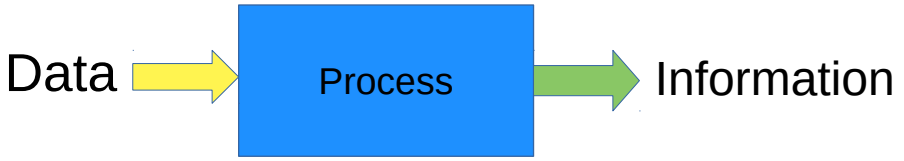
Chapter 1
Fundamentals of Computer

YOUR ALLOTMENT IS

Panangad VHSS (7193)
Commerce(39)



Data and Information

- **Data**: Raw facts and figures are called as Data. Eg: Single window Application
- Data are represented by numbers, characters and symbols.
- **Information**: Processed data is called as Information.
- Information is data arranged in an order and they are useful to the people for their needs. Eg: single window allotment result

Difference between data and Information

Data	Information
a). Raw Facts and Figures	Processed data
b). Like Raw Material	Like Finished Product
c). Can't be directly used	Add to knowledge and helps decision making
d). Don't give clear sense	Clear and Meaningful

What is Data Processing?

- Data Processing is the activity to convert data into information.
- There are six stages in Data Processing:

1)**Capturing Data**

2)**Input**

3)**Storage of Data**

4)**Manipulating Data(Process)**

5)**Outputting the result**

6)**Distribution of information**

1)**Capturing Data**: Usually collect data through pre-described format.

2)**Input**: Collected data is fed into the computer.

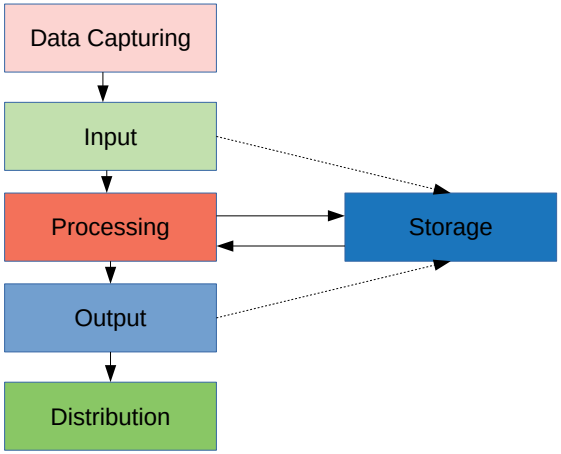
3)**Storage of Data**: For processing and future usage, data is stored in computer memory.

4)**Manipulating Data(Process)**: Various operations like calculation, classification, sorting, filtering, summarizing etc.. are carried out.

5)**Outputting the result**: The information obtained from the processing of the data is outputted to the user according to his need.

6)**Distribution of information**: The information obtained is distributed to the user to take decision or to solve problem.

Stages Of Data Processing



- **Q) What is Source Document?**
- ANS: The performa used for data collection
- **Q) What is the final stage of Data Processing?**
- ANS: Distribution of information

Functional Units of a Computer

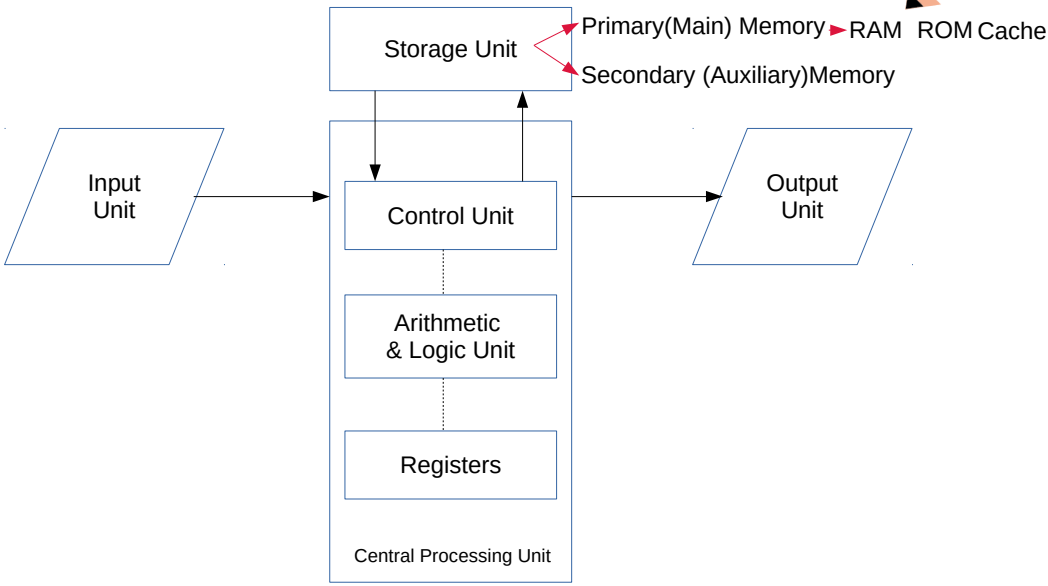
a) **Input Unit**

b) **Output unit**

c) **Central Processing Unit(CPU)** (Arithmetic and Logic Unit-ALU, Control Unit-CU, Register)

d) **Storage Unit**

Functional Units of a Computer



a) Input Unit

- The collected data and the instructions for their processing are entered into the computer through input unit.
- The data may be number, text, image, audio, video etc.
- Example: keyboard, mouse, scanner, micrphone, digital camera, web camera

b) Output Unit

- The information obtained after data processing is supplied to the outside world through the output unit in a human readable form.
- Example: Monitor, Printer, Projector, speaker etc

c) Central Processing Unit (CPU)

- CPU is the brain of the computer.
- CPU controls, operates and co-ordinates all operations inside the computer.
- CPU has three components

1. Control Unit (CU) : It co-ordinates and controls all activities of computers. It works like a nervous system in our body

2. Arithmetic and Logic Unit (ALU) : It perform all arithmetic and logical operations such as comparison and decision making

3. Registers: They are temporary storage elements that facilitate the functions of CPU.

d) Storage Unit

- They are used to store any type of data and information and also can retrieve when the user or other devices are needed.
- EG CD,DVD, Pen drive ,Memory Card,Hard Disk, RAM, ROM

Classification of Storage Unit (Memory)

- They are classified in to two:

1) Primary Memory (Main Memory): It is divided in to **RAM** (Random Access Memory), **ROM** (Read Only Memory) and **Cache**

- **RAM** holds instructions, data and intermediate results for processing.
- **ROM** contains instructions for the start up procedure of the computer. Speed is high but storage capacity is less.
- **Cache** memory is a small and fast memory between the processor and RAM (main memory). Frequently accessed data, instructions, intermediate results, etc. are stored in cache memory for quick access

2) Secondary Memory (Auxiliary Memory): Holds data, programs, information etc. Speed is less but capacity is more. It takes care of the limitation of Primary Memory. Eg: Hard Disk,CD,DVD,USB Drive,Memory Cards

Characteristics Of Computers

- **Advantages of Computers:**

1) Speed: A computer can perform millions of operations in a second. It can do in a minute, as much work as man can do in a year.

2) Accuracy: Accuracy means less errors in the output and also the precision with which calculation are performed.

3) Diligence (Hard Working): Since computer is a machine it can operate for long hours. They are best suited for routine jobs. They do not become lazy or express feeling for repetitiveness.

Characteristics Of Computers

4) Versatility: Computer can be used to perform many different kinds of processing tasks. It is a general purpose data processing machine.

5) Huge Memory (power of remembering): Computers have enormous memory capacity. Huge volume of data can be stored in its memory for processing.

Characteristics Of Computers

- **Disadvantages(Limitations) of Computers:**

  1) Lack of IQ: They don't have the power to make judgment of their own. If a computer is given with wrong instructions or invalid data, it cannot identify this.

  2) Lack of Decision Making Power: Computers cannot take decisions they own and they do not possess the intuitive capabilities like human beings.

What are the different methods to Represent characters?

- **ASCII**: American Standard Code for Information Interchange. It uses 7 bits to represent a character in computer memory. It can represent only128 characters. Another version is ASCII-8 uses 8 bits for each character, can represent 256 different characters.
- **EBCDIC**: Extended Binary Coded Decimal Interchange Code. This is similar to ASCII and is an 8 bit code. It can represent 256 characters.
- **ISCII**: Indian Standard Code for Information Interchange or Indian Script Code for Information Interchange. It uses 8-bits and can represent various writing systems of India.
- **Unicode**: Originally used 16 bits which can represent up to 65,536 characters. Nowadays Unicode uses more than 16 bits and hence it can represent more characters. Unicode can represent characters in almost all written languages of the world.

Representation of audio, image and video

- **Q) What are the different formats used to save images?**
- ANS: Joint Picture Experts Group (JPEG), BMP (Bitmap file format), TIFF (Tagged Image File Format), GIF (Graphics Interchange Format), PNG - (Portable (Public) Network Graphic).
- **Q) What are the different formats used to save audio files?**
- ANS: WAV(Waveform Audio File Format), MP3(MPEG Audio Layer-3), MIDI(musical instrument digital interface), AIFF(Audio Interchange File Format)
- **Q) What are the different formats used to save Video files?**
- ANS: MP4(Moving Picture Expert Group-4), MOV, WMV(Windows Media Viewer), AVI(Audio Video Interleave), MKV(Matroska Video)

Previous Questions

1)Meaningful and processed form of data is known as ..Information...

2)which of the following is known as the brain of the computer.
a). Central Processing unit b). Control Unit c). Arithmetic Logic Unit d). Monitor

3)Data processing refers to the activities performed on data to generate information. List the stages of data processing

Previous Questions

- 4. a)List down the functional units of a computer by using a diagram

  b)What are the advantages and limitations of a computer?
- 5) Compare Data and Information with example?

Chapter 2
Components of the Computer system

Compare Hardware and Software

- **Hardware** is the tangible and visible parts of a computer.
- Examples: Processor (CPU), Motherboard, Keyboard, Mouse.
- **Software** is a set of programs that help us to use computer system and other electronic devices efficiently and effectively.
- Examples: Android, Windows 10, Tally, MS Office, VLC player

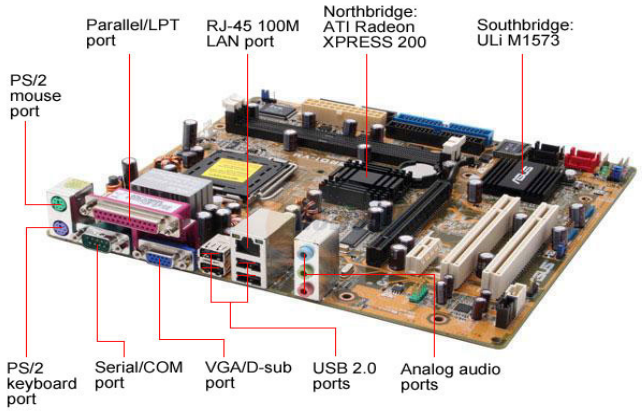
What is Hardware?

- Hardware is the tangible and visible parts of a computer. Examples:
- 1) Processor (CPU)
- 2) Motherboard
- 3) Peripherals and Ports
- 4) Memory
- 5) Input Devices
- 6) Output Devices

What are CPU Register?

- CPU Registers are used to retrieve and store data at an extreme speed when manipulations are done by the CPU on a temporary basis. Some Important CPU Registers are:
- a) **Accumulator**: Part of ALU. Used to store data to perform arithmetic and logical operation. The result of an operation is stored in the accumulator.
- b) **Memory Address Register (MAR):** Stores the address of a memory location to which data is either to be read or written by the processor.
- c) **Memory Buffer Register (MBR):** Holds the data, either to be written to or read from the memory by the processor
- d) **Instruction Register (IR):** The instructions to be executed by the processor are stored in the Instruction Register.
- e) **Program Counter (PC):** Holds the address of the next instruction to be executed by the processor.

What is a Motherboard?

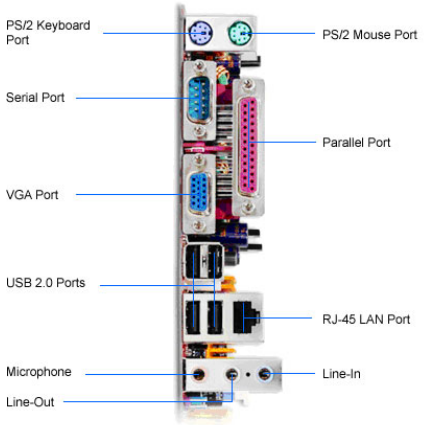


- Motherboard is a large Printed Circuit Board (PCB) to which all major components including the processor are integrated.
- It provides expansion slots for adding additional circuit boards like memory, graphics card, sound card etc.

What is a Peripheral?

- **Peripherals:** Peripherals are devices that are attached to a computer system to enhance its capabilities.
- Example: Input devices, Output Devices, External storage, Communication Devices etc

What is a Port?



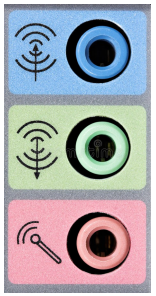
- **Ports:** Ports are present in motherboard. It is used to connect external devices. Eg: Serial port, Parallel port, USB port, LAN port etc

What are the examples of ports?

- a) **Serial Port:** A serial port transmits data one bit at a time. It is very slow. Used to connect modem, mouse, keyboard etc. Not used anymore.
- b) **Parallel Port:** Parallel ports can transmit several bits of data simultaneously. It is faster than serial port. Used to connect printer or scanner.
- c) **USB Port:** USB (Universal Serial Bus) is a connection that provides high speed data communication between devices. Used to connect keyboard, mouse, printer, scanner, flash drive, external hard disk etc. Capable of supplying electric power to external devices.

- d) **LAN Port:** Local Area Network port (Ethernet port) is a port connection that allows a computer to connect to a network using a wired connection. RJ45 is a standard type of connector used for connecting cables through LAN ports.
- e) **PS/2 Port:** Personal System/2 (PS/2) ports are special ports invented by IBM (International Business Machines) for connecting the keyboard and mouse. Slow. Now replaced by USB port.

- f) **Audio Ports**: Audio ports are used to connect audio devices like speakers, microphone etc. Audio Ports has three connectors.



Line in: Sound input

Line out: Sound output

Mic in: Microphone input

- g) **Video Graphics Array (VGA) Port:** It is used to connect a monitor or projector to a computer. It has 15 pins. It can channel only video. It is getting replaced by HDMI port.
- h) **High Definition Multimedia Interface (HDMI):** It is a type of digital connection capable of transmitting high-definition video and multi channel audio over a single cable.

What is Memory? What are the types of memory?

- Memory is a place where we can store data, instructions and results temporarily or permanently.
- Memory can be classified into two:
- 1) **Primary memory (RAM, ROM, cache):** Primary memory holds data, intermediate results and results of ongoing jobs temporarily.
- 2) **Secondary memory (Hard disk, CD, flash drive etc.):** Secondary memory is Non-volatile memory:the contents are retained even after the power is switched off.

