

Computer: is an electronic device which is used to perform operations on raw data as per instruction given by user. They are (1) It accepts data or instruction through input.

(2) It stores data.

(3) It can process the required data by the user.

(4) It gives result as production.

(5) It controls all functions inside the computer.

Input → Key board, mouse. ① Find devices which give output and input of system?

↓
Processor → CPU

↓
Output → Monitor, Printer.

② Data / Information

③ Processing memory

④ Booting.

⑤ Buffer / spooling.

Software = set of programs

Computer is an electronic device which performs task given by users with extremely fast speed and accuracy.

Like another device of machine, a computer has also a number of parts. Computer system consists of three main parts: input, output and central processing unit and output

Input unit: It converts input data into binary codes.

It sends data to main memory of computer.

CPU: CPU is the brain of computer.

An electronic circuitry that carries out the instruction given by a computer program.

- ① CPU can be classified into 3 parts:-
① CU:- It reads instructions from memory and generates signals to activate other parts of computer.
- ② ALU:-

- ③ MU:- used to store data and instruction before and after instruction.

RAM is primary memory.

SSD vs Hard disk?

Output units: It accepts data or information sends from main memory of computer.
It converts binary coded informations in High level languages.

Hardware: Hardware represents the physical components of a computer i.e., the component that can be seen and touched.

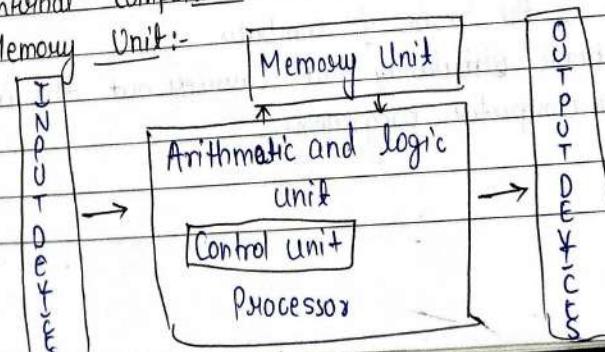
Hardware Components: ① Input devices:- keyboard, mouse, etc.

② Output devices: Printer, monitor, scanner, etc.

③ Secondary storage devices: Hard disk, USB, CD, DVD, etc.

④ Internal components: CPU, motherboard, RAM, etc.

⑤ Memory Unit:



Input unit: are used by the computer to read the information. The most frequently used input devices are keyboard, mouse, joysticks, trackballs, microphones and so on. Whenever a key is clicked the machine letter or digit is interpreted into its equivalent binary code and communication over a cable.

Output unit: The output unit is the reverse of input unit. When the processor sends the output to the output unit, it modifies the data supported by a computer system from binary language to human language. In this process data is transmitted in an external environment such as monitor and sound.

CPU's Central Processing Unit

A central processing unit is referred to as computer circuit within a computer that transfers out the instructions given by a computer program by executing the basic arithmetic and logical control and input-output operations determined by the instructions. The control unit is a part of central processing unit that relates to the operation of the processor. It communicates the computer memory arithmetic and logical unit how to control to a programmed instructions. The control unit is also referred to as the ^{unit more} heart of the computer system.

This is built into a single microprocessor chip, an integrated circuit, which executes programs in function and supervises the computer's overall operation.

Arithmetic and Logical Unit: There are various arithmetic and logical operations of a computer that are implemented in a arithmetic logical unit of the processor. It executes arithmetic operations such as addition, subtraction, multiplication and also logical operations including AND, OR and NOT operations.

Input devices: Software can be categorized into two types
① system software and ② application software

- ① System Software: Operates directly on hardware devices of computer. It provides a platform to run an application. It provides and supports user functionality. Examples of system software include operating systems such as windows, unix, etc.
- ② Application Software: An application software is designed for the benefit of users to perform one or more tasks. Examples of application software are Microsoft Word, Excel, Oracle, etc.

Difference between Software and Hardware:-

Software

- ① It is a collection of programmes to convert computer hardware system into operation.
- ② It includes numbers, alphabets, identifiers, etc.
- ③ Software products evolve by adding new features to existing programmes to support hardware.
- ④ It will vary as per computer and its built-in functions and programming languages.
- ⑤ It is designed and developed by experienced programmers in High-level language.

Hardware

- ① It includes physical components of computer system.
- ② It consists of electronic components like IC's, resistor, crystal, insulators, etc.
- ③ Hardware design is based on architectural design to make it work over a range of environmental conditions and time.
- ④ It is most constructed of all types of computer system.
- ⑤ The hardware can understand only low-level language or machine language.

⑥ It is low Java so
⑦ The as lo so



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- | | |
|---|---|
| 1 It is represented in any high level language such as C, Java, C++, basic | ⑥ The hardware works only on binary codes (1,0) |
| 2 The software is categories as operating system, utilities, language processor, application software, etc. | ⑦ The hardware consist of input devices, output devices, memory, etc. |

Information Technology

IT refers to the development, maintenance and use of computer software system and networks. It includes thin unit for processing and distribution of data. Data means information, facts, statistics, etc. Brings together fast retrieval, storage or analysis. This word technology can explore refers to application of scientific knowledge for practical purpose. IT anything related to computing technology, the internet, e.g. comes under the umbrella terms IT, so does computer hardware, software and networking. IT is a design and implementation of computer network for data processing and communication. This includes designing the hardware for processing, information and connecting separate components and developing software that can efficiently and faults analyze and distribute this data.

According to Balloux, the term IT first appeared in English language 1958 in a hardware business review article.

make ppt.
COMPUTER: computer is a electronic

Generations of Computers OR Development of computers

1st Generation (1940-1956): - The period 1940 to 1956
considered as the first generation of computers.

- (1) The 1st generation computer was developed by using **vacuum tube**.
- (2) The input of this system was based on punch cards and paper tape, however the output was displayed on printout.

(3) The first generation computer works on binary coded.
e.g., ENIAC, EDVAC, IBM-701, UNIVAC, IBM-650.

Electronic Integrator
Numerical and Computer

Electronic discontinuous automatic
computer

2nd Generation (1956-1963): The period 1956 to 1963 was considered as the 2nd generation of computers.

- * The 2nd generation was developed by using **transistor** technology.

Drawbacks of 1st generation:

- * In comparison to the 1st generation size of 2nd generation was smaller.
- * In comparison to the 1st generation, the computing time taken by the computers of 2nd generation was lesser.
e.g. IBM-1620, IBM-7094, CDC-3600, CDC-1604.

3rd Generation (1963- 1971): - The period 1963 to 1971

- was considered as the period of 3rd generation
- * The 3rd generation computers were developed by using

The integrated circuit (IC) technology.

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Drawbacks

- * In comparison to the 2nd generation, the size of the 3rd generation of computers was smaller.
- * In comparison to the computers of 2nd generation, the computing time taken by 3rd generation of computers was lesser.
- * The third generation computers consume less power and also generated less heat.
- * The maintenance cost of the computers in 3rd generation was also low.
- * The computer system of the computers of the third generation was easier for commercial use.
e.g.: IBM-360, Honeywell-6000 series, PDP, IBM-370/168

4th Generation:- (1971 - 2010).

- * The period 1972 to 2010 was considered as the 4th generation of the computers.
- * The forth generation computers were developed by using **microprocessor technology**.
- * By coming to 4th generation, computers became very small in size. It becomes portable and durability.
- * The machines of 4th generation starts generating very low amount of heat.
- * It is much faster and accuracy became more reliable.
- * The production cost reduced to very low in comparison to the previous generation.
- * It became available for the common people as well.
e.g.- Apple series-I and II, IBM 4341, STAR 1000, DEC 10, PDP 11.

