the original optical disk. If the originals are not available, scan the secondary media for viruses before installation.
- Do not use illegal software. The illegal software contain viruses.
- Ensure that the antivirus package scans all system and boot files at start-up.
- Always scan files downloaded from the Internet or transferred over the network before executing them on your machine.
- Scan all e-mail attachments before executing them on your machine.

AntiVirus Software

Anti-virus software is a program or set of programs that are designed to prevent, search for, detect, and remove software viruses, and other malicious software like worms, trojans, adware, and more. It must be updated frequently for protection against new viruses. It resides in the memory so that it detects the viruses at the time of entry and prevents them from doing any damage to the system. Some popular anti-virus software available are: Norton AntiVirus, McAfee VirusScan, Microsoft Security Essentials.

Antivirus software typically performs the following tasks:

- Scans files and folders for viruses.
- Provides information when a virus is detected.
- Cleans virus-infected files.
- Continuously monitors memory to protect the computer from memory-resident viruses.

Facts Corner

Anti virus software is important because it specializes in the quarantining and removal of viruses.

McAfee VirusScan

Kaspersky Anti-Virus is an antivirus program developed by Kaspersky Lab. It is designed to protect users from malware and is primarily designed for computers running Microsoft Windows and Mac OS X. Kaspersky Anti-Virus features include real-time protection, detection and removal of viruses, trojans, worms, spyware, adware, keyloggers malicious tools and auto-dialers, as well as detection and removal of rootkits. It also includes instantaneous automatic updates via the "Kaspersky Security Network" service.

Brainstorming task

Complete each statement in the spaces provided.

a. _____is a program or piece of code that is loaded onto your computer without your knowledge and runs against your wishes.

b. _____is a type of virus that infect computer systems by copying code either to the boot sector on a floppy disk or the partition table on a hard disk.

c. _____is a program or set of programs that are designed to prevent, search for, detect, and remove software viruses, and other malicious software like worms, trojans, adware, and more.

Tricky Terms

Antivirus software	A program designed to detect and remove viruses from the infected programs or files in the computer system.
Boot sector	The portion of a disk reserved for the self-starting portion of an operating system.
Boot sector virus	A computer virus designed to infect the boot sector of the disk.
File infecting virus	A computer virus designed to infect executable program files having extensions .exe, .com, or .dll.
Virus	A software program with the ability to reproduce itself.

Let Us Revise

- A computer virus is a software program that can generate multiple copies of itself.
- Computer viruses can spread through the following media: physical storage devices, E-mail and Internet.
- Computer viruses are categorized by their infection targets. They are of the following types: boot sector viruses and file infecting viruses.
- Boot sector viruses are designed to infect the boot sector of the disk. Disk Killer, Stoned and Michelangelo are the examples of boot sector viruses.
- The boot sector is the first sector of a disk which directs the computer to the location of the operating system.
- File infecting viruses are designed to infect executable program files having extensions .exe, .com, or .dll. Friday the 13th, Enigma and Nemesis are examples of this type of viruses.
- The impact of a computer virus infection can range from disruption in work by flashing messages on a computer screen to causing serious damages worth millions of dollars to an organization.
- Antivirus software is a program designed to detect and remove viruses from computer system.
- Some popular anti-virus software available are: Norton AntiVirus, McAfee VirusScan, Microsoft Security Essentials.

Solved Exercises

1. *What is a computer virus? What are the different types of computer viruses?*

Ans: *A computer virus is a software program that can generate multiple copies of itself. Computer viruses are categorized by their infection targets. They are of the following types: boot sector viruses and file viruses.*

2. *What is a file infecting virus? Give any two examples of file infecting virus.*

Ans: *File infecting virus is a computer virus that infects executable program files having extensions .exe, .com, or .dll. It can spread by using floppy disks, pen drives and CDs. Friday the 13th, Enigma and Nemesis are examples of file infecting virus.*

3. *What are the ill-effects of a computer virus?*

Ans: *The ill-effects of a computer virus are listed below:*

i. *Erases the files or programs from the system.*
ii. *Decreases the space in the main memory.*
iii. *Appearance of strange message or strange patterns on the screen.*
iv. *Slows down the system performance.*
v. *Increases the size of executable files.*
vi. *Causes system to hang or freeze frequently.*
vii. *Formats the hard disk.*

4. *List some of the precautions that must be observed to avoid virus infection.*

Ans: *Some of the precautions that must be observed to avoid virus infection are:*

i. *Always check a floppy for viruses before using it. Ensure that the floppy is write-protected when using it on a different machine.*
ii. *Never load an unknown disk into your system unless you make sure it is virus free.*
iii. *Do not use illegal software. The illegal software contain viruses.*
iv. *Always scan files downloaded from the Internet or transferred over the network before executing them on your machine.*
v. *Scan all e-mail attachments before executing them on your machine.*

5. *What is an anti-virus program? List some of the popular anti-virus software.*

Ans: *Antivirus software is a program designed to detect and remove viruses from the infected programs or files in the computer system. Some popular anti-virus software available are: Norton AntiVirus, McAfee VirusScan and SmartDog.*

Chapter Review

1. State whether the following statements are true or false.

a. Computer virus is a program designed to detect and remove viruses from the infected programs or files in the computer system.

b. Boot sector virus prevents the hardware from loading system when the computer is turned on.

c. Disk Killer, Stoned and Michelangelo are the examples of boot sector virus.

d. Some popular anti-virus software available are: Norton AntiVirus, McAfee VirusScan, Microsoft Security Essentials.

e. Kaspersky Anti-Virus is an antivirus program developed by Kaspersky Lab.

2. Match the following.

Group A	*Group B*
Antivirus software	A computer virus designed to infect executable program files having extensions .exe, .com, or .dll.
Boot sector	A computer virus designed to infect the boot sector of the disk.
File infecting virus	A software program with the ability to reproduce itself.
Boot sector virus	A program designed to detect and remove viruses from the infected programs or files in the computer system.
Virus	The portion of a disk reserved for the self-starting portion of an operating system.

3. Select the best answer from the list of choices.

a. _____viruses are designed to infect the boot sector of the disk.

i. Boot sector virus ii. File infecting virus iii. E-mail virus

b. The type of virus that is designed to infect executable program files having extensions .exe, .com, or .dll.

i. Boot sector virus ii. File infecting virus iii. Script virus

c. The first PC boot sector virus created in 1986 by two brothers, Basit and Amjad Farooq Alvi.

i. (c)Brain ii. Disk Killer iii. Stoned

d. A program designed to detect and remove viruses from the computer system.

i. Malware ii. Freeware iii. Antivirus

e. _____ is the popular antivirus software.

i. Microsoft Security Essential ii. Web browser iii. Microsoft Excel

4. Give the appropriate technical term for each of the following statements.

a. A software program with the ability to reproduce itself.

b. A computer virus designed to infect the boot sector of the disk.

c. The portion of a disk reserved for the self-starting portion of an operating system.

d. A computer virus designed to infect executable program files having extensions .exe, .com, or .dll.

e. A program designed to detect and remove viruses from the infected programs or files in the computer system.

5. In your own words, briefly answer the following questions.

a. What is a computer virus?

b. How does a computer virus spread from one computer to another?

c. What is a boot sector virus? Give any two examples of boot sector virus.

d. What is a boot sector?

e. List any three ill-effects of a computer virus.

f. List any three precautions that must be observed to avoid computer virus infection.

g. What is an antivirus program? Give an example.

h. List some of the tasks performed by antivirus software.

i. What is McAfee VirusScan?

Objectives

After completing this chapter, you will be able to:

- State the major benefits of computer network.
- Explain the important terminologies of computer network.
- Describe the main computer network models.
- Describe the different categories of computer network.
- Explain the various types of wireless network.

12

Computer Networking Concepts

Concept: Networks Rule

Computer networks are critical parts of almost every organization. Today, more and more computers are being connected into computer networks. The value of the computer connected to a network increases exponentially with the number of machines connected to it. Computer network is a communication system connecting two or more computers that work together to exchange information and share resources. It includes network media, such as a cable to carry network data; network adapter card to translate the data between the computer and the network media; a network operating system to enable a machine to participate in the network; and a network protocol to control the network communications.

Computer networks provide several important advantages to businesses and individuals.

- Networks offer a quick and easy way to share files directly.
- All computers in the network can share resources such as printers, fax machines, modems, and scanners.
- When connected to the Internet, network users can communicate with people around the world via the network.
- Networks allow their users to access files from computers throughout the network.
- Workgroup software like Microsoft BackOffice enables many users to contribute to a document concurrently. This allows for interactive teamwork.

expanding your horizons

BackOffice is a suite of network server software from Microsoft that includes Windows NT Server, BackOffice Server (for the integrated development, deployment, and management of BackOffice applications in departments, branch offices, and medium sized businesses).

Networking Terminology

The business of networking is like any other technical discipline; it has a language of its own. Part of the task of mastering the technology is to master the language used to describe that technology. There are a number of specialized terms that describe computer networks. Some terms often used with networks are explained below:

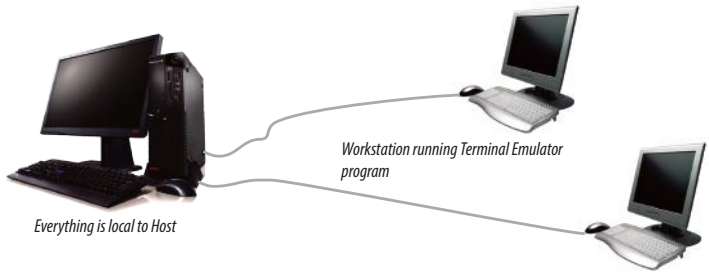
Terms	Description
Node	A node is any device connected to a computer network. Nodes can be computers, personal digital assistants (PDAs), cell phones, or various other network appliances.
Client	A client is a network computer that utilizes the resources of other network computers, including other clients. The client computer has its own processor, memory, and storage, and can maintain some of its own resources and perform its own tasks and processing.
Server	A server is a network computer that shares resources with and responds to requests from other network computers, including other servers. Servers provide centralized access and storage for resources that can include applications, files, printers or other hardware, and specialized services such as email.
Peer	A peer is a self-sufficient computer that acts both as a server and a client to other similar computers on the network.
Host computer	A host computer is a powerful, centralized computer system, such as a mainframe computer, that performs data storage and processing tasks on behalf of clients and other network devices.
Terminal	A terminal is a specialized network device on a host-based network that transmits the data entered by the user to the host for processing and displays the results. Terminals are often called "dumb" because they have no processor or memory of their own. It consists of a keyboard and a monitor.

Network Models

A network model is a design specifications for how the nodes on a network interact and communicate. The network model determines the degree to which communications and processing are centralized or distributed. There are three primary network models: centralized or heirarchical, client/server and peer-to-peer.

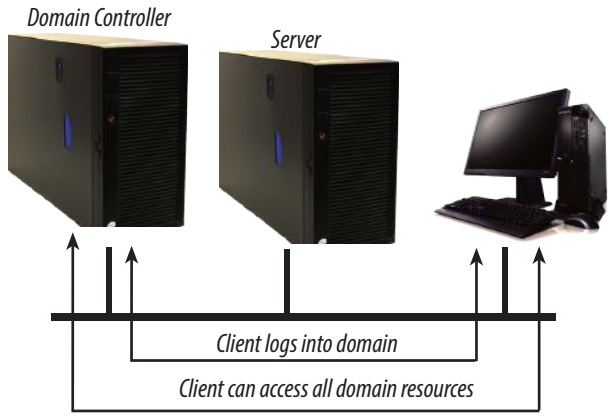
Centralized Computing Network

A centralized computing network is a network in which a central host computer performs data processing and storage on behalf of clients. Host computers run the UNIX operating system and can process multiple jobs simultaneously. Centralized computing network provides high performance and centralized management, but it is also expensive to implement. Centralized computing network is also called host-based networks.



Client/Server Network

A client/server network is a network model in which each computer or process on the network is either a client or a server. Servers are powerful computers or processes dedicated to managing disk drives (file servers), printers (print servers), or network traffic (network servers). Clients are personal computers or workstations on which users run applications. Clients rely on servers for resources, such as files, devices, and even processing power.



Peer-to-Peer Network

Peer-to-Peer is a type of network in which each workstation has equivalent capabilities and responsibilities. They are generally simpler, but they usually do not offer the same performance under heavy loads. Peer networks are also often situated physically near to each other, typically in homes, small businesses or schools. Some peer networks, however, utilize the Internet and are geographically dispersed worldwide. Peer-to-peer networks are easy and inexpensive to implement.

How will people and computers communicate in the future? Some computers already have speech recognition programmes and can understand spoken words. You talk, your words come up on screen, and the computer responds. Perhaps the future computer will look more human, with a robot-like body. It will understand what you say, walk and talk, even laugh at your joke. It could become your best friend!

A look to Future

Network Categories

Computer network, often simply referred to as a network, is a group of computers and devices interconnected by communication channels that facilitate communications among users and allows users to share resources. The act of connecting computers together into a network is called networking. The size and complexity of a network may vary from just two computers connected together to a chain of a few hundred computers of different types spread around the world. Thus, networks vary in size, complexity and geographical spread. The entire computer network can be classified into three categories depending on the basis of geographical spread. They are:

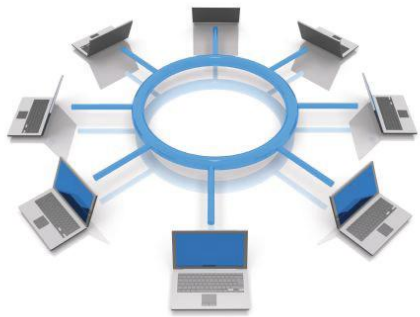
i. Local Area Network (LAN)

ii. Metropolitan Area Network (MAN)

iii. Wide Area Network (WAN)

Local Area Network (LAN)

Local area network (LAN) is a group of computers and associated devices that share a common communications line or wireless link. Typically, connected devices share the resources of a single processor or server within a small geographic area (for example, within an office building). It is composed of inter-connected workstations and personal computers which are each capable of accessing and sharing data and devices, such as printers, scanners and data storage devices, anywhere on the LAN. LANs are characterized by higher communication and data transfer rates and the lack of any need for leased communication lines.

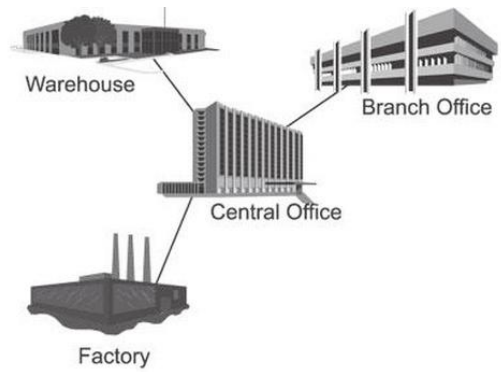


In the 1960s, large colleges and universities had the first local area networks (LAN). In the mid-1970s, Ethernet was developed by Xerox PARC (Xerox Palo Alto Research Center) and deployed in 1976. Chase Manhattan Bank in New York had the first commercial use of a LAN in December 1977. In the late 1970s and early 1980s, it was common to have tens or hundreds of individual computers located in the same site. Many users and administrators were attracted to the concept of multiple computers sharing.

Knowledge Update

Metropolitan Area Network (MAN)

Metropolitan Area Network is a network of computers spread over a city or town located in the same geographic area. This network is used as links between office buildings in a city. They typically use wireless infrastructure or optical fiber connections to link their sites. Cellular phone networks are a good example of such networks.



Wide Area Network (WAN)

Wide Area Network is a network of computers that spans multiple geographic location. This network may be across the town, between different cities, countries or continents. Typically, it will employ communication circuits such as long-distance telephone wires, microwaves and satellites. The Internet is the single largest global wide area network.

Wireless Network

A wireless network is any type of computer network that uses wireless data connections for connecting network nodes. Wireless networks use radio waves to connect devices such as laptops to the Internet, the business network and applications. When laptops are connected to Wi-Fi hot spots in public places, the connection is established to that business's wireless network.

The main types of wireless networks:

Wireless Local Area Network (WLAN)

A wireless local area network (WLAN) is a wireless distribution method for two or more devices that use high-frequency radio waves and often include an access point to the Internet. A WLAN allows users to move around the coverage area, often a home or small office, while maintaining a network connection.

Wireless Metropolitan Area Networks (WMAN)

Wireless MAN or a Wireless Metropolitan Area Network is a type of wireless network that connects several wireless LANs over a city or metropolitan area. A wireless technology known as the WiMAX or Wireless Interoperability for Microwave Access is used for setting up wireless MANs within a radius of 50 km.

Wireless Wide Area Network (WWAN)

Wireless WAN is a wide area network in which separate areas of coverage or cells are connected wirelessly to provide service to a large geographic area. WWAN services are typically delivered to smart phones and other handheld devices sold by cellular service providers and their retail partners but other mobile devices can use them as well. The three families of WWAN technologies are GSM/UMTS, CDMA One/CDMA2000 and WiMAX.

Brainstorming task

Complete each statement in the spaces provided.

a. A _____ is any device connected to a computer network.

b. A _____ is a network computer that shares resources with and responds to requests from other network computers, including other servers.

c. _____is a type of network in which each workstation has equivalent capabilities and responsibilities.

Tricky Terms

Client	A network computer that utilizes the resources of other network computers.
Host	The most powerful type of computer on the network, that does all the processing for the user.
Peer	A self-sufficient computer that acts both as a server and a client (shares and uses resources).
Server	A network computer that shares its resources and responds to requests from other networked computers.
Protocol	A set of rules by which computers communicate with each other over a network.

Let Us Revise

- A computer network is a group of computer systems and other computing hardware devices that are linked together through communication channels to facilitate communication and resource-sharing among a wide range of users.
- A network connector is defined as a device that facilitates the connection or the interconnection of computers and other devices to a network.
- A network operating system is an operating system designed for the sole purpose of supporting workstations, database sharing, application sharing and file and printer access sharing among multiple computers in a network.
- A client/server network is a network in which one or more computers are designated as a server(s) and the other computers on the network, called clients, can request services from the server.
- Local area network (LAN) is a group of computers and associated devices that share a common communications line or wireless link.
- Metropolitan Area Network is a network of computers spread over a city or town located in the same geographic area.
- Wide Area Network is a network of computers that spans multiple geographic location.
- A wireless network is any type of computer network that uses wireless data connections for connecting network nodes.

Solved Exercises

1. *What is a computer network?*

Ans: *A computer network is a communication system connecting two or more computers that work together to exchange information and share resources.*

2. *Define the following terms.*

Ans: *Host computer*

A host computer is a powerful, centralized computer system, such as a mainframe computer, that performs data storage and processing tasks on behalf of clients and other network devices.

Terminal

A terminal is a specialized network device on a host-based network that transmits the data entered by the user to the host for processing and displays the results.

3. *What is a network model? Name the three primary network models.*

Ans: *A network model is a design specifications for how the nodes on a network interact and communicate. There are three primary network models: centralized or hierarchical, client/server and peer-to-peer.*

4. *What is client/server network?*

Ans: *Client/server network is the workhorse of the network world and consists of at least one server (with shared resources) and the other computers on the network, called clients, makes a service request from the server.*

5. *What is local area network? What is the key purpose of local area network?*

Ans: *Local Area Network is a self-contained network consisting of many computers within a local area, such as a single building or company complex. The key purpose of local area network is it speeds up word processing and database analysis in busy systems, reduces costs, increases worker productivity and offers tremendous convenience.*

6. *What is Wide Area Network? Name the most popular WAN.*

Ans: *Wide Area Network is a telecommunications network, usually used for connecting computers, that spans a wide geographical area. The world's most popular WAN is the Internet.*

7. *What is Wireless Local Area Network (LAN)?*

Ans: *A wireless local area network (WLAN) is a wireless distribution method for two or more devices that use high-frequency radio waves and often include an access point to the Internet. A WLAN allows users to move around the coverage area, often a home or small office, while maintaining a network connection.*

8. *What is Wireless Wide Area Network (WAN)*

Ans: *Wireless WAN is a wide area network in which separate areas of coverage or cells are connected wirelessly to provide service to a large geographic area.*

Chapter Review

1. State whether the following statements are true or false.

a. Computer network is a communication system connecting two or more computers that work together to exchange information and share resources.

b. A node is a network computer that shares resources with and responds to requests from other network computers, including other servers.

c. A terminal is a specialized network device on a host-based network that transmits the data entered by the user to the host for processing and displays the results.

d. Local area network (LAN) is a group of computers and associated devices that share a common communications line or wireless link.

e. Wireless MAN is a wide area network in which separate areas of coverage or cells are connected wirelessly to provide service to a large geographic area.