Comparison between RAM and ROM

	RAM	ROM
1	It is faster than ROM	It is a slower memory
2	It stores the Operating System, application programs and data when the computer is functioning.	It stores the program required to boot the computer initially
3	It allows reading and writing	Usually allows reading only
4	It is volatile: its contents are lost when the device is powered off	It is non-volatile: its contents are retained even when the device is powered off.

What are the types of ROM?

- 1). **PROM** - Programmable ROM. It can be programmed only once.
- 2). **EPROM** - Erasable Programmable ROM. It can be erased using ultra violet radiation and can be programmed using special electronic circuits.
- 3). **EEPROM** - Electrically Erasable Programmable ROM. It can be erased and rewritten electrically. Eg. Pen Drive

What is Secondary Memory or Auxiliary Memory?

- Secondary memory is **Non-volatile** memory:the contents are retained even after the power is switched off.
- Secondary memory is much larger in size than RAM, but is slower. It stores programs and data but the processor cannot access them directly.
- Eg: Hard disk, CD, flash drive etc
- The different categories of storage devices are:

  a) **Magnetic Storage devices** (Floppy Disk, Magnetic Tape, Hard Disk)

  b) **Optical Storage devices** (CD, DVD, Blu-ray)

  c) **Semiconductor Storage** (USB flash drive, flash memory cards)

Magnetic storage devices

- Magnetic storage devices use plastic tape or metal/plastic disks coated with magnetic materials. Data is recorded magnetically in these devices.
- a). **Floppy Disk**: It is made up of plastic coated with magnetic material. Its capacity is 1.44 MB.
- b). **Magnetic Tape**: It can store huge volume of data and cheap. Data is stored in thin tape coated with magnetic material. It is a sequential access medium.
- c). **Hard Disk**: It contains a group of metallic disks, coated with magnetic material in a dust proof case. Each plate has read write head. It has huge capacity from 10 GB to 4 or more TB.

Optical Storage devices

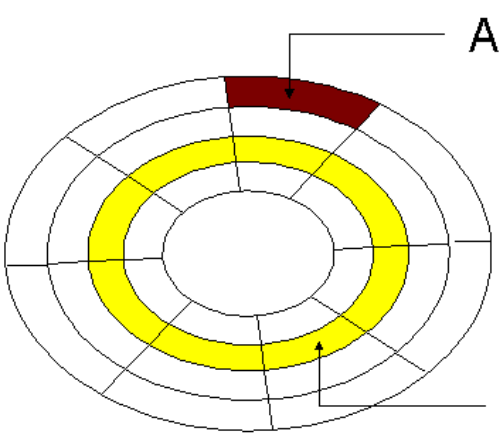
- Optical disk is a data storage medium which uses low-powered laser beam to read from and write data into it. It consists of an aluminium foil sandwiched between two circular plastic disks.
- Data is written on a single continuous spiral in the form of pits and lands.
- They are classified into three,
- a). **Compact Disk (CD)**: It is made up of a layer of aluminium in between two plastic plates. Its capacity is 700 MB. It may be CDROM or CD R/W. To read and write high beam of laser light is used.
- b). **Digital Versatile Disc (DVD)**: It is faster and has more storage capacity than CD. Its capacity is from 4.7 GB to 15.9GB
- c) **Blue Ray DVD**: Used to store High Definition videos and huge amount of data storage. It uses blue-violet LASER beams

Semiconductor Storage (Flash Memory)

- Flash drives use EEPROM chips for data storage. They do not contain any moving parts. Flash memory is faster and durable when compared to other types of secondary memory.
- 1). **USB flash drive** A flash drive is a small external storage device, which consists of flash memory typically the size of a human thumb. USB flash drives are portable and rewritable

- 2). **Flash memory cards** Flash memory card is another type of flash memory. They are flat and small in size. Storage capacity ranges from 1 GB to 32 GB.

Data is stored on the surface of a platter in sectors and tracks



Formatting is the activity of creating Sectors and Tracks

Q) What is Sequential and Random Access Memory ?

- **Sequential Access:** Here the data accessed in a sequential manner i.e. one after another Eg: Magnetic Tape.
- **Random Access**: Here the data accessed from any location randomly. It is classified in to two: Eg. Magnetic Disk, Optical Disk

What are different types of input devices used in a computer system?

- An input device is used to feed data into a computer or provide communication between user and the system.
- a). **Keyboard**: It is used to input alphabets, numbers and other characters. Keyboard detects the key pressed and generates the corresponding ASCII code.
- b). **Mouse**: It is a pointing device used to point and select objects from the screen and also draw pictures. There are various types of mouses like Ball mouse, Optical mouse, Laser Mouse
- c.)**Optical Character Recognition (OCR) Reader**:An OCR is a device that can read characters printed with a predefined font. .
- d). **Optical Mark Reader (OMR)**: They scans and detect marks made by a dark pencil or pen on special pre printed form. They are used in, 1. Objective type exam , 2. Surveys.
  Advantages: Reliable, Speed, Accurate

- e). **Magnetic Ink Character Recognition (MICR) Reader**:It can recognize human readable characters printed on documents with magnetic ink and special font. They mostly used in bank cheques to print cheque number.
- f). **Bar Code Reader/Quick response Reader**: It converts a pattern of printed bars (a sequence of black and white lines of different widths) in to a number. A bar code reader emits light to the code and it reflects back to the device. They used to identify products, books, certificates etc.
  A **QR code** is similar to barcodes. Barcodes are single dimensional whereas QR codes are two dimensional as a Square of pattern.
- g). **Scanner**: They are used to scan and digitalize images, documents etc. Here a light source moves to and fro to read the document.
- h). **Digital Camera**: A digital camera allows to take pictures and videos and convert them into digital format. The quality of the picture is determined by the number of pixels in each picture.
- i). **Web Camera**: Web camera is a compact and less expensive version of a digital camera. It is used in computers for video calling, video chatting, etc.

- n). **Touch Screen**: It enable the user to input data by touching the screen. Used in Mobile phones,tabs, ATM etc
- o). **Touch Pad**: It is an input device that allows the user to operate by simply touching on the flat surface.It has two buttons for click purpose. It is commonly used in Laptops.
- p). **Graphic Tablet**: A graphics tablet consists of an electronic writing area and a special pressure sensitive "pen" that works with it. It allows artists to create graphical images.
- q). **Biometric Sensor**: A biometric sensor is a device that identifies unique human physical features like fingerprints, retina, iris patterns, etc. with high accuracy.
- r). **Smart Card Reader**: Smart card readers are used to access data in a smart card. It can be contact type or contactless.

- j). **Microphone**: It can be attached to a computer to input sound. It accept sound which is analogue in nature and converts it to digital format.
- k). **Joystick**: It is a pointing device used to select and move objects on the screen. They are mainly used to play games , controlling training stimulations and robots
- l).**Track Ball**: It is also a pointing device like mouse. It has a ball, can rotate to control the cursor movements. They were especially used in laptops.
- m). **Light Pen**: Light pen is a pointing device used to draw pictures directly on the screen. Here the photocell inside the light pen responses the picture element on the screen. It is used by artist, designers for Computer Aided Designing (CAD) etc.
-

What are Output Devices?

- Output devices are devices that print or display output from a computer
- Output generated may be hardcopy or softcopy.
- There are five types of Output Devices

1)Visual Display Unit (VDU)

2)Printer

3)Plotter

4)Three Dimensional Printer

5)Audio output device

What is Visual Display Unit (VDU) ?

- A VDU is an output device that visually conveys text, graphics, and video information.
- Information here is softcopy.
- Examples:

1)Cathode Ray Tube (CRT) Monitor

2)Flat panel monitor

3)LCD projector

i) Cathode Ray Tube (CRT) Monitor

- Similar to television sets of the past
- Types:
  a) **Monochrome**
  b) **Color**
- A color monitor uses three different basic colours such as **red**, **blue**, **green**
- Color monitors are preferred by graphic artist and gamers
- **Disadvantages of CRT Monitors**: They are heavy, Bulky in size, High power consuming, Not portable and Make eyestrain.

ii) Flat panel monitor

- Flat panel displays are thinner, lighter in weight , consume less power and emit less heat compared to CRT monitors.
- Different types are:
- **a) LCD (Liquid Crystal Display)**: It consists of liquid crystals sandwiched between two plastic plates. These crystals rearrange to form an image when an electric current is passed through them.
- A light source(LED or Fluorescent lamb) at the back of the plate makes the picture visible.
- **Advantages of LCD Monitors:** They are weightless, Slim in size, Low power consuming, Portable and doesn't make eye strain.

- **b) LED(Light Emitting Diode) Screen**: It is also like LCD, but light source is an array of LEDs. It will create more clear pictures than LCD and power consumption is less. It is expensive.

  Advantages: better colour quality, clarity, wider viewing angle, faster refresh rates and power savings.
- **c) Plasma Monitors :** It consists of sandwiching neon or xenon gas between two sealed glass plates with parallel electrodes deposited on their surfaces.
- When a voltage pulse is passed between the two electrodes , the gas lights up as different colours creating images on the monitor.
- Plasma monitors provide high resolution but are expensive.

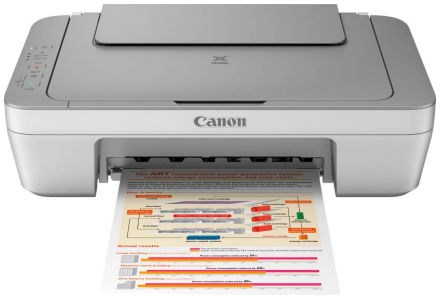
- **d) Organic Light Emitting Diode (OLED) Monitors:** The panel of OLED is made up of millions of tiny LEDs. O stands for organic. There is carbon in the light emitting layer of the panel. OLED screens are thinner and lighter than LCDs and LEDs.
- They can produce better quality images and have a better viewing angle. OLEDs consume less power, but are very expensive.

iii) LCD Projector

- It is used for displaying video, images, or computer data on a large screen or other flat surface.
- A beam of high intensity light travels through thousands of shifting pixels in an LCD display.
- The beam of light then passes through a lens which projects and focuses the image on the surface

What is a Printer ?

- It is used to produce hardcopy output.
- They are classified as
  a) **Impact Printer**: use the type writing or printing mechanism where a hammer strikes the paper through a ribbon. Eg: dot matrix printer.
- b) **Non Impact Printer:** Do not touch the paper while printing. Eg: Inkjet , Laser, Thermal printer etc.



- **i) Inkjet Printer**: It form the image on the page by spraying tiny droplets of ink from the print head.
- The printer needs cyan, yellow, magenta, black colours to make colour images.
- **Advantage**: Cost of printer is less
- **Disadvantage**: Cost of printer ink cartridge is more.
- **Usage**: Personal use

- ii) **Laser Printer:** The image to be printed is transferred to a drum using a laser beam. The toner powder from the toner cartridge is then sprayed on the drum.
- **Advantage**: good quality, fast
- **Disadvantage**: Costly
- **Usage**: Used to print documents in bulk.

- **iii) Thermal Printer**: It produces a printed image by selectively heating heat sensitive thermal paper when it passes over the thermal print head.
- **Advantage**: Print quiet and faster than dot matrix printers. Lighter and consume less power
- **Disadvantage**: Requires special thermal quality paper. Poor quality printing.
- **Usage:** Point of Sale terminals, Used as portable printers.

- iv) **Dot matrix Printer**: It use small electromagnetically activated pins in the print head and an inked ribbon, to produce images by **impact**.
- **Disadvantage**: Slow and noisy
- **Advantage**: Low printing cost
- **Usage**: Used in cash counters in shop

What is a Plotter?

- It is an output device used to produce hard copies of graphs and designs on the paper.
- It is used to print large format graphs or maps such as construction maps, engineering drawings and big posters.
- It is used in design of cars, ships, aircrafts , buildings, highways etc.
- There are two types:
  i) **Drum Plotter**
  ii) **Flatbed Plotter**

i) Drum Plotter

- It is also known as roller plotter.
- It consists of a drum or roller on which a paper is placed and the drum rotates back and forth to produce the graph on the paper.
- It also consists of a drawing arm that holds a set of coloured ink pen or pencils. The drawing arm moves side to side as the paper is rolled back and forth through the roller.
- **Usage**: drawing maps and graphs

ii) Flatbed Plotter

- It is also known as table plotter
- It plots on paper that is spread and fixed over a rectangular flatbed table.
- It uses two drawing arms, each of which holds a set of coloured ink pens or pencils. The drawing arms move over the stationary paper and draw the graph on the paper.
- **Disadvantage**: Very slow in drawing or printing graphs
- **Usage**: Used for printing drawings and graphs

What is a Three Dimensional (3D) Printer ?

- It is a new generation output device used to print 3D objects.
- It can produce different kinds of objects in different materials.
- It can print ceramic cups, plastic toys, metal machine parts, etc..

What is Audio Output Device ?

- It produces sound. Eg: Speaker
- Speaker is connected to computer through audio ports
- The speaker produces sound by the movement of the diaphragm in the speaker, forward and backward according to the electrical signals coming out of the audio port.

What is E-waste ?

- e-Waste refers to electronic products nearing the end of their "useful life" .
- Electronic waste may be defined as discarded computers, office electronic equipment, entertainment devices, mobile phones, television sets and refrigerators.

Why should we be concerned about e-waste

- e-Waste contains some toxic substances such as mercury, lead, cadmium, brominated flame retardants, etc. CRTs have a relatively high concentration of lead and phosphors.
- The toxic materials can cause cancer, reproductive disorders and many other health problems.
- e-Waste should never be disposed with garbage and other household wastes.

What are E-waste disposal methods?

- a). **Reuse**: It refers to second-hand use or usage after the equipment has been upgraded or modified.
- b). **Incineration**: It is a controlled and complete combustion process in which the waste is burned in specially designed incinerators at a high temperature (900 to 1000 degree Celsius)
- c). **Recycling of e-Waste**: Recycling is the process of making or manufacturing new products from a product that has originally served its purpose.
- d). **Land filling**: It is one of the most widely used, but not recommended methods for disposal of e-Waste. In this method soil is excavated from the trenches made and waste material is buried in it, which is covered by a thick layer of soil

What is Students role in e-waste disposal ?

- Stop buying unnecessary electronic equipments
- Try to repair and use faulty electronic devices
- Try to recycle electronic equipments
- Buy items with less hazardous substances, greater recycled content, higher energy efficiency, longer life span
- Find out if manufacturer has a take back programme or scheme for your discarded electronics
- Buy devices that has rechargeable batteries instead of disposable batteries.
- Buy products with good warranty and take back policies

What is Green Computing or Green IT?

- Green computing is the study and practice of environmentally sustainable computing or IT.
- Green computing is the designing, manufacturing, using and disposing of computers and associated components such as monitors, printers, storage devices, etc.., efficiently and effectively with minimal or no impact on the environment.

How to make computers green?

- a). **Green design**: Designing energy-efficient and eco-friendly computers, servers, printers, projectors and other digital devices.
- b). **Green manufacturing**: Minimising waste during the manufacturing of computers and other components.
- c). **Green use**: Minimising the electricity consumption of computers and peripheral devices and using them in an eco-friendly manner.
- d). **Green disposal**: Reconstructing or recycling unwanted electronic equipment.