5th Generation: (2010 to onwards); father John MacCarthy

- * The period 2010 to till date is considered as the period of 5th generation of computers.
 - * By the time the ^{computer} generation was being considered on the basis of hardware only, but the 5th generation technology also included software.
 - * The computers of the 5th generation has high capability and large memory capacity.
 - * Working with the computers of this generation was fast and multiple task would be performed simultaneously e.g.,
- Some of the popular advanced technologies of the 5th generation include: Artificial intelligence (AI), Quantum computation, nano technology, etc.
e.g. supercomputers, robots.

Types of Computers:

On the basis of ~~area~~ data handling capacities, the computer is of 3 types:-

- ① Analog Computer ② Digital Computer ③ Hybrid Computer.

① Analog Computer: are designed to process analog data. It is continuous data that changes continuously and cannot have discrete values. It is used to perform task using continuous data. The physical amount that changes continuously. It is used where we don't need exact values or need approximate values such as speed, temperature, pressure, etc.
e.g. Speedometer, thermometer, etc.

* Analogue clock is best ex. of analog
Shows the time with a smoothly moving second hand. The change is continuous.

Advantages of Analog Computer

data processing fast enough to keep up with an outside process

- It allows real time operations and computation at the same time and continuous representation of all data within the range of the analog machine.
- In some applications, it allows performing calculations without taking the help of transducers for converting inputs and outputs, with the to digital electronic form and vice-versa.
- The program can scale the problem for dynamic range of the Analog computer. The program can
- It provides insight into the problem and helps understand the errors and their effects.

② Digital Computer: They are designed in such a way that it can easily perform calculations and logical operations at high speed.

- It takes raw data as an input and process it with program stored in its memory. To produce the final output, e.g., laptops, desktops, etc.

- (2) Digital computer advantages: It allows you to store large amount of information and to ~~remove~~ ^{edit} it easily whenever you ~~never~~ need. (Found again)
- We can easily add new features to digital systems.
 - Many applications can be used in digital system just by changing the programme without making changes in hardware.
 - It offers high speed as the data is processed digitally.
 - It is highly reliable as it uses error correction codes.
 - Reproducibility of results is higher as the output is not effected by noise, temperature, humidity and other properties of its component.
- (3) Hybrid Computer: As the name suggest hybrid means the combination of two things. Similarly, the hybrid computers are the combination of analog and digital computers. Hybrid computers are fast like an analog computer and have memory and accuracy like digital computers.

e.g. airplane computer.

Advantages:

- ① Its computing is very high due to the all parallel configuration of the analog system.
- ② It produces precise and quick results, that are more accurate and useful.
- ③ It has the ability to solve and manage big equation in real time.

① It helps in the online data processing.

On the basis of size of computer:-

① Supercomputers: It was developed by Roger Way in 1946. They are the computers which are the fastest and very expensive, it can calculate upto 10 billion individual calculations per second.
e.g. Scientific computers, stock market computers, etc.

② Mainframes: They are designed in such a way that it can support 100 or 1000 of users at same time. They are smaller than super computers, it has high storage capacity and great performance. It runs smoothly for a long time and has a long life. e.g. ENIVAC, UNIVAC (universal Automatic Comp)

③ Mini Computers: It is a medium size multiprocessor computer, in this type of computer there are two or more processors and it supports 4 to 200 users at one time.

④ Workstations: It is designed for technical or scientific application. It consists of fast micro processor with large amount of RAM and high speed graphic adaptor. They are made exclusively for complex work purpose. It provides large storage capacity with better graphics and a more powerful CPU with compared to personal computers.

(5) Personal computers: They are designed for individual purpose, it consists of a microprocessor as a central processing unit, memory, input unit and output unit. It is smallest in size and easy to use.

Ques. How is a laptop different from desktop?

- Because laptop are designed for portability.
- A laptop has all in one design with a built in monitor, keyboard, touch pads and speakers. This means it is fully functional even when no peripheral are connected.
 - A laptop is also quicker to set up and there are few cables to get in the way.

① Touchpad: It is also known track pad.

② It is a touch sensitive pad that lets you control the pointer by making a drawing motion with your finger.

③ Battery: ① Every laptop has a battery which allows due to use the laptop when it is not plugged in. When you plug in the laptop the battery recharges.

② Another benefit of having a battery is that it can provide backup power to the laptop if the power goes out.

AC adaptor: A laptop usually a specialised power cable called an AC adaptor, which is designed to be used

with that specific type of laptop.

Ports: serve as an interface b/w the computer and other computer or peripheral devices.

There are diff types of ports:-

- ① Serial port
- ② parallel port
- ③ USB port
- ④ PS/2 port
- ⑤ VGA port
- ⑥ modem port
- ⑦ Fire wire port
- ⑧ Sockel
- ⑨ Infrared
- ⑩ Irani
- ⑪ Digital Video Interface
- ⑫ Ethernet

Personal digital Assistant

Computer Memory:- Inside the computer, there are different storage areas where it keeps data or information permanently or temporarily while working. This storage area is known as memory of the computer.

Two types of memory:-

* Primary memory: This is the main memory of computer. CPU can be directly read or write data in this memory. It is fixed on the motherboard of the computer.

further divided into:

→ RAM:-

- ① It is a temporary memory (volatile).
- ② The information stored in this memory is lost as the power supply to the computer is turned off.

③ It stores the data instruction given by the user and also the results produced by the computer temporarily.

Two types of RAM:-

① SRAM:-

- ① The word static indicates that the memory retains its contents as long as the power is being supplied.

② SRAM chips used a matrix of six transistors and no capacitors.

The very first ROMs were hard wired devices that contained a pre-programmed set of data and instruction. These kinds of ROM are known as MRDM.

It is inexpensive.

② PROM: Programmable Read Only Memory.

- # This read only memory that can be modified only once by a user.
- # The user biases a blank PROM and enters the desired contains using a PROM programme.
- # Inside PROM chips there are small fuses, which are burned open during programming.
- # It can be programmed only once and is not erasable.

③ EPROM: Erasable Programmable ROM.

- It can be erased by exposing it to ultraviolet light for a duration of up to 40 minutes.

④ EEPROM: Electrically Erasable and Programmable ROM.

- It is programmed and erased electrically.
- It can be erased and reprogrammed about 10,000 times.
- Both erasing and programming take about 4 to 10 milliseconds.

Characteristics of SRAM

- # Long time
- # No need to refresh
- # Faster
- # Used as Cache Memory
- # Large Size
- # Expensive
- # High power consumption

DRAM: Dynamic RAM

- Unlike SRAM must be continuously refreshed in order to maintain data.
- DRAM used for most system memory, as it is cheap and small.
- All DRAM are made up of memory cells, which are composed of one capacitor and one transistor.
- Short data lifetime.
- Slower as compared to SRAM, also smaller in size.
- Used as RAM.
- Less Expensive

→ ROM:

- ① Information stored in ROM is permanent, i.e. it holds the data even if the system is switched off.
- ② It holds the starting instruction for the computer
- ③ It is called non-volatile memory.