2. Match each term with the statement that best describes it.

Peer	A network computer that utilizes the resources of other network computers.
Client	The most powerful type of computer on the network, that does all the processing for the user.
Host	A self-sufficient computer that acts both as a server and a client (shares and uses resources).
Terminal	A network computer that shares its resources and responds to requests from other networked computers.
Server	A specialized network device on a host-based network that transmits the data entered by the user to the host for processing and displays the results.

3. Circle the word or phrase that best completes each statement.

a. A group of computers connected together to communicate and share resources.

i. computer network ii. server iii. client

b. A specialized network device on a host-based network that transmits the data entered by the user to the host for processing and displays the results.

i. Terminal ii. Client iii. Node

c. Which of the following term describes how the nodes on a network interact and share control of the network communications?

i. Network directory ii. Network model iii. Network structure

d. A network of computers spread over a city or town located in the same geographic area.

i. LAN ii. MAN iii. WAN

e. A network topology that uses a central connectivity device such as a hub, switch or computer.

i. Bus topology ii. Ring topology iii. Star topology

4. Give the full forms of the following abbreviations.

a. LAN b. MAN c. WAN d. CDMA e.WiMax

5. Give the appropriate technical term for each of the following statements.

a. A network computer that utilizes the resources of other network computers, including other clients.

b. A self-sufficient computer that acts both as a server and a client to other similar computers on the network.

c. A network model in which each computer or process on the network is either a client or a server.

d. A group of computers and associated devices that share a common communications line or wireless link.

e. A type of computer network that uses wireless data connections for connecting network nodes.

6. In your own words, briefly answer the following questions.

a. What is a computer network?

b. State any three important benefits of a computer network?

c. Define the following terms:

i. Client ii. Peer iii. Terminal

d. What is a network model? What are the three primary network models?

e. What is a client/server network? Illustrate your answer with the help of a diagram.

f. Differentiate between LAN and WAN.

g. What is wireless network? What are the main types of wireless network?

Objectives

After completing this chapter, you will be able to:

- Define Internet and explain the major services of the Internet.
- Define Electronic Mail and list the advantages and disadvantages of Electronic Mail.
- Explain how electronic mail works ?
- Define World Wide Web and explain the basic components of World Wide Web.

13

Introduction to Internet, E-Mail and Web

Concept: Network of Networks

Initially, computers were used as single stand-alone machines, each kept isolated from other computers. In course of time, computers were interconnected to form computer networks. Networking allowed sharing data as well as resources stored in one computer with another. More and more networks were formed in due course. As the number of networks grew, computer networks located in different places were connected to each other to form largest networks. Computers spread their 'net' across the world, and thus emerged the era of the Internet.

Internet can be defined as a global network of over a million of smaller heterogeneous computer networks. It is a network of networks that consists of millions of private, public, academic, business, and government networks, of local to global scope, that are linked by a broad array of electronic and optical networking technologies. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support electronic mail.

expanding your horizons

An optical network is a type of data communication network built with optical fiber technology. It utilizes optical fiber cables as the primary communication medium for converting data and passing data as light pulses between sender and receiver nodes. An optical network is also known as an optical fiber network or fiber optic network.

Origin and Growth of the Internet

The Internet originated from an experimental network called ARPANET created in 1969 by the U.S. Department of Defence's Advanced Research Projects Agency, or ARPA. It began in a modest way with one computer in California and three in Utah. The aim of this network was to establish a computer network which could carry government as well as military information and which could withstand adverse conditions such as nuclear attacks. In 1896, the U.S. National Science Foundation (NSF) created a national network to connect university computer science departments; it quickly evolved into NSFNET, a backbone network linking university researchers and scientists. When ARPANET and NSFNET were linked, the modern Internet was born, and the phenomenal growth began. Today, the Internet connects computers all over the globe and supplies information to people of all ages and interests.

How will people and computers communicate in the future? Some computers already have speech recognition programmes and can understand spoken words. You talk, your words come up on screen, and the computer responds. Perhaps the future computer will look more human, with a robot-like body. It will understand what you say, walk and talk, even laugh at your joke. It could become your best friend!

A look to Future

Major Internet Services

The Internet provides a mechanism for millions of computers to communicate, but what kind of information is transferred? Well, they exchange messages or E-mails, participate in discussion groups (known as news groups), chat with many people across the globe, retrieve data files and access all sorts of information. Many services are available over the Internet, and the following are the most popular ones:

- Sends files, data and information through electronic mail.
- Allows user to communicate with various other users online by using Internet chat.
- Allows to locate and download free computer software and other programs available.
- Allows to play the interactive multimedia games, listen to music and watch digital movies.
- Facilitates access to different sources of information, which is continously up-dated
- Facilitates management of companies information system
- Easier to access information from millions of Web sites using search engines

Electronic Mail

The Internet is a strong medium for transferring all types of information. Electronic mail service is one of the most widely used services on the Internet. E-mail is the method of transmitting data, text files, digital photos, or audio and video files from one computer to another over the Internet. It has become an important means of communication for personal and business use. A computer, a modem or network connection and an e-mail address are needed for using e-mail. All online services and Internet Service Providers (ISPs) offer e-mail account promptly after you sign up.

Raymond Samuel Tomlinson (born 1941) is a programmer who implemented an email system in 1971. The first e-mail was sent between two computers that were actually sitting besides each other. However, the ARPANET network was used as the connection between the two. The first email message was "QWERTYUIOP".

Knowledge Update

Advantages of electronic mail

The advantages of an electronic mail are as follows:

a. E-mail allows you to send and receive messages across the world at a very low cost.

b. E-mail system is very fast compared to the conventional postal system. A message can reach any part of the world in a fraction of a second.

c. The image, sound, video and documents can be attached to e-mail messages.

d. Multiple copies of the same message can be sent to a group of people or to a single person with equal ease.

Disadvantages of electronic mail

The disadvantages of an electronic mail are as follows:

a. The slightest error in the address or a failure in one of the links between sender and receiver is enough to prevent the delivery of the e-mail.

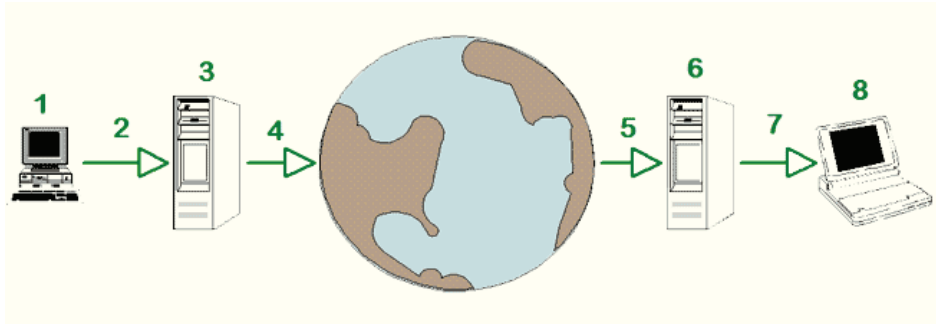
b. E-mail system depends on the electricity and telephone system. Thus, failure of any one of them can prevent the user from sending or receiving e-mails.

c. It is not possible to keep the secrecy of messages, unless they are encrypted.

d. E-mails, attached files and files downloaded from the Internet are the prime carriers of computer virus.

How Electronic Mail Works?

The Internet is a strong medium for transferring all types of information. Electronic mail service is one of the most widely used services on the Internet. E-mail is the method of transmitting data, text files, digital photos, or audio and video files from one computer to another over the Internet. It has become an important means of communication for personal and business use. A computer, a modem or network connection and an e-mail address are needed for using e-mail. All online services and Internet Service Providers (ISPs) offer e-mail account promptly after you sign up.



Free Electronic mail Accounts

There are many free electronic mail services available on the Internet. The user has to login to the site of the organization and complete and submit the online registration form to get a unique electronic mail identity account. These sites provide an inbox for storing incoming mails. Facilities are available in the site to select a mail and read it and also to send messages with or without attachments. The free electronic mail lets you access your e-mail from any system with a browser and an Internet connection. Some of the free electronic mail providers are HOTMAIL (www.hotmail.com), YAHOO (www.yahoo.com) and GOOGLE (www.gmail.com).

Solved Exercise

a. Connect to the Internet.

b. Open any Web browser, say Internet Explorer. A home page will appear on the screen.

c. Type www.yahoomail.com in the Address bar and press the Enter key. The home page of yahoomail.com will appear on the screen.

d. Click on Sign up for Yahoo to open a new account. Fill in the information and then click Create My Account.

e. If all the entries are filled in properly, your account will be created.

f. Click on the Inbox button to view the incoming mail.

g. Click on the Compose button to write a new mail and click on the Send button to send the mail.

World Wide Web

The World Wide Web (WWW) is the leading information-exchange service of the Internet. It is the information store of the Internet. It contains a large collection of linked text, image, sound, and video files. The World Wide Web was developed by British physicist and computer scientist Timothy Berners-Lee as a project within the European Organization for Nuclear Research (CERN) in Geneva, Switzerland. It uses the following components:

Web Browser

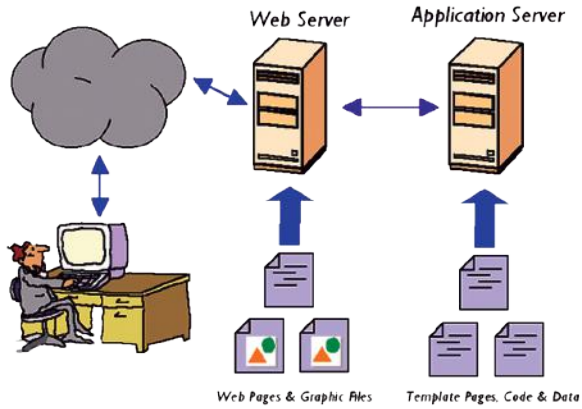
Web browser is the "window to the Web" for Internet users around the world. It is a software that is used to access the internet. A browser lets you visit websites and do activities within them like login, view multimedia, link from one site to another, visit one page from another, print, send and receive email, among many other activities. The most common browser software titles on the market are: Microsoft Internet Explorer, Google's Chrome, Mozilla Firefox, Apple Computer's Safari, and Opera.

Facts Corner

Mozilla Firefox is a free and open-source web browser developed for Windows, OS X, and Linux, with a mobile version for Android, by the Mozilla Foundation and its subsidiary, the Mozilla Corporation

Web Server

Web servers are computers that deliver (serves up) Web pages. Every Web server has an IP address and possibly a domain name. For example, if you enter the URL http://www.pcwebopedia.com/index.html in your browser, this sends a request to the Web server whose domain name is pcwebopedia.com. The server then fetches the page named index.html and sends it to your browser. Any computer can be turned into a Web server by installing server software and connecting the machine to the Internet. There are many Web server software applications, including public domain software from NCSA and Apache, and commercial packages from Microsoft, Netscape and others.



Web page

A web page (or web page) is a web document that is suitable for the World Wide Web and the web browser. These documents are written in HTML (hypertext markup language) and are translated by your Web browser. Web pages may be retrieved from a local computer or from a remote web server. Web pages are requested and served from web servers using Hypertext Transfer Protocol (HTTP).

Web site

Web site is a set of related web pages served from a single web domain. A website is hosted on at least one web server, accessible via a network such as the Internet or a private local area network through an Internet address known as a Uniform Resource Locator. All publicly accessible websites collectively constitute the World Wide Web. It is designed and developed for a wide variety of organizations in areas, such as education, business, research and e-commerce. It is under the control of a particular person or a group. Examples of some common Web sites are www.yahoo.com and www.google.com.

Facts Corner *The World Wide Web (WWW) was created in 1990 by the British CERN physicist Tim Berners-Lee. On 30 April 1993, CERN announced that the World Wide Web would be free to use for anyone.*

Brainstorming task

Complete each statement in the spaces provided.

a. _____can be defined as a global network of over a million of smaller heterogeneous computer networks.

b. _____is the method of transmitting data, text files, digital photos, or audio and video files from one computer to another over the Internet.

c. The_____is the leading information-exchange service of the Internet.

d. A_____is a web document that is suitable for the World Wide Web and the web browser.

e. _____is a set of related web pages served from a single web domain.

Tricky Terms

Internet	A global collection of millions of computers of different types belonging to various networks.
Web	A service that provides a multimedia interface to resources on the Internet.
Web site	A collection of Web pages.
E-mail	An electronic message sent from one computer to another in a near real time manner.
Web browser	A software that allows you to view Web pages or Web sites on the Internet.
ISP	Organization offering access to some or all the services available on the Internet.

Let Us Revise

- Internet can be defined as a global network of over a million of smaller heterogeneous computer networks.
- The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support electronic mail.
- The Internet originated from an experimental network called ARPANET created in 1969 by the U.S. Department of Defence's Advanced Research Projects Agency, or ARPA.
- In 1896, the U.S. National Science Foundation (NSF) created a national network to connect university computer science departments; it quickly evolved into NSFNET, a backbone network linking university researchers and scientists.
- E-mail is the method of transmitting data, text files, digital photos, or audio and video files from one computer to another over the Internet.
- Some of the free electronic mail providers are HOTMAIL (www.hotmail.com), YAHOO (www.yahoo.com) and GOOGLE (www.gmail.com).
- Web browser is the "window to the Web" for Internet users around the world.
- A web page (or web page) is a web document that is suitable for the World Wide Web and the web browser.
- Web site is a set of related web pages served from a single web domain.

Solved Exercises

1. What is the Internet?

Ans: Internet can be defined as a global network of over a million of smaller hetergeneous computer networks.

2. What are the advantages of electronic mail?

Ans: The advantages of an electronic mail are as follows:

- *E-mail is the cheapest mode of communication.*
- *E-mail system is very fast compared to the conventional postal system. A message can reach any part of the world in a fraction of a second.*
- *E-mails are easy to use. You can organize your daily correspondence, send and receive electronic messages and save them on computers.*

3. How does an electronic mail work?

Ans: The Internet is a strong medium for transferring all types of information. Electronic mail service is one of the most widely used services on the Internet. E-mail is the method of transmitting data, text files, digital photos, or audio and video files from one computer to another over the Internet. It has become an important means of communication for personal and business use. A computer, a modem or network connection and an e-mail address are needed for using e-mail. All online services and Internet Service Providers (ISPs) offer e-mail account promptly after you sign up.

4. What is World Wide Web? What are the advantages of World Wide Web?

Ans: World Wide Web is the leading information-exchange service of the Internet. The advantages of WWW are listed below:

- *The fastest medium for transferring information.*
- *Easier to access information from millions of Web sites using search engines.*
- *A link in a Web document can be used to open other documents.*
- *Allows user to interact with applications through dialog boxes and forms.*

5. What is a Web site?

Ans: Web site is a collection of Web pages containing text, images, audio and videos.

6. What is a Web page?

Ans: A web page or webpage is a document or resource of information that is suitable for the World Wide Web and can be accessed through a web browser and displayed on a monitor or mobile device.

7. What is a Web browser?

Ans: Web browser is the "window to the Web" for Internet users around the world. It is a program that enables a user to display and interact with text, images, sound and other information located on a web page of a web site on the World Wide Web.

Chapter Review

1. State whether the following statements are true or false.

a. Internet is a network of networks that consists of millions of private, public, academic, business, and government networks, of local to global scope, that are linked by a broad array of electronic and optical networking technologies.

b. The Internet originated from an experimental network called NSFNET created in 1969 by the U.S. Department of Defence's Advanced Research Projects Agency, or ARPA.

c. E-mail allows you to send and receive messages across the world at a very low cost.

d. Web servers are computers that deliver (serves up) Web pages.

e. A web site is a web document that is suitable for the World Wide Web and the web browser.

2. Match each term with the statement that best describes it.

Web	A global collection of millions of computers of different types belonging to various networks.
Internet	A service that provides a multimedia interface to resources on the Internet.
E-mail	A collection of Web pages.
Web browser	An electronic message sent from one computer to another in a near real time manner.
Web site	A software that allows you to view Web pages or Web sites on the Internet.

3. Circle the word or phrase that best completes each statement.

a. A global collection of millions of computers of different types belonging to various networks.

i. Web ii. Intranet iii. Internet

b. The method of transmitting data, text files, digital photos, or audio and video files from one computer to another over the Internet.

i. Postal mail ii. E-Mail iii. Web chat

c. The most common protocol used for transferring e-mail across the Internet.

i. FTP ii. SMTP iii. TCP/IP

d. A software that allows you to view Web pages or Web sites on the Internet.

i. Utility software ii. Web browser iii. Word processing software

e. A web page is accessed using a _____.

i. Search engine ii. Browser iii. Internet Service Provider

4. Give the full forms of the following abbreviations.

a. ARPANET b. NSFNET c. ISP d. CERN

5. Give the appropriate technical term for each of the following statements.

a. A global network of over a million of smaller heterogeneous computer networks.

b. The method of transmitting data, text files, digital photos, or audio and video files from one computer to another over the Internet.

c. A software that is used to access the internet.

d. A web document that is suitable for the World Wide Web and the web browser.

e. A set of related web pages served from a single web domain.

6. In your own words, briefly answer the following questions.

a. What is the Internet?

b. What are the major services of the Internet?

c. What is an e-mail? What are the things needed to use an e-mail service?

d. State any three advantages and disadvantages of e-mail service.

e. Explain in short how an e-mail works.

f. What is a free e-mail? Name some sites which offer free e-mail services.

g. What is World Wide Web?

h. Define the following terms with respect to the Internet:

i. Web server

ii. Web site

iii. Web browser

Objectives

After completing this chapter, you will be able to:

- Define number system and explain the types of number systems.
- Explain how to convert from one number system to another.
- Explain how to perform binary arithmetic operations.
- Define the terms: bit, crumb, byte, nibble, word and word size.

14

Computer Numbering System

Concept:Binary World

The discovery of numbers is considered as the greatest achievement of mankind. It took thousands of years to get the present system of numbers. Numbers earlier consisted of symbols like I for 1, II for 2, III for 3 etc. Each symbol represented the same value irrespective of its positional in the number. This approach is called an additive approach or the non-positional number system. As time passed, positional numbering systems were developed. In such a system, each digit represent different values depending on the position they occupy in the number. The value of each digit in such number is determined by three considerations:

a. The digit itself,

b. The position of the digit in the number, and

c. The base of the number system.

Number system is an organized and systematic way of representing numbers. Many number systems are in use in digital technology that represent the digits in various forms. The most common are the decimal, binary, octal and hexadecimal number systems.

expanding your horizons

The IBM 7030, also known as Stretch, was a supercomputer delivered to Los Alamos in 1961. It was the fastest computer in the world from 1961 until 1964. The term byte was coined by Dr. Werner Buchholz in July 1956, during the early design phase for the IBM Stretch computer.