What is Software?

- Software is a set of programs that help us to use computer system and other electronic devices efficiently and effectively.
- Eg: Android, VLC player, MS Office
- There are two types of Software:
  1) **System Software**
  2) **Application software**

What is System Software?

- It is a collection of programs that directly control the computer's internal operations and also that help ordinary users to make use of computer effectively and efficiently.
- It helps to manage resources of the computer
- The following are the components of System Software:
  a) **Operating system**
  b) **Language Processors**
  c) **Utility Software**

What is an Operating System?

- Operating System is a set of programs that act as an **interface** between the user and computer hardware
- **Controls and co ordinates** the operations of a computer.
- It acts as a **resource manager**
- It is the first program to be loaded from the hard disk in the computer
- Example: Android, ios, MS Windows XP, Vista, Windows 7, Windows 10, Ubuntu, Linux, DOS, MacOS.

- Major functions of an Operating System:
- 1) **Process Management: Process** is program in execution. Process management takes care of the allocation and de allocation of processes and scheduling of various system resources.
- 2) **Memory Management :** It handles or manages primary memory. It keeps track of memory location. It calculates how much memory is to be allocated to each process
- 3) **File Management :** It takes care of file related activities such as organising, naming, storing, retrieving, sharing, protection and recovery.
- 4) **Device Management**: It performs the management of devices attached to the computer. OS communicates with hardware device via the device driver software.

What is Computer Language?

- The language which is used to communicate with computer is called as **Computer Language.**
- Computer Language is classified in to

1) **Low level language** : Machine oriented language. Programs are written using the memory and registers available on the computer. Eg: Machine language and assembly language.
Machine Language: Language understood by computer: 0 and 1 (binary digits). Difficult.

Assembly Language: Intermediate program language. Use Mnemonics. Mnemonic is a symbolic name given to an operation (ADD, SUB). Machine dependent language

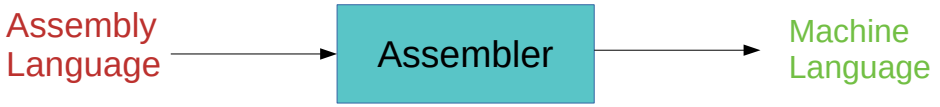
2) **High level language** : Uses english language to write programs .eg , if a>b print “a is big” . Eg: Java, C, C++

What is Language Processor?

- Language Processors: System programs that translate program written is high level language or assembly language to machine language is called as Language Processors.
- They are classified in to :
- 1) **Assembler**
- 2) **Interpreter**
- 3) **Compiler**

What is Assembler?

- Assembler Converts assembly language to machine language.



What is Interpreter?

- Interpreter Converts High level language to machine language **line by line**.
- If there is an error in one line, it reports and the execution of program is terminated. Eg: BASIC, Python

What is a Compiler?

- Compiler Converts high level language to machine language all at once. This process is called **compilation**.
- It scans the entire program in a single run. If there is an error , compiler provides a list or errors.
- If there are no syntax errors, the compiler will generate object file. Eg: C, C++, Java, Pascal

What is Utility Software?

- Utility software is a set of programs which help users in system maintenance tasks and in performing tasks of routine nature. Eg:
- 1) **Compression tools** : Large files can be compressed so that they take less storage area. Compression of files is known as **zipping** and decompression is called **unzipping**. Eg: WinZip, WinRAR
- 2) **Disk defragmenter**: It is a program that rearranges files on a computer hard disk. The files are arranged in such a way that they are no longer fragmented. This enables the computer to work faster and more efficiently.

- 3) **Backup software**: Backup means duplicating the disk information so that in an event of disk failure or in an event of accidental deletion, this backup may be used.
- 4) **Antivirus software**: A computer virus is a program that causes abnormality in the functioning of a computer. Antivirus software is a utility program that scans the computer system for viruses and removes them. Eg: Norton Antivirus, Kaspersky, etc. are examples of antivirus programs.

What is Application Software?

- Software developed for specific application is called application software. Eg: GIMP, Payroll System, Airline Reservation System, Tally.
- It is classified in to

  a) **general purpose software**
  b) **specific purpose software**.

a) **general purpose software**

- General purpose software are used to perform operations in a particular application area. General purpose software is classified as:
- i) **Word processing software**: It is designed for creating and modifying documents. It helps to create, edit, format and print textual matters. Eg: MS Word, Open Office Writer
- ii) **Spreadsheet software**: It allows users to perform calculations using spreadsheets. They simulate paper worksheets by displaying multiple cells that make up a grid. Eg: Microsoft Excel, Open Office Calc, Lotus 1-2-3 and Apple Numbers

- iii) **Presentation software**: It is used to display information in the form of a slide show is known as presentation software. . Eg: Microsoft PowerPoint and Open Office Impress are examples for presentation software.
- iv) **Database software:** Database is an organised collection of data arranged in tabular form. Database Management System (DBMS) consists of a collection of interrelated data and a set of programs to access those data. Eg: Microsoft Access, Oracle, PostgreSQL, My SQL, etc.

- v) **Multimedia software**: Multimedia is the integration of multiple forms of media. This includes text, graphics, audio, video, etc. Eg: VLC Player, Adobe Flash, Real Player, Media Player, etc.

b) **specific purpose software**.

- Specific purpose software is a highly specialised software designed to handle particular tasks. These are tailor-made software to satisfy the needs of an organisation or institution. It is also known as customised software.
- Eg: SPARK (Service and Payroll Administrative Repository for Kerala)

Application Software	Purpose
• Payroll System	• Payroll system maintains the details of employees of an organisation and keeps track of their salary details.
• Inventory Management System	• It is used for tracking inventory levels, orders, sales and deliveries in a business firm.
• Human Resource Management System	• It is used for managing human resource in an organisation.

Table 2.5 : Examples of Application Software

Free and Open Source Software

- Free and open source software gives the user the freedom to use, copy, distribute, examine, change and improve the software.
- **Advantages of Free and Open Source Software**: adaptable functionality, less overall costs, vendor independency, adherence to open standards, interoperability and security.

Four freedoms for free and open source software:

- The Free Software Foundation (FSF) defines the four freedoms for free and open source software:
- **Freedom 0** : The freedom to run program for any purpose.
- **Freedom 1** : The freedom to study how the program works and adapt it to your needs. Access to source code should be provided.
- **Freedom 2**: The freedom to distribute copies of the software.
- **Freedom 3** : The freedom to improve the program and release your improvements to the public, so that the whole community benefits.

Examples of free and open source software

- **GNU/Linux** : GNU/Linux is a computer operating system assembled under the model of free and open source software development and distribution. It was organised in the GNU project introduced in 1983 by Richard Stallman in the FSF.
- **GIMP:** It stands for GNU Image Manipulation Program. It is an image editing software. It can be used for retouching photographs, creating and editing images. It supports graphic files of different formats and allows converting from one format to another.
- **Mozilla Firefox**: It is one of the most popular web browsers created by the Mozilla Corporation. It provides added security features for safe browsing.
- **OpenOffice.org** : It is a complete office suite that contains word processor (Writer) to prepare and format documents, spreadsheets (Calc) and presentations (Impress). It works on both Linux and Windows platforms.

Freeware and Shareware

- **Freeware**: Freeware refers to copyrighted computer software which is made available for use free of charge for an unlimited period. Eg:Skype
- **Shareware**: Shareware refers to commercial software that is distributed on a trial basis. It is distributed without payment and with limited functionality. Shareware is commonly offered in a downloadable format on the Internet. Eg: Adobe Photoshop

Freeware	Shareware
Freeware refers to software that anyone can download from the Internet and use for free.	Sharewares give users a chance to try the software before buying it.
All the features are free.	All features are not available. To use all the features of the software, user has to purchase it.
Freeware programs can be distributed free of cost.	Shareware may or may not be distributed freely. In many cases, author's permission is needed to distribute the shareware.

Table 2.6 : Comparison of Freeware and Shareware

- **Proprietary software** : Proprietary software is a computer program that is an exclusive property of its developer or publisher and cannot be copied or distributed without licensing agreements. It is sold without any access to source code and is therefore not possible to change or improve by the user. Eg: Microsoft Windows Operating System, MS Office, Mac OS, etc.
- **Humanware or Liveware** Humanware or liveware refers to humans who use computer. I It refers to programmers, systems analysts, operating staff and other personnel working in a computer system

Who are the users of Computer?

Humanware	Job Description
System Administrators	Upkeep, configuration and reliable operation of computer systems; especially multi-user computers such as servers.
Systems Managers	Ensure optimal level of customer services and maintain expertise in all business unit systems and develop professional relationships with all vendors and contractors.
System Analysts	Design new IT solutions to improve business efficiency and productivity.
Database Administrators	Create, monitor, analyse and implement database solutions.
Computer Engineers	Design either the hardware or software of a computer system.
Computer Programmers	Write the code that computers read in order to operate properly.
Computer Operators	Oversee the running of computer systems, ensuring that the machines are running, physically secured and free of any bugs.

Table 2.7 : Examples of Humanware

Previous Questions

- Q1) What are the types of memories used in computer?
- Q2) a) Differentiate between a compiler and an interpreter.
  b) C++ uses ..... language processor for translation
- Q3) Almost all desktop computers have keyboard and mouse as their standard Input devices. List and explain any other five input devices used to enter data into a computer.
- Q4) List and explain different e-waste disposal method.
- Q5) Consider that NSS volunteers of your school have taken up a campaign to Educate your friends in other schools to reduce e-Waste. Write four captions(methods) for the campaign through which students can reduce the volume of e-waste produced.
- Q6) Write an example of an operating system that is a free and open source software.

- 7) Explain any five commonly used secondary or (auxilliary) memory devices.
- 8) “Central Processing Unit(CPU) is the brain of the computer”.What is the Role Of Control Unit(CU) in the CPU?
- 9) Mr.Rajmohan wants to buy a computer.He is an engineer by profession. He wants a device to ‘Draw which can be used to ‘draw directly on the screen’.
  a)Suggest him an input device.
  b)Suggest him any four practices of green computing.
- 10) What you mean by utility software? List any four utility softwares with their use ?

- 11) Program written in HLL is known as
- **ANS**: Source Code
- 12) Explain why computers are considered as the best electronic data processing machines.
- 13) What are the major functions of an Operating System?
- 14) Compare freeware and shareware
- 15) What are CPU Registers? Explain any two types of registers.
- 16) Define the following terms
  a) Assembler
  b) Interpreter
  c) Compiler
- 17) What is the importance of secondary storage devices in computer system?

- 18. a) What is the full form of FSF?
  b) Briefly elaborate four freedoms of open source softwares
  c) Give four examples of open source softwares
- 19. Who are the users of Computer?
- 20. What is Humanware?
- 21 Arrange the following memory or storage devices on the base of their operation speed in ascending order
  a. Hard Disk b. Cache c. RAM d. Registers

HOME

Chapter 3
Principles of Programming & Problem Solving

What are the different Stages/Phases in Programming

HOME

- There are 7 stages/phases in programming. They are

1) **Problem identification**: To identify the data involved in processing, its types, formula to be used, activities involve and the output to be obtained.
2) **Preparing algorithms and flowcharts**: to develop a step by step procedure for problem solving.
3) **Coding** : writing of actual program in computer language.
4) **Translation**: Conversion of high level language program to machine language.
5) **Debugging**: Finding and correcting of errors in the program
6) **Execution and testing**: Running of the program and testing for correctness.
7) **Documentation**: It will help to understand the program for proper usage and modification. Two types of documentations. 1) **Internal documentation** : Adding comments in program code etc.. 2) **External Documentation**: Writing manuals about the program for user help.

HOME

INPUT: *Write a program to find area and perimeter of a rectangle*

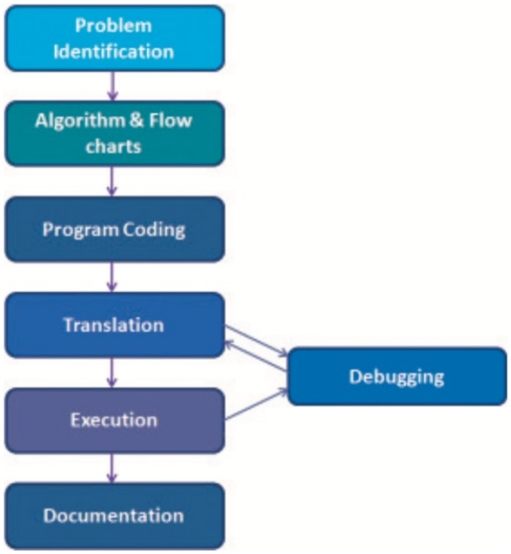


Fig. 3.3 : Phases of Programming

OUTPUT: *C++ Program*

What is algorithm and flowchart?

HOME

- **Algorithm:** It is a finite sequence of instructions to solve a problem. It is a step-by-step procedure to solve a problem, where each step represents a specific task to be carried out.
- **Flowchart**: The pictorial representation of an algorithm with specific symbols for instructions and arrows showing the sequence of operations is known as flowchart.

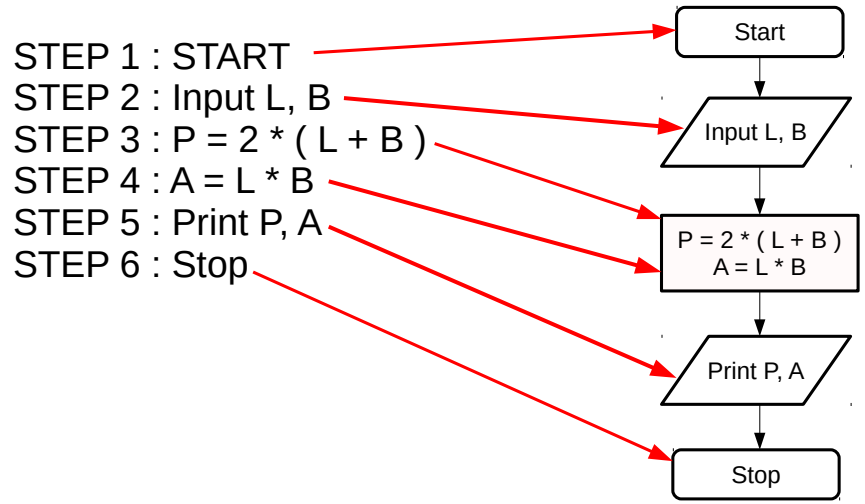
- **Eg : Algorithm and Flowchart to find the area and perimeter of a rectangle**

HOME

Algorithm

STEP 1 : START
STEP 2 : Input L, B
STEP 3 : P = 2 * (L + B)
STEP 4 : A = L * B
STEP 5 : Print P, A
STEP 6 : Stop

Flowchart



Flowchart Symbols

HOME

1)Terminal
2)Input / Output
3)Process
4)Decision
5)Flow lines
6)Connector

1) Terminal

HOME

- It is used to indicate the beginning (START) and ending (STOP) in the program logic flow.
- It is the first symbol and the last symbol in the flowchart.
- It has the shape of an **ellipse**.