Types of ROM:

- ① MROM :- Most Read Only Memory

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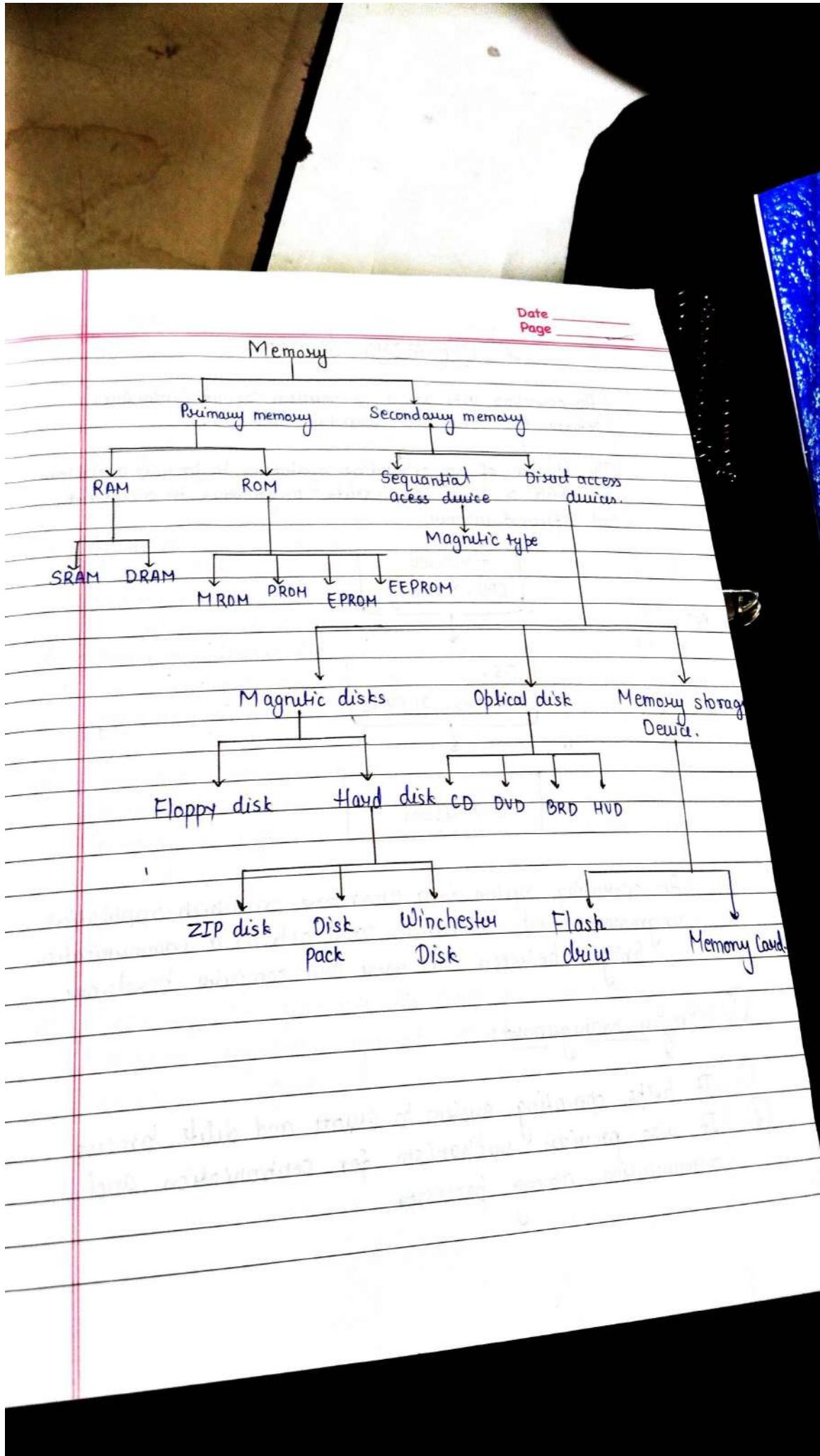
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* ② Secondary Memory

- ① The memory is permanent in nature.
- ② It is used to store the different programmes and the information permanently.
- ③ It holds the information till the erased it.

Types of Secondary Memory:

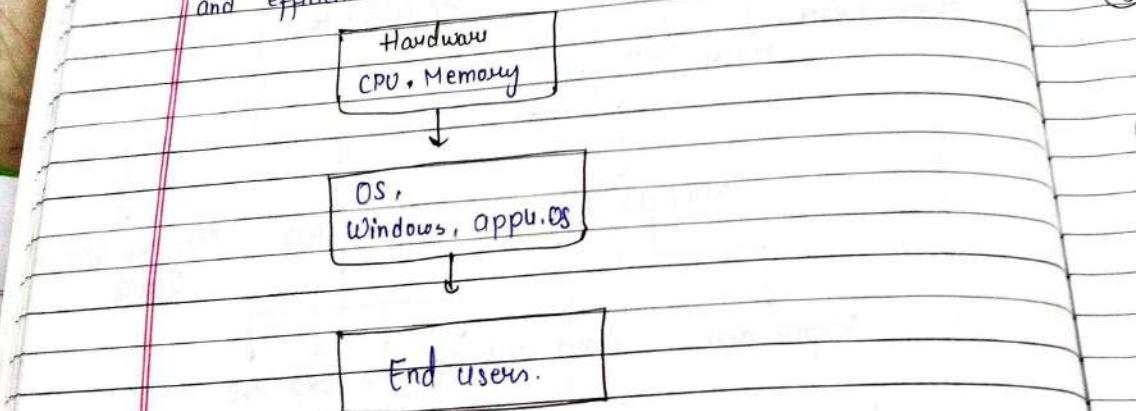
- ① DVD, CD, Hard disk.



* OPERATING SYSTEM

An operating acts as a communication bridge (interface) between the user and computer hardware.

The purpose of an operating system is to provide a platform on which a user can execute programmes in a convenient and efficient manner.



An operating system is a programme on which application programmes are executed and acts as a communication bridge between the user and computer hardware.

① Process management:

- ① It helps operating system to create and delete process.
- ② It also provides mechanism for coordination and communication among processes.

② Memory Management: It performs the task of allocation and deallocation of memory space to programs in need of the resources.

Allocation: memory allocation.

Deallocation: To free the memory deallocation

③ File Management: It manages all the file related activities such as its organization, storage, retrieval, naming, sharing and protection of file.

④ Device management: It keeps track of all devices.

- It also performs the task allocation and deallocation of the devices.

⑤ Secondary Storage Management: Systems have several levels of storage, which includes primary storage, secondary storage and cache storage.

- Instructions and data must be stored in primary storage or cache, so that running programs can be found.

⑥ Security: It protects the data and information of a computer system against malware threats and unauthorized access.

(IP, MAC)

Types of Operating System

- (1) Batch operating system:
Some computer process are very lengthy and time consuming to speed the same process. In job with a similar type of needs are batch together and run as a group.
⇒ The user of batch operating system never directly interacts with the computer. In this type of operating system every user prepares his or her job on an offline device like a punch card and submitted it to computer operator.
- (2) Multi-tasking or time sharing operating system:
 - This enables people located at different terminal to use a single computer at the same time.
 - The processor time (cpu) which is shared among multiple users is termed as time sharing operating system.
- (3) Real time operating system: A real time operating system, time interval to process and respond to input is very small.
e.g. military software system
space software system.

Client: is a computer running a program that requests the service from a server

Server: A simple computer that provides the network resources and provides service to other computers when they request it.

