

1st Generation of computer(1950-1959)

- Vacuum tubes were used as principal electronic component.
- Speed is measured in milliseconds

Example :- ENIAC, EDSAC, EDVAC

LIMITATIONS

- Computers are very expensive
- Limited storage capacity
- Very less speed
- Accuracy is very low
- Very large in size & weight
- Generate a lot of heat
- Costly

2nd Generation of computer(1959-1965)

- The 2nd generation computer used transistors in place of vacuum tubes.
- Speed is measured in microsecond

Example :- IBM-700, IBM-1401, ICL-1901

ADVANTAGES

- Smaller in size & weight
- Less heat generated
- Faster
- Less consumption of electricity
- More reliable

3rd Generation of computer(1965-1975)

- The major characteristics feature of 3rd generation computer was use of integrated circuit (IC).
- Speed is measured in nano second

Example :- IBM-360, ICL-1900, PDP-8

ADVANTAGES

- Smaller in size.
- More reliable.
- Consumed less power, fast in operations
- Improved Input & output devices are used
- High storage capacity
- Less heat generated
- Faster
- Less consumption of electricity
- More reliable

4th Generation of computer(1975-1985)

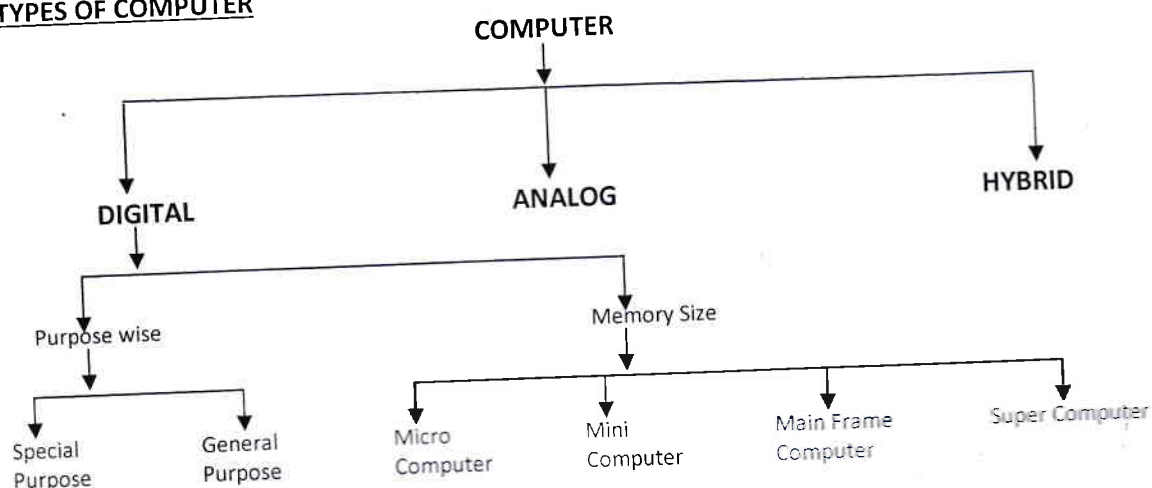
- The progress in LSI and VLSI technology led to the development of microprocessor which became the major characteristic feature of the 4th generation computers.
- Speed is measured in picco second.

Example :- IBM-370, ICL-2900, PDP-11

ADVANTAGES

- Smaller in size.
- Highly reliable.
- Consumed less power
- High processing speed
- Improved Input & output devices are used
- High storage capacity
- Less heat generated
- Faster
- Less consumption of electricity
- More reliable
- Totally general purpose

TYPES OF COMPUTER



DIGITAL COMPUTER

Digital computer is a type of computer that stores and processes data in digital form. It operates directly on decimal digits that represent data in term of discrete numbers. It takes input and gives out put in the form of numbers, letters and special characters. It generally works upon discontinuous type of data. Data is converted into binary digits (0 and 1) and operates on these two digits only. Ex.:- Calculator Mile meter etc.

ANALOG COMPUTER.

Analog computer represents data in terms of some continuous physical quantities i.e. in continuous electrical signal having specific magnitude. The data can be measured by comparing two physical quantities out of which one is measured and another is not measured. The different computations are carried out with physical quantities such as voltage, length, current, temperature. These computers are very fast in their operations.

HYBRID COMPUTER

Hybrid computer are combination of digital and analog computers. It uses the best features of digital And analog computer. It helps the user to process both continuous and discrete data. Very fast, Efficient and reliable. Hybrid computers are generally used for weather forecasting and industrial process control.

ANALOG COMPUTER	DIGITAL COMPUTER
1. Represents data in terms of some continuous physical quantity.	1. Represents data in terms of discrete numbers.
2. Accuracy is not high.	2. Accuracy is very high
3. Its memory capacity is less.	3. It has large memory capacity.
4. Operating speed is faster than digital computer.	4. Less operating speed.
5. It is costly.	5. it is less costly.
6. suitable for programming.	6. Difficult for programming.

PERSONAL COMPUTER(PC)

Personal Computer is a type of micro computer designed to be used by a person at a time for carrying out personal jobs or for applications such as in small business units, office automation, entertainment, home management etc. It is a small and inexpensive computer used by individual popularly known as PC.

These computers are further classified into three categories :-

- 1) PC 2) PC-XT 3) PC-AT.

MICRO COMPUTER

These are very small processing computers and can do a variety of jobs such as storage of data, calculations. These computers meant for a single user i.e. in a given time only one person can operate the computer. The CPU of micro computer is micro processor.

MINI COMPUTER

These computers can process more data and more input and output than micro computer. These computer are more powerful than the micro computer and mainly used in small & medium business organisations.

MAIN FRAME COMPUTER

These computers are designed to handle huge volumes of data and information. They are most expensive and very big general purpose computer. They can receive & transfer data from I/O devices and handle all types of high level Language.

SUPER COMPUTER

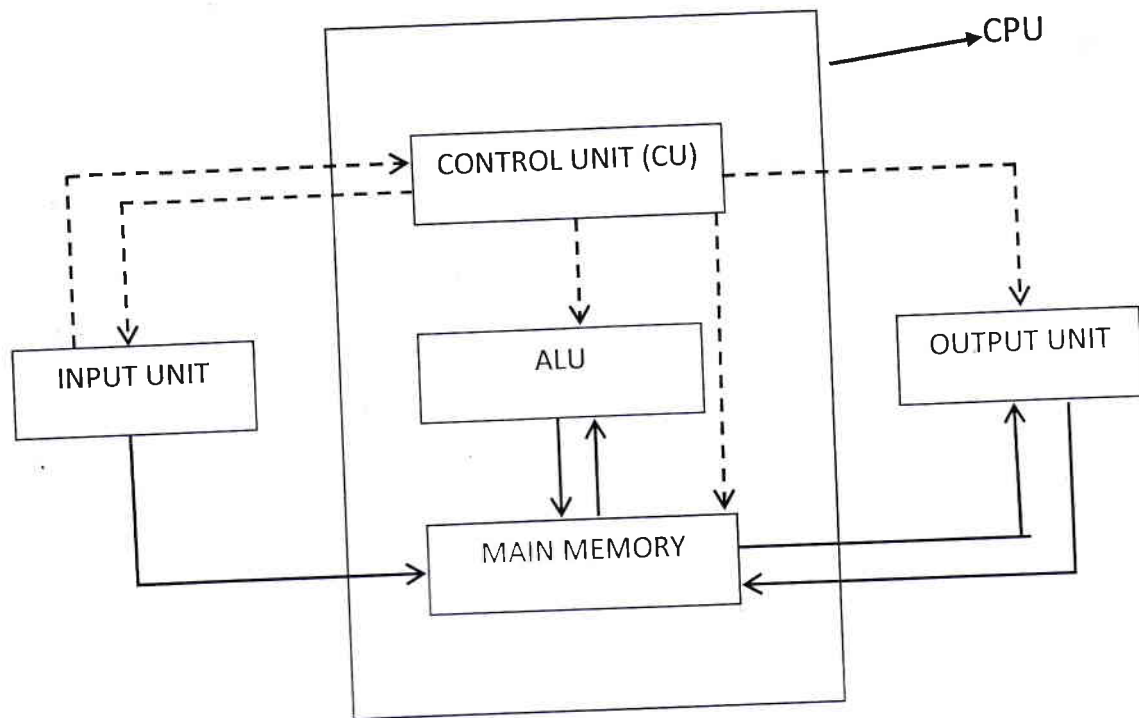
These computers are most powerful and faster computer. The speed of processing of super computer is measured in "GFLOPS" (Giga Floating Point operations per second). These computers used their own operating system and programming language. The high speed of the computer is due to use of number of microprocessors working in parallel.

EX.:- CRAY-3, CYBER-205, PARAM (India)

LAPTOPS :- Laptops computers are battery operated personal computers. These computers are smaller in size and are portable computers also known as notebook.

TABLETS :- Tablet or Tablet PC is a mobile computer that looks like a note book or a small writing slate but uses stylus pen or your finger tip to touch.

BLOCK DIAGRAM



—————> Data Signal
- - - - -> Control Signal

INPUT DEVICE : Input devices are devices that are used to provide data to a computer for storing and processing. They act as an interface between the computer and the user.

Example :- KEY BOARD, MOUSE, LIGHT BALL, TRACK BALL, JOYSTICK, SCANNER, CARD READER, DIGITAL CAMERA, WEB CAMERA, VIDEO CAMERA, VOICE RECOGNIZER

OCR – OPTICAL CHARACTER READER

BCR – BAR CODE READER

OMR – OPTICAL MARK READER

MICR – MAGNETIC INK CHARACTER READER

The **MAGNETIC INK CHARACTER READER (MICR)** is actually a combination of magnetic and paper media. In this system MICR reads characters printed in a special magnetic ink into the computer. MICRs are widely used by banks to process huge volume of cheques.

The technology allows MICR readers to scan and read the information directly into a data-collection device.

CPU (CENTRAL PROCESSING UNIT)

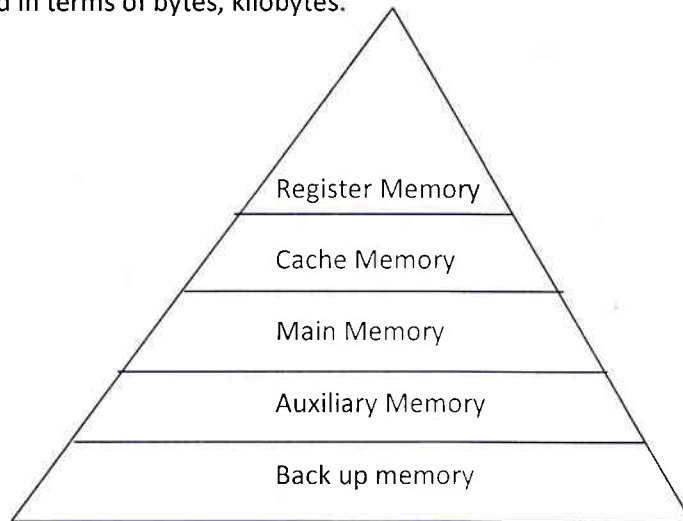
Control Unit, Memory Unit & Arithmetic and Logic Unit constitute the central processing unit (CPU) of a computer. CPU is known as the brain of the computer and is responsible for controlling the entire operations & functions of other units of the system. All major calculations and comparisons are made inside the CPU.

CONTROL UNIT Control Unit control the internal process of the computer. It is the main computing unit of a computer system. It controls, supervises all the activities of computer. It also coordinates and controls all the activities of the different components of the computer systems.

ALU :- It is the unit where actual execution takes place during the processing. This unit performs mathematical operations and logical on data. ALU compares two numbers and data and make decisions while processing.

CACHE MEMORY :- It is an extremely fast small memory between the CPU and the main memory whose access time is very high. Cache memory stores the program and data which are frequently accessed by the CPU of a computer.

MEMORY It is a storage device which stores data & instruction. The capacity of memory is measured in terms of bytes, kilobytes.



Memory is divided into two parts

1. Main or primary memory
2. Auxiliary or Secondary Memory

MAIN Memory

It is the internal memory of a computer where data are stored temporarily.