2) Input / Output

HOME

- The **parallelogram** is used as the input/output symbol.
- It denotes the function of an input/output device in the program.
- All the input/output instructions are expressed using this symbol.

3) Process

HOME

- A **rectangle** is used to represent the processing step.
- Arithmetic operations such as addition, subtraction, multiplication, division as well as assigning a value to a variable are expressed using this symbol.

4) Decision

HOME

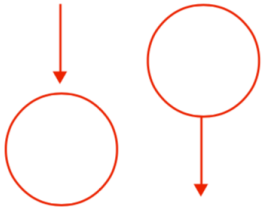
- The **rhombus** is used as decision symbol and is used to indicate a point at which a decision has to be made.
- A branch to one of two or more alternative points is possible here.

5) Flow lines

HOME

- Flow lines with **arrow heads** are used to indicate the flow of operation, that is, the exact sequence in which the instructions are to be executed.

6) Connectors



HOME

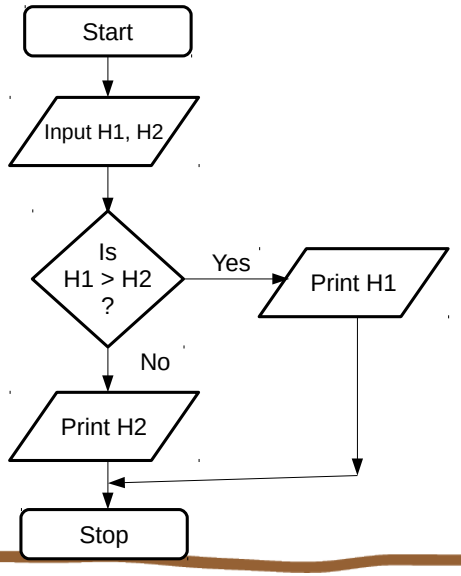
- Whenever a flowchart becomes complex and the number and direction of flow lines is confusing or it spreads over more than one page, a pair of connector symbols can be used to join the flow lines that are broken.
- This symbol represents an "entry from", or an "exit to" another part of the flowchart.

HOME

- **Eg 2: Algorithm and Flowchart to find the height of the taller one among two students**

Now lets analyse the program flow

ALGORITHM
Step 1: Start
Step 2: Input H1, H2
Step 3: If H1>H2 Then
Step 4: Print H1
Step 5: Else
Step 6: Print H2
Step 7: End of if
Step 8: Stop



What are Advantages of Flowchart

HOME

1. **Better communication**: It is easier for a programmer to explain the logic of the program to some other programmers.
2. **Effective analysis**: The whole program can be analysed effectively through the flowchart as it clearly specifies the flow of the steps constituting the program.
3. **Effective synthesis**: If a problem is divided into different modules and the solution for each module is represented in flowcharts separately.
4. **Efficient coding**: Once a flowchart is ready, programmers find it very easy to write the concerned program because the flowchart acts as a road map for them.

What are the Limitations(disadvatages) of Flowchart

HOME

1) Flowcharts are very time consuming and laborious to draw
2) Any change or modification in the logic of the algorithm requires a completely new flowchart.
3) There are no standards determining the amount of detail that should be included in a flowchart.

END

Characteristics of Algorithm

- i) It should begin with instruction(s) to accept inputs.
- (ii) Use variables to refer the data
- (iii) Each and every instruction should be precise and unambiguous.
- (iv) Each instruction must be sufficiently basic
- (v) The total time to carry out all the steps in the algorithm must be finite.
- (vi) After performing the instructions given in the algorithm, the desired results (outputs) must be obtained.

- **Q) What is Coding?**
- ANS: The process of writing program instructions to solve a problem is called **coding.**
- **Q) What is Source Code?**
- We use High Level Languages to do coding. The resulting file is called as **source code.**

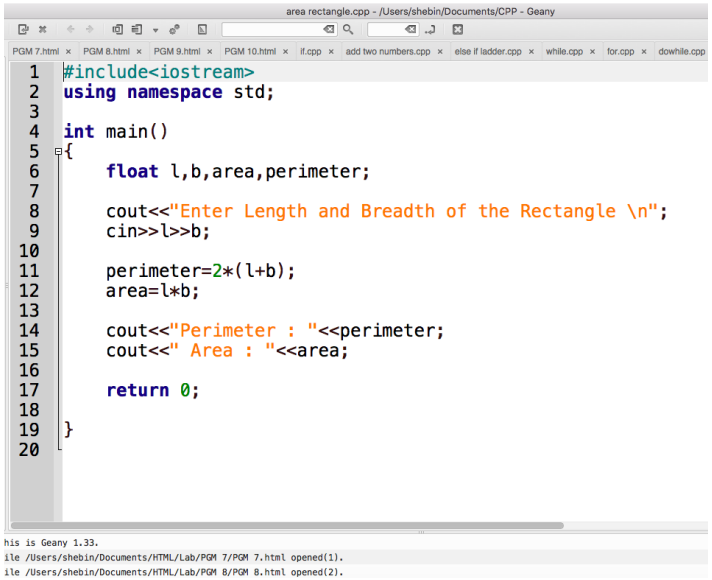


Fig: Coding using Geany

```
#include<iostream>
using namespace std;

int main()
{
    return 0;
}
```

00010101001101011010
00100111001010001010

Fig. 3.18 : Translation Process

What is object code?
ANS: The version of the source code we get after translation is known as Object Code.

HOME

- **Q) What is Debugging?**
- ANS: Programming errors are known as '**bugs**' and the process of detecting and correcting these errors is called **debugging.**
- **Q) What are the types of errors that may occur in a program?**

a) **Syntax error :** due to not following rules or syntax of the programming language

b) **Logical error :** due to improper planning of the program's logic.

c) **Runtime error :** due to improper inputting of data

What is Iteration Statement ?

HOME

- Iteration statements are used to perform repeated execution of a set of one or more statements in a program. They are also known as looping statements.
- There are two types of Iteration/Looping Statement :
- 1. Entry controlled loop (Eg: for loop, while loop)
- 2. Exit controlled loop (Eg: do while loop)

Entry controlled loop	Exit controlled loop
• Condition is checked before the execution of the body	• Condition is checked after the execution of the body
• Body may never be executed.	• Body will surely be executed at least once.
• Suitable when skipping of the body from being executed is required	• Suitable when normal execution of the body is to be ensured.

Table 3.1 : Comparison of loops

What are the components of Looping Statement?

HOME

- A looping statement has four components:

1) **initialisation expression:** sets the initial value of loop control variable

2) **test expression:** Condition that is checked for execution of loop

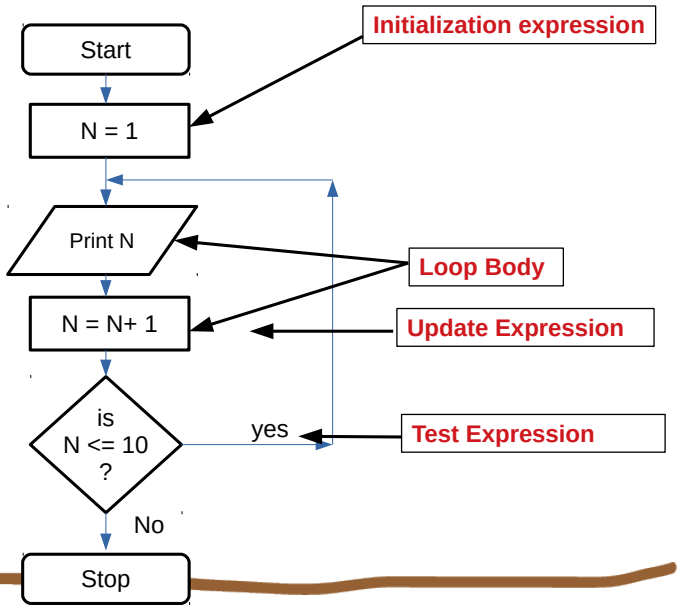
3) **update expression:** changes the value of the loop control variable.

4) **Loop-body:** set of statements for repeated execution.

Flowchart to print the numbers from 1 to 10
or
Flowchart to print first 10 natural numbers

HOME

1
2
3
4
5
6
7
8
9
10



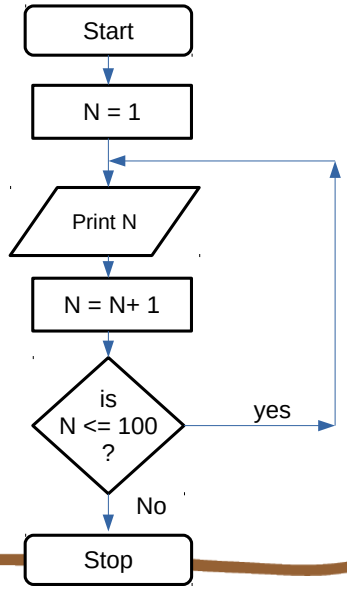
Flowchart and Algorithm to print the numbers from 1 to 100 or Flowchart and Algorithm to print first 100 natural numbers

HOME

ALGORITHM

Step 1: Start
Step 2: N=1
Step 3: Repeat steps 4 and 5 while (N<=100)
Step 4: Print N
Step 5: N=N+1
Step 6: Stop

FLOWCHART



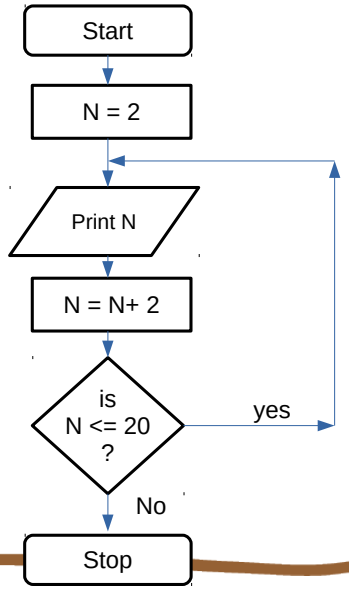
Flowchart and Algorithm to print first 10 even numbers

HOME

ALGORITHM

Step 1: Start
Step 2: N=2
Step 3: Repeat steps 4 and 5 while (N<=20)
Step 4: Print N
Step 5: N=N+2
Step 6: Stop

FLOWCHART



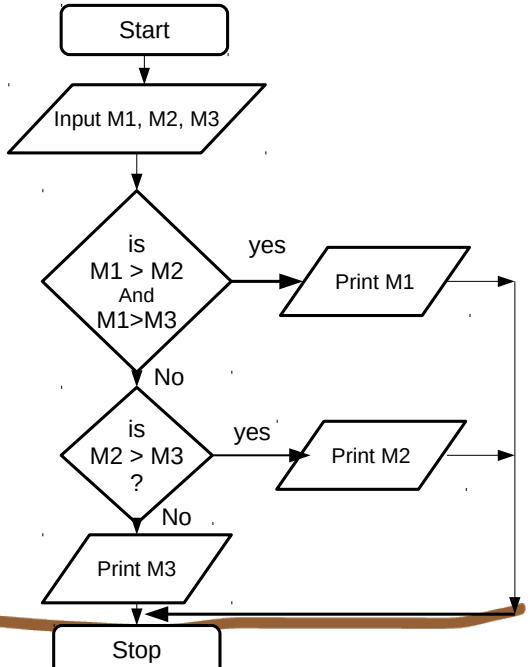
Algorithm and flowchart to input the scores obtained in 3 unit tests and find the highest score

HOME

ALGORITHM

Step 1: Start
Step 2: Input M1, M2, M3
Step 3: If M1>M2 And M1>M3 Then
Step 4: Print M1
Step 5: Else If M2 > M3 Then
Step 6: Print M2
Step 7: Else
Step 8: Print M3
Step 9: End of If
Step 10: Stop

FLOWCHART



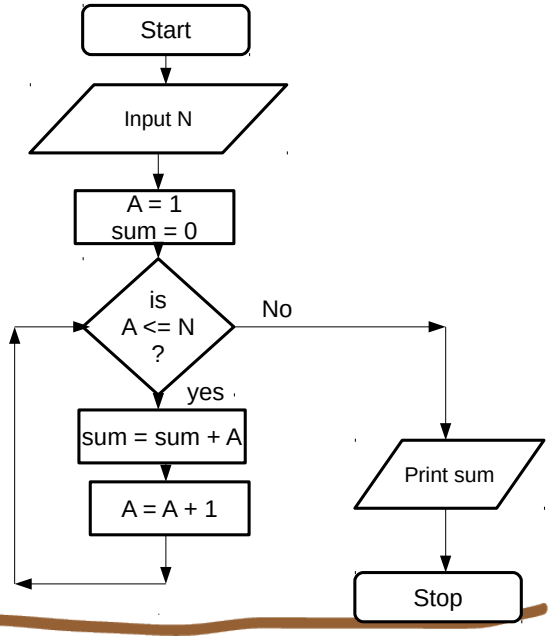
Algorithm and flowchart to print the sum of the first N natural numbers

HOME

ALGORITHM

Step 1: Start
Step 2: Input N
Step 3: A = 1, sum = 0
Step 4: Repeat Steps 5 and 6 While (A <= N)
Step 5: sum=sum+A
Step 6: A=A+1
Step 7: Print sum
Step 8: Stop

FLOWCHART



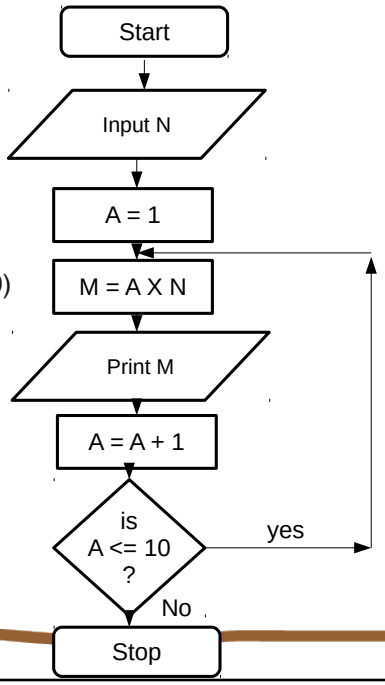
Algorithm and flowchart to print first 10 multiples of a given number

HOME

ALGORITHM

Step 1: Start
Step 2: Input N
Step 3: A=1
Step 4: M=A×N
Step 5: Print M
Step 6: A=A+1
Step 7: Repeat Steps 4 to 6 While (A <= 10)
Step 8: Stop

FLOWCHART



END

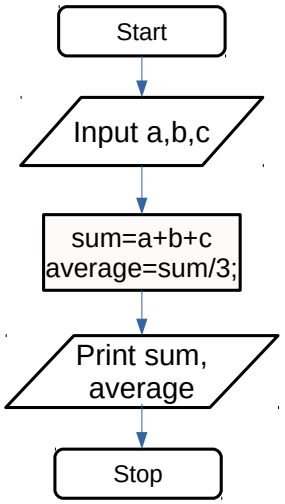
Algorithm and Flowchart to find sum and average of three numbers

HOME

ALGORITHM

Step 1: Start
Step 2: Input a,b,c
Step 3: sum=a+b+c
Step 4: average=sum/3;
Step 5: Print sum,average
Step 6: Stop

FLOWCHART



Performance Evaluation of Algorithms

HOME

- The performance of an algorithm is evaluated based on the concept of time and space complexity.
- The algorithm which will be executed faster with minimum amount of memory space is considered as the best algorithm for the problem.