Graphical User Interface (GUI)

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GUI was developed by Xerox Parc by Alan Kay and Douglas Engelbart and a group of other researchers in 1981.

Later, Apple introduced Lisa computer with the GUI on 19 Jan 1983.

- Ben. It is a system of interactive visual components for computer software.
- It displays objects that convey information and represents actions that can be taken by the user. The objects change colour, size, or visibility when the user interacts with them.
- GUI objects includes icons, cursor and button. manage users interaction with the system.
- It is considered to be more user friendly than a text based command line interface, such as MS-DOS.

Benefits:-

- ① GUI operating system are easier to learn and use because commands do not need to be memorized.
- ② User donot need to know any programming language.

e.g,

* Software Development life Cycle (SDLC) (1)

⇒ It refers to a methodology with clearly defined processes for creating high quality software.

Different phases of SDLC:-

- (1) Planning
- (2) Requirement analysis
- (3) Software design
- (4) Software development
- (5) Testing
- (6) Software Deployment.

(2) Requirement analysis:

(1) This stage means getting input from all stakeholders, including customers, sales people, industry experts and programmers.

(2) Learn the strengths and weaknesses of the current system with improvement as whole.

(2)(1) Planning:

(1) In this stage, the team determines the cost and the resources required for implementing the analyzed requirements.

(2) It also details the tasks involved, and provide sub-plans for initiating/improving the risk

(3) Software design: process of envisioning and defining software solution to a problem of a system such as architecture.

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- (4) Software development.
At this stage, the actual development starts.
- (5) Testing: In this stage we test for defect and deficiencies. We fix those issues until the product meets the original specification.
- (6) Software Deployment.
At this stage, the goal is to deploy the software to the production environment, so users can start using the product.

Process

1. Process is dynamic entity that is program in execution.
2. 2 or more process could execute simultaneously.
3. It is a sequence of instruction execution.
4. It is dynamic object (i.e. programs in execution).
5. Process is loaded into main memory.
6. Time span is limited.
7. It is an active entity.

Program

1. It is static entity made up of program statements.
2. Program defines a task or job to be performed by system.
3. Consists of sets of instruction in programming language.
4. It is static object existing in the file form.
5. Program is loaded into secondary storage device.
6. Unlimited.
7. It is a passive entity.

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Computer Networks

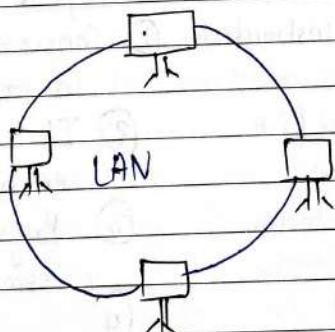
A computer network is a group of computers linked to each other that enables the computers to communicate with another computer and share their resources, data and applications.

A computer network can be categorized by their size:

- ① LAN: Local Area Network
 - It is a group of computers collected to be connected to each other in a small area such as building, office.
 - It is used for connecting two or more personal computers through ~~lengthy~~ communication medium such as twisted pair, coaxial cable.
 - It is less costly as it is built with inexpensive hardware, such as hubs, network adapters and ethernet cables.
 - The data is transferred at an extremely faster rate in local area network.
 - Lan provides higher security.



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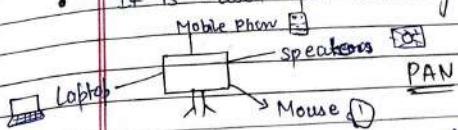
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(2)

PAN: Personal Area Network.

- It is a network arranged within a individual person.
- Typically range of 10m.
- It is used for connecting the computer devices of personal use.



- Thomas Zimmerman was the first research scientist to bring the idea of the personal area network.
- PAN covers an area of 30 feet.
- Personal computer devices that are used to develop the personal area network are laptops, mobile phones, media players and play stations.

Two types of PAN → Wireless
→ Wireless

Wireless PAN: Wireless PAN is created by using the USB (Serial Bus) Universal

Wireless PAN: It is developed by simply using wireless technology such as wi-fi, bluetooth etc.
• It is a low range network.

(3)

MAN: Metropolitan Area Network

- It is a network that covers a large geographic area by interconnecting different LAN to form a large network.
- Government agencies use MAN to connect to the citizens and private industries.

Computer

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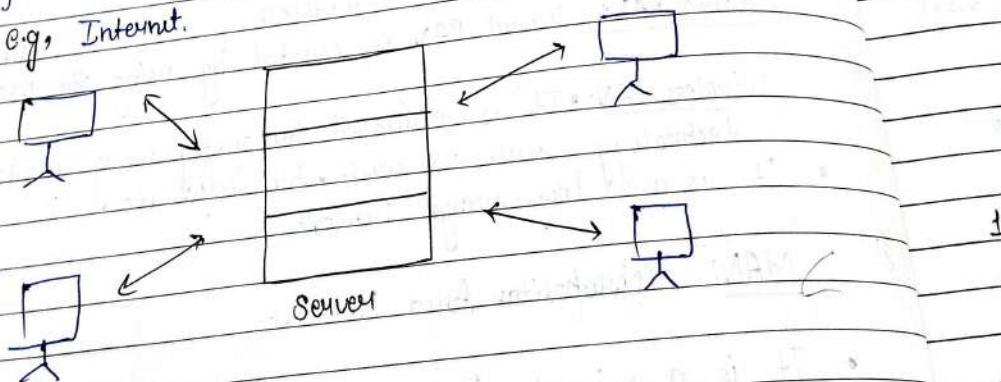
①

- In MAN, various LAN are connected to each other through a telephone exchange line.
- It has higher range than LAN e.g. used in communication between the bank in cities.
- ② Airline reservation
- ③ College within a city
- ④ Military communication



- ④ WAN: Wide Area Network
- It is a network that extends over a larger geographical area such as state or country.
 - It is quite bigger than local area network (LAN).
 - It is not limited to a single location, but it spans over a geographical area through telephone line, fiber optic cable or satellite cells.

e.g., Internet.



It is a model in a computer such as servers provide the network search of the other computer such as client to perform a user based task. This model

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is known as client server networking model.

- ⇒ An application program is known as client program running on the local machine that request for a service from an application program known as a server program running on the remote machine.
- ⇒ A client program runs only when it request for a service from the server by the server program runs all the time as it does not know when the service is required.
- ⇒ Client Server follows (many to one relationship) :-
Many clients used the one server

Client	Server
① It is a program that runs on a local machine requesting service from the server.	Server is a program that runs on the remote machine providing services to the clients.

Advantages of Clients / Servers:-

1. Centralized:- Centralized backup is possible in client server networks that is all the data is stored in a server.
2. Security:- These networks are more secure as all the shared resources are centrally administered.

The use of the dedicated server increases the speed of

sharing resources. This increases the performance of the overall system.

~~Scalability~~: We can increase the no. of clients and servers separately that is the new element can be added or we can add more nodes in a network at any time.

Disadvantages:

Drawbacks:

Traffic conjunction client:-

It is a big problem of client server network. When large no. of clients requests to the same server may on the problem of traffic conjunction.

- ⇒ Does not have a robustness of a network.
(if server is down we can't do anything).
- ⇒ When the server is down then the client requests can't be act anything.
- ⇒ Clients or server networks is very decisive.
able to make quick decision (conflict free)

Sometimes regular computer hardware does not serve a certain number of clients in such situations specific hardware is required at the server site to complete the work.

File and Printer sharing

① File sharing:- It is the practice of sharing or offering excess digital information or resources, including documents, multimedia, graphics, computer programs, images and e-books.