It is further divided into two parts

RAM & ROM

RAM : Random Access Memory. It is a volatile memory. There two types of RAM.

1. Static Ram (SDRAM)
2. Dynamic RAM(DRAM)

RAM is further divided into three parts

- Cyclic Memory
- Serial access memory
- Direct Access memory

ROM: READ ONLY MEMORY. It is a non volatile memory. It is divided into four parts.

- PROM : Programmable Read Only Memory
- EPROM: Erasable Programmable Read only Memory.
- EEPROM: Electrically Erasable Programmable Read only Memory.

SOFTWARE: It is defined as the set of computer programs, procedures and associated documents that are required for running or operating a computer system effectively. It is the collection of programs whose objective is to enhance the capabilities of hardware.

PROGRAM : A set of instructions that perform a particular task is called a program.

SYSTEM SOFTWARE : System software are sets of one or more programs that are designed to control the operations of a computer system. Those programs are written to assist the use of the computer system. They instruct the computer to perform tasks such as controlling the operations, moving data into and out of a computer and executing application program.

Ex. - Operating System, compiler, interpreter etc

APPLICATION SOFTWARE : Application software are computer programs designed to help the user in performing a certain type of work.

Ex.- Packages, utilities etc

PACKAGES : A package is a computer application consisting of one or more programs created to perform a particular type of work.

UTILITIES : An utility is a program designed to perform maintenance work on the system or on system components.

SYSTEM SOFTWARE	APPLICATION SOFTWARE
1. It is a collection of programs that enable users to interact with the hardware efficiently.	1. it is a collection of programs written for a special application such as library system, inventory control system.
2. it is machine dependent.	2.It is machine independent.
3. It interacts with the hardware directly.	3.It interacts with the hardware indirectly.
4. writing system software is complicated task	5. Writing Application software is comparatively very easy.

OVERVIEW OF OPERATING SYSTEM: Operating system is an integrated set of programs that are used to manage the various resources, control & coordinates the operations of a computer system. It is a master control program that runs the computer and works like a middle man. It permits the computer to supervise its own operation by automatically calling the application program. It acts as an interface and communicates effectively with the user and hardware.

Ex. MS DOS, Windows XP, Windows NT, Windows 7, UNIX

OBJECTIVES OF OPERATING SYSTEM

1. It acts as an interface between the user and the computer hardware and assist in input/output operations.
2. It controls the computer operations in such a manner that a number of programs are executed smoothly.
3. It utilises and manages the system resources (CPU<peripheral device and software) optimally.
4. Most of the Operating system provides time sharing facility to share the system resource.
5. Loading and scheduling user's programs along with necessary compilers.
6. It often acts as a control program and resource allocator for which the computer runs efficiently.

FUNCTIONS OF OPERATING SYSTEM

The functions of Operating System are as follows.

1. Processor management.
2. Memory management.
3. Input/Output Management.
4. Software management.
5. File Management.

SWARNAPRIYA NAYAK.

6. Data security and Management.
7. Managing and editing files.
8. Handling errors.
9. CPU scheduling and time management.
10. Protecting hardware, software and data from the improper use.
11. Keeping records.

TYPES OF OPERATING SYSTEM

1. Single User, Single Tasking Operating system.
2. Single User, multi- Tasking Operating system.
3. Multi user Operating system.
4. Multi tasking or time sharing Operating system.
5. Real time Operating system.
6. Multi- processing Operating system.
7. Multi Programming Operating system.
8. Networking Operating system.

BOOTING

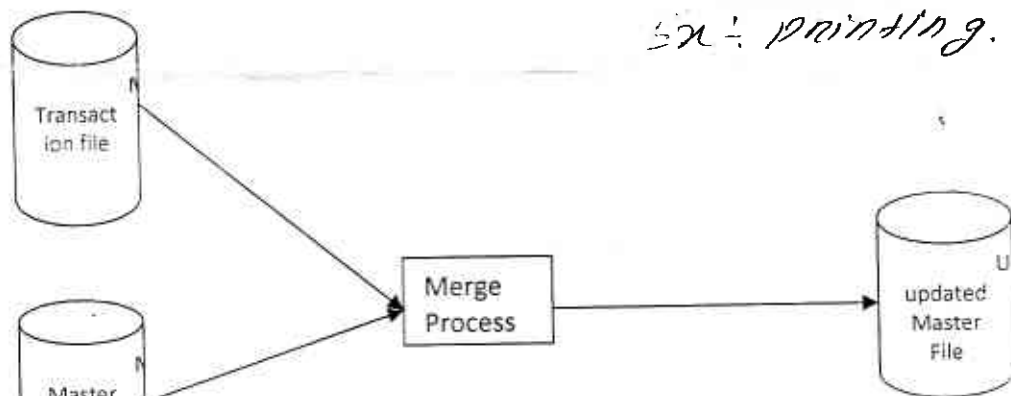
The process of loading the operating system onto the RAM is called bootstrapping or booting.

IMP

Batch Processing

Batch Processing is the execution of a series of programs (JOBS) on a computer without any manual intervention. Jobs are setup so they can be run to completion without human interaction. All input parameters are predefined through scripts, command lines, arguments, control files or job control language.

Batch jobs can be stored up during working hour and then executed during the evening or whenever the computer is idle.



IMP

MULTI PROGRAMMING

Multi programming is a rudimentary (limited to basic principle) form of parallel processing in which several programs are run at the same time on a uni-processor. Since there is only one processor, that can be no true simultaneous execution of different programs. *single processor,*

A multi programming operating system is one that allows end-users to run & move one programs at a time. The development of such system was a major step in development of sophisticated computer. This technology works by allowing the CPU of a computer to switch between two or more running tasks when a CPU is idle. A multiprogramming operating system acts by analyzing the current CPU activities in a computer. Multiprogramming is a common approach to the resource management.

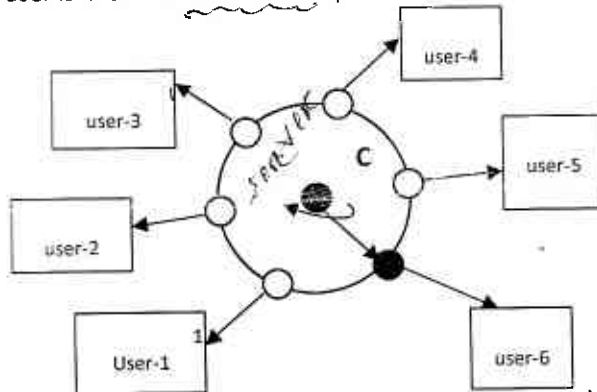
ADVANTAGES

The main advantage of this multiprogramming that it can reduce wasted time in a system operation.

TIME SHARING OPERATING SYSTEM

Time sharing operating system allows many users to share the computer resources simultaneously. In other words Time sharing refers to the allocation of computer resources in time slots to several programs simultaneously.

The time sharing operating system provides direct access to a large number of users where CPU time is divided among all the users on scheduled basis. The operating system allocates a set of time to each user. When time is expired it passes control to the next user on the system. The time allowed is extremely small and the users are given the impression that they each have their own CPU and they are the sole owner of the CPU. This short period of time allocated by CPU to each user is known as time slice or quantum.



In the above figure the user5 is active but user1 to user4 are in waiting state where as user6 is in ready status.

Features of DOS

- It is a single user operating system.
- It supports many application packages.
- It is a command based operating system.
- DOS requires low amount of primary memory for installation & running.
- It works as an interpreter between user and computer.

All the commands of DOS are divided into two parts.

1. Internal Command
2. External Command.

Features of WINDOWS

- Windows is a single user multitasking Operating System.
- Windows provides a graphic user interface (GUI) for the user for interfacing with the computer.
- It provides various commands in the form of menu and icon.
- It is a series of graphical interface operating system developed by Microsoft.
- It is very easy for software installation.

Ex.- WINDOWS-95, WINDOWS-98, WINDOWS-XP, WINDOWS-NT

Features of UNIX

- 1) Unix is a multi user, multi tasking operating system.
- 2) It provides GUI that helps the users to work in a more convenient environment.
- 3) Unix is more suitable for the computers that are connected to Local Area Network(LAN)
- 4) It supports hierarchical file system to store information.
- 5) Unix is highly portable O.S
- 6) It has set of commands and utilities that do specific task.

WINDOWS	DOS
1. It is a graphical user interface(GUI)	It is character user interface(CUI)
2. It is a powerful and fast operating system.	It is comparatively less powerful and slow operating system.
3. It provides multitasking environment.	It does not provide multitasking environment.
4. It supports graphics.	It does not supports graphics

UNIX	DOS
1. UNIX is a powerful operating system.	DOS is less powerful operating system
2. Multi user and multitasking operating system	It is single user and does not support multitasking OS.
3. UNIX support hierarchical file system.	It does not support hierarchical file system.
4. It visual display and graphics.	It does not support visual display and graphics.
5. It provides high security level.	It does not provide security level.
6. It supports networking of computers.	It does not support networking of computers.

COMPUTER VIRUS

A computer virus is a software program with the ability to reproduce itself and disrupt the normal functioning of the computer system. It may damage data or other programs, residing in a computer in a computer system. A virus is a creation of a human computer programmer. Viruses are written to affect our computer adversely without our knowledge. In some cases viruses can be extremely destructive, erasing data on a disk or corrupting programs.

WHAT VIRUS CAN DO

1. Virus can infect executable program files such as word processors, spread sheets or operating system program.
2. It can infect disks by attaching themselves to special programs called boot records in hard disks. These are the programs the computer uses to start up.
3. It can infect a file before it is attached to an e-mail message or to data disk that are used to transfer programs from one computer to another.

WHAT VIRUS CAN NOT DO

1. It cannot infect files on write-protected disks.
2. It cannot infect computer hardware such as monitor, key board etc. They infect only software.

HOW COMPUTER VIRUS SPREAD

1. Computer viruses are transmitted from one computer to another when we copy infected data from an external source.
2. Computer viruses can be transmitted through the internet, through shared disks or through transferred data.

TYPES OF VIRUS

- Boot sector virus
- Program virus
- Macro virus
- Multipar file virus.
- Polymorphic virus
- Stealth virus

Example of Virus.

1. Trojan Horses
2. Disk Killer
3. Michael Angelo
4. Cascade'
5. Die-hard2
6. Brain

TO PREVENT VIRUS INFECTION

- Do not allow outside CD/Floppy or pen drive to be used without proper scanning.
- Only allow genuine users to use the system.
- Never load an unknown disk into your your system unless it is virus free.
- Write protect your Floppies when using them in other computer
- Scan all disks with an anti virus application before using them.
- Do not visit websites which are not reputed.
- Do not open unknown emails received in your mail box.

ANTI VIRUS SOFTWARES

Antivirus software are applications designed to detect and remove viruses from computer systems.

Some of the popular Antivirus software is

- McAfee
- smartDog
- pc-clean
- Dr Solomen
- quick heal

SOURCE PROGRAM

A program written in high level language is called source program. In other words program written by us is known as source program.

OBJECT PROGRAM

When a source program is translated into machine language, it is known as object program. the program which works inside the computer.

MACHINE LANGUAGE :- Each instruction is written in the form of long string of 0's & 1's

ADVANTAGES

1. A Machine level program does not require any translator for execution.
2. A Machine level program is executed very fast.

DISADVANTAGES

1. Machine dependent. :- That means program written for a particular machine/computer can not be executed by the other computer.
2. Difficult to Write Program: - The programmer needs to have an idea about the computer hardware and also necessary to remember the code of the instructions.
3. Error Prone :- It is written as string of) 0's and 1's and will give error if the programmer miss a single bit.
4. Difficult to modify and understand.

ASSEMBLY LANGUAGE

Symbolic Program

Op code operation Code	Operand address/operand (Mnemonic)
---------------------------	--

Each instruction consists of two parts.

Opcode & operand

The opcode tells the computer to what to do and operand part gives the address of the operand on which the operation will be carried out.

ADVANTAGES

1. Easier to understand
2. Easier for locating errors and debugging.

DISADVANTAGES.

1. An assembly language program is machine dependent.
2. Knowledge of hardware Architecture is required to write program.
3. It is considered to be low level programming language.
4. Machine level coding.

ADVANTAGES OF ASSEMBLY LANGUAGE OVER MACHINE LANGUAGE.