END

Previous Questions

HOME

- 1. Fill the blank
  Source Code ----> ..Translation..--> Object Code
- 2. The process of converting source code into object code is called..Translation..
- 3. In a flowchart, the terminal symbol(ellipse) is used to indicate START..and STOP...
- 4 Algorithm.. is the step by step procedure to solve problem.
- 5. (a) List different phases in programming
  (b)Explain any three phases in programming

Previous Questions

HOME

- 6. Write short notes on the following :
  a). Coding
  b). Debugging
- 7. Briefly explain the phases in programming.
- 8. Draw a flowchart to print the first 100 natural numbers
- 9. Draw the flowchart to find the sum and average of three given numbers.
- 10. What are the characteristics of an algorithm.

Previous Questions

HOME

- 11. Write a short note on the importance of internal documentation.
- 12. Draw any six flow chart symbols and specify their standardized meanings.
- 13. Write algorithm to print first 100 natural numbers.
- 14. Explain the different types of errors that may occur in a program.
- 15. Explain two types of documentation in programming.
- 16. Pictorial representation of algorithm is called ...Flowchart.....

Chapter 4
Getting Started with C++

- **What is C++ ?**
- **ANS**: C++ is a powerful and popular, object-oriented programming language developed by **Bjarne Stroustrup**
- **What is a Program?**
- **ANS**: Program is a sequence of instructions given to a computer to be executed to perform a desired task.

C++ program to find area and perimeter of a rectangle

```
#include<iostream>
using namespace std;

int main()
{
    float l,b,area,perimeter;

    cout<<"Enter Length and Breadth of the Rectangle \n";
    cin>>l>>b;

    perimeter=2*(l+b);
    area=l*b;

    cout<<"Perimeter : "<<perimeter;
    cout<<" Area : "<<area;

    return 0;

}
```

What is a character set?

- A set of valid symbols that a programming language can recognize is called as character set. These are the fundamental units of the language.
- It contains:

1) **Letters :** A to Z, a to z
2) **Digits :** 0 to 9
3) **Special Characters :** , . ; : > < =
4) **White Space :** blank space, tab, form feed, new line, enter etc...
5) **Other characters :** C++ can process any of the 256 ASCII characters.

What are token?

- Tokens are the basic building blocks of a C++ program.
- There are five types of tokens in C++.

1) **Keywords**: Keywords are tokens that carry a specific meaning to the language compiler. Eg. int, switch etc..
2) **Identifiers**: Identifiers are user defined words that are used to name different program elements such as memory locations, statements, functions, classes etc.
3) **Literal** : Literals are data items that never change their values during the program running. They are also known as constants. There are 4 types of literals: Integer Literal, Floating Point Literal, Character Literal, String Literal
4) **Punctuators**: Special symbols that have syntactic or semantic meaning to the compiler. Eg: #,:,',",() ,[]
5) **Operators**: Operators are the tokens that trigger some kind of operations. The operations applied on a set of data called operands. Eg: +, - , * , /

Literals

1) **Integer literal**: tokens formed only by digits. It must not have decimal point. It may contain +ve or -ve sign as first character. Eg. 15, -20, +40
2) **Floating Point Literal(Real constants)**: They have fractional part. They can be written in two forms: Fractional and exponential form. They have at least one digit and a decimal point. Eg: 52.15, -715.12, .458E04
3) **Character Literal** : Single character enclosed with single quotes and that never changes its value during program run. Eg. 's' '$' '\n'
4) **String Literals**: Sequence of one or more characters enclosed within a pair of double quotes. Eg. "computer"

What are rules in naming of identifiers?

1)It is an arbitrary long sequence of letters, digits and underscores(_)
2)The first letter must be an alphabet or underscore (_)
3)White space and special characters are not allowed.
4)Keywords cannot be used as identifiers.
5)Upper and lower case letters are treated differently, i.e., C++ is case sensitive lang.

What is escape sequence ?

- C++ language has certain non-graphic character constants, which cannot be typed directly from the keyboard. Eg. Enter key, tab key, backspace etc.

- **What is IDE ?**
- **ANS**: Integrated Development Environment is used to enter the code, save, run, debug, compile, link, edit, execute a program. Eg: Geany

Step in coding in geany ide

- **Applications->Programming->Geany**
- Enter the C++ program and save with suitable file name with extension **.cpp**
- To compile the program, Choose **Build->Compile (**shortcut is **F8)**
- After successful compilation, Choose **Build->Build (**shortcut is **F9)** for linking
- To run the program. Choose **Build->Execute (**shortcut is **F5)**

Previous Questions

- 1) .....Literals.....are tokens that never change their values while execution takes place.
- 2) IDE stands for .....Integrated Development Environment.....
- 3) Identify and classify the different tokens in the following C++ statement.

  Age = 18;
- 4) Explain the rules for naming identifiers.
- 5) The following are invalid identifiers in C++. Write a reason for each. a) Id# b) void c) 2ab 9.

Chapter 5
Data Types and Operators

What is Data Type ?

- Data types are the means to identify the nature of the data and the set of operations that can be performed on the data

What are different data types in C++?

- a). **Fundamental data type (built in Data types)**: They are defined in the C++ compiler. They can not be further broken down.
- 1). char: They are symbols covered by the character set of C++ language. It uses only one byte of memory (storing in memory with its ASCII value).
- 2). int : Whole numbers without fractional part. It can be positive or negative, or zero. It uses Four bytes of memory based on GCC compiler.
- 3). float : They are numbers with fractional part. It uses four bytes of memory. It can be represented either by scientific notation or mantissa exponential method.
- 4). double: It is used for handling large floating point numbers. It uses Eight bytes of memory.
- 5). void : uses zero bytes of memory.
- b). **Derived data types**: They are derived from fundamental data types by some grouping or alteration in size. Eg. Array, pointer etc...
- c). **User defined data types:** The programmer can define there own data types. Eg. Struct, enum, union, class etc..

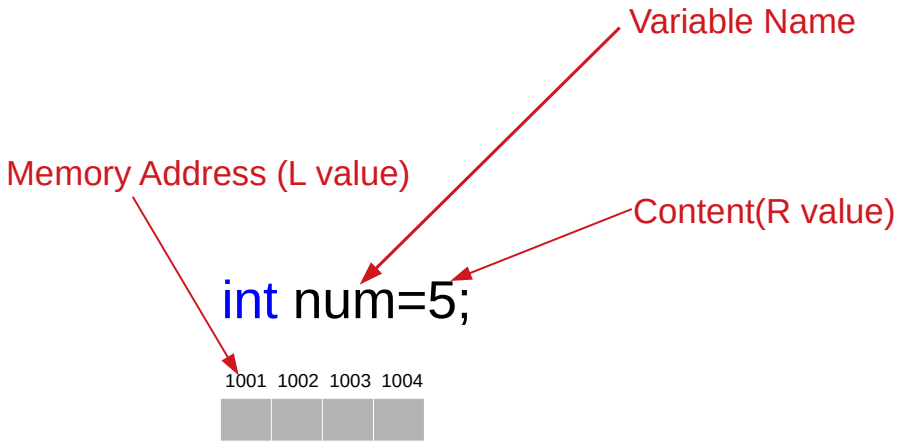
What is a variable

- Name given to a memory location is known as variable. It is used to store and retrieve data.
- It has three part:

1)Variable Name

2)Memory Address(starting address of the allocated memory) (L Value)

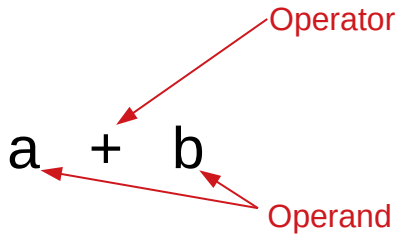
3)Content (R Value)



What are Operators ?

- **Operators** are tokens constituted by predefined symbols that can trigger computer to carry out operations.
- The participants of an operation is called **Operands**. Operand can be a constant or variable.

EXAMPLE:



What are the different types of operators used in C++ ?

- Based on the number of Operands, operators are classified in to three:

1)Unary operates on a single operand
Eg: +, -, ++, --

2)Binary operates on a two operand
Eg:arithmetic operators, relational operators, logical operators

3)Ternary operates on a three operand
Eg:conditional operator (? :)

- Classification of Operators based on the nature of the operation:

1)Arithmetic Operator (+, -, *, /, %)

2)Relational Operator (<, >, ==, !=, <=, >=)

3)Logical Operator (&&, ||, !)

4)Input / Output Operator (>>, <<)

5)Assignment Operator (=)

6)Increment / Decrement Operator (++, --)

What is Arithmetic Operator ?

- Arithmetic operators are defined to perform basic arithmetic operations such as addition, subtraction, multiplication and division. The symbols used for this are +, -, * and / respectively.
- C++ also provides a special operator % (modulus operator) for getting remainder during division.

What is modulus operator ?

- **Modulus operator**: The modulus operator, also called as mod operator, gives the remainder value during arithmetic division.
- This operator can only be applied over integer operands.
- Note that the sign of the result is the sign of first operand.

Variable X	Variable Y	Modulus Operation X % Y
10	5	0
5	10	5
-5	11	-5
5	-11	5
-11	-5	-1

What is Relational Operator ?

- Relational operators are used for comparing numeric data. These are binary operators.
- The result of any relational operation will be either True or False. In C++, True is represented by 1 and False is represented by 0.
- There are six relational operators in C++. They are:

1)< (less than)

2)> (greater than)

3)== (equal to)

4)<= (less than or equal to)

5)>= (greater than or equal to)

6)!= (not equal to)

What are Logical Operators ?

- Logical Operators are used to combine two or more comparisons
- The logical operators are

1)logical AND (&&) Operator

2)logical OR (||) Operator

3)logical NOT (!) Operator

1) logical AND (&&) Operator

- If two relational expressions E1 and E2 are combined using logical AND (&&) operation, the result will be 1 (True) only if both E1 and E2 have values 1 (True). In all other cases the result will be 0 (False).

E1	E2	E1&&E2
0	0	0
0	1	0
1	0	0
1	1	1

Table 5.6 : Logical AND

1 1
10>5 && 15<25 **1 (True)**

1 0
10>5 && 100<25 **0 (False)**

2) logical OR (||) Operator

- If two relational expressions El and E2 are combined using logical OR (||) operations, the result will be 0 (False) only if both El and E2 are having value 0 (False). In all other cases the result will be 1 (True).

E1	E2	E1 || E2
0	0	0
0	1	1
1	0	1
1	1	1

Table 5.7 : Logical OR

1 0
10>5 || 100<25 **1 (True)**

0 0
10>15 || 100<90 **0 (False)**

3) logical NOT (!) Operator

- This operator is used to negate the result of a relational expression. This is a unary operation.

E1	!E1
0	1
1	0

Table 5.8 : Logical NOT

0
! (100 < 2) **1 (True)**

1
! (100 > 2) **0 (False)**

END

What are expressions? What are different types of expressions in C++?

- Expressions are composed of operators and operands. It is evaluated to get a value(returning of value) On the basis of operators expressions can be divided into,

1) **Arithmetic expression**: Expression in which arithmetic operators are used (may be integer or floating point expression) Eg: a+b

2) **Relational expression** : Expression in which relational operators are used Eg: x<y

3) **Logical Expression** : Expression in which logical operators are used In an expression , the values of the variable have constant values, the expression is known as constant expression. Eg: m&&n

What is a statement? What are different types of statements?

- Statement is the smallest executable unit of programming language. It uses (;) as delimiter. All the statements except declaration statement are executable.
- There are mainly four types of statements,

1) **Declaration statements**: It is used to declare the type of the variable or constant used in the program. Eg.int x,y; int a=10;

2) **Assignment statement**: It is used to assign a value to a variable eg. a=10; b=c+d; = is assignment operator

3) **Input statement**: It allows the user to store data in the memory (RAM) during the program execution. In C++ get from or extraction operator(>>) is used for it. Eg. cin >> a;

4) **Output statement**: It allows the user to make available the results through any output device. In C++ put to or insertion operator(<<)is used for it. Eg. cout << a;

What is mean by cascading of I/O Operator?

- Multiple use of Input / Output operators in a single statement is called cascading of I/O Operator. Here the values are assigned to the variables from left to right.
- Eg
```
cout<<x<<y<<z;
cin>>x>>y;
```

Previous Questions

- 1. Briefly explain three important parts associated with every variables
- 2. Write short note on data types in C++
- 3. What are the different types of C++ statements
- 4. Given that x= 5 y=5. What will be the value of the expression x > y|| y > x?
- 5. The memory size of float data type in C++ is ..... bytes.
  a)2 b)4 c)8 d)10
- 6. Explain different types of logical operators on C++.

- 7. What is the difference between “=” and “= =” operators?
- 8. What is the difference between x= 5 and x ==5 in C++
- 9. The memory size of float data type in C++ is ..... bytes.
- 10. Identify the name of following operators in C++.
  && , || , !
- 11. Write the declaration in C++ for a variable that can be used to store height of a student. Justify, why you have selected this data type in the declaration.
  ANS: float height;
  Student’s Height might contain decimal point
- 12. Memory requirement of void data type in C++ is ..... byte(s).

- 13. Briefly explain any two expressions in C++.
- 14. What are data types ?Explain the fundamental data types in C++.
- 15. Classify the identifiers given below as valid and invalid .Give reason for invalidity.
  sum,if,_Num 1,Switch,stud Age
- 16. What do you mean by a data type? Compare the fundamental data types char and int available in C++.

Chapter 6
Introduction to Programming

- 1. **What is Pre-processor directive?**
- **ANS**: Pre processor are the compiler directive statements which direct the compiler to process the information provided before actual compilation starts. They are lines starts with # include in the program but not the part of it.
- 2. **What is the use of header files in C++ program?**
- **ANS**: Header files contain information about functions, objects or derived data types and are available along with compiler. .
  Eg. # include <iostream>
  iostream give information about the object cin and cout.

- **3. What is namespace ?**
- **ANS**: The concept of namespace is similar to a house name. Different identifiers are associated to a particular namespace. It is actually a group name in which each item is unique in its name..
- 4. **What is the use of main() in C++ ?**
- **ANS**: The execution of C++ program begins at main () and ends within main (). All other function used in the program are called from main ().

Structure of a C++ Program

```
#include<iostream>
using namespace std;
int main()
{
    cout<<"Hello, Welcome to C++";
    return 0;
}
```

END

Variable Declaration & Initialisation

Informing the compiler to create the storage in a memory location for variables is called as **variable declaration**

```
int num;
```

Supplying value to a variable at the time of its declaration is called **variable initialisation**.

```
int num=5;
```

Variable Declaration

```
int num;
cout<< num;
```

OUTPUT:
78347385348

The output will be a random number.
It is called as **Garbage Value**.
It is the unpredictable value assigned to a variable at the time of its declaration.

```
int a=5, b=2;
int num = a + b;
cout<<num;
```

OUTPUT:
7

If the variable initialized during the execution of the program is known as **dynamic initialisation**

Const -The access modifier

- The const keyword is used in the variable declaration to make variable's access read only, ie we can't change its value
- Eg. const float p=3.14;
- So const is known as access modifier.