Common methods of storage, transmission and dispersion include manual sharing utilising removable media, centralized servers on computer networks, world wide web based hyper link documents and the use of distributed peer to peer networking.
(person to person) (system to system)

② Printer sharing:-

- The most common shared device is printer.
- Sharing the single printer among group of users, cost must less than buying a printer for each computer.

Advantages of Networking printer:

① Multiple Users: Printers on a network are available to more than one user.

• Any computer that is part of the network can access and send print jobs to the printer queue.

• The queue managed by the server or primary computer, the printer is connected to, manages and fulfills the print jobs.

② Remote Networks: Users on a remote network connected to a home or corporate network through the internet and communication device can also access and send print jobs to network printers.

Q If b/w intranet and www?
Q Who owns intranet?

- ③ Multiple Platforms:
• Computers running on multiple platforms including windows, mac, linux and other platforms can access the same network printers and send print jobs to the printers using drivers designed for each platform.

* Qmb Intranet Intranet and Extranet

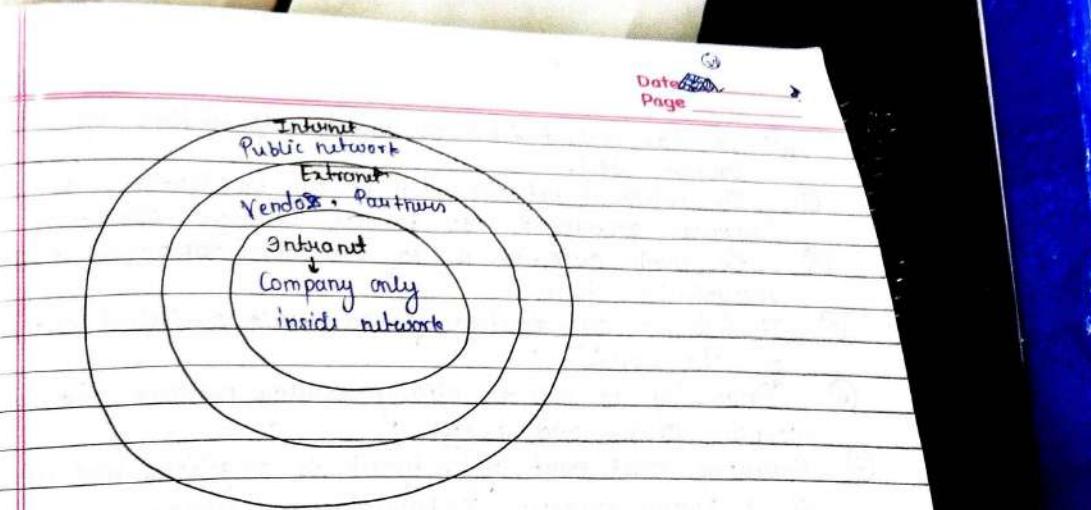
Intranet: It is a world wide publicly accessible computer network or intranet connected computer networks that transmit data using the standard IP (Internet Protocol).

* Largest intranet in the world is internet.

Intranet: It is a private network that is contained within an enterprise typical intranet for a business organisation consists of many interconnected LAN and use any MAN technology for network connectivity.

- The main purpose of an intranet is to share company information and computing resources among employees.
- It is a private intranet which is usually created and maintained by private organization.

The content available inside intranet are intended for only for the members of that organisation



Extranet: It can be viewed as part of a company's intranet i.e. extended to users outside the company like suppliers, vendors, partners, customers or other business associates. Extranet is required for normal day to day business activities e.g., placing purchase orders to supplier vendors, billing and invoices (true call), payment related activities, product process for partners etc.

(PSTN) Public Switched Telephone Networks:

Band width range = 300 - 3400 KHz.

It is a collection of and interconnected network of telephone lines own by both government as well as commercial organization.

Properties: ① It is also known as Plain Old Telephone Service (POTS).

- ② It has evolved from the invention of telephone by Alexander Graham Bell.
- ③ The individual networks can be owned by National government, regional government or private telephone operators.
- ④ Its main objective is to transmit human voice in a recognizable form.
- ⑤ It is an aggregation of end circuit switched network of the world.
- ⑥ Originally it was an entirely analog network laid with copper cables and switches.
- ⑦ Presently most part of PSTN is digitized and comprises of a wide variety of communicating devices.
- ⑧ The present PSTN comprises of Copper telephone lines, fiber optic cables, communication satellite, microwave transmission links and under sea telephone lines. It is also linked to the cellular networks.
- ⑨ The interconnection between the different parts of the telephone systems is done by switching centers. This allows multiple telephone and cellular networks to communicate with each other.
- ⑩ Present telephone systems are tightly coupled by WAN, and are used for both data and voice communication.

System software

1. General purpose that manage resources are

2. Written in assembly machine

3. Installed time & by a

4. Run

5. Up

6.

7.

Different types:-

- ① Single Exchange Area
- ② Multiple Exchange Areas.
- ③ Trunk Automated Area

System software

Module - 1

Date _____
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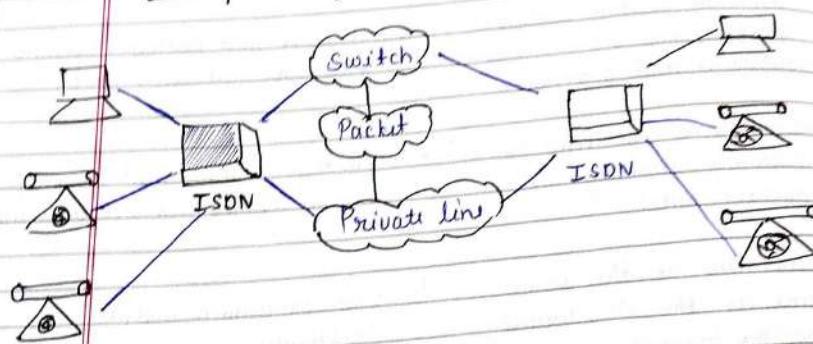
1. General purpose software that manages basic system resources and processes.
 2. Written in low-level language assembly language or machine code.
 3. Installed at the same time as the OS, usually by manufacturer.
 4. Run any time the computer is on.
 5. Works in the background and users don't usually access it.
 6. Runs independently.
 7. Necessary for the system to function.
1. Software that performs specific tasks to meet user needs.
 2. Written in high-level language such as python and javascript.
 3. User or admin installs software when needed.
 4. User triggers and stops the program.
 5. Runs in the foreground and users directly work with the software to perform specific task.
 6. Needs system software to run.
 7. Isn't necessary for the system to function.

(ADSL, ISDN, BRI etc.)
and many more
Full form ISDN

ISDN

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Stands for Integrated Services of Digital Networking.



D-channel
It is a

Two type

- ① Basic
- ② Primary

① BRI
User

BRI

User

②

- It is a telephone network based infrastructure that allows the transmission voice and data simultaneously at a high speed with greater efficiency. This is a circuit switched telephone network system.

- This also provides access to packet switched switch network.

- It supports variety of services such as voice calls, video text, electronic mail, data transmission and voice collection to internet image and graphic exchange, document storage and transfer audio and video conference etc.

bearer B-channel :- • B-channel or bearer channel are used to transmit voice and data simultaneously.

D-channel (Delta channel).

- It is used for signalling purpose to set-up communication.