1. Easier to understand and use.
2. Easier to locate and correct error.
3. Easier to modify program.
4. No worry about address of instructions and data.
5. Easily relocating errors and debugging.

ADVANTAGES OF HIGH LEVEL LANGUAGE OVER ASSEMBLY AND MACHINE LANGUAGE

1. Machine independent.
2. Easier to learn and use.
3. Gives very minimum number of errors.
4. Lower program preparation cost.
5. Better documentation.
6. Easier to maintain and modify.

Example of high level Language

FORTRAN, COBOL, BASIC, PASCAL, 'C' AND C++

TRANSLATOR.

1. ASSEMBLER
2. COMPILER
3. INTERPRETER

ASSEMBLER

An assembler is a program which translates an assembly language program into machine language program.

COMPILER

A compiler is a program which translates a program written in high level language into machine code and then executes. It first runs through the entire program and then translates the entire program into the machine code. It reports to the user all the errors of the program along with the line number. The translated program is called the object program.

INTERPRETER.

An interpreter is a program which translates one statement of program into machine code line by line and then execute. It proceeds in this way till all the statements of the program have been translated and executed.

COMPILER	INTERPRETER
1. Faster	1. Slower than compiler.
2. Bigger program than interpreter.	2. Smaller program compared to compiler.
3. Source code is not necessary.	3. Source code is always necessary.
4. Debugging is more difficult.	4. Debugging is easier.
5. The object code produced by compiler is saved.	5. The object code produced by interpreter is not saved.
6. It translates the entire program at a time.	6. It translates the program line by line.

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~~STUDY MATERIAL~~

ALGORITHM :
Algorithm is defined as a step by step method for writing the various steps of the solution to a problem.

Symbols used in Algorithm.

=, #, >, <, >=, <=

FLOW CHART
Flow chart is defined as the pictorial representation of a process which describes the sequence and flow of control and action in a process. The flow of information is represented in a flow chart in step-by-step form.

PDL

PROGRAM DESIGN LANGUAGE (PDL)
PDL is defined as a programming analysis tool that is used for planning program logic before writing a computer program. PDL code is also known as program design Language (PDL.)

C
C is a programming language developed at AT&T, Bell Laboratories and designed and written by Dennis Ritchie.

OPERATORS IN 'C'

- ARITHMETIC OPERATORS
- RELATIONAL OPERATORS
- LOGICAL OPERATORS
- ASSIGNMENT OPERATORS
- INCREMENTS AND DECREMENTS OPERATORS
- CONDITIONAL OPERATORS OR TERNARY OPERATORS
- BITWISE OPERATORS
- SPECIAL OPERATORS
 - a) Comma operators
 - b) Size operators
 - c) Pointer Operators

BASIC DATA TYPES

1. INTERGERS TYPE -- Occupies TWO bytes.
Ex. int z,
2. FLOATING POINT TYPE -- Occupies FOUR bytes.
Ex: - float mark,
3. CHARACTER TYPE -- Occupies ONE byte.
Ex. - char name,
4. Double -- Occupies eight bytes.
5. Void type -- No result.

STRUCTURE OF 'C' PROGRAM

```
< header file > void main()
{
  Declarations of variables.
  Statements
}
```

EXAMPLE

```
#include <stdio.h>
void main ( )
{
  printf( "this is a sample program " )
}
```

NETWORK: - A network can be defined as a group of computers and other devices connected by communication channels that allow users to share data, information, hardware and software with other users. So computer network is an interconnection of various computer system located at the same/different places. In computer the network connection can be made using either cable media or wireless media.

ADVANTAGES OF NETWORKING

1. Sharing files.
2. Sharing programs and DATA
3. Back Ups
4. Reliability
5. Resource sharing.
6. Communication

CONNECTING MEDIA

GUIDED MEDIA

- Twisted Media
- Coaxial Cabling
- Fiber optics cable

1) Twisted-pair cable or wire

A twisted pair cable consists of two insulated copper wires typically 1mm thick. The wires are twisted together in a helical shape. Twisted pair wires are commonly in local telephone communication and for digital data transmission over short distance up to 1 km.

2) Coaxial Cable

Coaxial cables offer much higher band widths and are capable of transmitting digital signals at very high rates of 10 mega bits per second. They are used in long distance of telephone lines and as cables for closed circuit TV. Two kinds of coaxial cable are used one kind is 50 ohm cable, used for digital transmission. And other kind 75 ohm cables used for analog transmission.

3) Fibers Optics Cables

The Fiber-optic cable transmits light signals rather than electrical signals. It is more efficient than other network transmission media. Each fiber has an inner core of glass or plastic that conducts light. There are two types light sources for which fiber cables are available.

- Light-emitting Diodes(LED)
- Light Amplification by stimulated and Emission radiation(Lasers)

Fiber-optic cabling provides data rates from 100 mbps to 2 giga bites per second.

DATA TRANSMISSION MODE

The way in which data is transmitted from one place to another is called Data transmission Mode. It is also called data communication mode. It indicates the direction of flow of information .

Different types of transmission modes are as follows:-

1. Simplex mode
2. Half-Duplex mode
- 3) Full-Duplex mode

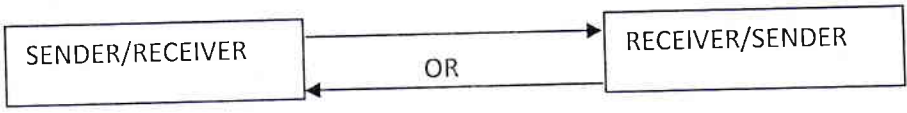
SIMPLEX MODE

In Simplex mode, data can flow in only one direction. In this mode a sender can only send data and cannot receive it. Similarly, a receiver can only receive data but cannot send it. Data sent from computer to printer is an example of Simplex mode.



HALF-DUPLEX MODE

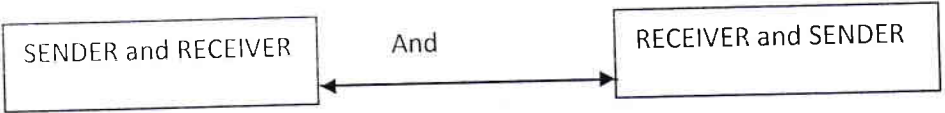
In half-duplex mode, data can flow in both direction but only in one direction at a time. In this mode data is sent received alternatively. It requires two wires. This is the most common type of transmission for voice communications because one person can speak at a time.



The internet browsing is an example of half duplex mode.

FULL-DUPLEX MODE

In Full Duplex-mode, data can flow in both directions at the same time. It is the fastest directional mode of data communication. The telephone communication system is an example of Full duplex communication mode. Tw persons can talk at a time.



NET WORK PROTOCOL

Network protocols are the set of rules and regulations that are generally used for communication between two networks. And also these rules govern how data is transferred, compressed and presented between two computers. Protocols may be implemented by the hardware, software or a combination of both.

TYPES OF PROTOCOL

1.INTERNET PROTOCOL (IP)

Internet Protocol is responsible for the addressing and sending of data from one computer to another and also specifies the process of delivering data from one node to other on the internet.

IP forwards each packet of data having an unique address called

2. TRANSMISSION CONTROL PROTOCOL(TCP)

This protocol is responsible for verifying the correct delivery of data from client to server and is also breaking up the data into packets and sequencing and numbering them for easy identification.TCP adds support to detect errors or lost data and to trigger retransmission until the data is correctly and completely received.

3. FILE TRANSFER PROTOCOL(FTP)

FTP is a standard network protocol used for transferring files from one computer to another over TCP/IP based network. FTP is preferred for exchanging files because it is faster than other protocol.

4.POST OFFICE PROTOCOL(POP)

The post office protocol is the protocol used by e-mail program to retrieve mail from a mail server via the internet.

5.SIMPLE MAIL TRANSFER PROTOCOL(SMTP)

It is a protocol for sending e-mail messages between the servers.

6.INTERNET MESSAGE ACCESS PROTOCOL(IMAP)

It is an internet protocol that allows distant(remote) access of mails on the mail server by an e-mail client. It supports multiple clients on the same mail box.

7.POINT TO POINT(PPP)

PPP is a protocol that establishes a direct connection between two nodes in a network.

8. TELNET

Telnet is a protocol that enables one computer to connect to another computer. This process is also known as remote Log in.

9. GOPHER

Gopher is a protocol designed to search, retrieve and display the documents from a remote sites on the internet.

10. HYPER TEXT TRANSFER PROTOCOL

It is a networking protocol for distributed, collaborative, hyper media information system.

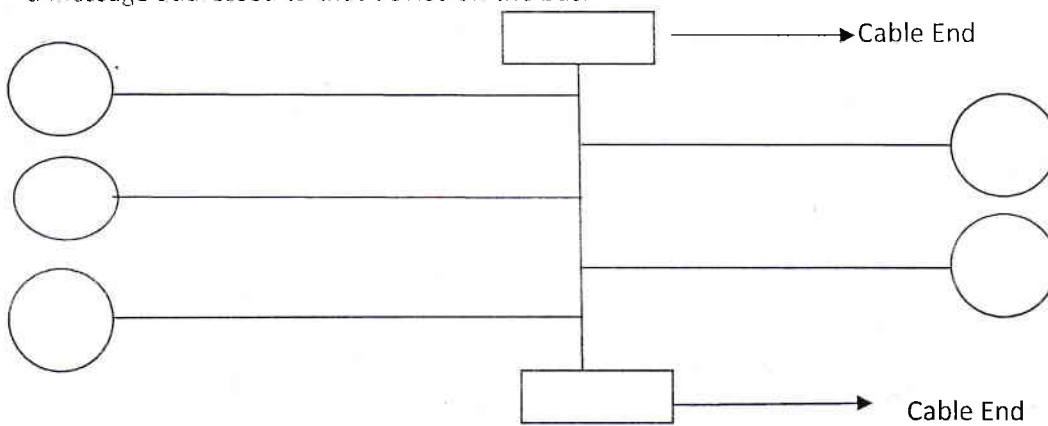
NETWORK TOPOLOGIES

Network Topology is defined as the arrangement of computers connected in a network through some physical medium such as cable, optical fiber etc. It is the method in which networks are physically connected together. It determines the shape of the network and the communication path between the various computers (nodes) of the network.

1. Bus Topology
2. Star Topology
3. Ring Topology
4. Tree Topology
5. Mesh Topology

1. BUS TOPOLOGY

In the linear Bus Topology all computers or nodes are connected to the single back bone or Bus with some medium such as twisted pair, coaxial cable with a terminator at each end. It is a passive topology which means one by one computer at a time can send a message. When a node wants to access to other nodes in the network it simply sends a message addressed to that device on the bus.

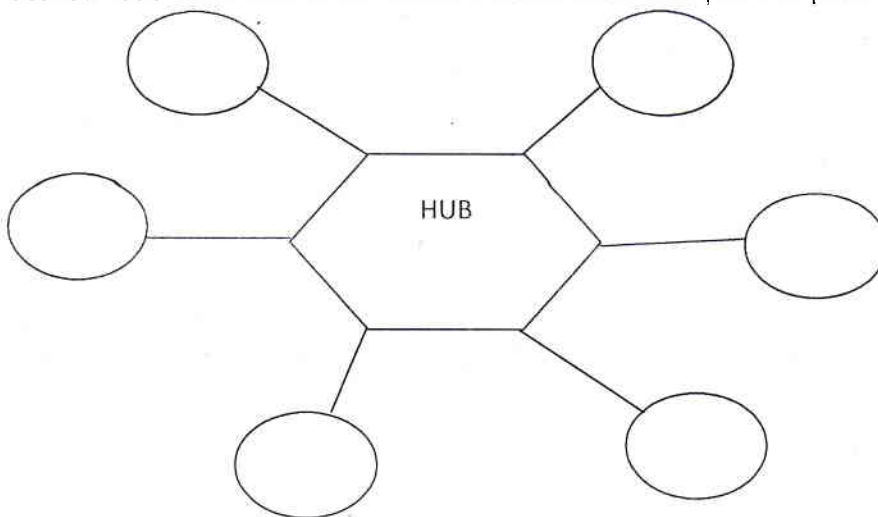


BUS TOPOLOGY

Ex Ethernet is based on BUS Topology

STAR TOPOLOGY

In the star topology, all nodes are connected to a common device known as hub. Nodes are connected with the help of twisted pair coaxial cable or optical fiber. All the messages have to be routed through the central "HUB". When nodes want to send message to other nodes, it first sends the message to the hub which forward the message to the desired node. Each node in the network is connected with point-to-point link to the hub.