What are Type Modifiers ?

- Type modifiers are given in the variable declaration to alter the size, range and precision of the variable.
- Important type modifiers are:

1) **signed**
2) **Unsigned**
3) **Long**
4) **short**

What is Arithmetic Assignment Operator ?

- Arithmetic assigned operators are C++ short hands used to represent arithmetic binary operations such as +, - ,* , /.
- For example, a=a+10 can be represented as a+=10.
- Example: +=, -=, *=, /=, %=

Arithmetic assigment operation	Equivalent arithmetic operation
x += 10	x = x + 10
x -= 10	x = x - 10
x *= 10	x = x * 10
x /= 10	x = x / 10
x %= 10	x = x % 10

Table 6.2: C++ short hands

END

What is Increment Operator ?

- The increment operator is represented by ++ symbol.
- It is a unary operator.
- It adds 1 to the content of the operand variable and the result is stored in it.
- There are two forms of increment operator;

1)**Prefix form (change and use method.):** In Prefix form, the value of the variable in increased by 1 immediately. Eg: ++a

2)**Postfix form (use and change method.) :** In Postfix form, the value of the variable is increased only in the next statement. Eg: a++

What is Decrement Operator ?

- The decrement operator is represented by -- symbol.
- It is a unary operator.
- It subtracts 1 from the content of the operand variable and the result is stored in it
- There are two forms of decrement operator;

1)**Prefix form** In Prefix form, the value of the variable in decreased by 1 immediately

2)**Postfix form** In Postfix form, the value of the variable is decreased only in the next statement.

What is Precedence of Operators ?

- Precedence is the order of operations will carried out in C++ when different operations are used with operands.

Priority	Operations
1	( ) parentheses
2	++, --, ! , Unary+ , Unary -, sizeof
3	* (multiplication), / (division), % (Modulus)
4	+ (addition), – (subtraction)
5	< (less than), <= (less than or equal to), > (greater than), >= (greater than or equal to)
6	== (equal to), ! = (not equal to)
7	&& (logical AND)
8	|| (logical OR)
9	? : (Conditional expression)
10	= (Assignment operator), *=, /=, %=, +=, -= (arithmetic assignment operators)
11	, (Comma)

Table 6.3: Precedence of operators

What is type conversion?

- Type conversion means converting one data type to another data type.
- There are two types of type conversion:

1) **Implicit type conversion (Type Promotion)**: also known as automatic type conversion is performed by the compiler. The conversion is always from lower type to higher type.
Eg: 6+2.5=8.5

2) **Explicit type conversion (Type casting)**: refers to conversion that is performed explicitly using cast operator. The operator used for this purpose is known as cast operator. The cast operator takes on the format cast type (expression)

- eg int a = (int) 10.5 , Here the value 10.5 is converted to integer type

- **Q) What is the use of adding comments in a program? How can we include different types of comments in a C++ program?**
- ANS: Comments are the lines of codes that are added in the program to describe the program. They are ignored by the compiler. Comments make the program more readable.
- There are two types of comments,
- a). **Single line comments:** In C++ // is used to write single line comments
- b). **Multiline comments** : These are included within /* and */

Previous Questions

- 1. Rewrite the expression a=a+10 using arithmetic assignment operator
- 2. Explain type modifiers in C++
- 3. Differentiate Type promotion and Type casting
- 4. Write a C++ program to find sum of two given numbers
- 5. Write short notes on
  a) Preprocessor directive
  b) Header file
  c) Main() function

- 6. Explain implicit and explicit type conversion with suitable examples.
- 7. What is the role of comments in a program? Explain the different ways to write comments in a C++ program.
- 8.What is implicit type conversion? Why it is called type promotion?
- 9. Write a C++ program to find the total and percentage of a student in Six Subjects.
- 10. Which header file is responsible for cout and cin objects?

- 11.
  a). Consider the structure of C++ program given below and answer the following question.

```
#include<iostream>
using namespace std;
int main( )
{
   Statements;
}
```

- Write the preprocessor directive statement in the code?
- (b). Explain the header files in a program.

Chapter 7
Control Statements

What are Control Statement?

- Control Statements are used for altering the normal flow of program execution.
- Control statements are classified into two:
- **(i) decision making/selection statements**
- **(ii) iteration / looping statements**

END

What is Decision Making / Selection Statements?

- Decision Making statements or Selection statements are used for selected execution of statements of the program.
- Eg:

1)if

2)Switch

3) Conditional Operator

END

a) if statement

- if statement is a single path statement, which executes statement only if the condition is true.
- Syntax :

```
if(condition or expression)
    statement1;
```

- If the condition is true then the statement1 will be executed.
- Example:

```
if (mark >=18)
    cout <<"You have Passed " ;
```

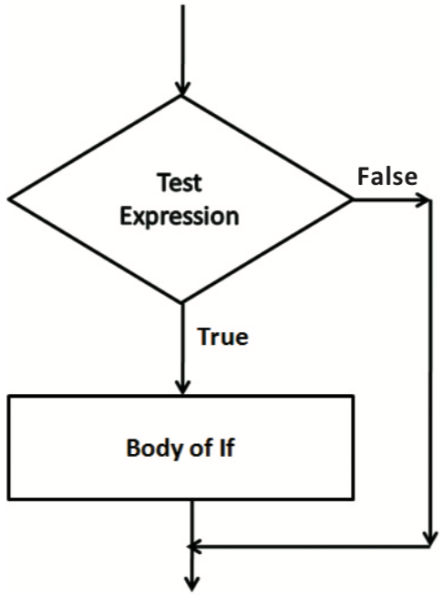


Fig. 7.1 : Working of if statement

if statement example

```
#include<iostream>
using namespace std;
int main()
{
    int mark ;
    cout << "Enter your mark: ";
    cin >> mark;
    if (mark >= 18)
        cout << "You have Passed";
    return 0;
}
```

END

b) if-else statement

- The if... else statement is used to test a logical condition and choose one of the alternatives based on the result of logical condition.
- Syntax :

```
if(condition or expression)
    statement1;
else
    statement2;
```

- If the condition is true then the statement1 will be executed. If condition is false then statement2 will be executed.
- Example:

```
if (mark>=18)
    cout <<"You have passed " ;
else
    cout <<"You have failed " ;
```

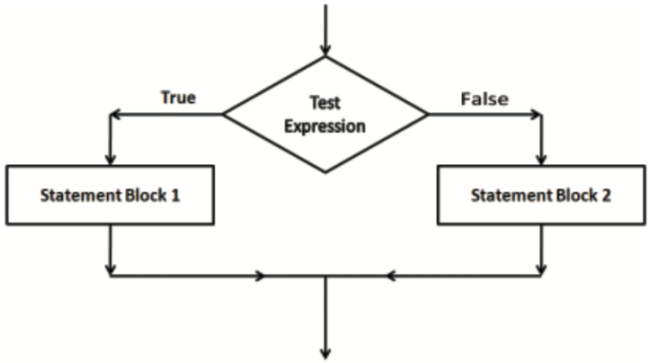


Fig 7.2: Flowchart of if - else

if-else statement example

```
#include<iostream>
using namespace std;
int main()
{
    int mark ;
    cout << "Enter your mark: ";
    cin >>mark;
    if (mark >=18)
                cout <<"You have passed";
    else
                cout <<"You have failed " ;
    return 0;
}
```

END

Nested if

- An if – else statement can be placed inside another if – else statement, is called nesting of if.
- Example:

```
if (mark >=60)
{
    if (age>=18)
    cout<<"Eligible for higher studies" ;
    else
    cout <<"Not Eligible" ;
}
```

END

else if ladder

- The else-if ladder helps to select one out of many alternative block of statements.
- Syntax :

```
if (test-expression)
{   Statement 1;  }
else if (test-expression)
{    Statement 2;   }
else if (test-expression)
{   Statement 3;  }
else
{    Statement 4;   }
```

Else if ladder Example

```
#include<iostream>
using namespace std;
int main()
{
    int n;
    cout<<"Enter a number";
    cin>>n;

    if (n>0)
        cout<<"The number is positive";
    else if (n<0)
        cout<<"The number is negative";
    else
        cout<<"number is zero";
    return 0;

}
```

END

switch

- The Switch enables to select one among several alternatives.
- It is a multi-path statement.
- Syntax:

```
switch (expression)
{
case value1 :
Statement 1;  break;

case value2 :
Statement 2;  break;

case value3 :
Statement 3;  break;

default :
Statement n;
}
```

- The expression is evaluated and statements are executed according to the value . If no match is found, then default statement is executed.

- Example:

```
int day=2;
switch(day)
{
case 1 :
cout<<”Sunday”;   break;

case 2 :
cout<<”Monday”;   break;

case 3 :
cout<<”Tuesday”;   break;

default :
cout<<”Invalid entry”;
}
```

END

Compare switch and else if ladder

switch statement	else if ladder
• Permits multiple branching.	• Permits multiple branching.
• Evaluates conditions with equality operator only.	• Evaluate any relational or logical expression.
• Case constant must be an integer or a character type value.	• Condition may include range of values and floating point constants.
• When no match is found, `default` statement is executed.	• When no expression evaluates to True, `else` block is executed.
• `break` statement is required for exit from the `switch` statement.	• Program control automatically goes out after the completion of a block.
• More efficient when the same variable or expression is compared against a set of values for equality.	• More flexible and versatile compared to `switch`.

Table 7.1: Comparison between switch and else if ladder

Conditional Operator

- Conditional operator is an alternative to if else statement.
- It is a **ternary operator**(ie, it takes three operands).
- Syntax:
  (condition)? true-part: false-part;
- The condition is a boolean expression. If it is true the result is the true part, else the result is the false-part .
- Eg: largest = (a>b) ? a : b;

What are Iteration Statements or Looping Statements

- The statement that execute one or more statements repeatedly several number of times is called as Looping Statements.
- C++ provides three looping statements:

1)while

2)for

3)do-while.

Entry controlled loop and Exit Controlled Loop

- Looping statements, also called iteration statements, are classified into two:

1)entry- controlled

2)exit-controlled

- **Entry Controlled Loops**: test expression(condition) is evaluated before the execution of the loop-body. Loop body is executed only if the condition is true. Eg: while, for .
- **Exit Controlled Loops**: test expression (condition) is checked after executing the loop- body. loop-body will be executed at least once Eg: do while

END

Compare Entry Controlled Loop and Exit Controlled Loop

Entry controlled loop	Exit controlled loop
• Condition is checked before the execution of the body	• Condition is checked after the execution of the body
• Body may never be executed.	• Body will surely be executed at least once.
• Suitable when skipping of the body from being executed is required	• Suitable when normal execution of the body is to be ensured.

Table 3.1 : Comparison of loops

What are the components of Looping Statement?

- A looping statement has four components:

1) **initialisation expression:** sets the initial value of loop control variable
2) **test expression:** Condition that is checked for execution of loop
3) **update expression:** changes the value of the loop control variable.
4) **Loop-body:** set of statements for repeated execution.

while loop

- The while ... loop is an entry controlled loop. The condition is checked first and if it is true the loop will be executed.
- Syntax:

```
initialisation expression
while ( test expression)
{
  loop body;
  update expression;
}
```

Program to print first 10 natural numbers

```
#include<iostream>
using namespace std;

 int main()
 {
     int i;
     i=1;
     while(i<=10)
     {
          cout<<i;
          cout<<"\n";
          i++;
     }
     return 0;
}
```

Initialisation Expression

Test Expression

Loop Body

Update Expression

END

for loop

- The for loop is an entry controlled loop. The condition is checked first and if it is true the loop will be executed.
- Syntax :

```
for(initialisation ; test expression ; updation)
{
   loop body;
}
```

Program to print first 10 natural numbers

```
#include<iostream>
using namespace std;

int main()
{
    int i;

    for(i=1;i<=10;i++)
    {
    cout<<i;
    cout<<"\n";
    }
    return 0;
}
```

END

do while

- The do while loop executes statement before the expression is tested.
- It is an exit controlled loop.
- Syntax:

```
initialisation expression
do
{
   loop body ;
   updation expression;
} while (test expression);
```

Program to print first 10 natural numbers

```
#include<iostream>
using namespace std;
int main()
{
    int i;
     i=1;

    do
    {
    cout<<i;
    cout<<"\n";
    i++;
    }while(i<=10);

    return 0;
}
```

What is a Nested Loop?

- Placing a loop inside the body of another loop is called nesting of a loop.
- Eg:

```
for( i=1; i<=2; ++i)
{
   for(j=1; j<=3; ++j)
   {
   cout<< "\n" << i << " and " << j;
      }
 }
```

Previous Questions

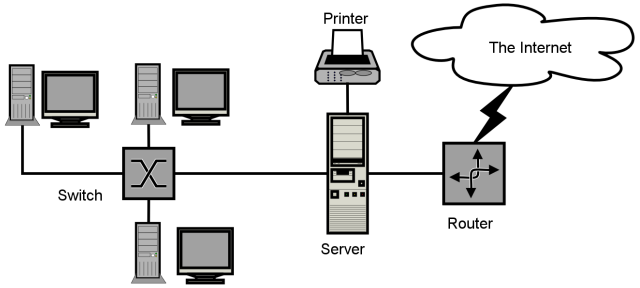
- 1. List the four important elements of a loop.
- 2. Compare while loop and do ... while loop in C++
- 3. Write the syntax of switch statement. Explain using an example of switch its working
- 4. There are three looping statements in C++. a) Which is the exit-controlled loop?
  b) How does it differ from an entry controlled loop?
- 5. Briefly explain conditional operators in C++

- 6. Compare switch statement and else if ladder
- 7. Differentiate between Entry Controlled Loop and Exit Controlled Loop
- 8. Write a C++ program to find the sum of numbers up to 100 by using any loop statement
- 9. Write a C++ program to find sum of Even numbers up to 100 by using any loop statement

Chapter 8
Computer Networks

What is a computer Network?

- Computer network is a group of computers and other computing hardware devices (such as printers, scanners, modems, CD drives, etc.) connected to each other electronically through a communication medium.



What are the uses/advantages of computer networks?

- By networking individual computers,
- 1. **Data communication is possible** . Computer network helps user to communicate with any other user of the network through its services like e-mail chatting etc..
- 2. **Resource Sharing**: The sharing of available hardware and software resources (like programs, printers , hard disk etc..)in a computer network
- 3. **Reliability**: A file can have copies in different computers . So breaking down of one system does not cause data loss.
- 4. **Scalability**: Computing and storage capacity can be increased or decreased easily by adding/removing computer or storage devices to the network..
- 5. **Price –Performance ratio**: Sharing of hardware and software instead of purchasing saves a lot of money.

What is meant by bandwidth, noise and node?

- a). **Bandwidth**: it is the amount of data transfer through a communication medium in a unit time.
- b). **Noise**: It is the unwanted electrical or electromagnetic energy that lowers the quality of the data signals.
- c). **Node**: Any device that is directly connected to a computer network is called a node.