Two types of ISDN:-

- ① Basic Rate Interface (Acen (BRI)
② Primary "

① BRI: It is simply called the ISDN BRI connection over the existing telephone infrastructure.

BRI configuration provides two bearer channels at 64 kbit/sec speed and one delta channel at 16 kbit/sec speed.

② PRI: It is simply called ISDN PRI connection which is used by enterprise and offices.

Advantages of ISDN:-

- As the service are digital, there is a less chance for errors.
- Connection is faster.
- Bandwidth is higher.
- Voice data and video of these can be send over a single ISDN line.

Drawbacks of ISDN:-

- It requires specialized digital services. And it is costly.

ADSL

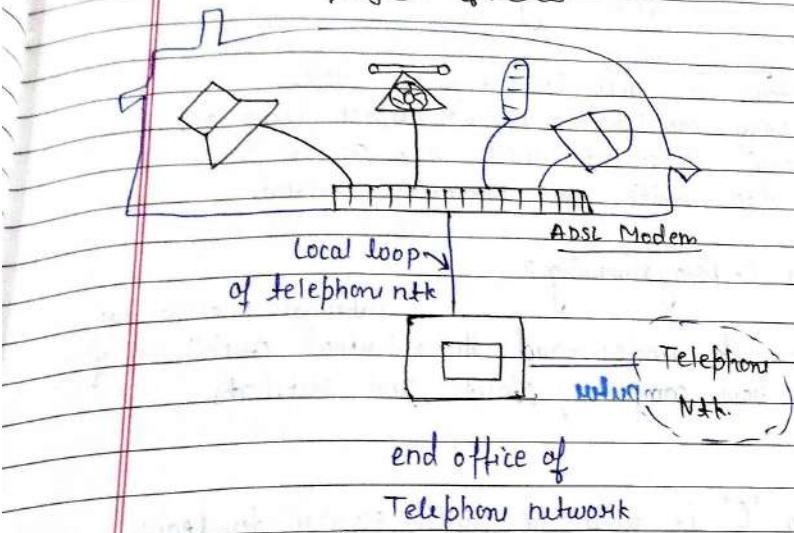
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Asymmetric Digital Subscriber Line.

- It is a technology that will offer faster connection speed than the traditional internet via dial up telephone lines put offer.
- It is a technology that delivers many internet connections would wide.
- Although the new fibre technology allows the faster connection to the internet, ADSL is still a popular choice because of its flexibility.
- Fibre is being connected to more blocks, but ADSL allows the individual customers besides for themselves, because the technology uses existing metal cables into home or the business premises.
- Features of ADSL
- It uses the higher frequency of the lines that the land line telephone.
- It has much faster speeds in comparison with modem.
- This technique was produced to send video on request to the telephone network.
- The majority of broadband connection today, uses ADSL technique but and it more and more competing with fibre optics.

Diagram of ADSL

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प्राचीन तकनीकी का अवधारणा विकास
द्वारा तिथि तकनीकी का विकास

(1920) विकास लाइब्रेरी = नेटवर्क

* Module-4

C-programming a middle level language

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Page _____

- 'C' is a general purpose programming language created by Dennis Ritchie at bell laboratory in 1972.
- It is a very popular language despite being old.
- 'C' is strongly associated with unix as it was developed to write unix operating system.

Why learn C-programming?

- 'C' helps us to understand the internal architecture of a computer how computer stores and retrieves information.
- After learning 'C' it will be much easier to learn other programming languages like java, python, etc.
- 'C' is very fast compared to other programming languages like java, python, etc.
- 'C' is very versatile. It can be used in both applications and technologies.
- Opportunity to work on open source projects. See some of the largest open source project such as

* FORTRAN = Formula translation (by IBM)

Before C
PASCAL
COBOL

$$\begin{aligned} 1 \text{ byte} &= 8 \text{ bits} \\ 1 \text{ nibble} &= 4 \text{ bits} \end{aligned}$$

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Opportunity to work on open source projects. Some of the largest open source projects such as LINUX Kernel, SQL DBMS, Data base, Python Interpreter, etc all are written in C programming language.

Features:

1. Procedural language: Instruction in a C-program are executed step by step.
2. Portability: We can move C-programs from one platform to another and run it without any or minimal changes.
3. Speed: It is faster than other programming languages.
4. General purpose: C-programming can be used to develop operating system, embedded system, data base and so on.

- Software is a collection of programs and program is a collection of instruction given to the computer.
- Development of software is a step-wise process.

for solving the problem, algorithm is implemented.

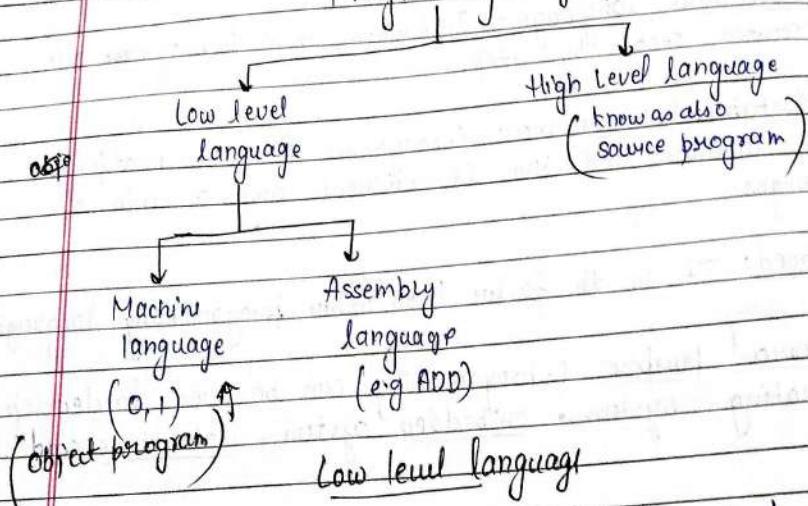
Algorithm is a sequence of steps that gives method of solving a problem

Intel developed processor

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1KB = 1024
1MB = 1024 KB
1GB = 1024 MB
1TB = 1024 GB
1PB = 1024 TB

Programming language



- ① Machine Level Language:
- Computers can understand only digital signal which are in binary digits i.e 0 and 1.
 - So, the instruction given to the computer can be only in binary codes.
 - The machine language consist of instruction that are in binary (0,1).
 - Computers can understand only machine level language.

grind

calculus

- (2) Assembly Language: The difficulties face in machine level language were reduced to some extent by using a modified form of machine level language called assembly language.
- In assembly language instructions are given in English like words such as MOV, ADD, SUB, etc.

High level language

- These are English like languages such as FORTRAN, PASCAL, COBOL, JAVA. So, it is easy to write and understand the programs of high level language.

Translator

- Translators are just computer programs which accept a program written in high level or low level language and produce an equivalent machine language program as output.

different types

1. Assembler
2. Compiler
3. Interpreter.

1. Assembler: It is used for converting the code of low level language (Assembly language) into machine level language.

2. Compiler :- used to convert the code of high level language into machine language

Delimiters:-

(1)	:	Colon	Used for label
(2)	;	semicolon	end of statement
(3)	()	parenthesis	used in expression
(4)	[]	square brackets	used for arrays
(5)	{ }	curly braces	used for block of statements.
(6)	#	hash	preprocessor direction
(7)	,	Comma	variable delimiter.

KEY WORDS / Reserved words

that are

- There are certain words reserved for doing specific task. • These words are known as keywords. And they have standard, predefined meaning in C.
- They are written in lower case.
They are 32.