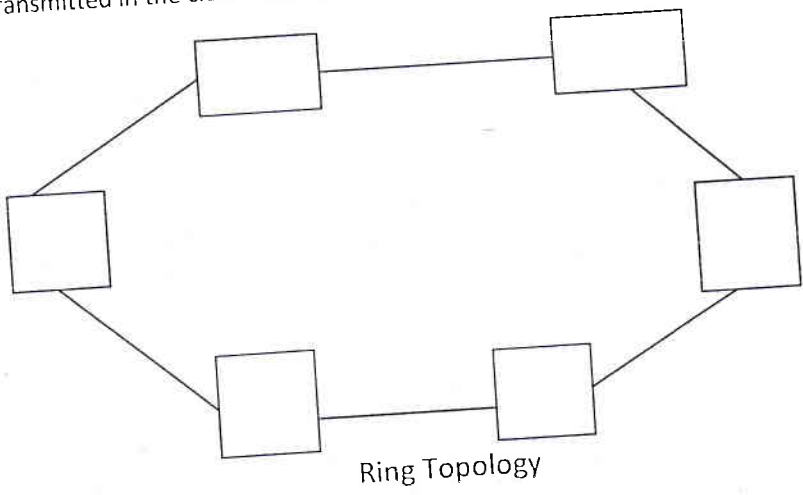


STAR TOPOLOGY

EX ATM :- (Asynchronous Transmission Mode)

RING TOPOLOGY

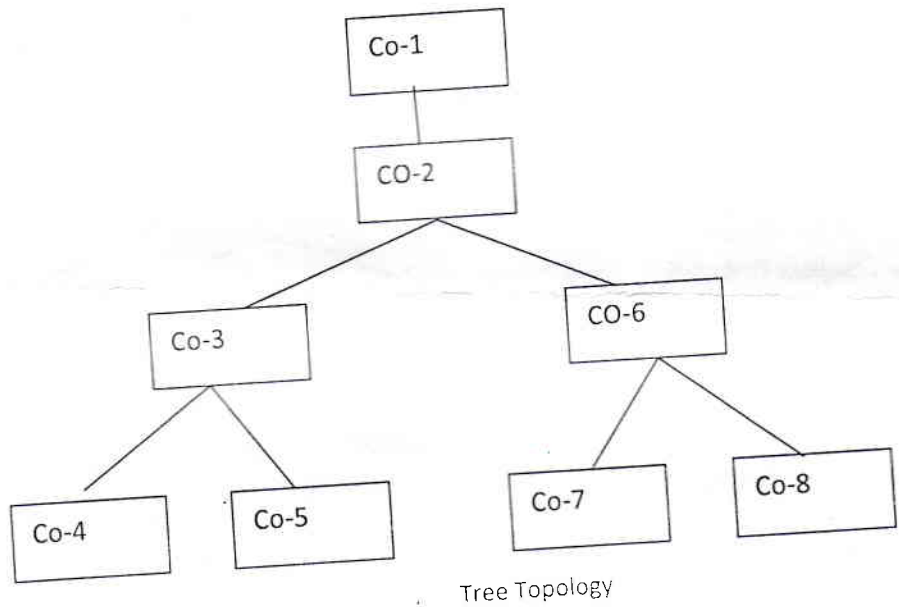
In the Ring topology, the nodes are serially connected in the form of closed ring with the help of twisted pair. Each node is connected directly the other two nodes in the network. Data travels around the ring in one direction with each device on the ring acting as a repeater. Data is transmitted in the clock wise direction from one node to another.



Ring Topology

TREE TOPOLOGY

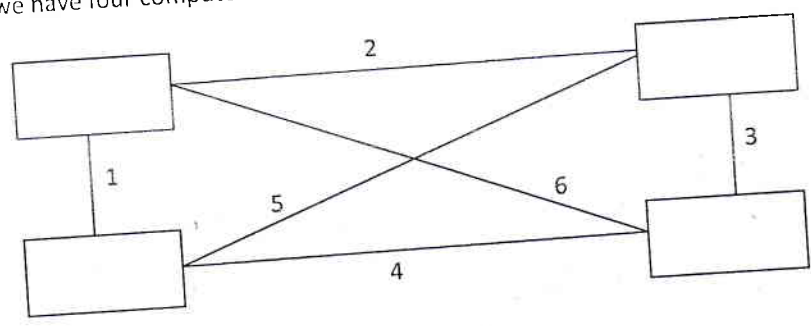
A tree topology combines characteristics of linear Bus and Star topology. This particular type of network topology is based on a hierarchy of nodes. In this topology the branches of the Bus topology are connected to other Bus topology networks, thus allowing more stations to access the bus. Only hub devices connect directly to the tree bus and each hub functions as the root of a tree of devices.



Tree Topology

MESH TOPOLOGY

Mesh Topology involves the concept of routes. Messages sent on a mesh network can take any several possible path from source to destination. In this topology computer is connected to every in point-to-point mode. If we have four computers then we must have six links. So if we have "n" computers then we have $(n(n-1))/2$ Links.



Mesh Topology

This type of topology is commonly used for wireless network.

... a common connection point for devices in a network. Hubs are commonly used to collect segments of a LAN. It contains multiple... When a packet arrives at one point it is copied to the other ports so that all the segments of the LAN can see all the packets.

REPEATER

It is a network device used to regenerate or replicate a signal. These are used in transmission system to regenerate Analog or Digital signal distorted by transmission lost. Analog repeater frequently can only amplify the signal while digital repeater can re-construct a signal to near its original quality.

SWITCHES

A network switch is a computer networking devices that connects all the devices together on a computer network by using packet switching to receipt, process and forward data to the destination device. Unlike less advance network hub, a network switch forwards data only to one or multiple devices that need to receive it , rather than broadcasting the same data out of each of its port.

BRIDGE

A telecommunication network, A bridge is a product that connects a local area network to another local area network (LAN) that uses the same protocol.

Example: Ethernet or Token ring.

ROUTERS

It is a device that forwards data packets along network. A router is connected to at least two networks commonly two LANS or WANS. Routers are located at the places where two or more network connects. This connecting point of the two networks is known as gateway.

GATEWAYS

A network gateway is an internet working systems capable joining together two networks that use different base protocols. A network gateway can be implemented completely in software or computers in hardware or as a combination of both.

NIC

NIC is a computer circuit board or card that is installed in a computer so that it can be connected to a network. NIC provides the computer with a dedicated, full time connecting to a network.

TYPES OF NETWORKS

1. LOCAL AREA NETWORK(LAN)
2. WIDE AREA NETWORK(WAN)
3. METROPOLITAN AREA NETWORK(MAN)

LAN

LAN is a digital communication system capable of inter connecting a large numbers of computer, terminals and other peripheral devices within a limited geographical area, usually less than 1 km.

Through this type of network, users can easily communicate each other by sending and receiving messages. Data transfer rate over a Local Area Network is usually 1 mbps to 100 mbps.

WAN

WAN is a digital communication system where a group of computers are connected in a large geographical area such as country, continent etc. The transmission media used in WANs are normally public systems such as telephones lines, microwave links. The example of WAN is the internet itself.

MAN

MAN is a collection of Local Area Networks. MAN connects computers located in the same geographical area such as a city or town. The geographical area covered by a MAN is larger than LAN but smaller than WAN. MAN is generally owned by private organization. The transmission media used in MAN are normally optical fibers or micro wave circuits. The most common example of MAN is cable television network within city.

LAN	WAN
LAN is limited to a small geographical location	A WAN is spread over a very large geographical location
The data transmission rate is generally higher in case of LAN	The data transmission rate is lower in case of WAN
The cost of the communication is less in case of LAN	The cost of communication is higher
LAN is established by wired media	A WAN is always established by using wireless media

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INTERNET SERVICES

1. Email – It stands for electronic mail.

Email is a method of sending messages, voice, text, picture and graphics from one computer to another over a computer network in a digital form. It is a type of client / server application. Users can send E-mail over the internet to any location that has a telephone or wireless digital service.

An E-mail Consists of Two components

- a) Message header b) Message bod.

ADVANTAGES OF E-MAIL

- i) Easy to use.
- ii) Speed
- iii) Easy to identify
- iv) Reliable and secure
- v) Easier for reference
- vi) Automated E-mail
- vii) Use of Graphics

FORMAT OF THE E-Mail

Consider the e-mail ID – education@gmail.com

In the above example **education** is the local part, which is the name of a mail box on the destination computer where finally the mail will be delivered ,-

g-mail is the mail server where the mail box education exists.

.com - is the type of organization on net which is hoisting the mail server.

SOME OF THE MAIL ORGANISATION CATEGORIES

- . com – Commercial institution or organization
- . edu - Educational institution
- . gov - government site
- . mil - military site
- . org - private organisation

- 2. **WWW-** It is a system of internet server that supports specially formatted documents. The documents are formatted in a Markup language called **HTML** which is accessed via the internet it is an information sharing model that is built on top of the internet.
- 3. **CHARTTING** – Real time communication between two users via computer. Once a chart has been initiated either user can enter text by typing on the key board or the entered text will appear on other's user monitor. Most network and online services offer a chart features.
- 4. **ONLINE SHOPPING** - The act of purchasing product or services over the internet . People can do shopping by seating at the home or offices over internet.
- 5. **ISP-** It is a company that provides individuals and other companies' access to the internet and the other related services such as website building and virtual hosting.
- 6. **INTERNET CONFERENCING** - Internet or web conferencing allows users to carry business meetings and seminars, make presentations, provide online education and offer direct customer support.
- 7. **ELECTRONIC NEWS PAPER-** An electronic news paper is a self-contained, reusable and refreshable version of a traditional news paper that acquires and holds information electronically.

OF INTERNET CONNECTIVITY

- a) Dial-up connection
- b) Broadband connection
- c) Fixed Broadband connection
- d) Fixed wireless and satellite connection
- e) Mobile Broadband connection
- f) Wireless Hot Spots

MODEM

MODEM stands for modulator Demodulator. It acts as an interface between the computer and telephone lines to transmit data.

MODEM is a computer peripheral that allows the user to connect and transmit or receive Data to and from others computers over telephone lines.

FILE

A computer file is a resource for storing information which is available to a computer program and is usually based on some kind durable storage. A collation of data or information that has a name called a file name.

Files are stored in hard disk, optical drive and other storage devices.

There are different types of file i.e. Data file, text file, & program file etc.

FOLDER

A folder is a location that stores multiple files and other folder. Folders allow users to organize their files in a way that makes sense to them.

The computer operating system also used folder to store data such as system file, library files etc.

Folder takes small space on a hard disk because folders are really just pointer to file.

SEQUENTIAL ACCESS FILE

In Sequential file, the records are arranged in the ascending or descending order of a key field where data items are arranged serially in a sequence one after another. In order to access a particular record in the file, it is necessary to process in serial order from the beginning. In other words, the records can be accessed in the same manner in which they have been physically stored. It is not possible to start reading or writing a sequential file from anywhere except at the beginning. So if somebody wishes to access record no. 20 then he must go through the first 19 records before one can get to record no.20.

These types of file organization are generally maintained on magnetic tapes which are best suited for batch processing.

Examples: - Sequential access mechanism is similar to storing songs in cassettes by an audio tape recorder.

DIRECT ACCESS OR RANDOM ACCESS FILE

In these types of organizations the files are stored in the direct access storage device like magnetic disk using an identifying key. This identifying key relates a record to its actual storage position in the file. In order to locate the desired record, the computer directly locates the key without searching through any other records.

In this arrangement one can access to any record which is situated at the middle of the file without reading or passing through other records in the file.

For example students records can be accessed by using the student roll no assigned to them.

INDEXED SEQUENTIAL ACCESS METHOD (ISAM)

The Indexed Sequential Access Organization is a combination of both sequential and random access file organization. In this method the records are stored sequentially on a direct access device and data is accessible either randomly or sequentially. This type of organization is best suited for both batch and online processing.