Binary Number System

A number system consisting of only two digits, 0 and 1 is called binary number system. This is ideal for representing patterns of bits, with 0 expressing a bit that is turned off and 1 expressing a bit that is turned on. It has base 2. The 0s and 1s can be arranged in various combinations to represent all the numbers, letters, and symbols that can be entered into the computer. The binary number can be converted to decimal form in the following way:

$1010 = (1 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (0 \times 2^0)$

$= 8 + 0 + 2 + 0$

$= 10_{10}$

Decimal Number System

A system of numbers having base 10 is called decimal number system. It utilises the symbols of the numbers from 0 to 9. It is also called denary number system. The value that the digits represent depends on the "weights" or position they hold. For example, if we consider the number 487, the digit 7 represents the number of units, 8 represents the number of tens and 4 is the number of hundreds. The relationship is represented symbolically as follows:

$487 = (4 \times 100) + (8 \times 10) + (7 \times 1)$

$400 + 80 + 7$

487

Octal Number System

A system of numbers having base 8 is called octal number system. Octal number system utilises the digits from 0 to 7. The positional weights are based on the powers of 8. The octal system is used in computing as a simple means of expressing binary quantities. For example, the decimal value of an octal number 615 is computed as follow:

$615_8 = (6 \times 8^2) + (1 \times 8^1) + (5 \times 8^0)$

$512 + 8 + 5$

525_{10}

Hexadecimal Number System

A number system with a base of 16 is called hexadecimal number system. The symbols used in this system are the decimal digits 0 through 9 and six additional digits which are generally represented as A, B, C, D, E, and F. The letters are used because our standard numbering system has only 10 distinct digits in decimal number system. The positional weights are based on the powers of 16.

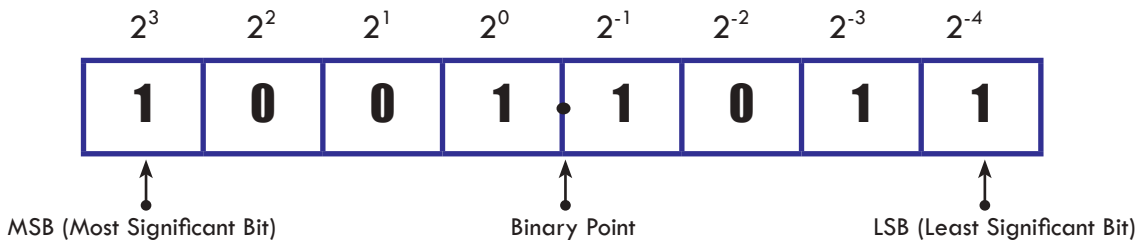
Number Conversion

A number system is a systematic way to represent numbers with symbolic characters and uses a base value to conveniently group numbers in compact form. The most common number system is decimal, which has a base value of 10, and a symbolic character set of 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. However, there are other number systems, and they can be more efficient to use for a specific purpose. For example, because computers use Boolean logic to perform calculations and operations, they use the binary number system, which has a base value of 2.

Binary to Decimal Conversion

Binary number can be converted to its decimal equivalent by the following method.

- Assign position values to every digit of the binary number starting from the LSB and moving upwards. The position value starts from 0 and increases by 1 each time you move one position upwards.
- Raise the base of the binary number system i.e. 2 to the position value of the LSB and multiply the result with the LSB. Repeat the procedure for every binary digit of the binary number.
- Now add all the resulting numbers to generate the decimal equivalent.



Solved Problem

Convert 10111_2 into decimal equivalent.

Solution:

Binary number = 1 0 1 1 1

Positional notation = 4 3 2 1 0

$= (1x2^4) + (0x2^3) + (1x2^2) + (1x2^1) + (1x2^0)$

$= (1x16) + (0x8) + (1x4) + (1x2) + (1x1)$

$= 16 + 0 + 4 + 2 + 1$

Answer = 23_{10}

Thus, $10111_2 = 23_{10}$

Decimal to Binary Conversion

Decimal number can be converted to its binary equivalent by the following method.

- Divide the decimal number by 2 successively.
- Keep a note of the remainder in one column.
- Repeat the process until the quotient is zero.
- The answer is obtained by writing the answer in the reverse order.

Solved Problem

Convert the decimal number 104_{10} into binary equivalent.

Solution:

		Remainders
2	104	0
2	52	0
2	26	0
2	13	1
2	6	0
2	3	1
2	1	1
	0	

Thus, $(104)_{10} = (1101000)_2$

Brainstorming task

Complete each statement in the spaces provided.

a. _____ is an organized and systematic way of representing numbers.

b. A number system consisting of only two digits, 0 and 1 is called _____.

c. A system of numbers having base 10 is called _____.

d. _____ utilises the digits from 0 to 7.

e. A number system with a base of _____ is called hexadecimal number system.

Addition of Binary Numbers

The binary addition rules are shown in the table below:

A	B	A + B
0	0	0
0	1	1
1	0	1
1	1	0 and carry 1 to the next more significant bit

Solved Problem

Add 00011010 with 00001100

Solution:

```
      1 1                    carries
  0 0 0 1 1 0 1 0  =  26(base 10)
+ 0 0 0 0 1 1 0 0  =  12(base 10)
  0 0 1 0 0 1 1 0  =  38(base 10)
```

Subtraction of Binary Numbers

The binary subtraction rules are shown in the table below:

A	B	A - B
0	0	0
1	1	0
1	0	1
0	1	0 borrow 1 from the next more significant bit

Solved Problem

Subtract 00100101 from 00010001.

Solution:

```
      0 1                    borrows
  0 0 1 0 0 1 0 1  =  37(base 10)
- 0 0 0 1 0 0 0 1  =  17(base 10)
  0 0 0 1 0 1 0 0  =  20(base 10)
```

Multiplication of Binary Numbers

The binary multiplication rules are shown in the table below:

A	B	A + B
0	0	0
1	1	1 and no carry or borrow bits
1	0	0
0	1	0

Solved Problem

Multiply 00101001 with 00000110.

Solution:

```
    0 0 1 0 1 0 0 1        =  41(base 10)
  × 0 0 0 0 0 1 1 0        =  6(base 10)
    0 0 0 0 0 0 0 0
  0 0 1 0 1 0 0 1
+ 0 0 1 0 1 0 0 1
  0 0 1 1 1 1 0 1 1 0      =  246(base 10)
```

Division of Binary Numbers

The binary division rules are shown in the table below:

A	B	A + B
0	1	0
1	1	1 and no carry or borrow bits
1	0	Not defined
0	0	0

The steps for binary division are:

- Start from the left of the dividend.
- Perform subtraction in which the divisor is subtracted from the dividend.
- Put 1 in the quotient if the division is possible.
- Put 0 in the quotient if the division is not possible.

Solved Problem

Add 101010 with 110

Solution:

```
              1  1  1                         =  7(base 10)
           ______________
1  1  0 )  1  0  1  0  1  0                   =  42(base 10)
        -  1  1  0                            =  6(base 10)
              1  0  0  1
           -  1  1  0
                 1  1  0
              -  1  1  0
                       0
```

Computer Data Storage

The number of instructions and the amount of data a computer can store in its memory is measured in bytes. One byte contains 8 bits (short for binary digits, 0 and 1). Computers work by using pulses of voltage which is represented by either 0 or 1. A low voltage pulse represents a 0 and a high voltage pulse a 1. In most cases, 8 bits are needed to store one character. So, a single character (letter, number or symbol on the keyboard) can be stored in one byte. Some of the most common terms that are used to describe a computer's ability to store information are listed below:

a. Kilobyte (KB) ~ A unit of computer memory or data storage capacity equal to 1,024 (2^{10}) bytes.

b. Megabyte (MB) ~ A unit of computer memory or data storage capacity equal to 1,024 kilobytes (2^{20} bytes).

c. Gigabyte (GB) ~ A unit of computer memory or data storage capacity equal to 1,024 megabytes (2^{30} bytes).

d. Terabyte (TB) ~ A unit of computer memory or data storage capacity equal to 1,024 gigabytes (2^{40} bytes).

e. Petabyte (PB) ~ A unit of computer memory or data storage capacity equal to 1,024 terabytes (2^{50} bytes).

Tricky Terms

Number System	An organized and systematic way of representing numbers.
Binary number system	A positional number system having base 2
BIT	The smallest unit of information handled by a computer.
Storage	The place where data is held in an electromagnetic or optical form for access by a computer processor.
Byte	A combination of 8 bits.

Let Us Revise

- Number system is an organized and systematic way of representing numbers.
- Number systems are basically of two types: non-positional and positional number systems.
- The non-positional number system is a number system in which each symbol represents the same value, regardless of its position in the number.
- Positional number system can be represented by a few symbols called digits, which represent different values depending on the position that they occupy.
- Binary number system is a positional number system having base 2.
- Decimal number system is a positional number system having base 10.
- Octal number system is a positional number system having base 8.
- Hexadecimal number system is a positional number system having base 16.
- In a computer, storage is the place where data is held in an electromagnetic or optical form for access by a computer processor.
- Storage has been divided into: (1) primary storage, which holds data in memory (sometimes called random access memory or RAM) and other "built-in" devices such as the processor's L1 cache, and (2) secondary storage, which holds data on hard disks, tapes, and other devices requiring input/output operations.
- A digital computer represents data using the binary numeral system.
- Text, numbers, pictures, audio, and nearly any other form of information can be converted into a string of bits, or binary digits, each of which has a value of 1 or 0.

Solved Exercises

1. *What is a number system? What are the two types of number systems used in a computer?*

Ans: *A set of values used to represent different quantities is known as number system. Number systems are basically of two types: non-positional and positional number systems.*

Number systems are basically of two types: non-positional and positional number systems.

2. *What is meant by the base of a number system?*

Ans: *The base of a number system defines the range of possible values that a digit may have.*

3. *What is the difference between positional and non-positional number systems?*

Ans: *Positional number system can be represented by a few symbols called digits, which represent different values depending on the position that they occupy. The main positional number systems used in computer are decimal (base 10), binary (base 2), octal (base 8) and hexadecimal (base 16).*

The non-positional number system is a number system in which each symbol represents the same value, regardless of its position in the number. The most common non-positional number system is the Roman Number System.

4. *What is a binary number system? What is the base of decimal number system?*

Ans: *Binary number system is a positional number system having base 2. It utilizes the symbols 0 and 1. It is an effective number system for computers because it is easy to implement with digital electronics.*

5. *What is a number system? What are the two types of number system used in a computer?*

Ans: *Number system is an organized and systematic way of representing numbers. Number systems are basically of two types: non-positional and positional number systems.*

6. *What do you understand by the term "bit"?*

Ans: *BIT (Binary Digit) is the smallest amount of information which may be stored in a computer.*

7. *What is a byte? How many bytes are there in 7 KB (Kilobyte)?*

Ans: *Byte is the amount of memory needed to store one character, usually eight bits. There are 7 x 1024 = 7168 bytes in 7 kilobyte.*

8. *What is a nibble?*

Ans: *A string of four bits or half a byte is called nibble.*

9. *A computer has 4KB words of main store. Each word comprises 24 bits. How many bits are there in the whole memory?*

Ans: *4 x 1024 x 24 = 98304 bits.*

Chapter Review

1. State whether the following statements are true or false. Rewrite each false statement to make it a true statement.

a. Number system is an organized and systematic way of representing numbers.

b. A number system consisting of the numbers from 0 and 9 is called binary number system.

c. Octal number system has base 8.

d. Bit is the amount of computer memory space needed to store one character, which is normally 8 bits.

e. Kilobyte is a unit of computer memory or data storage capacity equal to 1,024 terabytes (2^{50}bytes).

2. Match the following.

Kilobyte	Amount of computer memory space needed to store one character, which is normally 8 bits.
Binary number	A unit of computer memory or data storage capacity equal to 1,024 terabytes (2^{50} bytes).
Byte	A number system consisting of only two digits, 0 and 1.
Octal number	A unit of computer memory or data storage capacity equal to 1,024 (2^{10}) bytes.
Petabyte (PB)	A number system consisting of the numbers from 0 to 7.

3. Complete each statement in the spaces provided using the words in the list below.

Clue Box

octal, terabyte, hexadecimal, base, byte

a. The _____ of a number system tells the number of symbols used in the system.

b. A number system consisting of the numbers from 0 to 7 is called _____ number system.

c. A number system consisting of the numbers from 0 to 9 and the letters A through F is called _____ number system.

d. _____ is the amount of computer memory space needed to store one character, which is normally 8 bits.

e. _____ is a unit of computer memory or data storage

4. Give an appropriate technical term for each of the following.

a. A positional number system having base 8.

b. A combination of 8 bits.

c. A unit of computer memory or data storage capacity equal to 1,024 bytes.

d. A unit of information or computer storage equal to 1,024 ZB.

e. A group of bits representing data or instruction that forms the basic information unit of the computer.

5. Answer the following questions.

a. What is a number system? What are the types of number systems used in a computer?

b. What is the difference between positional and non-positional number systems?

c. What is a binary number system? Why is it used in computer systems?

d. What is meant by byte in computer terminology? How many bytes are there in 1011 1001 0110 1110 numbers?

e. Define the terms:

i. Nibble ii. Kilobyte iii. Petabyte (PB) iv. Yotabyte

6. Convert the following as indicated.

a. $1001_2 = (?)_{10}$ b. $1111_2 = (?)_{10}$ c. $1011_2 = (?)_{10}$

d. $1101_2 = (?)_{10}$ e. $111_2 = (?)_{10}$ f. $11101_2 = (?)_{10}$

g. $152_{10} = (?)_2$ h. $324_{10} = (?)_2$ i. $324_{10} = (?)_2$

j. $102_{10} = (?)_2$ k. $425_{10} = (?)_2$ l. $3014_{10} = (?)_2$

7. Perform the following binary arithmetic operations.

a. 11111 + 10000 b. 10100 + 11101 c. 11100 + 111001

d. 10011 + 10101 e. 1100 + 10101 f. 10001 + 100011

g. 11101 x 11001 h. 11111 x 1001 i. 10111 x 101

j. 101 x 101 k. 1101 x 11 l. 1001 x 11

Objectives

After completing this chapter, you will be able to:

- Define graphic software.
- Define Adobe Photoshop and list its advantages.
- Explain how to set foreground and background colours.
- Explain Photoshop's painting tools.
- Explain Photoshop's editing tools.

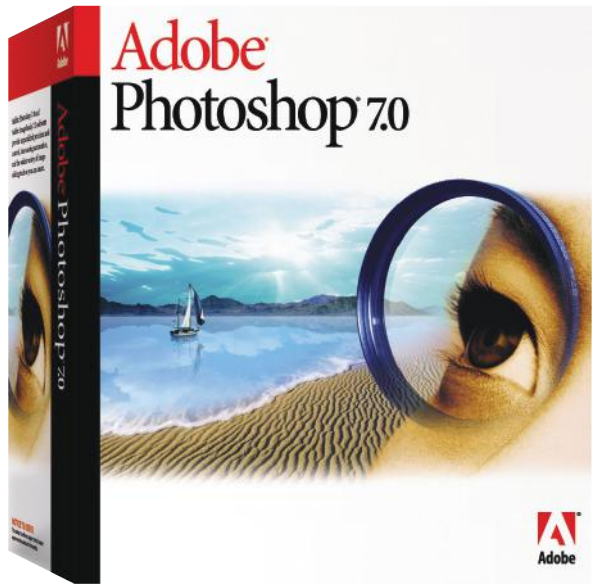
15 Adobe Photoshop 7

Introduction

A graphic is an image or visual representation of an object. Therefore, computer graphics are simply images displayed on a computer screen. Graphics are often contrasted with text, which is comprised of characters, such as numbers and letters, rather than images

Graphic software is is any kind of software which can be used to create, edit, and manage 2D computer graphics. These computer graphics may be clip art, Web graphics, logos, headings, backgrounds, digital photos, or other kinds of digital images.

Adobe Photoshop is a graphics editing program developed and published by Adobe Systems. It is used for creating and editing graphics. It can as well be used to change photographs and other varieties of computer graphics. Adobe Photoshop delivers a comprehensive environment for professional designers and graphics producers to create sophisticated images for both print and the Web. It has the advantage of vector-based drawing and editing, improved tools for producing Web graphics, and an enhanced user interface. It allows all formats of images, such as GIF, JPG, PCX and many more images, to be imported and edited, customized or changed into almost anything imaginable.



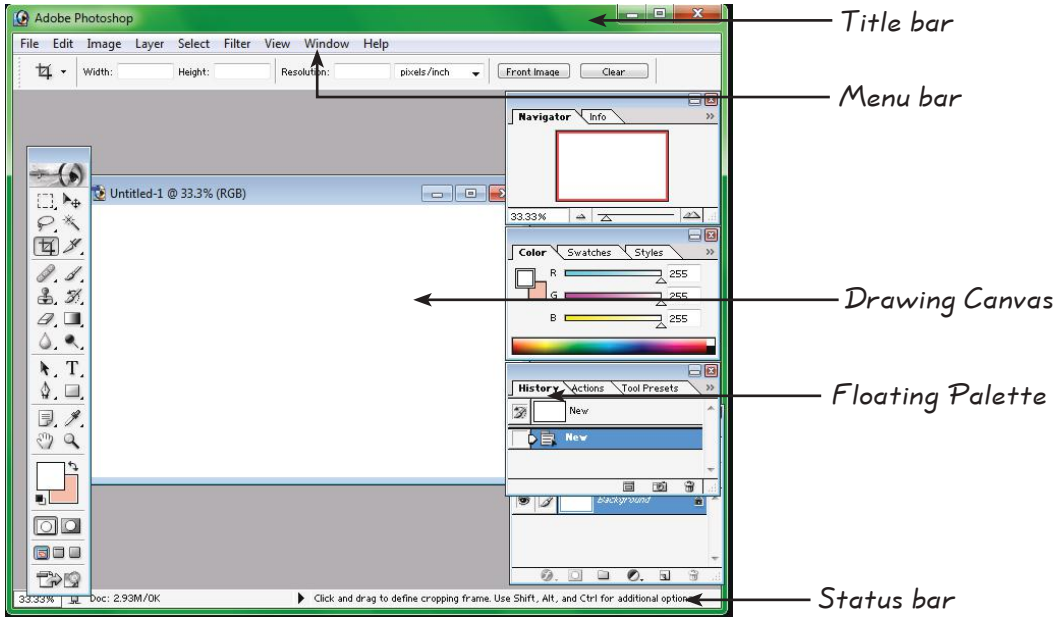
expanding your horizons

Adobe's 2003 "Creative Suite" rebranding led to Adobe Photoshop 8's renaming to Adobe Photoshop CS. Thus, Adobe Photoshop CS6 is the 13th major release of Adobe Photoshop. However, in 2013, Adobe announced a new brand - Creative Cloud. And the Photoshop version included in this suite is named Photoshop CC.

Starting Adobe Photoshop

You can run Photoshop on your computer by following the sequence of steps as given below.

Select Start | Programs | Adobe Photoshop 7. The Adobe Photoshop window appears. The Adobe Photoshop work area includes the command menus at the top of the screen and a variety of tools and palettes for editing and adding elements to the image.

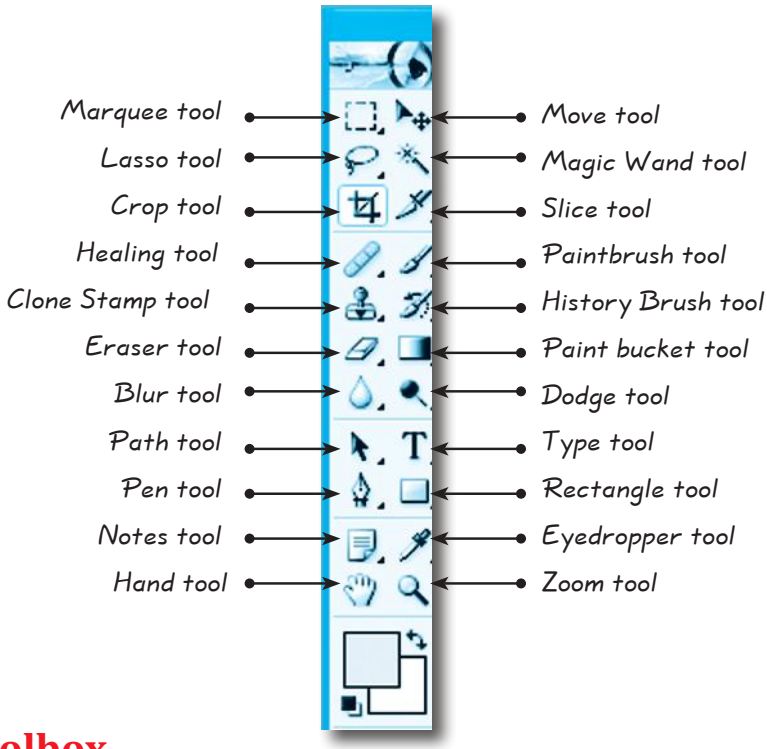


The main components of Photoshop window are:

Title bar	Title bar displays the name of the application in use.
Menu bar	Menu bar contains the main menu with related options to work in the software.
Toolbox	Toolbox contains various tools used in Photoshop.
Option bar	Option bar contains different options to allow customization of tools selected in the toolbox.
Drawing Canvas	The drawing canvas is the area in which you will create and/or modify images.
Floating Palettes	Floating Palettes help to manage the colour and some other aspects of digital images.
Rulers	Rulers are present along the left side of the drawing canvas, and help in positioning the image properly.
Status Bar	Status bar is located at the bottom of the image window and displays information like current magnification, size, etc. of the image file.