END

What is Data Communication System?

- Data communication is the exchange of digital data between any two devices through a transmission medium.

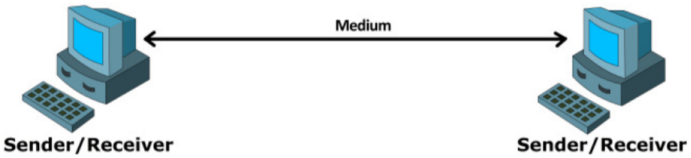


Fig. 8.1 : Data communication system

What are the basic elements of a data communication system?

- a). **Message** : It is the information to be communicated like text, picture etc.
- b). **Sender** (transmitter or source) : The device used for sending data
- c). **Receiver** : The device that receives the message
- d). **Medium** :It is the path through which message travels from sender to receive.
- e) **Protocol** : The rules under which transmission takes place between sender and receiver.

END

What is communication medium ? What are different communication media?

- The path through which message travels from sender to receiver is known as communication media.
- There are two types of communication media

1) **Guided Media (Wired):** Here data is transmitted through some physical media such as metal wire or optical cable. Eg: Twisted pair cables, Coaxial cable, Optical Fibre

2) **Unguided Media (Wireless):** Here data transmission takes place through space or air. Electromagnetic waves are used for it. Eg: Radio waves, Microwaves, Infrared Waves

END

Twisted Pair cables

- It consists of four twisted pairs which are enclosed in an outer shield. These pairs are colour coded.
- There are two types of twisted pair cables
- a). **Unshielded twisted pair(UTP)**: cheap and flexible. It consists of two insulated conductors twisted together to avoid noise. Characteristics: Low cost, thin and flexible, ease of installation and carries data up to a length of 100m.
- b). **Shielded Twisted pair(STP)**: Here the twisted pair itself is shielded again. Characteristics: protection from electromagnetic noise, difficult to install and expensive.

END

Coaxial cables:

- It has an inner central metallic core surrounded by an insulating sheath. It is then surrounded with a conducting outer cover and is again covered with a protecting insulation .
- **Characteristics:**

a) Expensive high band width

b) less flexible

c) difficult to install and carries data up to a length of 500m.

END

Optical Fibre

- Optical fibres are long thin glass fibres through which data is transmitted as light signals.
- Data travels as fast as light and can be transmitted to far off distances.
- **Characteristics:** High bandwidth, carries data over a long distance, expensive, difficult to install.

END

- Optical fibre has the following parts:
- 1. **Core** - the thin glass rod at the centre through which the light travels.
- 2. **Cladding** - the outer optical material surrounding the core that reflects the light back into the core.
- 3. **Coating** - the plastic coating that protects the cable from damage and moisture.

Radio Waves:

- Its frequency range from 3 KHz to 3 GHz. It can used for short distance and long distance communication. it can be used in indoors and outdoors.
- Examples: **Bluetooth, Wi-Fi, Wi-MAX, Satellite Link**
- **Characteristics of Radio Waves transmission**
- a). Not a line of sight transmission
- b). Inexpensive than wired media
- c). Can penetrate through most objects
- d). It can be affected by electrical equipments like motor

I) Bluetooth

- Frequency range: 2.402 GHz to 2.480 GHz.
- short distance communication (approx 10m).
- Used in cell phones, wireless keyboard etc..
- **Characteristics**:
- i). Not a line of sight communication
- ii). Can connect up to 8 devices
- iii). Slow transfer rate(up to 1Mbps)

ii) Wi-Fi

- Wireless Fidelity.
- Frequency range: 2.4 GHz to 5 GHz.
- **Characteristics**:
- i) . Not a line of sight communication.
- ii). Data transfer speed is up to 54Mbps
- iii). Can connect more devices at a time.
- Iv). Range up to 114m

III) Wi-MAX

- Worldwide interoperability for Microwave Access.
- Frequency range: 2 GHz to 11 GHz
- It combines the benefits of wireless and broadband.
- **Characteristics:**
- i). Hundreds of users can connect at a time
- ii). Range up to 45 Km
- iii). Transmission speed up to 70Mbps
- iv). High cost of installation and power consumption.

IV) Satellite Link

- These are like repeaters. It covers large area. 36000KM above earth.
- Geostationary satellites.
- It receive the sending signal from earth(uplink) (frequency 1.6 GHz-30GHz) and retransmit it to earth(downlink) (frequency 1.5 GHz-20GHz)
- **Characteristics of satellite transmission**
- i). satellite cover a large area of the earth.
- ii). Requires permission and license
- iii). Expensive

END

Micro waves

- line of sight method.
- Tall antennas and transceivers receive the wave and strengthen and retransmit..
- Eg. Mobile communication.
- **Characteristics:**
- 1. Inexpensive than wired media
- 2. Transmission is in straight line
- 3. Easy communication over difficult areas

Infrared waves

- Frequency range: 300 GHz to 400 THz.
- Short distance communication (approx 5m)
- Eg. remote control device
- **Characteristics:**
- 1. A line of sight transmission.
- 2. Only two device can communicate
- 3. Short distance communication

What is Data Communication Device?

- A data communication device provides an interface between computer and the communication channel.
- These devices are used to transmit, receive, amplify and route data signals across a network through various communication media.
- The various Data communication Devices are:

1) **Network Interface Card (NIC)**
2) **Hub**
3) **Switch**
4) **Repeater**
5) **Bridge**
6) **Router**
7) **Gateway**

- a). **Network Interface Card(NIC)**: It enables a computer to connect a network and communicate. It can break up data into small units, translate the protocols , send and receive data. It may be wired(Ethernet) or wireless(Wi-Fi).
- b). **Hub**: Hub is used in wired network to connect devices of the same network. It transmit data to all the devises connected to it. Only the device to which data is assigned is responds to it. Large network traffic due to this reduces its bandwidth.

- c). **Switch:** It is an intelligent hub. It store addresses of all the device connected to it. Switch read the destination address of the data from the packet and send data to the particular destination device only. So network traffic can be reduced.
- d). **Repeater**: They are used to receive the incoming signal , amplify it to their original strength and retransmit it.

- e). **Bridge**: It is used to interconnect different segments of an existing network. Only those packet addressed to a node on a particular segment allowed to pass the bridge and transmitted to all the nodes in the segment.
- f). **Router**: It can interconnect two networks of the same type using the same protocol. It can find the best path for data packets to travel and can reduce the amount of traffic in the network.

- g). **Gateway**: It can interconnect two different networks using the different protocols. It can translate one protocols to other and can understand the address structure used in different networks.

What is Data terminal Equipment (DTE)?

- These are the devices that controls data flowing to or from a computer. These are connected at the end of the communication link.
- a). **Modem**: It is used for communication between computers through telephone lines. It convert digital signals received from a computer in to analog signals (**Modulation**) and analog signals received from telephone lines in to digital signals (**Demodulation**).
- b). **Multiplexer/Demultiplexer**: It divide the transmission medium into several logical frequency channels through which we can send many different signals at a time. At the destination, a demultiplexer separates the different signals.

What is Topology?

- Topology is the way in which computers are physically interconnected to form a network. Common types of topologies are:

1) **Bus Topology**
2) **Star Topology**
3) **Ring Topology**
4) **Mesh Topology**

1) Bus Topology

- There is a main cable called bus from the server to which every node computers are connected by short drop cables.
- A small device called terminator is attached at the end of the bus.
- **Advantages:**
- i). Easy to install
- ii). Less cable is needed. So less expensive
- iii). Failure of node does not affect the network.
- **Disadvantages:**
- i). Fault detection is difficult.
- ii). Failure of cable, server or terminator will affect entire network.

2) Star Topology

- Each node is directly connected to a hub/switch.
- If any node has to send some information to any other node, it sends the signal to the hub/switch.
- **Advantages:**
- i). If one workstation fails, it does not affect the whole network.
- ii). Easy to install
- iii). It easy to expand
- iv).Easy to find faults and remove workstations.
- **Disadvantages:**
- i). Requires more cables than Bus topology
- ii). If the central device fails it affect entire network

3) Ring Topology

- All nodes are connected using a cable that loops in a ring or circle.
- **Advantages:**
- i). No signal amplification required because each node do this.
- ii). Requires less cable, so cost effective
- **Disadvantages:**
- i). If a node fails, entire network will fail.
- ii). Addition of nodes is difficult.

4) Mesh Topology

- Every node is connected to other nodes.
- If one path fails, the data will take another path and reach the destination.
- **Advantages:**
- i). If one workstation or a path fails, it does not affect the whole network.
- **Disadvantages:**
- i). Requires more cables so very expensive.
- ii). Very complex and difficult to manage.

END

What are the different types of Network ?

- On the basis of the area covered, computer networks are classified as:

1) **Personal Area Network(PAN):** Network of communication devices in the proximity of an individual. Eg. Bluetooth communication.

2) **Local Area Network(LAN):** Networking of communication devices within a limited area like a building , room or a campus. It can setup using **wired media**(UTP/STP cable) or **wireless media**(infrared, radio waves etc) and can cover up to a few kilometers.

3) **Metropolitan Area Network(MAN):** It is a networking of communication devices within a city. Its coverage may up to a few hundred kilometers. It can interconnects a number of LANs and computers.

4) **Wide area Network(WAN):** It can span a geographically wide area like 1000 or more kilometers and may include many small networks. It may use transmission media like microwave. The largest WAN in the world is internet.

Explain the Logical classification of networks

- This classification is based on the role of computers in the network and division falls into two categories:

1) **Peer-to-peer**: Here there is no dedicated server system. Any computer in the network can act as Server or Client at any instance.

2) **Client-server:** Here a high end computer (Server) provides specific services to the clients upon clients request.

What are the different types of servers

- a) **File server** - A computer that stores and manages files for multiple users on a network.
- b) **Web server** - A computer dedicated to responding to requests for web pages.
- c) **Print server** - Redirects print jobs from clients to specific printers.
- d) **Database server** - Allows authorised clients to view, modify and/or delete data in a common database.

END

What is internet?

- A collection of interconnected networks is called Internet.
- It is a network of networks which is capable of communicating with computers on other networks and sending data, files and other information.

What are the Hardware and Software needed to get internet in computer?

- A Computer
- A Modem
- A telephone connection
- A TCP/IP Account with a Service Provider.
- Software such as browser.

What is Extranet and Intranet?

- **Intranet:** Intranet is a private network owned by an organization. It used to connect various offices in that organization.
- **Extranet:** Extranet is like intranet but it can communicate with some external systems.

What is Protocol ?

- A protocol is the special set of rules to be followed in a network when devices in the network exchange data with each other.
- Eg: **TCP/IP, HTTP, FTP, DNS**

TCP/IP

- **What is TCP/IP ?**
- **TCP/IP, Transmission Control Protocol/Internet Protocol** defines rules for how electronic devices (like computers) should be connected to the Internet and how data should be transmitted between them.
- **What is TCP?**
- When data is to be sent from one computer to another over Internet, it is first broken into smaller packets by **TCP** and then sent. The packets are assembled into the original message
- **What is IP?**
- Delivery of each of Data packets to the right destinations is done by **Internet protocol (IP)**.
- **HTTP, FTP and DNS** are three sub protocols of TCP/IP protocol suite.

HTTP

- Hypertext Transfer Protocol.
- It is a standard protocol for transferring requests from client-side and to receive responses from the server-side.
- The HTTP client (browser) sends a HTTP request to the HTTP server (web server) and server responds with a HTTP response. This pair of request and response is called an HTTP session.
- **The two important characteristics of HTTP are**

1) HTTP is **transmission medium independent**.

2) HTTP is **stateless** (The server and client are aware of each other only during a request or response. Afterwards, each forgets the other).

FTP

- FTP stands for File Transfer Protocol.
- It is a standard for exchanging of data and program files across a network.
- FTP is the easiest way to transfer files between computers via the Internet. It uses TCP and IP to perform uploading and downloading.
- FTP client software eg: Filezilla, Cute FTP, Smart FTP

DNS

- DNS stands for Domain Name System.
- DNS returns the IP address of the domain name, that we type in our web browser's address bar.

END

What is MAC address ?

- A **Media Access Control (MAC)** address is a universally unique address (12 digit hexadecimal number) (or 48 bit Binary) assigned to each NIC (Network Interface Card) by its manufacturer .
- MM:MM:MM:SS:SS:SS

serial number assigned to the adapter (NIC)

ID number of the adapter manufacturer

What is IP Address ?

- Internet Protocol address is a unique 4 part numeric address assigned to each node on a network, for their unique identification.
- IP address is assigned to each machine by the network administrator or the Internet Service Provider.
- There are two versions of IP addresses:

1)**version 4** (IPv4) 32 bit

2)**version 6** (IPv6). 128 bit

END

What is URL ?

- **Uniform Resource Locator**.
- URL is a formatted text string used by web browsers, email clients and other software to identify a network resource on the Internet.
- **URL string can be divided into three parts.**
- a) Network protocol: It enables the browser to know what protocol is used to access the information specified in the domain. Eg: http,ftp
- b) Domain name (Host name or address): It is the name assigned to a server through the DNS to identify a particular web server. Eg dhsekerala.com
- c) File name: It is the file to be opened

Generic Domain Names	
·com	Commercial business
·edu	Educational institutions
·gov	Government agencies
·mil	Military
·net	Network organizations
·org	Organizations (nonprofit)

Country Specific Domain Names	
·in	India
·au	Australia
·ca	Canada
·ch	China
.jp	Japan
.us	United States of America

Table. 8.2 : Generic and country specific domain names

END

Previous Questions

- 1. Compare the communication technologies Bluetooth and Wi-Fi
- 2. a) Define Communication medium
  b) Explain different types of communication medium
- 3. What is the full form of MAC?
- 4. Assume that recently your school computer lab is networked. List any four advantages you can experience when using a networked computers instead of stand alone computers

- 5. Name the major parts of an optical fibre cable
- 6. “Servers have much importance in a client server network”. Write the importance and list any two classifications of servers
- 7. a) Define Network Topology
  b) Compare Ring Topology with Star Topology
- 8. What are the hardware and software requirements of connecting a computer to the internet?

- 9. a) What is a URL
  b) Identify three parts of an URL
- 10.Consider that your teacher is planning to connect the computers in the computer lab of your school to form network.
- a) He has a switch and a hub to connect these computers. Which one would you prefer? Why?
- b) Name a topology that you will suggest for this network. Give reasons for your suggestion.

Chapter 9
Internet

What is internet?

- A collection of interconnected networks is called Internet.
- It is a network of networks which is capable of communicating with computers on other networks and sending data, files and other information.
- **Vinton Gray Cerf** is called as the father of internet

What is ARPANET ?

- ARPANET(Advanced Research Projects Agency Network).
- The Internet started as a small network through a project by the US Department of Defence called **ARPANET**
- It is the world's first WAN

Who invented WWW and HTTP ?

- In 1989, Tim Berners Lee, invented **World Wide Web (WWW)**.
- Tim Berners Lee and his team invented **Hyper Text Transfer Protocol (HTTP)**.