Identifiers

They are user defined.

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Data Types

- It defines the type of a variable which are used in any programming structure.
- It defines the data stored in a variable and the various operations, which are performed in this data

The following basic data types are:-

1. int :- It defines the data type for integers.

Properties:-

Size → 2 bytes

Value → 2, 4, 6, ...

Range → -2^{16} to $+2^{16}$

2. float:- It defines the data type for fractional numbers.

size → 4 bytes

value → 2.5, 4.2, ...

Range → -2^{32} to $+2^{32}$

char

~~char~~:- This data type is used for characters.

size → 1 byte

value → A, a, b, ...

Range → -2^8 to $+2^8$

CUI = Character User Interface

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4. long: This data type is used to store large range.

Size = 4 bytes

Value = $2^{31} \dots -2^{31}$

Range = -2^{31} to $+2^{31}$

5. double: This data type is used to store values of fractional part of large range.

Size = 8 bytes

Value = $2^{31} \dots -2^{31}$

Range = -2^{64} to $+2^{64}$

STORAGE CLASSES

This concept explains the various features regarding the data type of a variable or the properties of a variable.

1. Default initial value
2. Place of storage
3. Scope
4. Life time.

① Default initial value:-

In uninitialised variable, system can use garbage value or zero as default initialisation.

The property which shows with a garbage garbage

stored at zero is stored depends upon storage class.

- ② Place of storage: The memory space to any data type can be allocated from RAM or registers. This space is allocated from RAM or registers depends on storage class.

(CPU takes data from RAM (even store in Hard disk) don't take memory from hard disk)

- ③ Scope:

It defines the availability of a variable in a particular functional block.

- ④ Life Time:

It defines the extent to which a variable hold a particular value in it.

Declaration:

Structure of C

C program is a collection of one or more function.

Every function is a collection of statement and performs some specific task.

① Comments: Comments can be placed anywhere in the program and are enclosed between the delimiters.
/* */

They are generally used for documentation purpose.

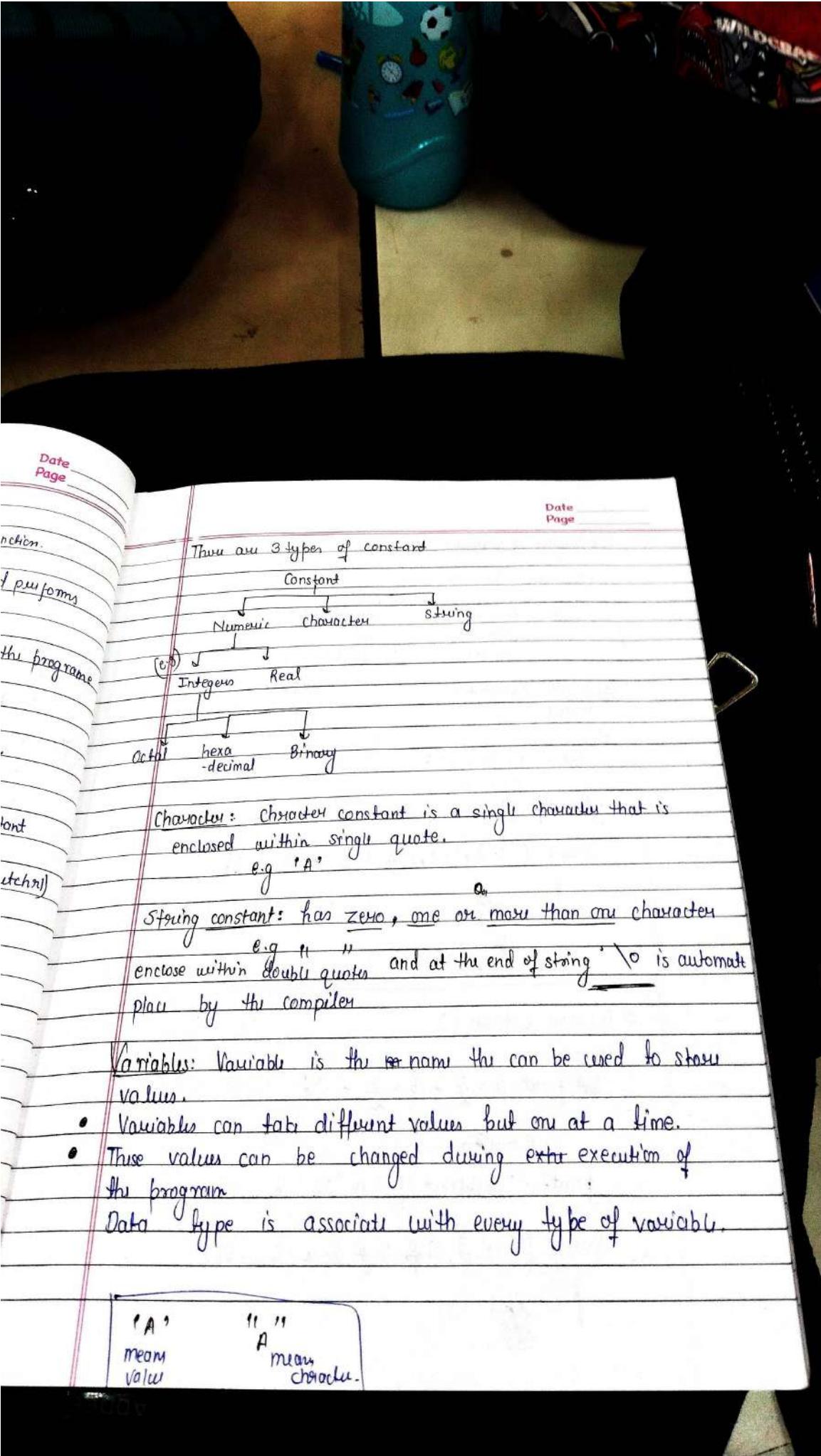
② Preprocessor directives: (#include, #define) :-
(header file) symbolic constant and

③ Main function
• If a program has only one function then it must be main

• Execution of every C program starts with main function, it has two parts declaration of local variables and statements.

• Statements in the main function are executed one by one.

Constants: Constant is the value that cannot be changed during execution of the program



Declaration of variable:

Syntax:-

Data type Variable name.

e.g. int a;
 float a;
 char a;

initialization
 int a =
 float b = 2.5

#include <stdio.h>

main()

{
 int a=1, b=2, c;
 c=a+b

printf (" sum of %d %d : %d ", a, b, c);

scanf ("%d %d %d", &a, &b, &c);

#include <stdio.h>

main()

{ float a = $\frac{1}{2}$, b = $\frac{3}{2}$, c;

c = a - b

printf (" Subtract of 2 no":c);

scanf ("%f %f %f", &a, &b, &c)

{
 a = b + c

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String { sc

The amper
 the star

(Qu a =

inc

ma

{

String char str[10]
 { scanf ("%s", str); }

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The ampersand (&) is called address operator. and it gives the starting address of the variable name in memory.

Ques- a = 12.4 , b = 3.8

include <stdio.h>

main ()

{ float a=12.4 , b=3.8 + c;
c=a+b;

printf (" sum of 2 no: c);

scanf ("%f %f %f") &a &b &c;

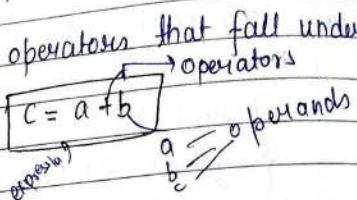
}

Operators and Expressions

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- An operator specifies an operation to be performed that yields a value. The variables, constant can joint by various operators to form an expression.
- An operand is an data item on which an operator act.
- Some operators requires two operand while the others act only one operand.
- C includes a large number of operators that fall under several different categories.