Tools of Adobe Photoshop 7

Photoshop has lots of tools to work with. These tools are available on the left side of the screen in the form of a toolbar. These tools are used for various purposes such as selection, painting, drawing, erasing, etc.



Using a Toolbox

To select a tool from the Toolbox, do the following:

- Click on the icon of the desired tool in the toolbox.
- A small triangle at the lower right of a tool icon indicates hidden tools. Positioning the pointer over a tool displays a tool tip with the tool's name and keyboard shortcut.

Making a Selection

One of the most important techniques when using Photoshop is making selections. When you make a selection, you are selecting an area of the image to which you want to make changes, and isolating the remainder of the image so that it is not affected by changes. A selection is indicated on-screen by a selection marquee-a dotted line, sometimes referred "marching ants" border.

Facts Corner *Raster graphics are the most common and are used for digital photos, Web graphics, icons, and other types of images.*

Using Tools of Adobe Photoshop

To select a tool from the Toolbox, do the following:

- Click on the icon of the desired tool in the toolbox.
- A small triangle at the lower right of a tool icon indicates hidden tools. Positioning the pointer over a tool displays a tool tip with the tool's name and keyboard shortcut.

Setting the Foreground and Background Colors

The foreground colour is used to paint, fill and apply strokes. The background colour is used to fill in erased areas. Both colors are used to create gradient fills and are also used in some filter effects, like the Sketch filters.

The foreground and background colors can be set using the Eyedropper tool, the Colour and Swatches panels and the Adobe Color Picker. The default foreground color is black and the background is white.

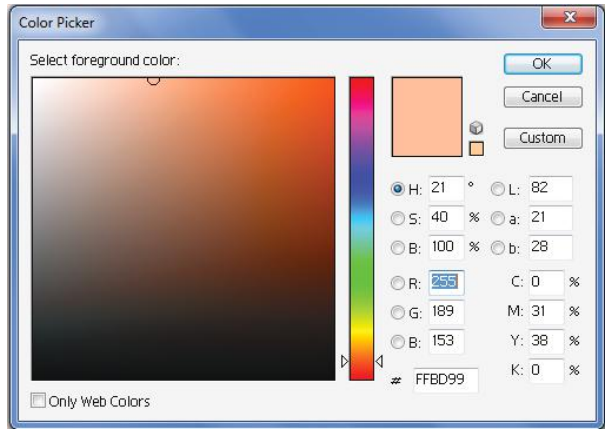
Default Colours

Clicking on this icon will set the foreground and background colours to their default black and white. The keyboard shortcut is D.

Toggle Colours

This will reverse the foreground and background colors. The keyboard shortcut is X.

- Click on the Foreground or Background color selection box in the toolbox.
- The Color Picker dialog appears.



- Drag the color slider.
- Click on the color selection box and choose a color.

Photoshop's Painting Tools

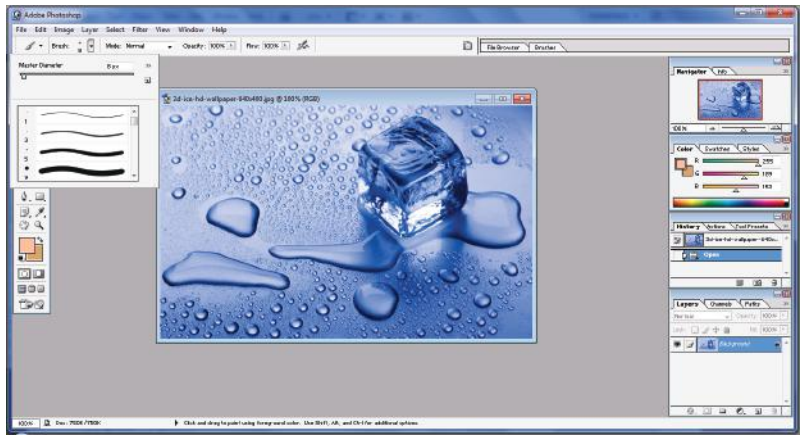
In Photoshop, the painting tools are used to paint strokes, and fill areas with color or with colors that blend together. The main painting tools in Adobe Photoshop are Brush tool, Pencil tool, Gradient tool and Paint Bucket tool.

Brush Tool

The Brush tool in Adobe Photoshop allows you to use your mouse as a paintbrush while using Photoshop. With the many options available, you can change the size, shape and painting style of your brush.

To use the Brush tool, do the following:

- Start a new Photoshop document or open an existing file. Select the Brush tool from the Photoshop Toolbox.
- Click on the down-arrow button beside the Brush option in the Options bar. The Brush Preset Picker appears on the screen.



- Set tool options for mode, opacity, and so on, in the options bar.
- Click on the Foreground color box in the tool box. The Color Picker Palette appears on the screen.
- Click on the appropriate color in the Color Picker Palette and click on OK.
- Click and drag the mouse pointer over the unselected portion of an image, it remains unchanged.

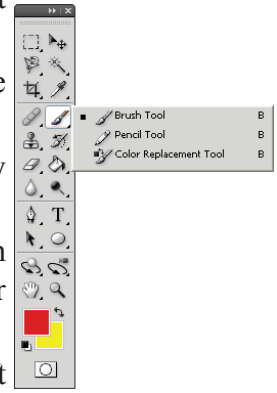
Pencil Tool

The Pencil tool is used to draw freeform lines. The lines drawn with the Pencil tool are always hard-edged-in other words, the edges of your lines are not anti-aliased. The Pencil tool paints or draws with the foreground color. The pencil tool options are the same as the brush tool, except:

There is no airbrush option.

There is an Auto Erase option. This paints the background colour over areas containing the foreground colour.

To use the Pencil tool, do the following:

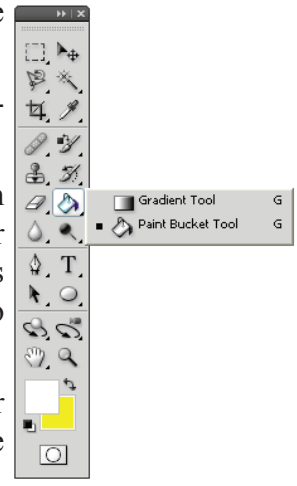


- Start a new Photoshop document or open an existing file. Select the Pencil tool from the Photoshop Toolbox.
- Set a brush size using the Brush Pop-up palette. Or use the Brushes palette to create custom brush settings for the tool.
- Use the Pencil Options bar to specify: Blending Mode, Opacity and Auto Erase options.
- Click and drag to create a freeform pencil stroke. Hold down Shift, then drag to constrain the pencil stroke vertically or horizontally.
- Click and move the cursor to a new position. Hold down Shift key and then click again to create a straight pencil stroke between two points.

Gradient Tool

The gradient tool allows you to fill an area with specific range of colors, with a defined pattern. You can use the Gradient tool to create transitions from one color to another. You can also create multicolored gradients. There are options for Linear, Redial, Angle, Reflected and Diamond gradients. You can apply a gradient fill to a selection, or to an entire active layer.

To use the gradient tool, do the following:



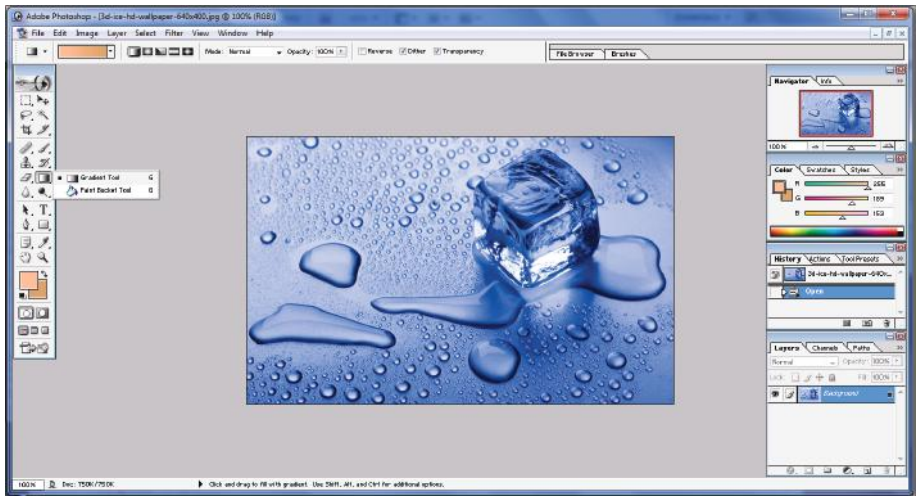
- Choose the Gradient tool and choose a gradient type from the Options bar.
- Select a Blending mode and set opacity. Use the Gradient pop-up to choose one of the preset gradients.
- Position your cursor where you want the gradient to start, then click and drag. The angle and distance you drag the cursor defines the angle and distance of a linear gradient, or the radius of a radial gradient. (Click and drag from the center out to create Radial Angle, Reflected and Diamond gradient fills.)
- For basic gradient fills leave the Transparency and Dither options selected. Choose the Reverse option to reverse the order of the colors in the gradient.

Paint Bucket Tool

The Paint Bucket tool in Adobe Photoshop is used to fill in any area with a solid color or pattern. You can fill a shape, background or any other object quickly and easily this way. Using the paint bucket is simple, and you can change the settings of the paint bucket tool to get the look that you want.

To use the Paint Bucket tool, do the following:

- Click on the paint bucket tool in your Photoshop toolbox.



- Choose a fill color by clicking the color picker and selecting the color you would like to use for your paint bucket. The color picker is the two squares overlapping each other - be sure to click on the top square.
- Use the paint bucket tool options palette at the top of the screen to change the paint bucket to fill the foreground or background of the object you are going to fill with paint.
- Use the "Mode" option on the options palette to select what effect you want your paint bucket tool to have.
- Change the "Opacity" option on the options palette to change the opacity of your paint. Decreasing the opacity of your paint will make your brush more transparent, while increasing the opacity will make it less transparent.
- Set the remaining options on the options palette such as tolerance, anti-alias, contiguous and all layers. Tolerance controls the amount of shades used by the paint bucket. Check the anti-alias box to smooth the edges of your fill, the contiguous box to fill adjacent pixels based on your tolerance setting and the all layers box to fill a different layer.
- Click on your background or inside of an object to fill it with paint.

Photoshop's Editing Tools

The editing tools-Blur and Sharpen, Smudge, Clone and Pattern Stamp, Dodge, Burn, Sponge, Eraser, Healing Brush, Patch and Color Replacement-let you edit or change pixels in a variety of ways.
The editing tools can be used within a selection or anywhere on an image. Use the Brush Pop-up palette to specify a brush size for the editing tool.

Blur, Sharpen and Smudge Tool

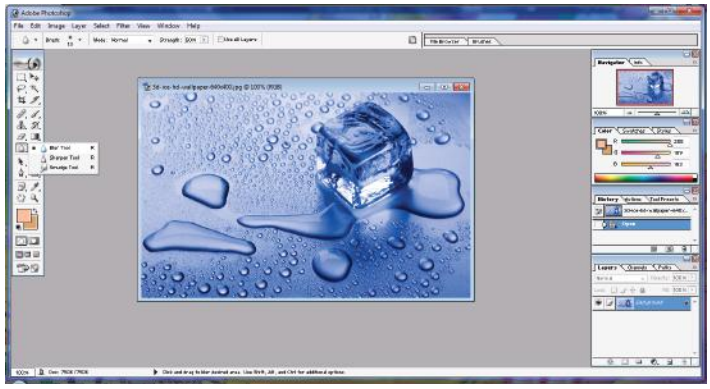
The Blur tool reduces the sharpness (focus) of an image. It does this by reducing the color contrast of neighboring pixels.

The Sharpen tool increases the sharpness (focus) of an image, by increasing the contrast of neighboring pixels. This results in increased clearness and contrast of borders, and heightened detail in the image.

The Smudge tool spreads color in an image, displacing pixels of corresponding colors. It is similar to the effect created by smearing your fingers through wet paint. Smudge works by "grasping" a color at the beginning of a stroke and then mixing it with other colors as it is dragged across the image.

To use any of these tools, do the following:

- Choose a tool from the Toolbar.



The Blur, Sharpen and Smudge occupy one cell in the Toolbar, represented by the icon of the last tool used. To choose another instrument, press the triangle next to the icon and choose the desired icon from the menu that appears.

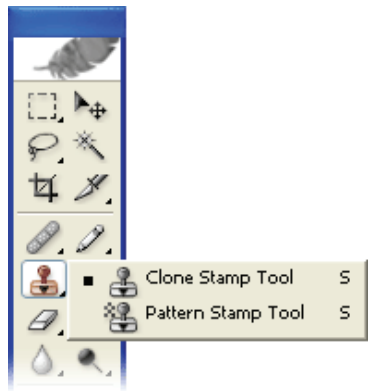
- Set the parameters for the chosen tool in the Options Panel.
- Bring the cursor into the image window.
- Press the left mouse button and, while keeping it pressed, move the cursor over the image.

Clone Stamp Tool

Photoshop's Clone Stamp tool copies pixels from one place to another. With the Clone Stamp you can delete distracting objects from the image's background, or remove unwanted dirt, scratches or problem areas that aren't improved by the Healing Brush. You can also be creative with the Clone Stamp tool and merge or layer images creating collages or montages.

To use Clone Stamp tool, do the following:

- Open up an image in Adobe Photoshop and select the clone stamp tool from the Photoshop toolbox.



- On the clone stamp tool options bar, change the brush tip size or mode settings. The higher the number of brush tip, the bigger the brush tip. The mode selections offer many different options for cloning effects.
- Hold down the "Alt" key to select the area you want to copy from. Your cursor will change to the Clone Stamp tool. Click to set the source.
- Move your cursor to the area you want to copy to. Click and drag and a crosshair image moves along with the brush cursor. This indicates the center of the clone source.
- When you release the mouse button, you stop drawing a stroke. Shift and drag to resume drawing the previous stroke.
- Use "Align" to line up the source with the destination. Generally you leave this feature on. If it is on, you can use multiple strokes to paint on one copy. If you uncheck it, the source is the same for each brush stroke so you are always painting the same thing

Dodge, Burn and Sponge Tool

The Dodge, Burn, Sponge tools are known as the toning tools.

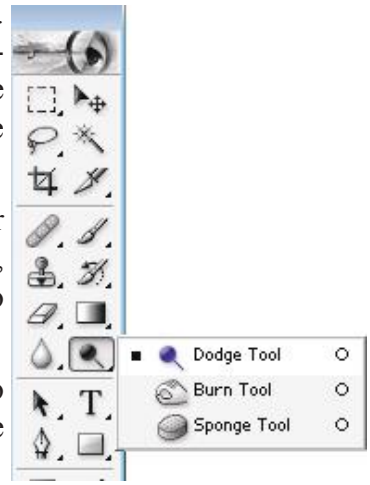
Dodge - Lightens pixels where you paint.

Burn - Darkens pixels where you paint.

Sponge - Saturates or desaturates the pixels where you paint.

Dodge Tool

To use Dodge tool, do the following:



- To lighten areas of an image, select the Dodge tool. Remember to choose an appropriate brush size. A soft-edged brush usually create the smoothest result. If the Options bar does not appear, you can double-click the Dodge tool to show it.
- Set the Range pop-up menu to Midtones, Shadows or Highlights to limit changes to the middle range of grays, the dark or light areas of the image respectively, and also set Exposure to control the intensity of the tool.
- Position your cursor on the image, then click and drag to lighten the pixels. Release the mouse then drag across the pixels again to intensify the effect.

Burn Tool

To use Burn tool, do the following:

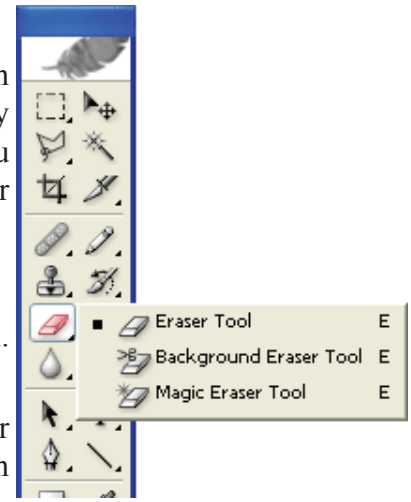
- To darken areas of an image, select the Burn tool. Remember to choose an appropriate brush size. A soft-edged brush usually creates the smoothest result.
- Set the Range pop-up to Midtones, Shadows or Highlight to limit changes to the middle range of grays, the dark or light areas of the image respectively, and also set Exposure.
- Position your cursor on the image, then click and drag to darken the pixels. Release the mouse then drag across the pixels again to intensify the effect.

Sponge Tool

To use Sponge tool, do the following:

- To saturate/desaturate areas of an image, select the Sponge tool. Remember to select an appropriate brush size.
- Set the Mode pop-up to Saturate or Desaturate and apply a Flow setting.
- Position your cursor on the image, then click and drag to alter saturation.

Eraser Tool



The Eraser tool in Adobe Photoshop works much like an eraser does on a sheet of paper. The eraser tool erases any area that you would like to be removed on an image. You can use brush, pencil or block shape as an eraser for your image.

To use Eraser tool, do the following:

- Open an image to use for practice using the eraser tool. Select the eraser tool from the Photoshop toolbar.
- Change the brush size on the eraser options bar underneath the menus. The larger the number of brush size, the bigger your brush will be.
- Choose a "Mode" of either "Brush," "Pencil" or "Block." The shape you select will be the shape that your eraser will use when erasing parts of your image.
- Make any changes to the opacity or flow of the eraser tool. Decreasing the opacity of your brush will make your brush more transparent while increasing the opacity will make it less transparent. The higher the flow, the more paint that will be released. The lower the flow, the less paint that will be released when you click your mouse.
- Select the "Erase to History" checkbox to store a history of the erasing that you make to your image.
- Click or click and drag with your mouse to erase a pixel or section of your image.

Magic Eraser Tool

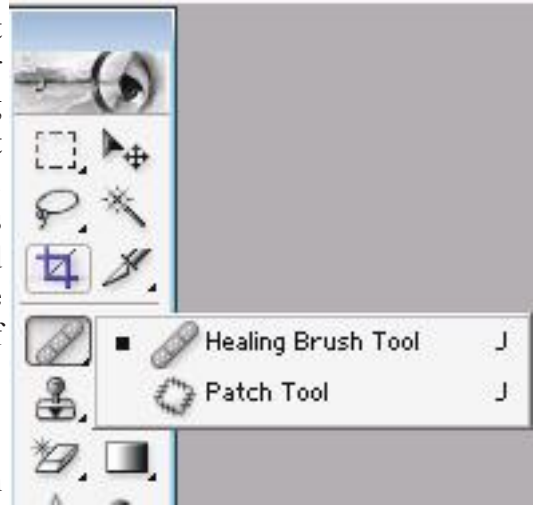
The magic eraser tool, similar to the magic wand, is used in Photoshop to change a photo's background or other color area. It is a helpful tool and works best when you are trying to remove the background pixels around a hard-edged object.

To use Magic Eraser tool, do the following:

- Select the layer on which you want to work. The layer must contain the elements you wish to alter with the magic eraser tool.
- Choose the magic eraser option from the tools menu found on the left side of the screen.
- Look at the options bar for choices concerning the magic eraser. You must select a tolerance value for the magic eraser tool. A low tolerance value will erase pixels that are very similar in color value to the pixel on which you first click. A high tolerance value will erase a wide range of pixels.