What are different types of internet connection available?

- Internet connectivity is based on speed of the connection and technology used.
- They can broadly classify in to:
- a) **Dial Up connection:** It uses telephone line and dial up modem connection is made by dialling . It has a speed of 56kbps.
- b) **Wired Broadband connection**: It is "always on" type connectivity with high band width. Eg: Integrated Services Digital Network (ISDN), Cable Internet, Digital Subscriber Line(DSL), Leased Line, Fiber To The Home(FTTH)
- c) **Wireless Broadband Connection**: It has same speed as Wired Broadband. Advantage: Wireless. Eg: Mobile Broadband, Wi-MAX (Worldwide interoperability for MicrowaveAccess), Satellite Broadband

Wired Broadband Connection Examples

- 1). **Integrated Service Digital Network(ISDN)**: ISDN is a broadband service capable of transporting voice and digital data. It has a transfer rate of 2Mbps.
- 2). **Cable Internet**: It uses co-axial cables of cable TV network for data transfer. A cable modem is used to connect cable network and computer. Its band width is about 10Mbps.
- 3). **Digital Subscriber Line(DSL)**: It uses telephone line to transfer data and voice. Commonly it uses Asymmetric Digital Subscriber Line(ADSL) technology to allow a speed up to 24 Mbps.
- 4). **Leased Line**: It is a dedicated line used to transfer data with speed up to 100 Mbps.
- 5). **Fibre To The Home(FTTH)**: It uses optical fiber from ISP to users home. By using light signals , it has a very high band width.

Wireless Broadband Connection Examples

- 1). **Mobile Broadband**: It used in mobile devices like mobile phone, tablets etc in which modem is built in or USB dongle is used. It allows freedom to use internet on move. It uses cellular network to data transfer. Its speed increases with generations like 2G, 3G, and 4G.
- 2).**Wi-MAX(Worldwide interoperability for Microwave Access)** combines the benefits of wireless and broadband. It has a bandwidth up to 70 Mbps to a range of 45 KM.
- 3). **Satellite Broadband**: Very Small Aperture Terminal(VSAT) dishes and transceiver are used to communicate with satellite. A modem links the transceiver to computer. Its speed is up to 1Gbps and is more expensive one.

Compare between Dial-up connection & Wired Broadband connection

Dial-up connection	Wired broadband connection
• Slow connection, speed upto 56 kbps	• High speed connection, speed usually higher than 256 kbps
• Requires dialing to connect to ISP	• Always on connection
• Uses telephone line exclusively	• Simultaneous use of voice and Internet
• Uses dial-up modem	• Uses broadband modem

Table 9.1 : Comparison between dial-up and wired broadband connections

What are the different internet access sharing methods?

- Internet connection can be shared by,
- a). **Using LAN**: It can be either by connecting devices directly to router or using Hub/Switch hardware and proxy server or operating system features to share internet among other devices.
- b). **Using Wi-Fi network**:It is short distance (up to 100M) data transmission method using Wi Fi router or wireless network access point(Hot spot). It is less secure than wired connection.
- c). **Using Li-Fi network**: It is a fast optical version of WiFi. Here data signal is converted in to light by an LED and photo detector is used as receiver.

What are the services given by Internet?

- The services provided by Internet are

1)**World Wide Web(WWW):** It is a system of interlinked hyper text document accessed via internet.

2)**Search Engines:** special programs to help people to find information available on WWW Eg: Google, Yahoo, Bing

3)**E-mail:** It is used to exchange digital data between devices over internet. Eg: Gmail, Yahoo Mail

4)**Social Media:** use of mobile and web based technology through which individuals and communities can create , share, discuss and modify content. Eg: Facebook, Instagram, Twitter

What are advantages and disadvantages of e-mail?

- **Advantages**
- i).Speed
- ii). Easy to use
- iii). Provision of attachment of text and multimedia
- iv). Reduce paper usage(environmental friendly)
- v).easiness to reply
- vi). Low cost
- vii). Available every where any time
- Disadvantages
- i). e-mails may carry viruses
- ii). Unwanted messages may consume a lot of space and time

What are the sections of an e-mail?

- i). **To**: A box to type primary recipient address.
- ii). **Cc(Carbon Copy)**: To type addresses of secondary recipient address.
- iii). **Bcc(Blind Carbon Copy)**: To type addresses of tertiary recipient address. These addresses can't displayed in primary and secondary recipient's messages.
- iv). **Subject**: to type the subject of the message.
- v). **Content**: To type the original message
- vi). **Attachment**: the sender can attach text or multimedia content here.

What are the different types of Social Media?

- i). **Internet forums:** It is an online discussion website where people can engage in conversations. Eg: Reddit.com
- ii). **Social Blogs**: Blog(Web Log) is a discussion or informational website contains entries /posts. Eg: Blogger.com
- iii). **Microblogs**:It allows the user to exchange short sentences, individual images or video links. Eg. Twitter.com
- iV). **Wikies**: It allow people to add content or edit existing information in a web page to form a community document. Eg: wikipedia.com
- v). **Social Network**: It allows people to build personal web pages and then connect with friends to communicate and share content. Eg. Facebook.com, linkedin.com
- vi). **Content communities**: Content communities are websites that organize and share content like photos, videos, etc. eg. Youtube.com

What are the advantages and disadvantages of Social Media?

- **Advantages:**
- i). Bring people together
- ii). Can plan and organize events
- iii). Business promotion
- iv). Can express social skills
- **Disadvantages**
- i).Intrusion to Privacy
- ii).Misuse of private information
- iii).Addiction
- iv). Spread rumours

Suggest some best practices for the use of social media

- a). Avoid unnecessary uploading of personal data.
- b). Setting time schedule for the usage.
- c). Think twice before you post anything in social media.
- d). Set exact privacy levels.
- e). Do not use bad languages.

What is meant by cyber security? What is its need?

- Cybersecurity is the practice of protecting computer systems, networks, and data from security breaches, unauthorized access, and attacks.
- Cybersecurity is essential to safeguard sensitive information, protect privacy.

What are the threats for computer network?

- a) **Computer virus:**
- b) **Worms:**
- c) **Trojan Horse:**
- d) **Spams :**
- e) **Hacking:**
- f) **Phishing:**
- g) **Denial of service (DOS) attack:**
- h) **Man- in – Middle attack:**

- a). **Computer virus**: It is a program that attaches itself to another program or file to spread from one computer to another. A virus might replicate itself, corrupt or delete data on our computer. A virus spread to computers when the file to which virus is attached is transferred to that computer via USB, network or by e-mail.
- b). **Worms**: It is a malware which can replicate itself and spread to computers by file transferring. A worm can transfer itself without the help of a file to attach. It slow down the data transfer by using the band width to spread. It also spread as e-mails by using the contact address of the e-mail address book.

- c). **Trojan Horse**: It is appear to be a useful program but once it is installed , it will do damages to the computer like deleting or altering files. It may also make path(back door) in computer through which illegal users can access personnel information from computer through network. Trojan can't self-replicate.
- d). **Spams** : Spams are junk messages send to email users by collecting address from internet services. They may be for product or service promotion. Clicking on links in spams may lead to viruses.

- e). **Hacking**: Unauthorized access to system is known as hacking.

  Computer experts performing hacking to reveal weakness in computer and network is known as white hat hackers and such hacking is known as ethical hacking.

  Computer criminals break into secure networks to destroy data , illegal use of data for profit, or making network unusable are known as black hat hackers and such hacking is known as unethical hacking
- f). **Phishing**: It is an attempt to get information such as username, password, credit card details by posing as original website like bank etc. Phishing website have home page similar to original site. The act of creating such misleading site is known as spoofing. It is mostly using for financial crimes.

- g). **Denial of service (DOS) attack**: Its aim is to shut down the target server to preventing service to the genuine users. A DOS attack using previously attacked computers known as zombies, to send huge number of request to the target server until it collapses.
- h). **Man- in – Middle attack**:A man-in-the-middle attack refers to an attack in which an attacker secretly intercepts electronic messages between the sender and the receiver and then captures, inserts and modifies messages during message transmission.

How can we prevent cyber treats?

- a). **Firewall**: Firewall is a system of computer hardware and software that provides security to the computers in an organization. It controls the incoming and outgoing network traffic and deny malicious data from entering in to the computer.
- b). **Antivirus Scanners**:Antivirus tools scans files and programs for known malware like viruses and remove them or store them in quarantine area to preventing them from execution.
- c). **Cookies**: Cookies are small text files created when we browse a website. It may remember our username, password etc..so hackers can use them for their malicious purpose. They use cookies as spyware to keep track our activities in system. So cookies should be frequently removed.

Suggest some best practices of the use of computer over internet.

- a). Use antivirus, firewall and spam blocking s/w on your PC and update them frequently
- b).Download files only from reputed sites.
- c).Do not respond or act on email sent from unknown sources.
- d). Use complex passwords and change it frequently.
- e). Do not select check boxes or click Ok buttons before reading the contents of any agreement
- f). Do not hide your identity to fool others.
- g). Do not click on pop-ups and advertisements..
- h).Always scan your USB drive for virus before use.
- i). Use strong passwords.
- j). Do not force the sites to remember your passwords.
- k). Keep backup of your important files.

Previous Questions

- 1. Email is a popular communication tool. Discuss any two advantage of Email
- 2. Your friend wants to take an internet connection. Explain and compare any three connectivity available now a days
- 3. Define the terms
- a) Phishing
- b) Hacking
- 4. Which one of the following is not a web browser?
  a). Mozilla Firefox b). Google c). Internet explorer
  d). Opera

Chapter 10
IT Applications

What is e- Governance?

- e-Governance is the application of ICT for delivering Government services to citizens in a convenient, efficient and transparent manner.

What are the different interactions of e-Governance?

- a). **Government to Government (G2G)** : It is the sharing of data/ information among government agencies, department or organizations.
- b). **Government to Citizen (G2C)**: It create interface between the government and citizen to increase the availability and accessibility of public services. Its primary purpose is to make the Government citizen – friendly.
- c). **Government to Business (G2B)**: It create interface between the government and businesses. Its objectives are to save time and cost and create more transparent business environment.
- d). **Government to Employee (G2E)**: The Government policies and guidelines for implementing various government programs are made available to employees as orders and circulars. Employees salary and personal details are also managed through it.

Explain Infrastructure of e- Governance.

- In Kerala, it consists of three parts.
- a). **State Data Centre(SDC**): It keeps central data repository, secure data storage , online delivery of service etc..
- b). **Kerala State Wide Area Network(KSWAN)** : It is the backbone of the State Information Infrastructure(SII). It extended to all Districts, Blocks and Panchayaths.
- c). **Common Service Centre(CSC)**: It is the front end delivery point of the government. It offers web enabled government services to rural areas. It helps to pay bills, generating certificates , submitting online applications, e-ticket etc.. eg. Akshaya

What are the benefits and challenges of e-Governance?

- **Benefits:**
- i). Leads to automation of government services.
- ii). Strengthen Democracy
- iii). More transparency in the functioning
- iv). Increase the responsibility of government departments
- v). Saves unnecessary visit to government offices.
- **Challenges:**
- i). e-Literacy is necessary
- ii). Possibility of cyber attack
- iii). Huge initial investment is needed from the part of Government
- iv). People are not interested to share there personal information to the agencies assigned for data collection.
- v). Integrity of various department is needed

- Q) **What is e-Business?**
- e-Business is the sharing of business information , maintaining business relationships and conducting business transactions by means ICT applications.
- Q) **What is e- Commerce ?**
- e-commerce covers business transactions that involve exchange of money .

What are the advantages and disadvantages of e-Commerce?

- **Advantages:**
- a). It overcomes the geographical limitations of business
- b). It minimize the operational cost, travel time etc.
- c). It remains open all the time.
- d). We can find a product quickly from a wide range of choices
- **Disadvantages:**
- a) Lack of knowledge to people about online business.
- b) Plastic money like credit/debit card is not common in rural area.
- c) Chance of frauds
- d) Touch and feel option is not available like traditional business

What is meant by electronic payment system (EPS) and e- Banking?

- A system of financial exchange between buyers and sellers in an online environment is known as **electronic payment system (EPS)**. Eg: Google pay
- **e- Banking** is the automatic delivery of banking services directly to customers through electronic channels like internet. Eg: SBI internet banking

What is e- Learning ?

- The use of electronic media and ICT in education is known as e- Learning.
- e- Content like videos, presentations graphics, animations etc.. and educational TV channels are used for this.

E-Learning tools

- **E-Books** :E book reader like tablet
- **E-Text**:Text info available in electronic format,and text can be automatically read
- **Online chat**: text,audio,video chat with tutors.
- **E-Content**: Multimedia contents can be published in TV,websites etc
- **Educational TV Channel**: Victers provide Recorded class in different subjects

What are advantages and disadvantages of E learning?

- **Advantages:**
- i). It offers variety of courses from national and international institutions to a large number of students from distant locations.
- ii). Low cost
- iii). No time and space limitations
- **Disadvantages:**
- i). Face to face contact between students and teachers are not possible.
- ii). Proper interaction may not possible.
- iii). Hands on practices, constant motivation etc. are not possible.
- iv). Proper equipments and technology may not available.

What is the role of ICT in Health care?

- a) **Medical equipments**: Most of the modern medical equipments like scanners , computer guided equipments, hand held equipment like sugar level monitors etc uses micro processors.
- b). **Electronic Medical Record(EMR)**: Now patients medical records are stored in digital format. It is economic, environmental friendly and can easily transfer to personal and institutions.
- c). **Telemedicine**: The remote diagnosis and treatment of patients by means of telecommunications technology. It is used to share observations and prescriptions with experts in the medical field . Here distance is not a limitation. It reduces time and cost.
- d). **Research and development**: Today, drugs meant for specific purposes can be design and developed with use of advanced computers. It reduces much time and cost for developing them.

- Q) **What is meant by Business Process Outsourcing (BPO)?**
- The process of hiring a third party service provider to do the operations and responsibilities of specific business functions. It may also involve transferring of employees and asset from one firm to another. It increases the efficiency in services and saves cost. Eg. Customer care service.
- Q) **What is mean by Knowledge Process Outsourcing (KPO)?**
- Knowledge and information related work is carried out by different company or subsidiary within the organization. It includes data search, data integration , market search etc.

- Q) **What is meant by call centre?**
- A call centre(also called service centre, sales centre, contact centre etc..) is a telephone service facility set up to handle a large number of incoming and outgoing calls for supporting various responsibilities of an organization.

Distinguish between teleconferencing and video conferencing?

- **Teleconferencing** is a meeting or conference held between two or more parties in remote locations by use of IT infra structure and services.
- **Video conferencing** is a type of teleconferencing in which the video of the parties involved in the conference is also included. A video camera and microphone and communication system is needed.
- Both Teleconferencing and video conferencing will save time and travel expense.

Previous Questions

- 1. e-Learning playing an important role in education field. Discuss any three advantages of e-Learning
- 2. What are the benefits of e-Governance?
- 3. Summarize major benefits of e-Learning
- 4. Explain any three e-Learning tools