Records are stored sequentially by a key record in a direct access storage device (DASD) but an index is also used to speed up access to the records. Indexes are used to permit access to selected records without searching the entire file. So computer can use an indexed sequential access method to locate a record by using an index instead of searching it from the beginning of the file. The records of the file can be stored in a random sequence but the index table is in sorted sequence on the key value.

Sl.no	File Organization method	Method of Access	Possible medium
01	Sequential	Serial(Sequential)	Magnetic Tape
02	Random	Random	Magnetic Disk
03	Index Sequential	Sequential ,Random	Magnetic Disk

Different Between File & Folder

<u>File</u>	<u>Folder</u>
Files store data	Folders store both files & other folder
Files take space in the hard disk	Folders usually take no space in the hard disk
Files are smaller in size	Folders are normally bigger in size as they hold many files & folders

DATA: -

Data is defined as the description of basic facts about the activities of a business.
Examples: - Name, RollNo, date, cost, Basic Pay etc

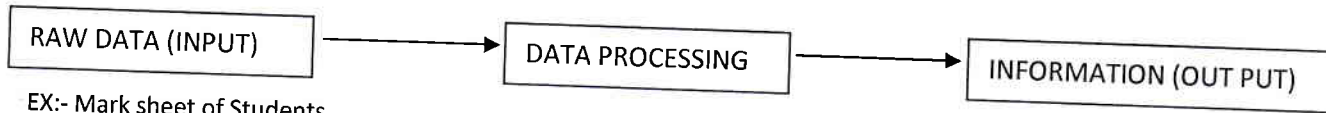
INFORMATION: -

It is the set of Data which has been converted or organized into a more useful form.
Example: - Payslip, Marksheet etc

DATA PROCESSING: -

It is defined as sequence of operations on data to convert into a more useful form or information. It includes classification and transfer of data from one place to another.

Otherwise it can be defined as the process of collecting all items of data together to produce meaningful information. Data processing is mostly associated with business and commercial work.



EX:- Mark sheet of Students

METHODS OF DATAPROCESSING

Data Processing can be accomplished through following method.

1. MANUAL DATA PROCESSING.
2. SEMI-MANUAL DATA PROCESSING.
3. MECHANICAL DATA PROCESSING.
4. ELECTRONIC DATA PROCESSING.

MANUAL DATA PROCESSING.

In this type of Data Processing data is processed and transferred manually from one place to another. It deals with Abacus, Slide-Rule, Logarithm table etc. This method of Data Processing is very slow and an error may occur in the output.

SEMI-MANUAL DATA PROCESSING.

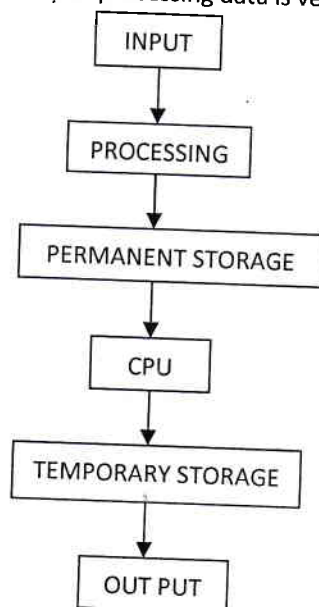
This method of Data Processing involves the use of calculator, totaling machines etc. This type of Data Processing is slightly faster than manual Data Processing and less error occur in output in compare to manual processing.

MECHANICAL DATA PROCESSING. This method of Data Processing used devices like printing press, Milo Meter and facet calculator.

ELECTRONIC DATA PROCESSING

In this method, processing is done by using some modern Electronic device like computers. So computer is known as Electronic Data Processing machine or EDP.

This method of processing data is very fast and output obtained is accurate.



MODES OF DATA PROCESSING

1. BATCH PROCESSING
2. ONLINE PROCESSING.

BATCH PROCESSING

It is processing of data where data is collected as input in batches and results are obtained periodically. Data collection is usually done off line.

Ex: - Pay Roll.

ONLINE

It is a Data processing system where the result of data processing transactions is available immediately. The transaction of processing, file updating and data collection processes are also handled simultaneously by the online application system.

Ex: - Banking system

Stock Exchange

Airlines reservation system.

DATA STORAGE

It is the holding of data in electromagnetic for access by the computer. Mainly there are two kind of data storage.

- i) Primary Storage
- ii) Secondary Storage

Primary storage is the data that is stored in RAM & other memory devices Secondary storages data is stored on external storage device such as hard disk, tape, CD etc.

DATA RETRIEVAL

Data retrieval is process of identifying and extracting data from a data base, based on a query provided by the user or applications. It enables the fetching of data from a data base in order to display on a monitor or use within an application.

CHAPTER –5: PROBLEM SOLVING METHODOLOGY

Problem solving

Solving problems is the core of computer science. Programmers must first understand how a human solves a problem, then understand how to translate this "algorithm" into something a computer can do, and finally how to "write" the specific syntax (required by a computer) to get the job done. It is sometimes the case that a machine will solve a problem in a completely different way than a human.

Computer Programmers are problem solvers. In order to solve a problem on a computer you must:

1. Know how to represent the information (data) describing the problem.
2. Determine the steps to transform the information from one representation into another

Algorithm, Pseudo code and Flowchart

Algorithm

An algorithm is a set of specific steps to solve a problem. Think of it this way: if you were to tell your 3 year old niece to play your favorite song on the piano (assuming the niece has never played a piano), you would have to tell her where the piano was, and how to sit on the bench, and how to open the cover, and which keys to press, and which order to press them in, etc, etc, etc.

Definition:

- An algorithm is a well-defined procedure that allows a computer to solve a problem.
- Algorithm is defined as the step-by-step solution of problem in user's language.
- It is considered as an effective procedure for solving a problem in finite number of steps.
- Another way to describe an algorithm is a sequence of unambiguous instructions.
- In fact, it is difficult to think of a task performed by your computer that does not use algorithms.

The characteristics of Algorithm are

- Precise
- Unambiguous
- Finite termination
- Unique solution

Example:

1. Algorithm to find out sum of two numbers to be taken as input.

Step-1 Read the 1st number x Step-2 Read the 2nd number y Step-3 Sum=x+y
Step-4 Print Sum

This is an example where only sequence is exhibited

2. Algorithm to find out larger between two numbers to be taken as input.

Step-1 Read the 1st number x Step-2 Read the 2nd number y Step-3 If $x > y$

Then Print x Else if $x < y$ Then Print y

Else Print —Both are Equal —

This is an example where Branching is exhibited

3. Algorithm to find out sum of first 10 natural numbers. Step-1 $i=1$, Sum=0

Step-2 Repeat step 3 and 4 while $i < 10$ Step-3 Sum= Sum+i

Step-4 $i=i+1$ Step-5 Print Sum

This is an example where Repetition is exhibited

Pseudocode

It is a concise description algorithm in English language that uses programming language constructs. It contains outlines of the program that can be easily converted to program. It focuses on the logic of the algorithm without giving stress on the syntax of programming language. This is meant for understanding the logic of the program easily. Flowchart can be considered as an alternative to pseudo code. Several constructs/key words of programming language can be used in the algorithm to write the pseudo code.

Some of them are

If ... Endif

Do while ... end do While ... end while Repeat ... until

For ... end for Case end case Call

Return

Flowchart

Flowchart is a graphical or symbolic representation of the process of solution to a problem or algorithm. It helps to visualize the complex logic of the solution of the problem in a simplified manner through diagrammatic representation. Each step of the algorithm is presented using a symbol and a short description. The different symbols used for the flowchart are

S y m b o l	Purpose	Description
	Flow line	Indicates the flow of logic by connecting symbols.
	Terminal(Stop /Start)	Represents the start and the end of a flowchart.
	Input/output	Used for input and output operation.
	Processing	Used for arithmetic operations and data-manipulations.
	Decision	Used for decision making between two or more alternatives.
	On-page Connector	Used to join different flowline
	Off-page Connector	Used to connect the flowchart portion on a different page.
	Predefined Process/Function	Represents a group of statements performing one processing task.

Generation of Programming Languages

Programming Language

Programming language is a tool to express the logic or instructions for understanding of the computer. Any programming language has two components:

- a) Syntax
- b) Semantics

Syntax refers to the rules to be followed for writing valid program statements. Compiler can detect errors in syntax while compiling the program. Semantics is associated with logic of the program. Compiler cannot detect the semantic error. The user of programmer can diagnose semantic error.

There are good numbers of High level languages, each meant for specific area of data processing. Commonly known languages are BASIC, FORTRAN, COBOL, Pascal, C, C++ etc. While FORTRAN is good for Numerical and scientific calculation, COBOL is good for Business applications involving large amount of data handling.

Generations of Programming Language

The Programming languages can be classified into 4 generations:

1st Generation: Machine Language 2nd Generation: Assembly Language 3rd Generation:

High Level Language 4th Generation: Very High Level Language

Machine Level language contains instructions in binary form i.e. in 0s and 1s. Thus writing instruction was very difficult and needs heavy expertise. This was used in early days computers.

Assembly level language instructions were written using symbolic codes known as mnemonics. In comparison to Machine language, it is relatively easier to write program, but still it requires lot of expertise. A translator called assembler is used to translate assembly language program to machine level language.

High level language contains instructions in English like words so that user will feel easier to formulate and write the logical statements of the program. Here the logic may spread over multiple statements as against a single statement in assembly language. It uses a translator called compiler for translation of High level language program to machine level language program. There are many High level languages used for programming such as BASIC, FORTRAN, COBOL, PASCAL, C, C++ etc.

Very High Level language otherwise called as 4GL uses nonprocedural logical statements.

A typical example of 4GL is the query language such as SQL.

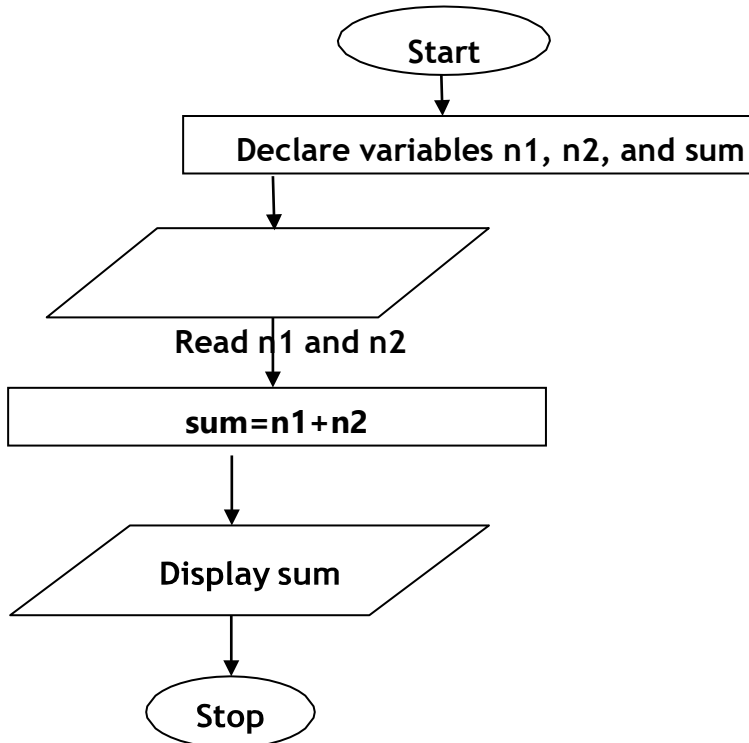
Structured Programming Language

Structured Programming is also known as Modular Programming. In this type of programming technique, the program shall be broken into several modules. This helps in managing memory efficiently as the required module of the program will be loaded into the memory only and not the entire program. This will also enhance code reuse. Writing, understanding, debugging and modifying the individual module of the program is also easier.