- Choose the opacity for the magic eraser tool. Opacity in Photoshop refers to the amount of transparency a layer has. An opacity of 100 percent will erase pixels completely. A lower opacity will create a partially transparent effect.
- Select the anti-aliased option to create a smoother edge when pixels are erased. Using anti-aliased helps avoid creating unwanted jagged edges.
- Select continuous to erase only pixels that fall within the tolerance value you specify and that are adjacent to each other. This erases continuous areas of pixels. Deselect this option if you want the magic eraser to erase all pixels that fall within the tolerance value anywhere in the image.
- Position the cursor and click to erase pixels that fall within the tolerance value. The tolerance value extends or limits the pixels that are erased.

Healing Brush Tool



The healing brush tool lets you correct imperfections, causing them to disappear into the surrounding image. Like the cloning tools, you use the healing brush tool to paint with sampled pixels from an image or pattern. However, the healing brush tool also matches the texture, lighting, and shading of the sampled pixels to the source pixels. As a result, the repaired pixels blend seamlessly into the rest of the image.

To use Healing Brush tool, do the following:

- Select the healing brush tool healing brush tool.
- Use the Brush Pop-up palette to choose a brush size. Select a blending mode, if required. Use Replace mode to preserve the texture, noise and any film grain at the edges of the brush strokes. Leave the Source option set to Sampled to use pixels from within the image.
- Select Aligned in the Options bar.
- Position your cursor on an area of the image that you want to sample from to repair the imperfection. Hold down Alt/option, then click the left mouse the button. This sets the sample area of pixels.
- Release the Alt/option key. Move your cursor over the area you want to repair. Click or press and drag to repair the area. When you click or drag the mouse, the (+) indicates the area of the image you are sampling pixels from.

Tricky Terms

Photoshop	A graphics editing program developed and published by Adobe Systems.
Drawing Canvas	The area in which you will create and/or modify images.
Floating Palettes	The Palettes that help to manage the colour and some other aspects of digital images.
Brush Tool	The tool that allows you to use your mouse as a paintbrush while using Photoshop.
Gradient Tool	The tool allows you to fill an area with specific range of colors, with a defined pattern.
Blur Tool	The tool that reduces the sharpness (focus) of an image.

Let Us Revise

- A graphic is an image or visual representation of an object.
- Adobe Photoshop is a graphics editing program developed and published by Adobe Systems.
- Photoshop offers useful ways to keep your images organized after you have edited them.
- The drawing canvas is the area in which you will create and/or modify images.
- Floating Palettes help to manage the colour and some other aspects of digital images.
- In Photoshop, the painting tools are used to paint strokes, and fill areas with color or with colors that blend together.
- The Brush tool in Adobe Photoshop allows you to use your mouse as a paintbrush while using Photoshop.
- The Pencil tool is used to draw freeform lines.
- The gradient tool allows you to fill an area with specific range of colors, with a defined pattern.
- The Paint Bucket tool in Adobe Photoshop is used to fill in any area with a solid color or pattern.
- The editing tools-Blur and Sharpen, Smudge, Clone and Pattern Stamp, Dodge, Burn, Sponge, Eraser, Healing Brush, Patch and Color Replacement-let you edit or change pixels in a variety of ways.

Solved Exercises

1. *What is Adobe Photoshop?*

Ans: *Adobe Photoshop is a graphics editing program developed and published by Adobe Systems.*

2. *What are the advantages of Adobe Photoshop?*

Ans: *The advantages of Adobe Photoshop are listed below:*

- *Adobe Photoshop excels at editing digital photographs.*
- *You can combine different image elements in Photoshop.*
- *Photoshop offers useful ways to keep your images organized after you have edited them.*
- *Photoshop allows you to print your images, save them in a format suitable for use on a web page, or to prepare them for use in a page-layout program.*
- *Photoshop allows you to retouch images to give them a cleaner, smoother and brighter finish.*

3. *What is a drawing canvas?*

Ans: *The drawing canvas is the area in which you will create and/or modify images.*

4. *What is the use of foreground colour and background colour?*

Ans: *The foreground colour is used to paint, fill and apply strokes.*
The background colour is used to fill in erased areas.

5. *What is the use of painting tools?*

Ans: *In Photoshop, the painting tools are used to paint strokes, and fill areas with color or with colors that blend together.*

6. *Write the use of the following tools?*

i. Paint Bucket
ii. Gradient
iii. Blur
iv. Clone Stamp
v. Eraser

Ans: *The Paint Bucket tool in Adobe Photoshop is used to fill in any area with a solid color or pattern.*
The gradient tool allows you to fill an area with specific range of colors, with a defined pattern.
The Blur tool reduces the sharpness (focus) of an image.
Photoshop's Clone Stamp tool copies pixels from one place to another.
The Eraser tool in Adobe Photoshop works much like an eraser does on a sheet of paper.

Chapter Review

1. State whether the following statements are true or false.

a. Adobe Photoshop is a word processing program developed and published by Adobe Systems.

b. Floating Palettes help to manage the colour and some other aspects of digital images.

c. The Brush tool in Adobe Photoshop allows you to use your mouse as a paintbrush while using Photoshop.

d. The gradient tool allows you to fill an area with specific range of colors, with a defined pattern.

e. The Blur tool in Adobe Photoshop is used to fill in any area with a solid color or pattern.

2. Match the following.

Group A	*Group B*
Floating Palettes	A graphics editing program developed and published by Adobe Systems.
Rulers	The area in which you will create and/or modify images.
Photoshop	The Palettes that help to manage the colour and some other aspects of digital images.
Menu bar	Present along the left side of the drawing canvas, and help in positioning the image properly.
Drawing Canvas	The bar that contains the main menu with related options to work in the software.

3. Name the Photoshop tools used to perform the following tasks.

a. Allows you to use your mouse as a paintbrush while using Photoshop.

b. Allow you to reduces the sharpness (focus) of an image.

c. Allows you to copy pixels from one place to another.

d. Allows you to fill an area with specific range of colors, with a defined pattern.

e. Allows you to fill in any area with a solid color or pattern.

f. Allows you to change a photo's background or other color area.

4. Select the best answer from the list of choices.

a. A powerful image editing program created and maintained by Adobe.

i. Adobe Indesign
ii. Adobe Photoshop
iii. Adobe Illustrator
iv. None of the above

b. The area in which you will create and/or modify images.

i. Floating Palettes
ii. Drawing Canvas
iii. Status bar
iv. Rulers

c. The tool in Adobe Photoshop allows you to use your mouse as a paintbrush while using Photoshop.

i. Pencil
ii. Brush
iii. Gradient
iv. None of the above

d. The tool that copies pixels from one place to another.

i. Blur
ii. Smudge
iii. Clone Stamp
iv. None of the above

e. The tool that erases any area that you would like to be removed on an image.

i. Eraser
ii. Magic Eraser
iii. Clone Stamp
iv. None of the above

5. Answer the following questions.

a. What is Adobe Photoshop? Who developed it?
b. What are the advantages of Adobe Photoshop?
c. What are the main components of Photoshop?
d. What is a Photoshop's Painting Tool? Give the main painting tools of Adobe Photoshop?
e. What is the difference between Brush tool and Pencil tool?
f. Write the steps to use the Paint Bucket tool?
g. What is the use of the following tools?

i. Blur Tool
ii. Sharpen Tool
iii. Burn Tool
iv. Magic Eraser Tool

Objectives

After completing this chapter, you will be able to:

- Define multimedia.
- State the advantages of using multimedia.
- Identify the elements of multimedia.
- Identify the hardware and software requirements of multimedia.
- Describe the application areas of multimedia.

16

The Magic of Multimedia

Concept: World of Creativity

Multimedia is a computer-delivered electronic system that allows the user to control, combine, and manipulate different types of media, such as text, sound, video, computer graphics, and animation. It aims at making computers easier to use and opens up a world of creativity. It is one of the most realistic ways of communication, which targets people of all ages and from different walks of life. It has made computers an excellent device for interaction and entertainment. Common multimedia computer applications include games, learning software, and reference materials, such as encyclopedias.

The advantages of multimedia are as follows:

a. Multimedia reduces training costs and also makes learning easier, attractive and effective.

b. Multimedia can be used in classrooms or workplaces as training tools and allows the trainer to provide higher quality lessons.

c. The students can hear and see the subjects that they are learning about and bring it to life through technology.

d. Multimedia provides high-quality video images and audio.

e. Multimedia offers system portability.

expanding your horizons

Interactive multimedia is any computer-delivered electronic system that allows the user to control, combine, and manipulate different types of media, such as text, sound, video, computer graphics, and animation. Interactive multimedia integrate computer, memory storage, digital (binary) data, telephone, television, and other information technologies.

Elements of Multimedia

Multimedia is media that uses content in different forms. The six major elements of multimedia include text, audio, graphics, animation and video.

Text

Text is the basic element of multimedia. It involves the use of text types, sizes, colours and background colour. It is used to give directions and communicate information, text-based menus and buttons help guide users through the multimedia application. Text can be combined with other media to present information.

Audio

Audio is sound within the acoustic range available to humans. This may include speech, audio effects, ambient sound and music. It is the only medium that can accurately provide information such as the heartbeat or the sound of the ocean.

Graphics

Computer graphics are graphics created using computers and the representation of image data by a computer specifically with help from specialized graphic hardware and software. It includes drawings, scanned photographs and images. It helps in making the concepts more clear through illustrations and charts. For example, in a multimedia application a photograph of a horse along with its textual description makes the illustration much more effective.

Animation

Animation is a series of images that are displayed in rapid succession, giving the illusion of movement. In multimedia, digital animation is used. Digital animation can be categorised into two broad area: 2D (2 Dimension) and 3D (3 Dimension) animations. It is especially useful for illustrating concepts that involve movement. Concepts such as playing a guitar or hitting a cricket ball are difficult to explain using a text or a single photograph. Animation makes it easier to portray these aspects of the multimedia application.

Video

Video provides a powerful impact in a multimedia program. Video deals with the recording and display of a sequence of images at a reasonable speed to create an impression of movement. It is an excellent way of conveying the message to the user in a very limited time. It is very useful for illustrating concepts that involve movement.

Multimedia System Requirements

A multimedia computer system is a computer equipped with special hardware and software that makes multimedia possible. Multimedia computer systems require the following hardware components:

- Multimedia system requires faster CPU for quicker processing of large amount of data.
- Multimedia system requires high capacity hard disk to store and retrieve multimedia information.
- Multimedia system requires larger RAM for running programs with large data size.
- High resolution monitors for displaying graphics, animation and video
- Sound card and speakers to play any audio associated with a multimedia application program
- Keyboard and pointing device to work with multimedia software

The most commonly used software for creation of graphics, animation, etc. are:

- Corel Draw
- Picture Publisher
- Photo Magic
- Animation Pro
- Designer

Facts Corner

CorelDraw (styled CorelDRAW) is a vector graphics editor developed and marketed by Corel Corporation of Ottawa, Canada.

Areas of Multimedia

Multimedia is a type of media that provides different content forms such as audio, video, text, images, and animations. Multimedia is important in the society for use in business, education, and entertainment purposes. It is important in school and business presentations by providing learning, especially in group of individuals. In the times to come, multimedia will give a new dimension and a complete new face to this computer industry in the world. The following sections examine few uses of multimedia technologies.

Multimedia in Education

Multimedia is both fun and educational. Multimedia is growing at home, school and work, changing the way we learn. Education through multimedia makes learning skills easy and interesting. Multimedia based education greatly enhances traditional education by providing the student with options of individual attention at his own pace. It brings presentations alive with sounds, movies, animations,and interactivity and motivates students to become active participants in the learning process. Interactive multimedia programs bring concepts to life and help students integrate critical-thinking and problem-solving skills.

Multimedia classroom simulate classrooms by providing interactive learning. Multimedia based education allow visualization of different objects, thus making the process of learning easier. It helps the students to find topic on the various subjects and learn at their own pace. Multimedia atlases contains maps and illustrations. They present the information in a more dynamic way. It produces an animated display of the chief characteristics of that country- population, currency, cities, water-resources, etc.

Knowledge Update

Multimedia in Business

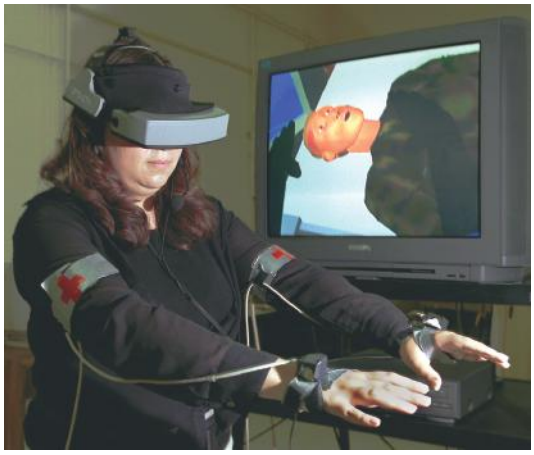
The role of multimedia is now becoming increasingly important in the world of business. It is also helpful for providing employee training, advertising and selling products all over the world via virtually unlimited web-based technologies. It provide multimedia catalogues that allow prospective buyers to browse virtual showrooms. Businesses use multimedia for office presentations, especially in meetings so as to make the meeting more appealing or to draw attention to some key points in a presentation. With multimedia systems, employees are able to work anytime, anywhere.

Multimedia in Entertainment Industry

Multimedia is heavily used in the entertainment industry, especially to develop special effects in movies and animations. The new breed of games is better designed to take advantage of new form of computing. These games are more interactive, using both digitized video and standard computer animation.

Virtual Reality

Virtual reality is a technology that allows people to enter and interact with three dimensional computer graphics world. The user wears a headset that contains two screens-one in front of each eye. The brain combines the screen images to create a three-dimensional (3D) scene. The headset plays stereo sounds-one into each ear-which the brain combines for a surround-sound effect. In addition, many systems make use of gloves, shoes and even whole suits with sensors to detect the user's movement. The computer analyzes these movements and changes the images and sounds to fit. So the user seems to move through a virtual landscape, and can grasp virtual objects. Virtual reality is currently used in applications such as aircraft pilot training, medical rehabilitation, training for surgical procedures, engineering and scientific visualization, manufacturing design, the control of remote (tele-operated) vehicles, and computer games.



The term "multimedia" was coined by Bob Goldstein (later 'Bobb Goldsteinn') to promote the July 1966 opening of his "LightWorks at L'Oursin" show at Southampton, Long Island. Goldsteinn's multimedia work was recognized as an important influence on art, cinema, advertising, fashion, and retail display.
Bobb Goldsteinn (born Bob Goldstein, June 10, 1936) is an American showman, songwriter, and artist. As a pop pioneer, he wrote The Village Stompers' international hit "Washington Square" and produced The GoldeBriars, Curt Boettcher's original Sunshine Pop singing group.

Knowledge Update

Brainstorming task

Complete each statement in the spaces provided.

a. _____is a computer-delivered electronic system that allows the user to control, combine, and manipulate different types of media, such as text, sound, video, computer graphics, and animation.

b. _____are graphics created using computers and the representation of image data by a computer specifically with help from specialized graphic hardware and software.

c. _____is a series of images that are displayed in rapid succession, giving the illusion of movement

Tricky Terms

Multimedia	The combination of multiple media such as text, high-quality sound, two and three dimensional graphics, animation, photo images and full-motion video.
Graphics	The creation and manipulation of picture images in the computer.
Animation	A series of images that are displayed in rapid succession, giving the illusion of movement.
Resolution	The degree of sharpness of a displayed or printed character or image.
Virtual Reality	A technology that allows people to enter and interact with three-dimensional computer graphics world.

Let Us Revise

- Multimedia uses computers to present text, audio, video, animation, interactive features, and still images in various ways and combinations made possible through the advancement of technology.
- Computer graphics are graphics created using computers and the representation of image data by a computer specifically with help from specialized graphic hardware and software.
- Animation is a series of images that are displayed in rapid succession, giving the illusion of movement.
- A multimedia computer system is a computer equipped with special hardware and software that makes multimedia possible.
- Multimedia system requires faster CPU for quicker processing of large amount of data.
- Multimedia based education greatly enhances traditional education by providing the student with options of individual attention at his own pace.
- Businesses use multimedia for office presentations, especially in meetings so as to make the meeting more appealing or to draw attention to some key points in a presentation.
- Virtual reality is a technology that allows people to enter and interact with three dimensional computer graphics world.

Solved Exercises

1. What is multimedia? What are the main elements of a multimedia program?

Ans: Multimedia is a computer-delivered electronic system that allows the user to control, combine and manipulate different types of media. The main elements of a multimedia program are text, images, movies, animation, sound and user controls.

2. State two advantages of multimedia technology.

Ans: The two advantages of multimedia technology are listed below:

- *Multimedia reduces training costs and also makes learning easier, attractive and effective*
- *Multimedia can be used in classrooms or workplaces as training tools and allows the trainer to provide higher quality lessons.*
- *The students can hear and see the subjects that they are learning about and bring it to life through technology.*

3. What is a multimedia computer system? What are the components of multimedia setup?

Ans: A multimedia computer system is a computer equipped with special hardware and software that makes multimedia possible. The components of multimedia setup are listed below:

- *Faster CPU (for quicker processing),*
- *Larger storage devices (for storing large data files),*
- *Larger main memory (for running programs with large data size),*
- *Super VGA monitors with high resolution for displaying graphics, animation and video, and*
- *Sound card and speakers to play any audio associated with a multimedia application program.*

4. What is the role of multimedia in education?

Ans: Multimedia is extensively used for educational training in schools. It allow students to function as designers, using tools for analyzing the world, accessing and interpreting information, organizing their personal knowledge, and representing what they know to others. Multimedia applications engage students and provide valuable learning opportunities. Multimedia based education provides the student with options of individual attention at his own pace.

5. What is virtual reality? Where is it used?

Ans: Virtual reality is an artificial world that consists of images and sounds created by a computer and that is affected by the actions of a person who is experiencing it. Virtual reality is currently used in applications such as aircraft pilot training, medical rehabilitation, training for surgical procedures, engineering and scientific visualization, manufacturing design, the control of remote (tele-operated) vehicles, and computer games.

Chapter Review

1. State whether the following statements are true or false.

a. Multimedia is one of the most realistic ways of communication, which targets people of all ages and from different walks of life.

b. Multimedia can be used in classrooms or workplaces as training tools and allows the trainer to provide higher quality lessons.

c. Audio deals with the recording and display of a sequence of images at a reasonable speed to create an impression of movement.

d. Multimedia system requires faster CPU for quicker processing of large amount of data.

e. Artificial reality is a technology that allows people to enter and interact with three dimensional computer graphics world.

2. Match the following.

Group A	*Group B*
Graphics	The combination of multiple media such as text, high-quality sound, two and three dimensional graphics, animation, photo images and full-motion video.
Multimedia	The creation and manipulation of picture images in the computer.
Virtual Reality	A series of images that are displayed in rapid succession, giving the illusion of movement.
Animation	The degree of sharpness of a displayed or printed character or image.
Resolution	A technology that allows people to enter and interact with three-dimensional computer graphics world.

3. Select the best answer from the list of choices.

a. A type of media that provides different content forms such as audio, video, text, images, and animations.

i. Monomedia
ii. Multimedia
iii. Hypermedia
iv. All of the above

b. The process of displaying still images in a rapid sequence to create the illusion of movement.

i. Text
ii. Graphics
iii. Video
iv. Animation

c. In order to work with multimedia, a personal computer typically requires the following hardware components:

i. Faster CPU
ii. Large main memory
iii. All of the above
iv. None of the above

d. An artificial world that consists of images and sounds created by a computer and that is affected by the actions of a person who is experiencing it.

i. Multimedia Kiosks
ii. Virtual Computer
iii. Virtual Reality
iv. None of the above

4. Give the appropriate technical term for each of the following statements.

a. A type of media used to present text, audio, video, animation, interactive features, and still images in various ways and combinations made possible through the advancement of technology.
b. A series of images that are displayed in rapid succession, giving the illusion of movement.
c. The recording and display of a sequence of images at a reasonable speed to create an impression of movement.
d. A computer terminal featuring specialized hardware and software designed within a public exhibit that provides access to information and applications for communication, commerce, entertainment, and education.
e. An artificial world that consists of images and sounds created by a computer and that is affected by the actions of a person who is experiencing it.