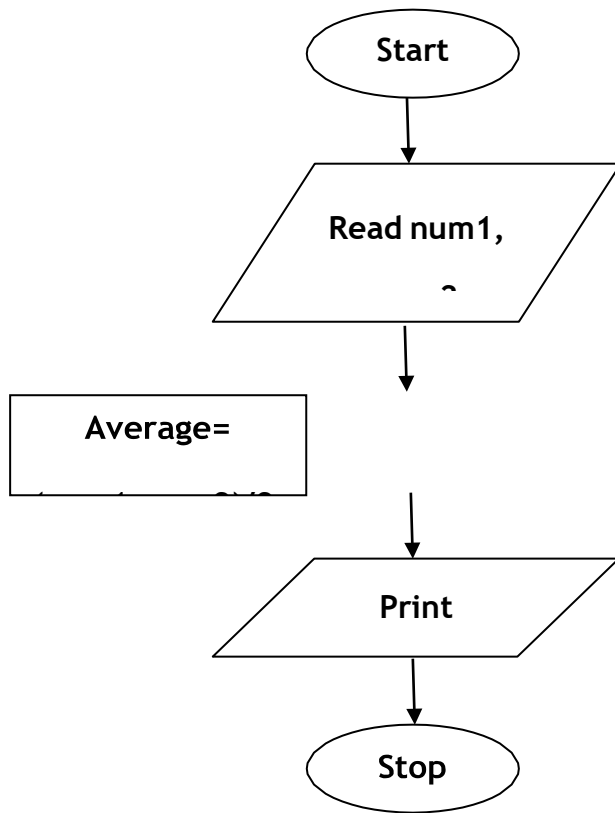
Examples of Problem solving through Flowchart

Example

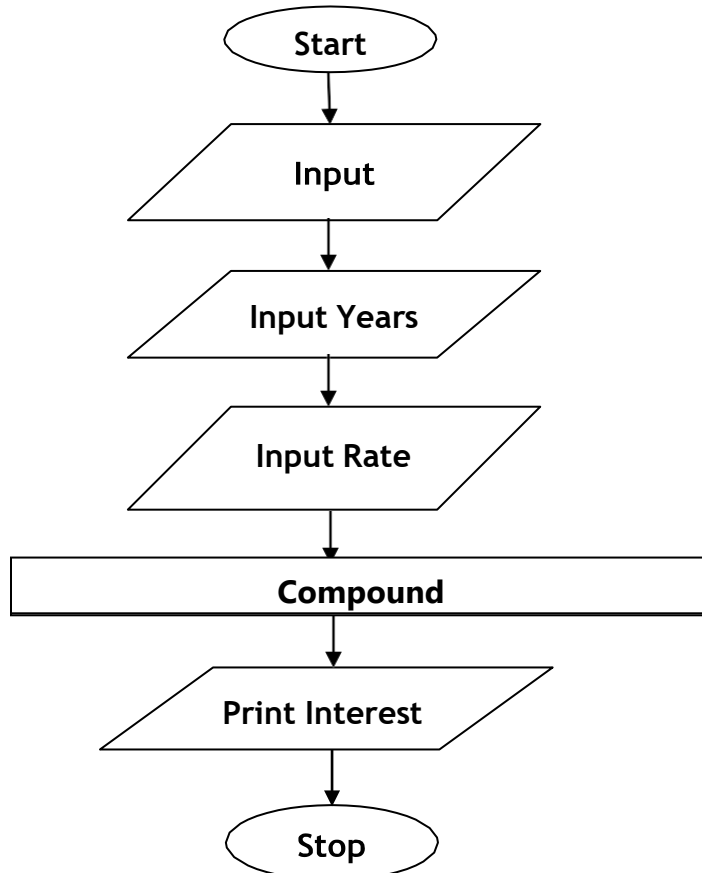
1. Add two numbers entered by the user.



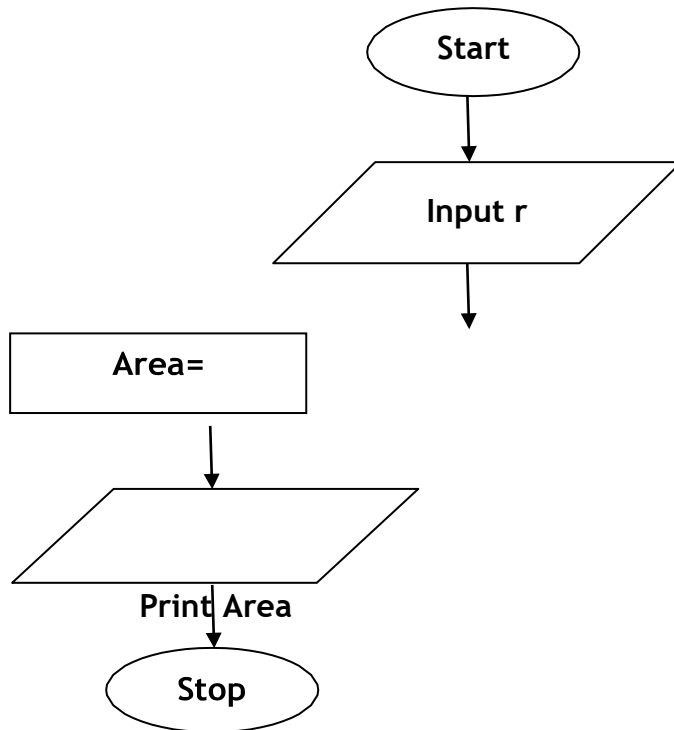
2. Flowchart to calculate the average of two numbers



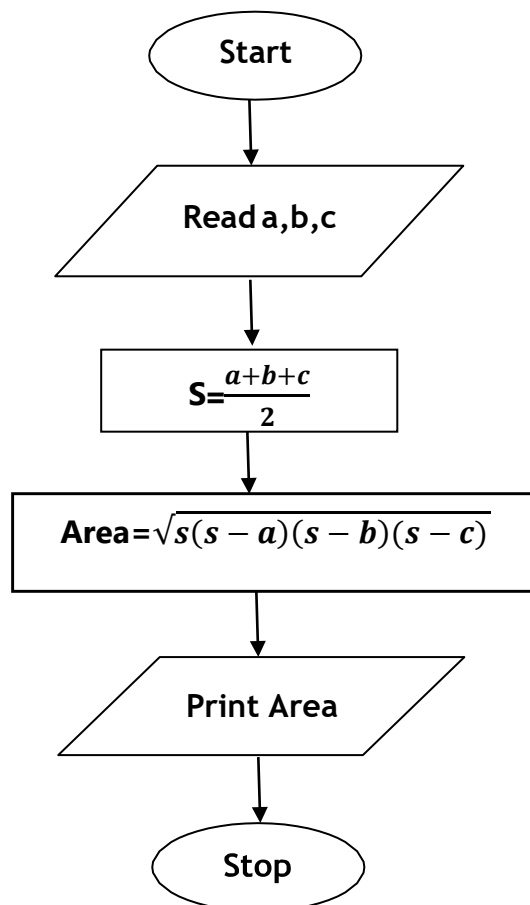
3. Flowchart to Calculate the Interest of a Bank Deposit



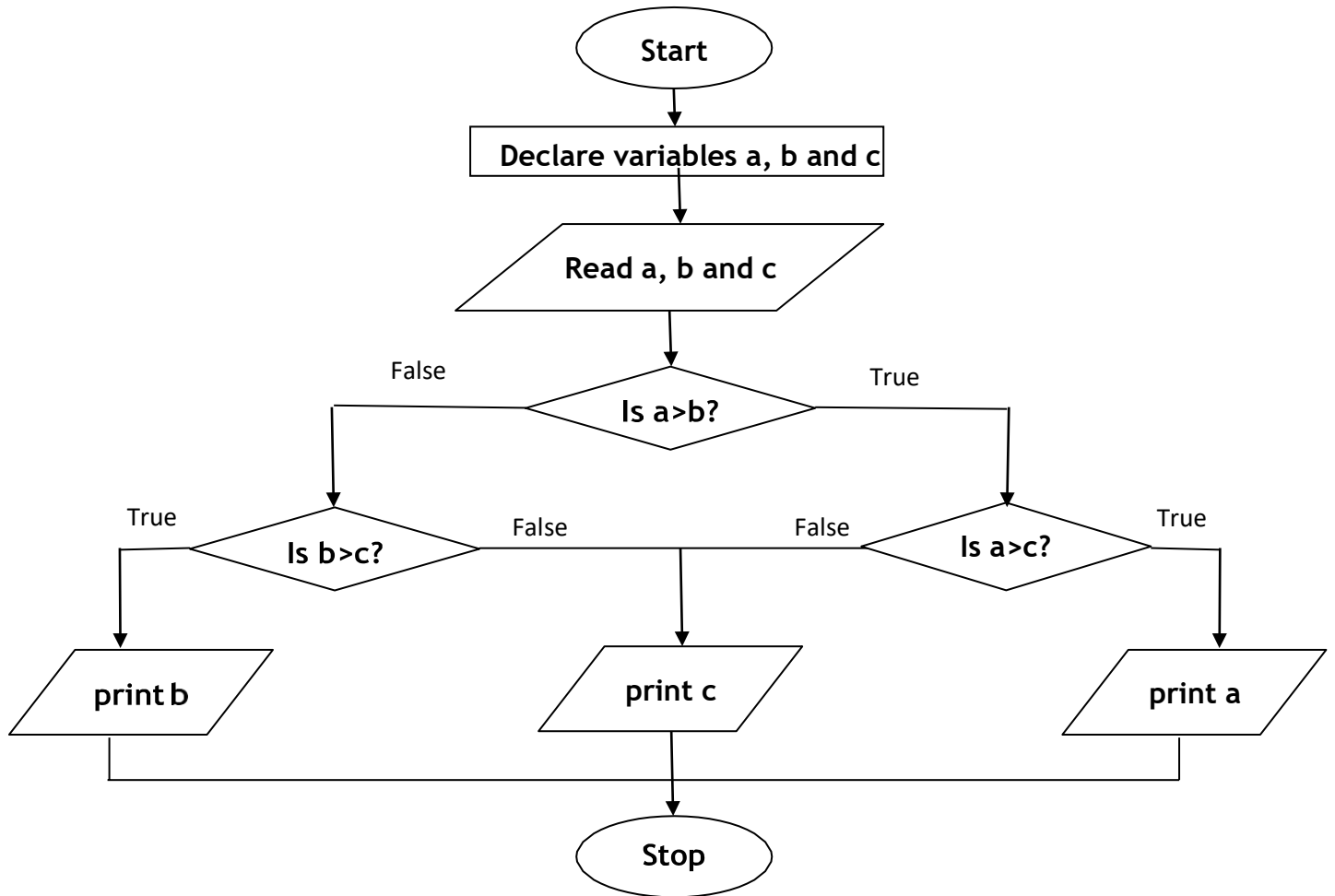
4. Flowchart to calculate the area of a circle.