5. In your own words, briefly answer the following questions.

a. What is multimedia?
b. What are the different types of media in a multimedia?
c. What do you mean by animation? Why is it important in multimedia application?
d. What is a multimedia computer system? What are the hardware components of multimedia system?
e. What is the role of multimedia in education?
f. How is multimedia useful in business?
g. What is virtual reality?

Objectives

After completing this chapter, you will be able to:

- Identify the most commonly used techniques in programming.
- Define an algorithm and list the basic features of an algorithm.
- Define flowchart and list the advantages and disadvantages of flowchart.
- Explain the rules for designing a flowchart.
- Define pseudocode.

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Programming Techniques

Introduction

A computer is a programmable machine designed to sequentially and automatically carry out a sequence of arithmetic or logical operations. Information can be crunched, organized and displayed in the blink of an eye. However, being machines, computers cannot perform any task on their own. They do not have the power of decision making. They need systematic and stepwise instructions to solve a problem. The instructions to the computer is given in the form of a program. Computer programmers write programs that transform computers into the specialized tools of many trades. The programmers use different programming techniques to develop the logical sequence for the solution of the problem. Some of the commonly used programming techniques are algorithm, flowchart and pseudocode.

- Algorithm can be defined as a set of well-defined rules for solving a problem in a finite number of times.
- A flowchart is a diagrammatic representation that shows the logical flow of a program.
- Pseudocode is a detailed readable description of what a computer program or algorithm must do.

expanding your horizons

The word "Algorithm" or "Algorism", comes from the name Al-Khwarizmi (c. 780-850), a Persian mathematician, astronomer, geographer and a scholar in the House of Wisdom in Baghdad, whose name means "the native of Kharazm", a city that was part of the Greater Iran during his era and now is in modern day Uzbekistan.

Algorithm

Algorithm is the central concept of computing. It is defined as a formal set of instructions that can be followed to perform a specific task such as solving a logical or a mathematical problem. It is written in simple English language with few mathematical expressions or formulas. An algorithm generally takes some input, carries out a number of effective steps in a finite amount of time, and produces some output.

Characteristics of Algorithm

Algorithm is a composition of finite steps hence may require one or more operations. The characteristics of algorithms are:

- Each step of the algorithm should be simple.
- The logic of each step should be clear.
- It should be effective i.e. it must lead to a unique solution of the problem.
- An algorithm must come to an end after a finite number of steps.
- Every step of the algorithm must be accurate and precise. At the same time, it must have the time limit for execution.
- The output must be logically correct.

Advantages of Algorithm

The advantages of algorithm are listed below:

- They are simple to understand and provide a step-by-step solution for a problem.
- Errors can be pointed out very easily. Debugging is simple.
- They do not depend on any of the programming languages.
- They are compatible with computer languages.

Developing Algorithm

The steps used to develop an algorithm are listed below:

- The problem has to be understood thoroughly.
- The inputs required by the problem, to achieve the desired output, have to be identified.
- A logic or process, that will produce the required output from the given input, has to be developed.
- The expected output has to be identified.
- The algorithm should be tested for accuracy for a given set of input data.
- The steps given above are repeated till the algorithm produces desired results.

Solved Problem

Write an algorithm to instruct the computer to add two numbers.

Solution:

Step 1 : Start

Step 2 : Accept the first number (a).

Step 3 : Accept the second number (b). → *Input*

Step 4 : Find the sum of a and b.

(Sum = a + b) → *Processing*

Step 5 : Display the sum. → *Output*

Step 6 : Stop

Counter

Counter variable is a simple variable which control that how many time the loop will execute. The counter variable is incremented or decremented with some fix amount as required. The following points should be taken care while using the counters:

- Initialize the counter by setting it to a starting value.
- Increase/decrease the counter each time the loop is executed.
- Check the counter against the maximum limit of the number of repetitions required.

Solved Problem

Write an algorithm to generate the first five natural numbers.

Solution:

Step 1 : Start

Step 2 : Store 1 in a variable A.

Step 3 : Display the value stored in variable A.

Step 4 : Increase the value of A by 1.

Step 5 : Is A<=5

{ If yes: Goto step 3

no: Goto step 6 }

Step 6: Stop

Accumulator

Accumulator accumulates the actual value of one data item with another to give a final total. The accumulator is represented by a numeric variable which stores the values in a memory location, addressed by its name. It should be initialized to zero at the beginning of the program.

Flowchart

Flowchart is a graphical representation of logical sequence of steps involved in solving a programming problem. It consists of standard set of symbols of different shapes which are connected by arrows. Each symbol represents a specific kind of activity and arrows which join these symbols are called flow lines. The flow lines indicate the sequence of the steps and flow of information in a program.

Advantages of a flowchart

Flowchart is an aid to writing programs and it serves several other purposes. They are listed below:

- It helps in reviewing and debugging of a program.
- It helps to detect deficiencies in the problem statement.
- It helps the programmer in developing the program logic and to serve as documentation for future reference for a completed program.
- It helps in the discussion of a solution with others or in explaining the program to others.

Disadvantages of a flowchart

In spite of its advantages, a flowchart has some disadvantages, which are as follows:

- Drawing a flowchart is time consuming.
- Making changes in the flowchart is not an easy job. Re-drawing of flowchart is required.
- If the logic of the problem is complex, the flowchart becomes complicated.
- Flowchart cannot be directly converted into program code.

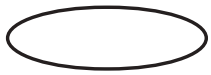
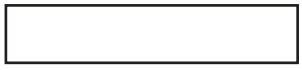
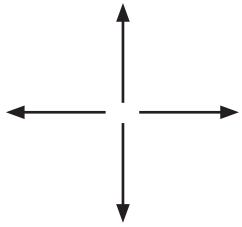
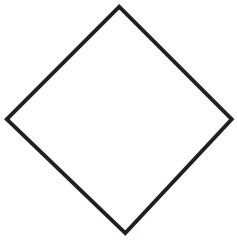
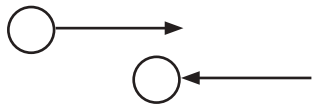
Rules for drawing a flowchart

Some of the rules and guidelines are as follows:

- Always concentrate on the main logic of the problem.
- After completing the main logic, concentrate on the branches and loops.
- Every flowchart must have start and stop points.
- Avoid using computer language in a flowchart.
- The terms used in the flowchart should be unambiguous, so that any programmer can easily understand the logic.
- Flow lines should not cross each other.
- The arrowheads are used to indicate the direction of flow of control in the problem. The general direction of flow in any flowchart is from top to bottom or from left to right.
- The connectors joining the different pages must be adequately referenced while drawing a chart on more than one sheet of paper.

Flowchart Symbols

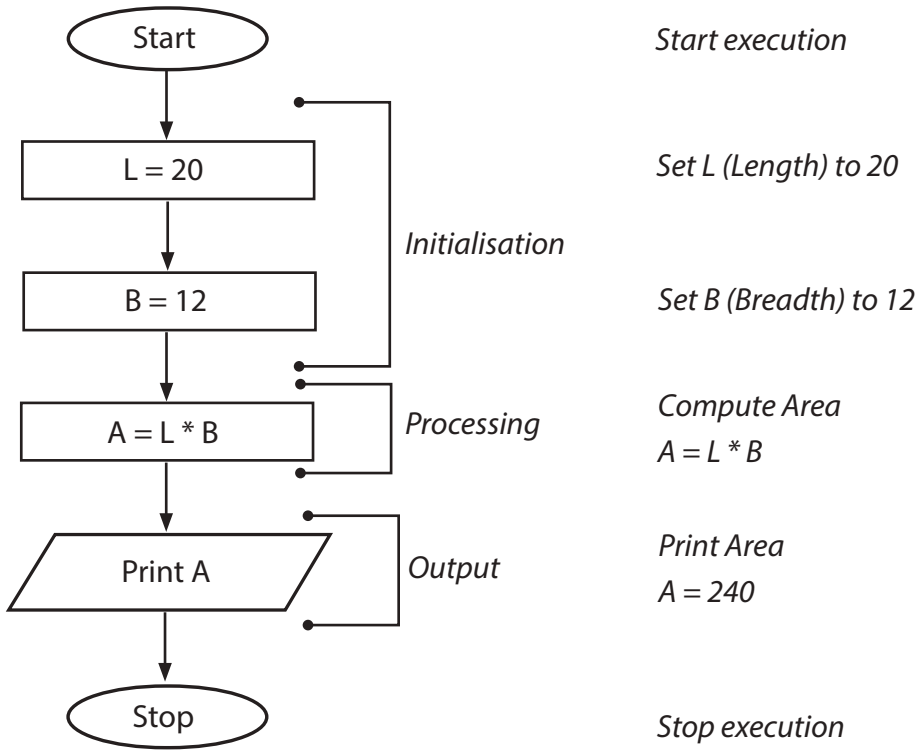
A flowchart consists of simple geometrical symbols for different functions. Some of the basic flowchart symbols are given below:

Symbol	Purpose
Terminal Box 	The oval shaped terminal box is used to indicate the start and the end of a flowchart.
Input/Output Box 	The parallelogram shaped input/output box, as the name suggests, is used to show the input and output related steps in a flowchart.
Processing Box 	The rectangular shaped processing box is used to show the processing step (calculations, data manipulation, etc.) in a flowchart.
Flow Lines 	The arrows that are used to connect the various geometrical symbols in flowchart are called flow lines. The direction of the arrow shows the order in which the computer will execute the instructions to solve the problem.
Decision Box 	The diamond shaped decision box is used to show the steps involving comparison and decision making steps. The outcome of any decision can be either true or false. It has one entry and two exit points which are for true and false. (Observe that one arrow goes into the decision box, and two arrows come out of it to indicate two alternate actions to be performed based on the outcome of the decision making).
Connector 	The connectors indicate the continuation of the flow on another page, where a corresponding symbol (containing the same letter) is located.

Solved Problem

Draw a flowchart to find the area of the room where length of a room is 20 ft. and breadth is 12 ft.

Solution:



Pseudocode

Most software programs are developed using a programming language, like C++ or Java. These languages have a specific syntax that must be adhered to when writing program's source code. Pseudocode, on the other hand, is not a programming language, but simply an informal way of describing a program. It does not require strict syntax, but instead serves as a general representation of a program's functions. Pseudocode is an informal language, so it is mainly used for creating an outline or a rough draft of a program. Because it is not an actual programming language, pseudocode cannot be compiled into an executable program. Therefore, pseudocode must be converted into a specific programming language if it is to become an usable application. It uses a combination of English words, mathematical notations and a set of capitalized keywords, such as BEGIN, END, READ, PRINT, IF, ELSE, ELSEIF, ENDIF, WHILE, DO and ENDWHILE.

Tricky Terms

Algorithm	A formal set of instructions that can be followed to perform a specific task such as solving a logical or a mathematical problem.
Counter	A variable which keeps track of the number of times a particular program or part of the program has been executed.
Accumulator	A variable that accumulates the actual value of one data item with another to give a final total.
Flowchart	A graphical or symbolic representation of a process.
Pseudocode	An informal language used to express the flow of a program.

Let Us Revise

- Algorithm is a set of step-by-step instructions given in a logical order to solve a problem.
- Algorithm generally takes some input, carries out a number of effective steps in a finite amount of time and produces some output.
- Algorithms are simple to understand and provide a step-by-step solution for a problem.
- A counter is a variable which keeps track of the number of times a particular program or part of the program has been executed.
- Accumulator accumulates the actual value of one data item with another to give a final total.
- Flowchart is a graphical or symbolic representation of a process.
- Flowcharts are better way of communicating the logic of a system to all concerned.
- Flowcharts serve as a good program documentation, which is needed for various purposes.
- The oval shaped terminal box is used to indicate the start and the end of a flowchart.
- Pseudocode is a detailed readable description of what a computer program or algorithm must do.
- Pseudocode uses a combination of English words, mathematical notations and a set of capitalized keywords, such as BEGIN, END, READ, PRINT, IF, ELSE, ELSEIF, ENDIF, WHILE, DO and ENDWHILE.

Solved Exercises

1. *What is an algorithm?*

Ans: *An algorithm is defined as a set of well defined steps for performing a task or solving a problem.*

2. *Write an algorithm to generate the first five even numbers.*

Ans:
Step 1: Start
Step 2: Store 2 in a variable A.
Step 3: Display the value stored in variable A.
Step 4: Increase the value of A by 2 (A=A+2).
Step 5: Is A<=10
{If yes: Goto step 3
no: Goto step 6}
Step 6: Stop

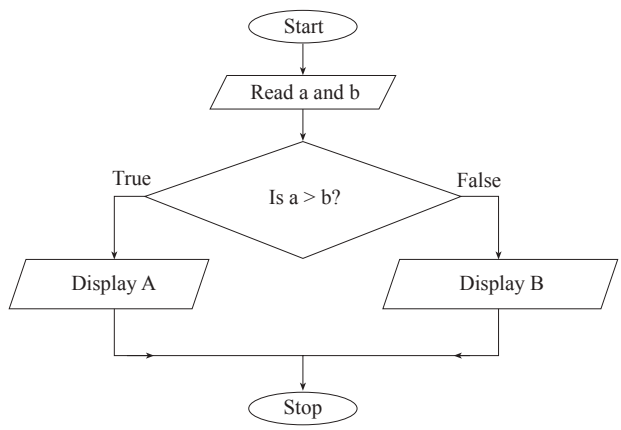
3. *List any two advantages of flowcharts.*

Ans: Flowchart is an aid to writing programs and it serves several other purposes. They are listed below:
Ÿ It is easier to understand at a glance.
Ÿ It helps in reviewing and debugging of a program.

4. *Write a pseudocode to find the area of a rectangle.*

Ans:
```
BEGIN
PRINT "Enter the values for length and breadth:"
READ L, B
A = L * B
PRINT "The area of a rectangle is", A
END
```

5. *Draw a flowchart to find the largest of the two numbers.*



Chapter Review

1. State whether the following statements are True or False. Rewrite each false statement to make it a true statement.

a. Algorithm consists of standard set of symbols of different shapes which are connected by arrows.

b. The flowchart helps in the discussion of a solution with others or in explaining the program to others.

c. Terminal box marks the start and end points of a flowchart.

d. Decision box indicates any calculation or manipulation.

e. Connectors are used to connect the flowchart symbols.

2. Match the following.

Group A	*Group B*
Algorithm	An informal language used to express the flow of a program.
Programmer	A set of well defined steps for performing a task or solving a problem.
Program	A diagrammatic representation that shows the logical flow of a program.
Pseudocode	A person mainly involved in designing, writing and testing computer.
Flowchart	A set of instructions that tells the computer how to solve a problem or perform a task.

3. Select the best answer from the list of choices.

a. A person mainly involved in designing, writing and testing computer.

i. Programmer ii. User iii. System analyst

b. The word algorithm originated from the name of a famous Arab mathematician. _____.

i. Al-Khowarizmi. ii. Pingala iii. Shankara Variyar

c. A graphical representation of logical sequence of steps involved in solving a programming problem.

i. Chart ii. Algorithm iii. Flowchart

d. A flowchart symbol used to show the steps involving comparison and decision making steps.

i. Processing box ii. Decision box iii. Terminal box

4. Answer the following questions.

a. What is a programming technique? Name the most commonly used programming techniques.

b. List any three features of algorithm.

c. What are the advantages of an algorithm?

d. What are the disadvantages of flowcharts?

e. List any five important rules for drawing a flowchart.

f. What are the various basic symbols used in flowcharting? Give their pictorial representation.

g. What is a pseudocode? Why is it so called?

5. Write an algorithm for the following problems.

a. To convert fahrenheit into celcius. (F = C * (9 / 5) + 32)

b. To input a number and find whether it is even or odd.

c. To find odd integers between 1 and 49.

d. To find the squares of even integers between 2 and 50.

e. To find the sum of first ten natural numbers.

6. Draw a flowchart for the following problems.

a. To input any two numbers and find their sum.

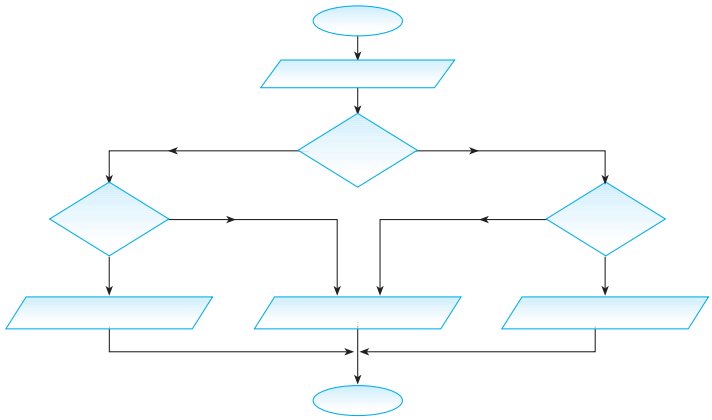
b. To find the area of a triangle. (Area = 1/2 * B * H)

c. To find the area of a circle. (Area = pr2).

d. To input marks in three subjects and find the total marks obtained.

e. To input two different numbers and find the sum of their squares.

7. Draw a flowchart that reads three numbers and find the largest among them.



Objectives

After completing this chapter, you will be able to:

- Identify the special features of QBASIC.
- Identify the use and syntax of basic statements of QBASIC.
- List out the two main categories of control statements.
- Identify the use and syntax of branching statements.
- Identify the use and syntax of looping statements.

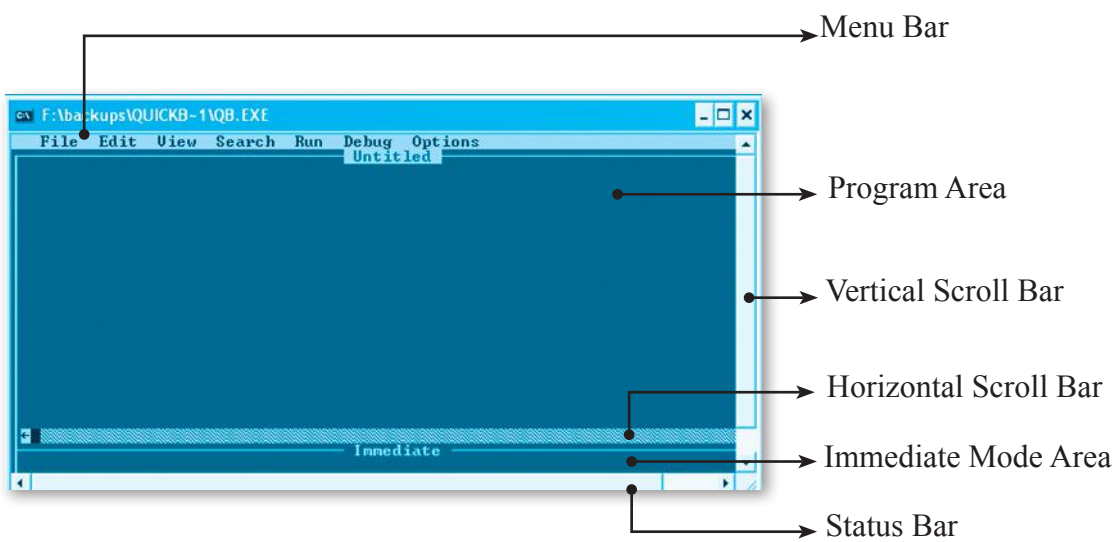
18

QBASIC Programming

Introduction

BASIC (Beginners' All Purpose Symbolic Instruction Code) is one of the easiest high level programming languages. It allows the usage of English-like language and uses mathematical notation. It was developed in 1964 at Dartmouth College, U.S.A. by Professors John Kemeny and Thomas Kurtz. Originally, it was developed as an interactive language for mainframes. Since, its development BASIC has undergone many modifications and improvements and now many versions of BASIC are available, each version having some extra features. Some of the versions of BASIC are GW-BASIC, QBASIC and Visual BASIC.