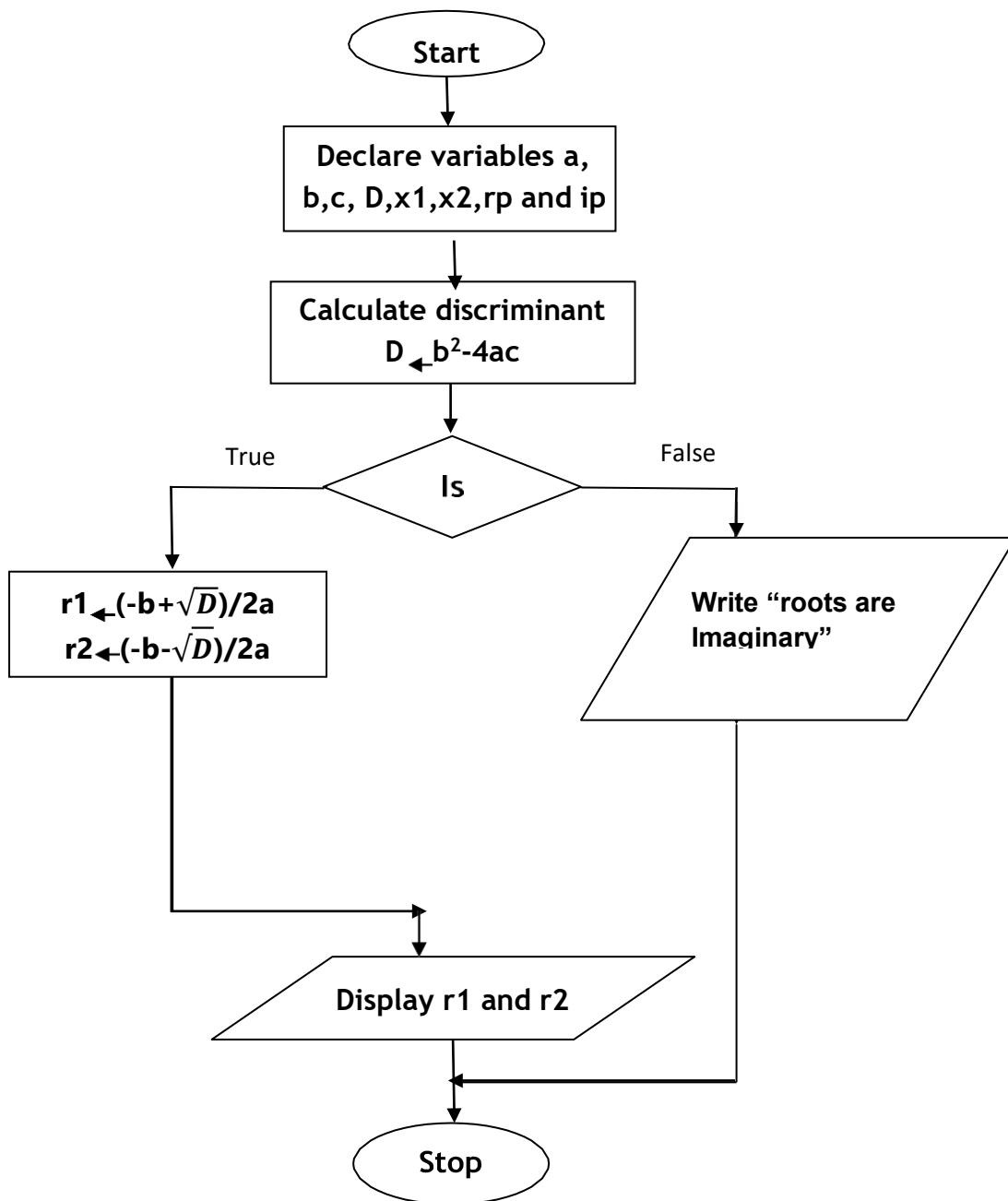
5. Flowchart to calculate the area of a triangle.



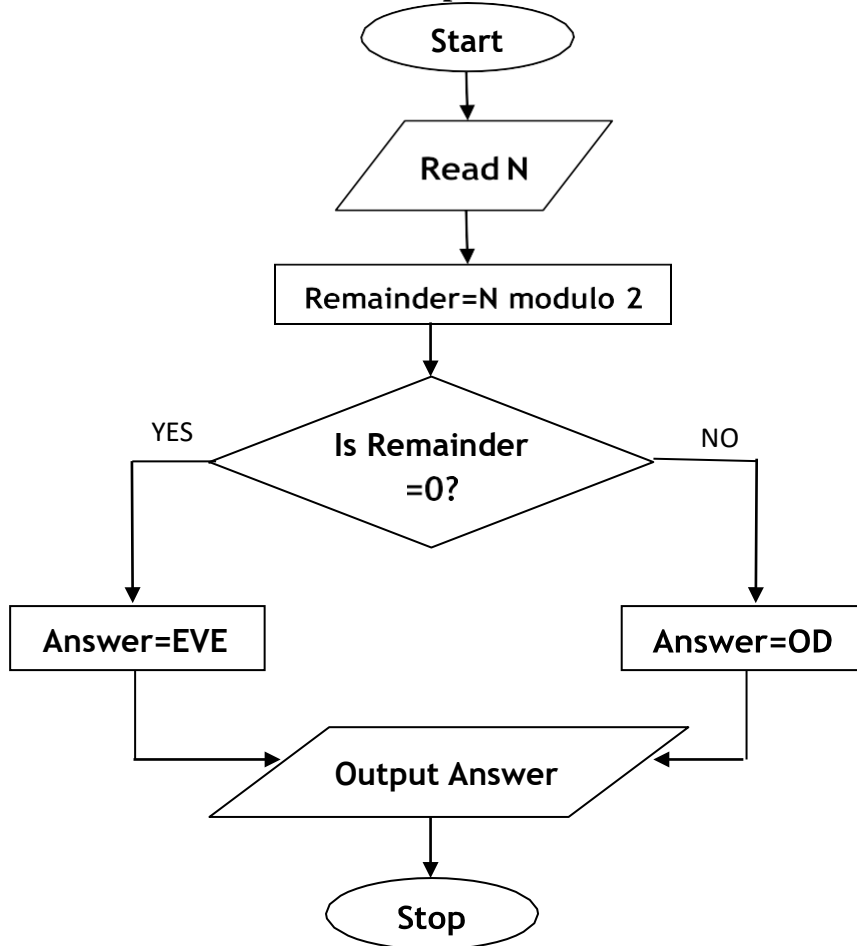
6. Find the largest among three different numbers entered by the user.



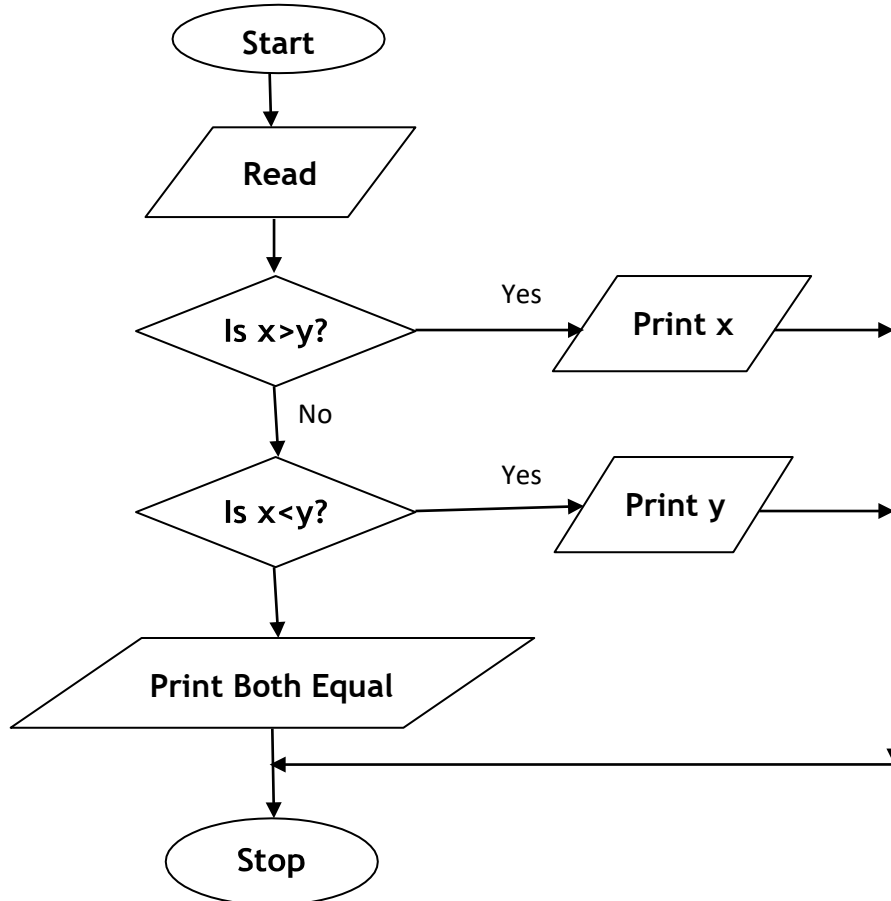
7. Find all the roots of a quadratic equation $ax^2+bx+c=0$



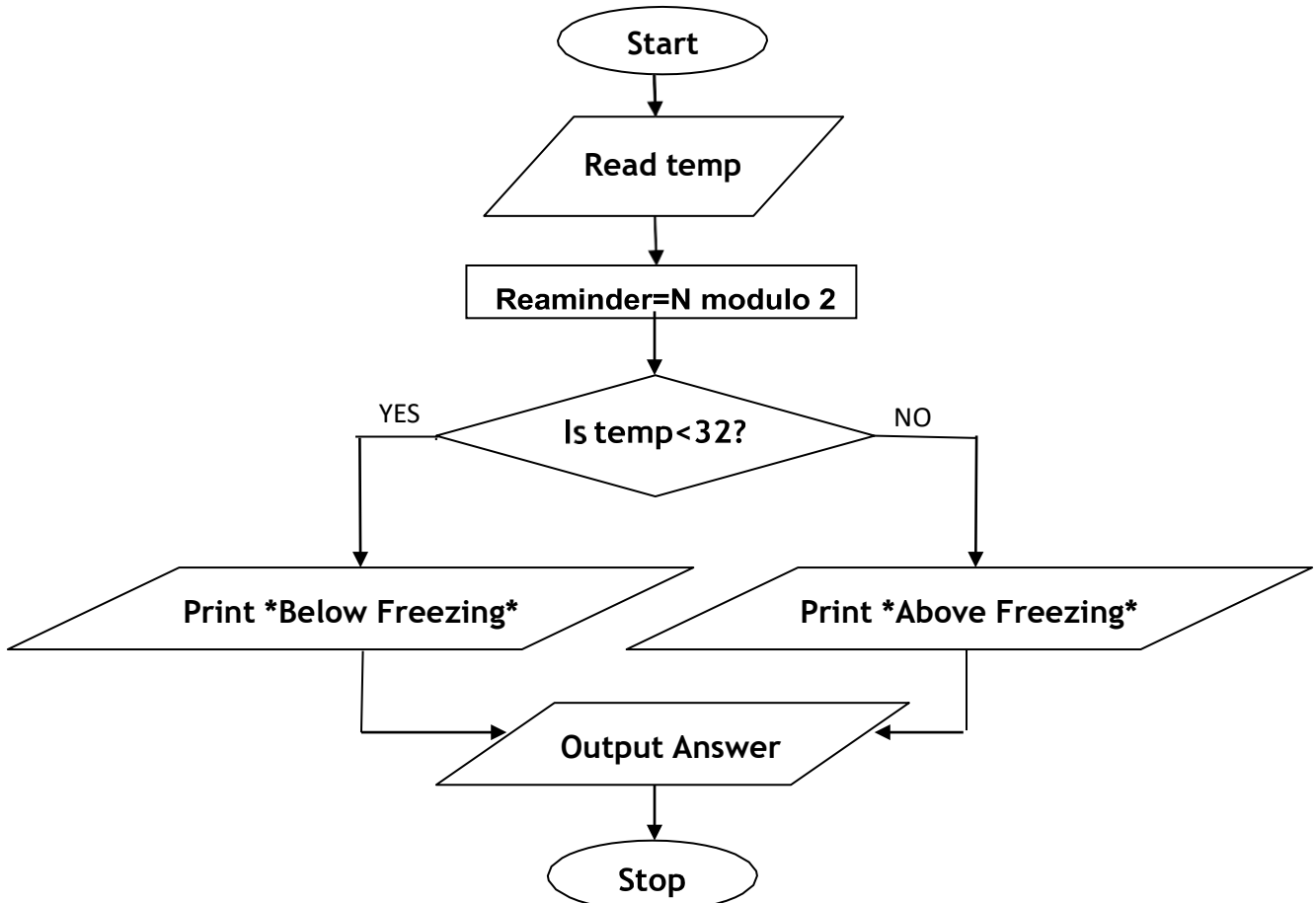
8. Flowchart to Determine and Output Whether Number N is Even or Odd