QBASIC is a high level computer language published by Microsoft. QBASIC environment includes a full screen syntax checking, multi-file and multi-window editing, full debugging facilities, pull-down menus, syntax-checking editor and a simple yet a powerful menu structure that can be driven through either by a keyboard or a mouse. Once you are in the QBASIC environment you can edit, run, debug, and rerun the program without switching programs.



expanding your horizons

Visual Basic is a third-generation event-driven programming language and integrated development environment from Microsoft for its COM programming model first released in 1991. Visual Basic was derived from BASIC and enables the rapid application development (RAD) of graphical user interface (GUI) applications.

Elements of QBASIC Programming

The important elements of QBASIC program are:

- QBASIC character set
- Variable
- Constant
- Operator and expression
- Keywords (Reserved words)

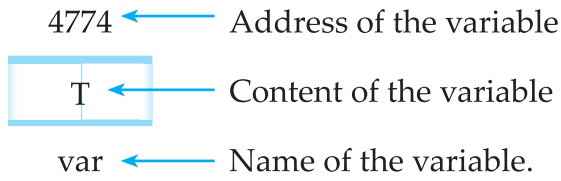
Character Set

The QBASIC character set is a set of symbols used to frame the various components of a program. The character set consists of digits, letters and special characters that are valid in QBASIC. The QBASIC has the following character set:

- Alphabets : A to Z (small and capital letters)
- Numbers : 0 to 9
- Special characters : ; = + -* / ^ ( ) % $ # ! , .' " : & ? < > \ -

Variable

Variables are programmer-defined areas in the computer's memory for storing data. The data stored in a variable can change during the execution of the program as per the requirements and functionality of your program. However, the name of the variable in a program remains unchanged. This is the reason why variables are very easy to use. The variables are of two types: numeric variable and string variable depending on the kind of data item they represent.



Numeric variable

The numeric variable has a number as its value. It must begin with an alphabet and the remaining characters, if used, may be alphabets or digits or both. Some of the valid numeric variables are a1, area and weeks7.

String variable

The string variable has a string of characters or alphanumeric as its value. It must begin with an alphabet and end with a dollar($) sign. Mathematical calculations cannot be performed using string variables. Some of the valid string variables are A$ AND t1$.

Constant

Constant is a data item whose value does not change during the execution of a program. It is also called literal. Constants are of two types: numeric constant and string constant.

Numeric constant

Numeric constant is a sequence of positive or negative numbers on which mathematical operations can be performed. They are entered in the same form. Commas are not allowed in a numeric constant. Some of the valid numeric constants are 52, -20, +74 and 29.

String constant

String constant is a sequence of characters which may include numbers, letters, and certain special characters enclosed in quotation marks. It is used to represent non-numeric information such as names, addresses, class, sections, etc.

Solved Problem

```
REM "This program has constant and variable"
apples = 20
PRINT "Today we sold "; apples; " bushels";
PRINT " of apples."
END
```

Constant or Variable	Types of constant
20	Integer constant
"Today we sold "	String constant
" bushels"	String constant
" of apples."	String constant

Operator and Expression

Operators are the symbols representing the operations they perform. Operator helps to convert one or more values into a single value. The values on which the operators work are referred to as operands.

A combination of an operator and its operands is referred to as an expression. Operators are used in expressions to store or return a value. Look at the following statement:

```
sum = 21 + 6
```

Since 21 + 6 has a value, it is an expression. Its value, 27, is stored in the variable sum.

Expressions do not have to be in the form of mathematical operations. In the following statement, 3 is an expression.

number = 3

QBASIC offers different classes of operators: arithmetic, relational, logical and string operators.

Arithmetic operators

Arithmetic operators are the operators that operate on numeric constants and variables. They are used to perform various mathematical operations. The general format of arithmetic operator is:

operand1 arithmetic_operator operand2

The arithmetic operators, in order of precedence, are listed below:

Operator	Description	Example
^	Raises a number to the power of another	x = y^z
*	Multiplies the operands	x = y * z
/	Divides the left operand by the right operand	x = y/z
\	Divides an integer and returns the number of times one integer can be evenly divided into another	x = y\z
Mod	Divides the left operand by the right operand and returns the remainder	x = y mod z
+	Adds the operands	x = y + z
-	Subtracts the right operand from the left operand	x = y - z

Note:

Operations within parenthesis are performed first. Inside the parenthesis, the usual order of precedence is maintained. It is always a good idea to put parenthesis around the expression. Some advanced operators will produce unexpected results otherwise.

The table given in the next page shows sample algebraic expression and their BASIC counterparts:

Algebraic Expression	BASIC Expression
5a + 6b	5*a + 6*b
$a^2 + b^2$	a^2 + b^2
2 (l + b)	2*(l + b)
(3a - 4b)/c	(3*a - 4*b)/c
$4x^2+3$	4 * x^2 + 3
(2a)b	(2*a) ^ b

Relational operators

Relational operators are used to compare two values of same type, either both numeric or both string. The general format is:

operand1 relational_operator operand2

The relational operators supported by QBASIC are:

Operator	Description	Example
=	Compares two numbers and evaluates them to true if the operands are equal	A = B
<	Compares two numbers and evaluates them to true if the left operand is less than the right operand	A < B
>	Compares two numbers and evaluates them to true if the left operand is greater than the right operand	A > B
<=	Compares two numbers and evaluates them to true if the left operand is less than or equal to the right operand	A < = B
>=	Compares two numbers and evaluates them to true if the left operand is greater than or equal to the right operand	A > = B
<>	Compares two numbers and evaluates them to true if the operands are not equal	A < > B

Logical operators

Logical operators are used to connect two or more relational expressions to evaluate a single value as True or False. The general format is:

Operand1 logical_operator operand2

The logical operators supported by QBASIC are:

Operator	Description	Example
AND	Evaluates to true when both conditions	A>B AND
	are true	A>C
OR	Evaluates to true when one or both	A>B
	conditions are true	OR A>C
NOT	Reverses a condition. It makes a true	A NOT B
	expression false, and a false expression true.	

Concatenation operators

An expression involving string variables and constants are called string expression. Concatenation operators connect multiple strings into a single string. QBASIC use the plus sign (+) as a string concatenation operator.

Solved Problem

```
A$ = "Programming"
B$ = "great fun."
C$ = A$ + "is" + B$   'Plus sign (+) connects multiple
strings.
PRINT C$
END
```

Program Output

Programming is great fun.

Keywords (Reserved words)

Keywords are the words that convey a special meaning to the language. These are reserved for special purpose and must not be used as normal identifier names. Some of the QBASIC keywords are: REM, CLS, INPUT, LET, PRINT and END.

QBASIC Statements

QBASIC statement is a meaningful expression or an instruction in a source language. Each statement is followed by a RETURN key. These statements are first stored in the memory and executed only when the command RUN is given. It is either executable or non-executable. Executable statements are program instructions that tell BASIC what to do during the execution of a program. Non-executable statements do not cause any program action. The statements can be divided into four categories: declaration statement, assignment statement, input/output statement and control statement.

REM Statement

The REM statement is a non-executable statement. It is used to include explanatory remarks to be inserted in a program, which are very useful to explain what a program does and what specific lines of code do. This statement can be used anywhere and any number of times in a program. They are intended for people who may be reading the source code. This statement can be used anywhere and any number of times in a program. An apostrophe (‘) may be used instead of REM. The general format of REM statement is:

REM <remark> or ‘ <remark>

Solved Problem

```
REM “This program calculates the area of a circle”
PI = 3.14159
LET R = 8
‘ Calculates the area of circle.
Area = PI * (R ^ 2)
‘ Displays the area of circle.
PRINT “The area of circle is:::”; Area
END
```

CLS Statement

CLS statement is used to clear the output screen. It makes the screen completely blank. This command is generally given before the start of any program so that there is a fresh screen and any left over from the previous program is cleared completely. The general format of CLS statement is:

CLS

LET Statement

LET is an assignment statement used to assign the value of an expression to a variable. LET is an optional keyword i.e., the equal sign is sufficient when assigning an expression to a variable name. The type of the expression (string or numeric) must be the same as the type of the variable. Otherwise a "Type mismatch" error will occur. The general format of LET statement is:

LET <variable> = <expression>

Solved Problem

```
CLS     ' Clears the screen
REM "Calculate the area of a rectangle"
LET length = 30
LET breadth = 20
LET area = length * breadth    ' Calculates the area of rectangle
PRINT "The area of rectangle is" ; area
END
```

INPUT Statement

The INPUT statement is used to accept input from the keyboard during program execution. It facilitates the use of same program for various sets of data to obtain different results in different executions. During the execution of a program, when the control comes to INPUT statement, a question mark appears on the screen and waits for data to be input on the keyboard. Unless a response is entered, the control does not move to the next line. The type of data item in the response (numeric or string) must agree with the type specified by variable and the number of data items supplied by the user must be the same as the number of variables listed in the statement. The general format of INPUT statement is:

INPUT ["definer"; | ,] list of variables

Solved Problem

```
INPUT "Enter the side of a cube";l
volume = l ^ 3
tsa = 6 * l ^ 2
PRINT "Volume of a cube";volume
PRINT "Total surface area"; tsa
END
```

PRINT Statement

PRINT statement is used to display data on the screen. This statement will print constants, variables or expressions. A question mark (?) may be used instead of the word PRINT. The general format of PRINT statement is:

PRINT [list of expressions] [, | ;]

or

? [list of expressions] [, | ;]

Print positions

BASIC divides the line into print zones of 14 spaces. The position of each item displayed on the screen is determined by the punctuation used to separate the items in the list. The separator and print position is described below:

Separator	Print Position
,	Zonewise
;	Side by side
space(s)	Immediately after the last value

Solved Problem

```
INPUT "Enter a student's name:";n$
INPUT "Enter marks in subject1"; m1
INPUT "Enter marks in subject2"; m2
INPUT "Enter marks in subject3"; m3
total = m1 + m2 + m3
avg = total / 3
PRINT "The student's name is:";n$
PRINT "The marks in subject1:";m1
PRINT "The marks in subject2:";m2
PRINT "The marks in subject3:";m3
PRINT "The average score is:";avg
END
```

TAB Function

TAB function is used to space to position n. It may be used only in PRINT, LPRINT, and PRINT# statements. Space 1 is the left most position, and the right-most position is the defined width. If the current print position is already beyond space n, TAB goes to that position on the next line. If n is negative, it produces the same result as TAB (1). If n is out of range, an overflow error occurs. The general format is:

TAB (n)

LOCATE Statement

LOCATE statement is used to move the cursor to the specified position on the screen and determine the height of the cursor. The general format is:

LOCATE[row][,[col][,[cursor][,[start][,stop]]]]

Solved Problem

```
INPUT "Enter the length of the room"; leng
INPUT "Enter the breadth of the room"; brea
INPUT "Enter the height of the room"; heig
INPUT "Enter the cost of painting per unit area"; cost
LET area = (2 * (leng + brea)) * heig
LET total = cost * area
LOCATE 9, 50: PRINT "Total cost of painting the room is:"; total
END
```

END Statement

END statement denotes the end of the program. Once the program encounters the END statement, the computer stops processing any further as it has reached the termination point. It must be written as the last statement in every program. The general format of the END statement is:

END

Control Statements

A computer program is a set of ordered statements which are normally executed in the sequential order i.e. they appear in order from top to bottom. But sometimes, the operational flow of control of a program has to altered depending upon a condition or repeat a group of statements until certain specified conditions are met. QBASIC provides facilities for controlling the order of execution of statements. They are known as the control flow statements.

The control statements of QBASIC can be put into the following categories: branching statements and looping statements.

Branching Statement

Branching statement allows your program to transfer the control to some other specified statement instead of the sequential execution. There are two types of branching statements: unconditional and conditional branching.

Unconditional Branching Statement

Unconditional branching statement is a statement that transfers the control unconditionally (without testing any condition) from one statement to another statement in a program. GOTO statement is the simplest unconditional branching statement.

GOTO statement

GOTO statement is used for unconditional transfer of execution from one part of the program to the other. It does not depend on any test of condition. The general format of GOTO statement is:

GOTO [line number | line label]


```
x = 1
top: ‘ A label is a name followed by a colon.
y= x*x
PRINT y
x=x+1
GOTO top
END
```

The program evaluates the expression y= x * x repeatedly for x = 1, 2, 3, ... The value of x is incremented at the fourth line and then the control of execution comes to GOTO top, it will be transferred to the label top:. The control will never come to the END statement. So, it becomes an infinite loop

(i.e a never-ending loop). To stop the execution of this program, press CTRL+Pause Break key.

A line label is an identifier followed by a colon which can be placed before any QBASIC statement. The line label has the following syntax: [label]:

Conditional Branching Statement

Conditional branching statement is a statement that allows the selective execution of statements based on a particular condition. It enables the computer to decide upon which of the several possible actions to take. On the basis of a given condition a selected segment of the program is executed. It depends upon the state of a particular condition being true or false. Conditional branching statement is also called decision-making statement. The conditional branching statements include IF...THEN and SELECT CASE statements.

IF...THEN statement

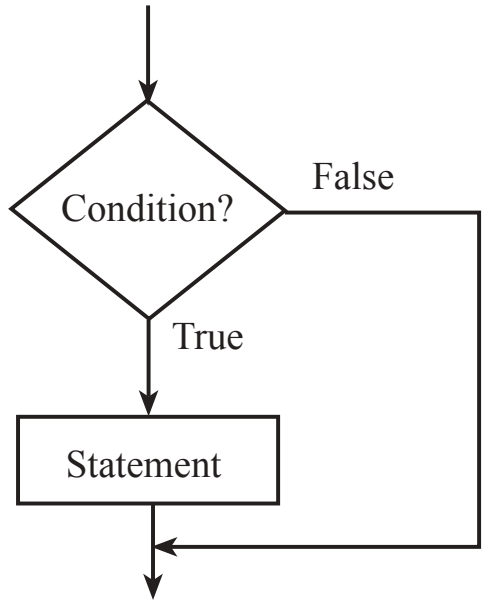
The IF...THEN statement is used for making decisions as well as comparisons. It allows branching depending upon the value of an expression. The statement to be executed or ignored depends upon the condition. The different forms of IF...THEN statement are:

- IF...THEN statement
- IF...THEN...ELSE statement
- IF...ELSEIF...ENDIF statement

i. IF...THEN statement

IF...THEN statement is a conditional branching statement. If the condition is true, the statement given next to THEN will be executed otherwise next executable statement following IF...THEN statement will be executed. The general format of IF...THEN statement is:

IF <condition> THEN <statement>



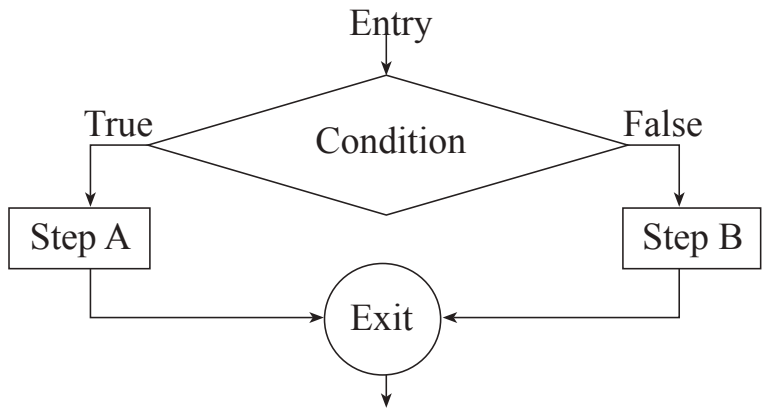
Solved Problem

```
dis = 0
INPUT "Enter quantity"; q
INPUT "Enter rate"; r
IF (q > 1000) THEN dis = 10
total = (q * r) - (q * r * dis / 100)          'Calculates the total expenses
PRINT "Total Expenses = "; total
END
```

ii. IF...THEN...ELSE statement

IF...THEN...ELSE statement is an extension of IF...THEN statement. IF...THEN...ELSE statement tests a particular condition and asks the computer true or false questions only. If the condition is true, the computer will follow the command given after THEN. If the condition is false, the computer will altogether ignore the command after THEN and moves to the ELSE part to execute the command stated there. The general format of IF...THEN...ELSE statement is:

IF <condition> THEN <statement1> ELSE <statement2>



Solved Problem

```
REM "This program calculates tax of an employee"
INPUT "Enter the annual salary of an employee"; sal
IF sal > 15000 THEN tax = 15 / 100 * sal ELSE tax = 10 / 100 * sal
PRINT "The total tax paid by an employee:::"; tax
END
```

iii. IF...ELSEIF...ENDIF statement

The IF...ELSEIF...ENDIF statement is a chain of IF statements. They perform their tests, one after the other, until one of them is found to be true. The conditions are evaluated from the top and if one of them is true, the corresponding block of statements is executed. The executable statements following the last ELSE statement are executed if all the other conditions on the IF and ELSEIF lines are false.The general format of IF...ELSEIF...END IF statement is:

IF [condition1] THEN

[statementblock-1]

ELSEIF [condition2] THEN

[statementblock-2]

ELSE

[statementblock-n]

END IF

Solved Problem

```
CLS
INPUT "Enter no. of passenger"; p
INPUT "Enter destination"; d$
IF d$ = "pokhara" THEN
t = 200 * p
ELSEIF d$ = "butwal" THEN
t = 300 * p
ELSEIF d$ = "chitwan" THEN
t = 180 * t
END IF
IF p >= 5 THEN d = 5 / 100 * t
f = t - d
PRINT "Total bus fare="; f
END
```

Looping Statement

Loop is a control structure that causes a statement or group of statements to repeat, based on a condition. The repetition continues while the condition set for it remains true. When the condition becomes false, the loop ends and the control is passed to the statement, following the loop. The looping statements allow flexibility to the programmer in controlling the number of times a specific instruction is to be repeated. QBASIC supports the following looping statements: FOR...NEXT, WHILE...WEND and DO...LOOP.

FOR...NEXT Statement

FOR...NEXT statement is used to execute a series of instructions for a given number of times. FOR statement is placed at the beginning of the loop and NEXT statement at the end. The general format of FOR...NEXT statement is:

FOR <counter variable>=x to y <STEP z>

<program statements>

NEXT <counter variable>

In the FOR...NEXT loop:

- A counter variable is used to keep count of the number of times the loop is repeated.
- The initial value (x) and final value (y) for the counter variable are given with the FOR statement. The statement clause may be included to increase or decrease the value of the counter variable by any number.
- If the STEP clause is not included, the default value for STEP, i.e., 1 is used. The STEP statement may also have a negative value if the initial value is greater than the final value.

Rules for FOR...NEXT statement

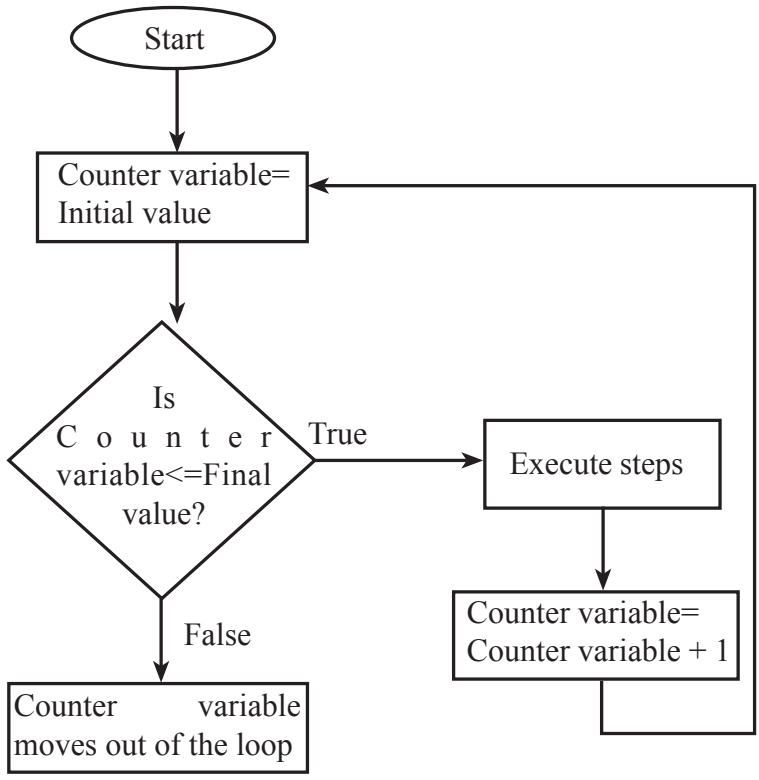
The following rules must be kept in mind while constructing a FOR...NEXT loop:

- The counter variable can appear in a statement inside a loop, but its value cannot be changed.
- If the initial and final values of the counter variables are equal and the step value is non-zero, then the loop is executed once.
- The loop will not be executed when:

i. the initial and final value of the counter variables are equal and the step value is zero.

ii. the final value of the counter variable is less than the initial value and the step value is positive.

iii. the final value of the counter variable is greater than the initial value and the step value is negative.