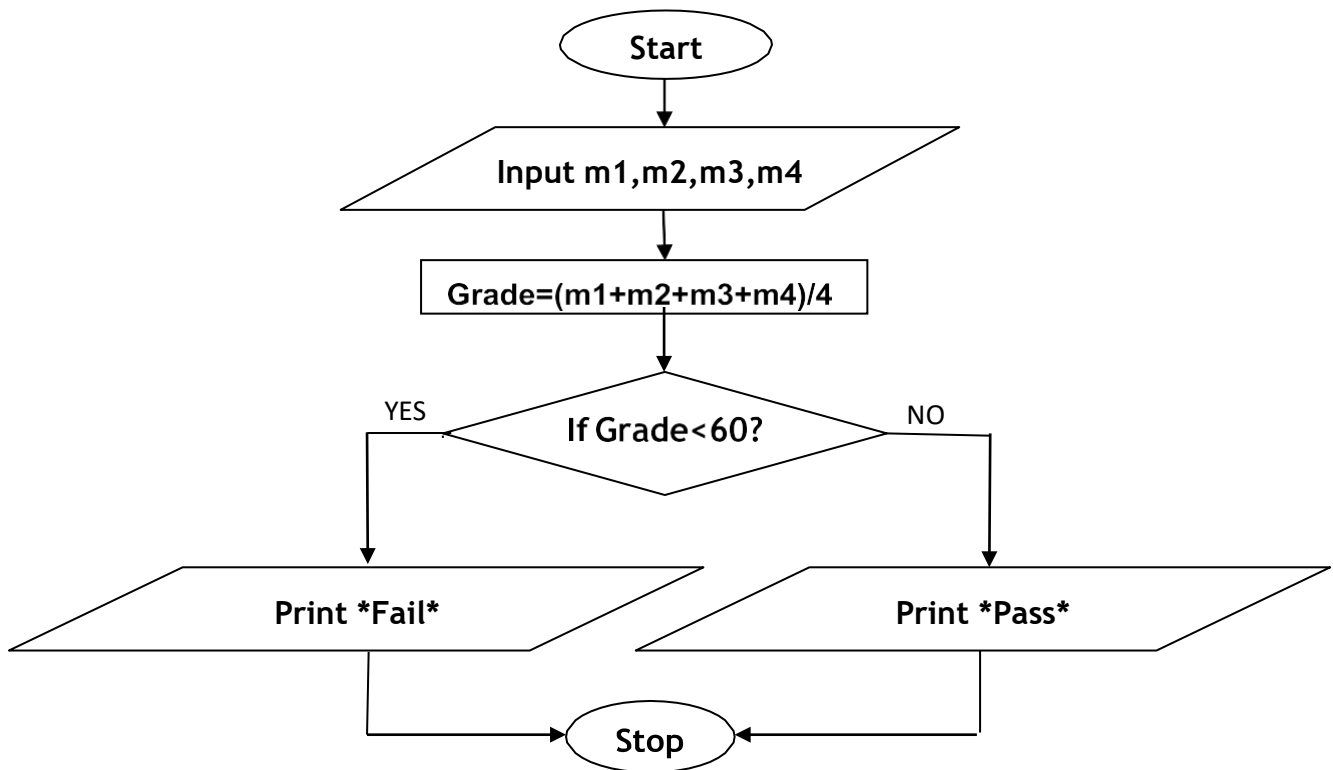
9. Flowchart to find out larger between two numbers to be taken as input



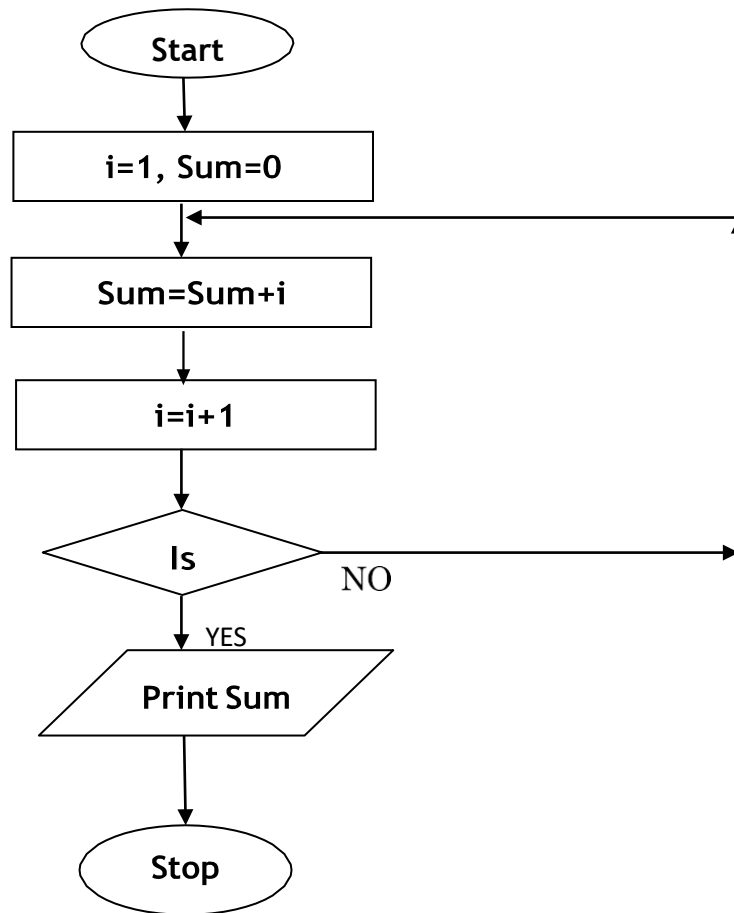
10. Flowchart to Determine Whether a Temperature is Below or Above the Freezing Point



11. Flowchart to Determine Whether A Student Passed the Exam or Not



12. Flowchart to find out sum of first 10 natural numbers



C - PROGRAMMING

Def:- "C" is a general-purpose procedural programming Language. It was initially developed by Dennis Ritchie at Bell Laboratory during the year 1972.

It was mainly used to develop software like operating system, database and compilers.

It is an excellent Language to learn to program for beginners.

C - introduction.

- ① Keywords and Identifiers
- ② Variables and constants.
- ③ C - Data Types
- ④ C - INPUT/OUTPUT
- ⑤ C - OPERATORS

Character set

:- A character set is a set of alphabets, letters, and some special character that are valid in C Language.

Alphabets

Upper case - A, B, C, ..., Z

Lower case - a, b, c, ..., z

digits - 0 to 9

special character - \langle , \rangle , $($, $)$, $\{$, $\}$
etc

C accepts both lower case and uppercase alphabets as variables and function.

C - keywords

Keywords are predefined reserved words used in programming that have special meanings to the compiler.

As "C" is a case sensitive language, so all the keywords must be written in lower case.

Example of keywords

auto, break, case, char, continue, do,

const, double, else, for, if, goto, float,

int etc.

C- Identifiers :- Identifiers refers to name

given to entities such as variables, function etc. Identifiers are created to give a unique name to an entity to identify it during the execution of program.

Example

~~at~~ money, sum

Here money, sum are identifiers

Also remember identifiers names must be different from keywords.

Hence you can not use "int" as an identifier because "int" is a keyword as discussed earlier.

Rules for naming Identifiers :-

① A valid identifier can have letters (both uppercase and lowercase), digits.

and underscore (-)

② The first letter of an identifier should be either a letter or an underscore.

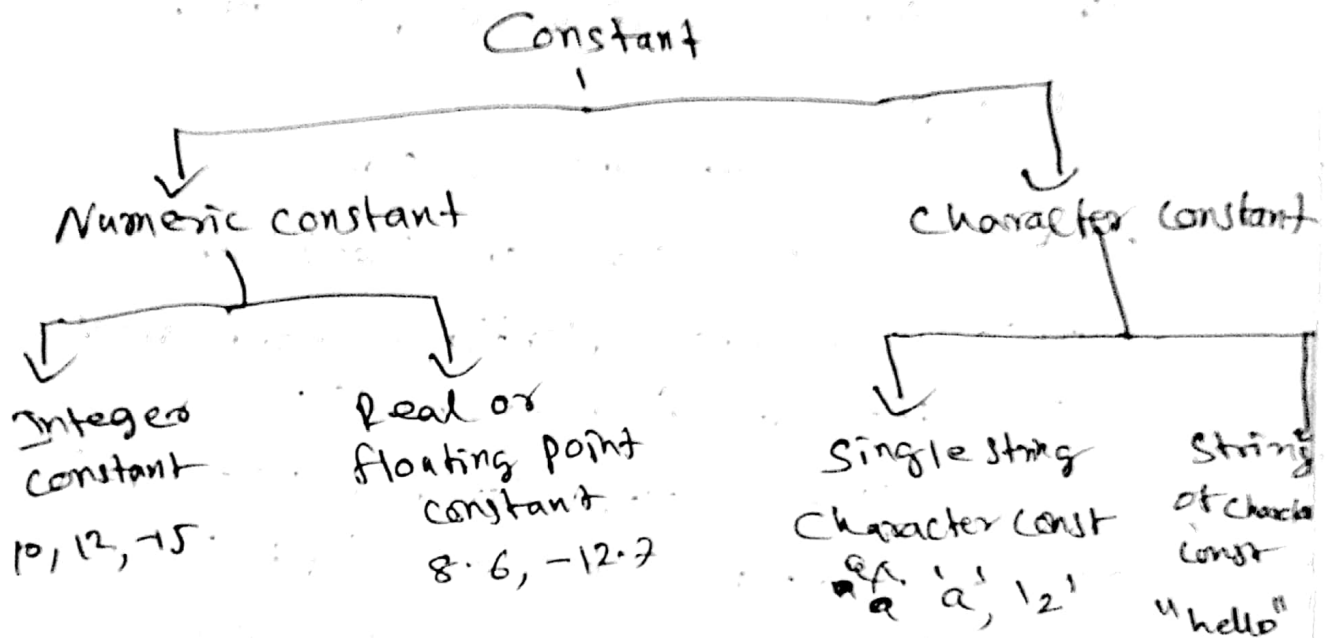
③ Keywords can not be used as identifiers.

④ Can not be longer than 31 characters but it is a good practice to be shorter length.

Example - sum, b-pay, etc.

CONSTANT

Constants in "C" are the fixed values that are used in program and its value does not change during the entire execution of program.



Rules

Integer constant

- ① An integer constant must be at least one digit.
- ② It must not have a decimal point.
- ③ It can either be positive or negative.
- ④ no comma or blanks are allowed within an integer constant.
Ex - 27, -15 etc.

(4)

Real or Floating point constant

- ① A real or floating point constant must at least contain a decimal point
- ② It can either be positive or negative
- ③ no commas or blanks are allowed within a real constant.

Ex - 18.93, -15.65 etc.

Single String Character constant

- ① any single character enclosed within a single quotation ('')

Ex - 'a', '2' etc.

String of character const.

- ① String of characters enclosed within double quotation ("")

Ex - "hello", "yes"

VARIABLE

A variable is any characteristic, number or quantity that can be measured or counted. A variable is also called as data item.

Ex - age, sex, sam etc

(5)

Variable declaration :- In "C" programming

Variables which are to be used in different parts of the function have to be declared.

In program variable declaration tells the computer two things -

① The name of the variables.

② The type of data the variable will hold.

Type Declaration :- C-DATA TYPES

<u>Basic data types</u>	<u>Byte required</u>
-------------------------	----------------------

① int	2 byte
-------	--------

② float	4 byte
---------	--------

③ char	1 byte
--------	--------

Example

```
int sum;
```

```
float average, area;
```

```
char name;
```

INPUT/OUTPUT STATEMENT :-

Input means to provide the program with some data to be used in the program.

61

Example

scanf

output

output means to display data on screen or write the data to a printer or a file.

Ex -

printf

Structure of C program

```
#include <stdio.h>
```

```
#include <conio.h>
```

```
main()
```

```
{ → Beginning of program
```

Type declaration

```
----- } C-statement  
-----  
-----
```

```
getch();
```

```
} → End of C program.
```

(7)

Assignment

Example-I

write a program in C- to add two numbers

```
#include <stdio.h>
```

```
#include <conio.h>
```

```
main()
```

```
{  
    int a, b, c;
```

```
    printf("Enter the first number");
```

```
    scanf("%d", &a);
```

```
    printf("Enter the second number");
```

```
    scanf("%d", &b);
```

```
    c = a + b;
```

```
    printf("sum of two numbers %d", c);
```

```
    getch();
```

```
}
```

DASI
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Example-2

Assignment

Write a program in C. to calculate area of a circle.

```
#include <stdio.h>
#include <conio.h>
main()
{
    int r;
    float a;
    printf("Enter the value of radius");
    scanf("%d", &r);
    a = 3.14 * r * r;
    printf("Area is = %f", a);
    getch();
}
```