Solved Problem

```
A = 1
C = 2
FOR CNT = 1 TO 5
        PRINT A
        A = A * 10 + C
        C = C + 1
NEXT
END
```

WHILE...WEND Statement

WHILE...WEND statement is an entry-controlled loop. It is used to execute a series of statements as long as a given condition is true. If the condition is true, all the statements are executed and when the WEND statement is reached, control is returned to the WHILE statement which evaluates the condition again. If the condition is still true, the process is repeated. If the condition is false, the program execution jumps to the statement following the WEND statement. The general format of WHILE...WEND statement is:

WHILE [expression]

<program statements>

WEND

Rules for WHILE...WEND statements

The following rules must be kept in mind while constructing a WHILE...WEND loop:

- All variables in the test condition of the WHILE construct must be initialized at some point before the WHILE loop is reached.
- The body of the loop must do something to change the value of the variables used in the condition being tested. Otherwise, the condition will remain true, and the loop will never terminate. This situation is known as an infinite loop.
- To prevent infinite loops, a statement must be included in the WHILE...WEND loop that modifies the variable in the expression.

Solved Problem

```
c=0
INPUT "Enter a number";n
WHILE n<>0
        n=n\10
        c=c+1
WEND
PRINT "No. of digits:";c
```

DO...LOOP Statement

DO...LOOP statement causes a set of program statements to execute repeatedly until certain conditions are met or as long as certain conditions are true. There are two variations of DO...LOOP statement and both use the same basic model. A loop can execute either while the condition is true or until the condition becomes true. These two variations use the keywords WHILE and UNTIL to specify how long the statements are executed. The syntax for DO...LOOP statement can take either of the two forms.

Syntax 1

DO

<statement block>

LOOP WHILE|UNTIL <boolean expression>

Syntax 2

DO WHILE|UNTIL <boolean expression>

<statement block>

LOOP

Solved Problem

```
n = 5
i = 1
DO
PRINT n; "x"; i; "="; n * i
i = i + 1
LOOP WHILE i <= 10
END
```

Nested Looping

A loop structure placed inside another loop structure is said to be a nested loop. When a loop is defined inside another loop, the inner loop operates as many times for all the values of the outer loop. The rules for the formation of nested loop are:

- An outer loop and inner loop cannot have the same control variable.
- The inner loop must be completely nested inside the body of the outer loop.
- The inner loop must terminate before the outer loop.
- Outer loop opens first but closes last.
- Loops must never cross each other.

Solved Problem

```
FOR outloop = 1 TO 5
FOR inloop = 1 TO outloop
PRINT inloop;
NEXT
PRINT
NEXT
END
```

Tricky Terms

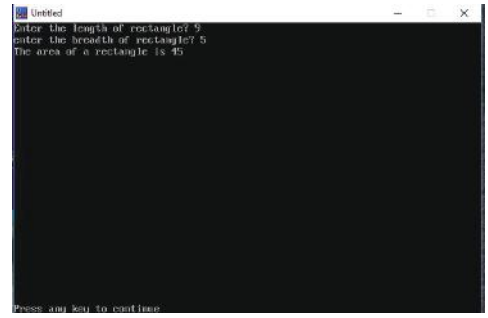
Constant	A data item whose value do not change during the program execution.
Variable	The storage location in the computer's memory for storing data.
Relational operator	An operator used to compare two values of same type, either both numeric or both string.
Conditional statement	A statement that allows selective execution of statements based on a condition having a certain value.
Looping statement	A statement that allows a set of instructions to be repeated a certain number of times.

Let Us Revise

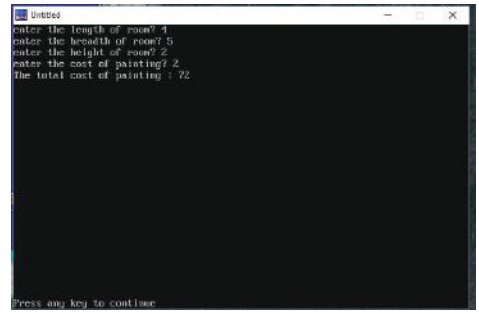
- BASIC (Beginners' All Purpose Symbolic Instruction Code) is one the easiest high level programming languages. It allows the usage of English-like language and uses mathematical notation.
- The important elements of QBASIC programming are character set, keywords, variables, constants, operators and expressions.
- Variables are the storage locations in the computer's memory. Variables are of two types: numeric variable and string variable.
- Constant is a data item whose value does not change during the execution of a program. Constants are of two types: numeric constant and string constant.
- Operators are the symbols representing the operations they perform. QBASIC offers different classes of operators: arithmetic, relational, logical and string operators.
- A statement is a meaningful expression or an instruction in a source language. The statements can be divided into four categories: declaration statement, assignment statement, input/output statement and control statement.
- Branching statement allows your program to transfer the control to some other specified statement instead of the sequential execution.
- Unconditional branching statement is a statement that transfers the control unconditionally (without testing any condition) from one statement to another statement in a program.
- Conditional branching statement is a statement that allows the selective execution of statements based on a particular condition.

Solved Exercises

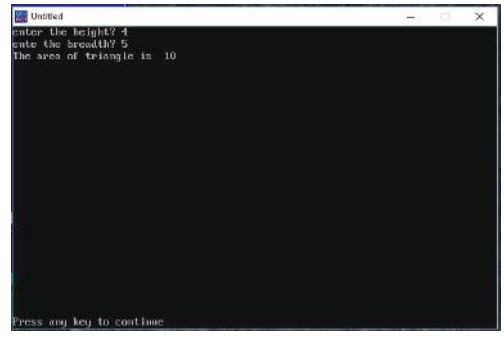
A. *Write a program that calculates the area of rectangle.*

Program code	Output Screen
CLS INPUT "enter the length of rectangle";L INPUT "enter the breadth of rectangle";B A = L * B PRINT "The area of a rectangle is";A END	

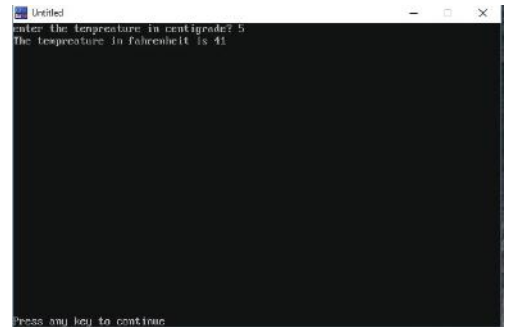
B. *Write a program to find the cost of painting the four walls of room.*

Program code	Output Screen
CLS INPUT "enter the length of room";l INPUT "enter the breadth of room";b INPUT "enter the height of room";h INPUT "enter the cost of painting";c a = (2 * (L + B)) * H t = C * a PRINT "The total cost of painting :";t END	

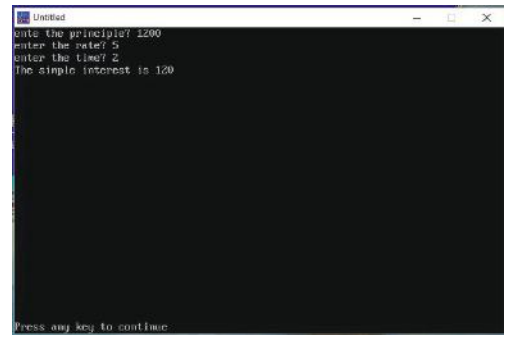
c. *Write a basic program to input the height and base and find out the area of triangle.*

Program code	Output Screen
CLS INPUT "enter the height";H INPUT "ente the breadth";B area = 1 / 2 * (H * B) PRINT "The area of triangle is";area END	

d. *Write a program that converts centigrade temperature into Fahrenheit temperature. Where F=(9/5)*c+32.*

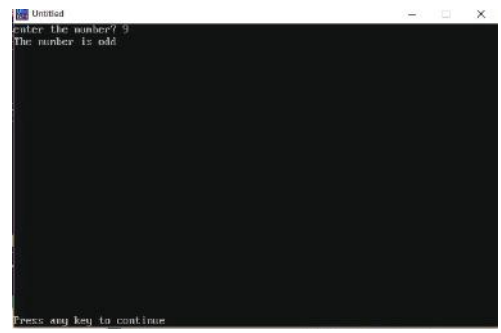
Program code	Output Screen
CLS INPUT "enter the tempreature in centigrade";c F = C * (9 / 5) + 32 PRINT "The tempreature in fahrenheit is";F END	

e. *Write a program to calculate the simple interest.*

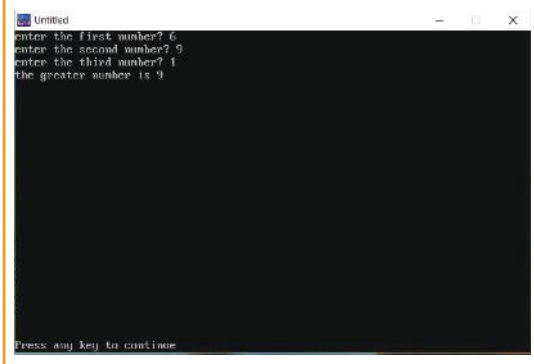
Program code	Output Screen
CLS INPUT "ente the principle";p INPUT "enter the rate";r INPUT "enter the time";t si = (P * T * R) / 100 PRINT "The simple interest is";si END	

f. *Write a program to check whether the entered number is even or odd.*

Program code	Output Screen

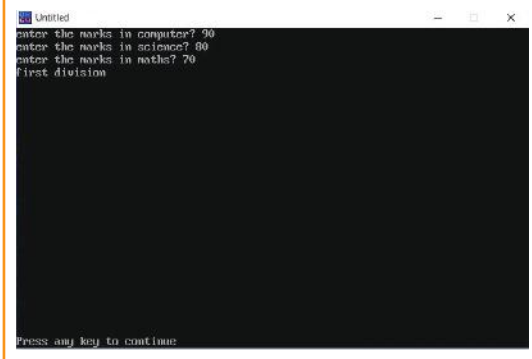
CLS
INPUT "enter the number"; n
IF n MOD 2= 0 THEN
PRINT "The number is even";
ELSE
PRINT "The number is odd";
END IF
END
	

g. *Write a program to display a greater number between any three entered number*

Program code	Output Screen
CLS INPUT "enter the first number";a INPUT "enter the second number";b INPUT "enter the third number";c IF a>b AND a>c THEN greater=a IFb>a AND b>c THEN greater=b IFc>a AND c>b THEN greater=c PRINT "The greater number is";greater END	

h. *The marks obtained by a student in computer, science and maths are input through the keyboard. Write a program to calculate a percentage and decide division as per following rule:*
per>= 60 ---------- First division
per>=50 and per<=59----------Second division
per>=40 and per<=49---------- Third division
per<40---------- Fail

Program code	Output Screen

CLS
INPUT "enter the marks in computer";m1
INPUT "enter the marks in science";m2
INPUT "enter the marks in maths";m3
 	
p = (M1 + M2 + M3) / 3
IF(p>=60) THEN
PRINT "first division";
ELSE IF (p>=50) AND (p<=59) THEN
PRINT "second division";
ELSE IF(p>=40) AND (p<=49) THEN
PRINT "third division";
ELSE
PRINT "fail";
END IF
END IF
END IF
END
	

i. WAP to display natural number from 1 to 100.

```
CLS
FOR i=1 To 100
PRINT i
NEXT i
END
```

j. WAP to find out the sum of all even number from 2 to 100.

```
CLS
LET Sum=0
FOR i= 2 To 100 STEP 2
Sum=sum+i
NEXT i
PRINT "sum of even number upto 100 is"; sum
End
```

k. WAP to display following series

100,95,90,85,…….upto 5

```
CLS
FOR I=100 TO 5 STEP-5
PRINT I
NEXT I
END
```

l. Write a program to generate the following pattern:

```
1
121
12321
1234321
123454321

CLS
a = 1
FOR i=1 to 5
   PRINT a*a
   a = a * 10 + 1
NEXT
END
```

m. WAP to display following pattern.

```
4444
444
44
4
```

```
CLS
A = 4444
WHILE A>=4
   PRINT A
   A = (A - 4) / 10
WEND
END
```

n. WAP to display following pattern.

```
55555
4444
333
22
1
```

```
CLS
FOR I=5 TO 1 STEP -1
   FOR J=1 TO I
      PRINT I;
   NEXT
   PRINT

NEXT
END
```

o. WAP to display following pattern.

```
12345
1234
123
12
1
```

```
CLS
FOR I=5 TO 1 STEP -1
   FOR J=1 TO I
      PRINT J;
   NEXT
   PRINT
NEXT
END
```

Chapter Review

1. State whether the following statements are true or false. Rewrite each false statement to make it a true statement.

a. BASIC was developed in Darthmouth College, USA, under the directions of Professors John G. Kemeny and Thomas E. Kurtz, in 1964.

b. Constant is an area in computer memory and within a program that can be referred to by a name and whose value can be altered during program execution.

c. Relational operators are used to connect two or more relational expressions to evaluate a single value as True or False.

d. A computer program is a set of ordered statements which are normally executed in the sequential order i.e. they appear in order from top to bottom.

e. Looping statement allows a set of instructions to be repeated a certain number of times.

2. Match the following.

Group A	*Group B*
GOTO statement	Used to assign the value of an expression to a variable
LET statement	Used to receive data items from the keyboard during program execution
INPUT statement	used to display data on the screen.
IF...THEN statement	Used for unconditional transfer of execution from one part of the program to the other
PRINT statement	Used for making decisions as well as comparisons

3. Write QBASIC expressions for the following algebraic expressions.

a. $4x + 5y$ b. $x^3 + y^3$ c. nr^2+KT d. $2b + 4c(k^3)$ e. $ut + gt^2$

4. Evaluate the following expressions for x = 5 and y = 6.

a. (x<2) AND (y>5)

b. (x<7) OR (y>7)

c. (x<7) AND (y>7) OR (x+4>y)

d. (y<8) AND (x=3) OR (y+2=4)

5. Answer the following questions.

a. What is a BASIC program? Who developed BASIC?

b. What are the important elements of QBASIC programming language?

c. What are the two types of variables used in QBASIC? Give three examples for each.

d. What are control statements?

e. What is a conditional statement? Name the most commonly used conditional statement.

f. What is the use and syntax of the IF...THEN statement?

g. What are looping statements? What are the looping statements provided by QBASIC?

h. What is the function of FOR...NEXT statement? Under what conditions will the FOR...NEXT statement loop be executed only once?

i. What is the function of WHILE...WEND statement? State the rules for constructing WHILE...WEND statement.

j. What is the function of DO...LOOP statement? What are the different variations of DO...LOOP statement?

6. There are number of errors in the following programs. Locate as many as you can.

a.
```
2=a;
b=3;
c=4;
(a+b)*c = x
PRINT  "The value of x="; x
STOP
```

b.
```
PRINT "Enter the first number"; f
INPUT "Enter the second number"; s
product = f x s
DISPLAY "Product =":product
END
```

c.
```
FOR B = 10 TO 1 STEP 1
LET A=5
C = A * B
NEXT B
PRINT B
END
```

d.
```
I = 1
WHILE I$<=5
PRINT I$;
I$=I$ - 1
REPEAT
END
```

7. Write the output of the following programs.

a.
```
x = 0
y = 5
LET x = y^2+10*y
PRINT "The value of x is "; x
END
```

b.
```
num = 5.2
value1 = 2 * num^2
value2 = 3 + value1 / 2 - 1
PRINT value2
END
```

c.
```
c = 1
FOR i = 1 TO 5
PRINT c
c = c * 10 + 1
NEXT
END
```

d.
```
x=1
WHILE x<10
PRINT x
x = x + 2
WEND
END
```

8. Write a program to input the side of a cube. Print the volume of a cube. (Hint: Volume of Cube = Length ^ 3)

9. Write a program to compute the area and perimeter of a circle for a given radius r.

10. Write a program to input principal, rate and time and find the simple interest.

11. While purchasing certain items, a discount of 10% is offered if the quantity purchased is more than 1000. If quantity and price per item are input through the keyboard, write a program to calculate the total expenses.

Write a program to input sales amount for a salesman. Print sales commission using the following ranges of values.

Sales Amount	Commission
Below 2000	No commission
>=2000 and <5000	10%
>=5000	15%

12. Write a program to print the first ten natural numbers. (Use FOR...NEXT)

13. Write a program to print the first ten even numbers. (Use WHILE...WEND)

14. Write a program to print out the multiplication table of 2. (Use DO...LOOP)

15. Write a program to generate the following series: (Use all the looping statements)

a. 1, 4, 9, 16, 25

b. 1,.3,.05,.007,.0009

c. 5, 25, 125, 625, 3125

Lab Exercises

Lab Exercise 1

a. The cost of an item is Rs 40. What will be the cost of 28 such items. Write a simple program.

b. Temperature is measured in degree celsius. Given the temperature in Fahrenheit, write a program to determine the values in degree celcius. [C = 5/9 (F -32)]

c. The metre charges for a taxi is Rs. 150 per km. Write a program to input the distance and calculate the taxi fare.

Lab Exercise 2

a. Write a program to input the side of a cube. Print the volume and the total surface area. (Hint: Volume of cube = length^3 and total surface area = 6 * length^2)

b. Write a program to compute the area and circumference of a circle.

c. The sum of the first n natural numbers is given by the formula: sum = n(n+1)/2. Write a program to input n and print the sum of the first n natural numbers.

Lab Exercise 3

a. Write a program to input the values of two angles and find out the third angle of a triangle. (Hint: The sum of all the three angles of a triangle is 180°.)

b. Write a program to ask the name of a person and address. Print it sequentially.

c. Write a program asking the user to input his/her first name and the last name. Concatenate the two strings and display the first name followed by the last name.

Lab Exercise 4

a. Write a program to input name and marks in three subjects. Calculate total and percentage. Print all the information with grade using the following conditions:

If percentage is greater than or equal to 70, grade is A.

If percentage is greater than or equal to 60 and less than 70, grade is B.

If percentage is greater than or equal to 50 but less than 60, grade is C.

Otherwise grade is D.

b. Write a program to input sales amount for a salesman. Print sales commission using the following ranges of values.

Sales Amount	Commission
Below 2000	No commission
>=2000 and <5000	10%
>=5000	15%

Lab Exercise 5

a. Write a program to print the first ten natural numbers in the descending order.

b Write a program to find out the sum of the first ten even numbers.

c. Write a program to print out the multiplication table of 2.

Lab Exercise 6

a. Write a program for the following series:

i. 1, 4, 9, 16, 25 (Use FOR...NEXT)

ii. 1, 8, 27, 64, 125 (Use WHILE...WEND)

iii. 5, 25, 125, 625, 3125 (Use DO...LOOP WHILE)

b. Write down the programs to generate the following patterns:

i.	ii.	iii.
1	12345	2
12	1234	22
123	123	222
1234	12	2222
12345	1	22222

Lab Exercise 7

a. Write a program to generate the following pattern.

3
33
333
3333
33333

b. Write a program that will print even numbers from 1 to 10 in reverse order.

c. Write a program to generate the sum of the first ten natural numbers.

Lab Exercise 8

a. Write a program for the following series:
5, 25, 125, 625, 3125

b. Write a program to generate the following series: 1,5,9,13,...50

c. Write a program to print the numbers from 1 to 10 followed by their squares.