I) Arithmetic Operators



These are used for numeric character calculations.

They are of two types

i) Unary operator : It requires only one operand

e.g. $+x$, $+b$

ii) Binary operator : It requires two operand

e.g.
+ \rightarrow operator
 \rightarrow add

- \rightarrow sub

* \rightarrow multiply

/ \rightarrow Division

% \rightarrow Modulus

$$a = b$$

$$\begin{aligned} & x = 5 + 1 \\ & x = 6 \\ & y = 6 \\ & x = 5 \\ & y = 5 + 1 \\ & x = 6 \end{aligned}$$

3) Assignment Operators

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- A value can be stored in a variable with the use of assignment operator.
- This assignment operator " $=$ " is used in assignment expression and assignment statement.
- The operand in the left hand side should be a variable while the operand on the R.H.S should be can be any variable, constant or expression.
- The value of R.H.S. operand is assigned to the L.H. operand.

e.g., $x = 8$, $y = 2$, $c = x + y - 2$, $x = y$, $y = x$

Increment and Decrement Operator

- C has two useful operators increment ($++$) and decrement ($--$). These are unary operators because they operate on a single operand.
- The increment operator increments the value of variable by 1 and
- Decrement operator decrements the value of variable by 1.

Prefix

$++x$

$x = 5$

$x = 5 + 1 = 6$

$y = 1$

$y = 6$

Postfix

$x ++$

$x = 5$

$y = 5$

$x = 5 + 1$

$x = 6$

- Q. Use prefix program to understand the use of prefix increment in documents.

```
#include <stdio.h>
main()
{ int a=8;
  printf("%d", a)
  printf("%d", ++a);
  printf("%d", a);
  printf("%d", --a);
  printf("%d", a)
```

$$\begin{aligned} a &= 8 \\ a &= a+1 = 9 \\ a &= 9 \\ a &= 9-1 = 8 \\ a &= 8 \end{aligned}$$

Q. Relational Operators:

- These are used to compare values of two expressions depending on their relations.
- If the relation is true then the value of relational expression is 1.
- And if the relation is false, then the value of expression is zero.

Operators	e.g., $a=5$ $b=2$	True/False	Value	Meaning
<		False	0	
\leq		False	0	
$=$		False	0	
(not equal) \neq		True	1	
$>$		True	1	
\geq	greater than or equal (one cond. satisfy)	True	1	

Logical OR Boolean operators

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- An expression that combines two or more expressions is termed as logical expression.
- For combining these expressions we use logical operators.
- These operators return 0 for false and 1 for true.
The operands may be constant, variable or may be expression.

'C' has three logical operators:-

1. & & = AND $a > b \& \& a = 9$
2. || = OR $a > b || a = b$
3. ! = NOT $a != b$

Conditional operators:-

Conditional operator is a ternary operator (? and :)
which requires 3 expressions as Operands

This is written as $? Testexpression? Expression1: Expression2$

Firstly, test expression is evaluated

- If test expression is true, then expression 1 is evaluated and it becomes the value of the overall conditional expression.
- If test expression is false, then expression 2 is evaluated and it becomes the value of overall conditional expression.

e.g., $a = 5, b = 8$ $a = 2, b = 5$

$$a > b ? a : b$$

$$\max = a > b ? a : b$$

$$\max = a \quad \text{True}$$

$$a > b ? a : b$$

$$\max = b \quad \text{False}$$

Program to print the largest number using conditional
~~operator~~ operator

⇒ #include <stdio.h>

main ()

{ int a, b, max;
printf ("Enter values for a & b: ");

scanf ("%d,%d", &a, &b); /* Summary operator */
max = a > b ? a : b; /* Largest of a and b is 'a' if a > b else 'b' */

printf ("%d", max);

}

(comma operator)

⑦ If / else statement

or b

if (condition)

{ Statement;

}

else

{ statements;

}

(Control Statement)

- * In C program statements are executed sequentially in C program in the order in which they appear in the program. But sometimes, we may want to use a condition for executing only a part of program.
- Also, many situations arise where we may want to execute some statements several times.
- Control statements enable us to specify the order in which the various instructions in the program are to be executed.
- This determines the flow of control
- Control statements define how the control is transferred to other parts of the program.
- C-language supports 4 types of control statements:

1. If else
2. Goto
3. Switch
4. loops
 - for
 - while
 - Do-while

① If else: It is a binary conditional control statement

syntax: if (condition)
 { statement;

}

else

{ statement;
}

→ Walk down the program to print a message that number is negative.

```
# include <stdio.h>
main()
{
    int a;
    printf("Enter the value for a");
    scanf("%d", &a);
    if (a < 0)
        {a number is negative;
```

Ques Given number is even or odd:

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else is ladder

if (condition)
 { statement;
 }
 else if (condition)
 {
 }
 else

Ques Find out program to find larger of their value

```
# include <stdio.h>
int main () {
    int a, b;
    printf (" Please enter three different values/n ");
    scanf (" %d %d %d ", &a, &b, &c);
    if (a>b & a>c)
```

Ques Program to find grade of a student when the marks of 4 subjects are given.

If $\% \geq 85$, Grade = A

$70 \leq \% \leq 85$, Grade = B

$\% < 70, \geq 55$, Grade = C

$55 \leq \% > 40$ Grade = D

$40 < \%$ Grade = E

```
⇒ #include <stdio.h>
int main ()
{
    int english, chemistry, physics, math;
    float Total, Percentage;
    printf ("Enter the four subject marks : \n");
    scanf ("%d %d %d %d", &english, &chemistry, &physics, &math);
    Total = english + chemistry + physics + math;
    Percentage = (Total / 400) * 100;
    printf ("Total marks = %.1f", Total);
    printf ("Marks percentage = %.1f", Percentage);

    if (Percentage ≥ 85.0)
        printf ("\n Grade A");
    else if (Percentage ≤ 70.0 &gt; 85.0)
        printf ("\n Grade B");
    else if (Percentage ≤ 55.0 &gt; 70.0)
        printf ("\n Grade C");
    else if (Percentage ≤ 40.0 &gt; 55.0)
        printf ("\n Grade D");
    else
        printf ("\n Fail");
}
return 0;
```

⇒ #include < stdio.h >

Program to find three numbers are equal.

⇒ #include < stdio.h >

main()

{

 }

LOOPS

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- Loops are used when we want to execute a part of the program or block of statements several times.
e.g. suppose we want to print C is the best ten times.
- With the help of loop, we can execute a part of the program repeatedly till some condition is true.

There are 3 loop statement in C-language:-

- (1) for (2) while (3) do while

(1) for loop:- The for statement is very useful while programming in 'C'.

- It has three expressions and semicolons for separating these expression.
- The for statement can be written as

```
for (expression 1; Expression 2; Expression 3)
{
    printf ( )
}
```

Ques Program to print the numbers from 1 to 10 using for loop.

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

```
n = 1 to 10 → main()
```

```
{ int n;
```

```
for (n=1; n<=10; n++)
```

```
{ printf ("%number%", n);
```

```
    printf ("\n")
```

```
}
```

Ques Program to print the numbers from 10 to 1.

```
#include <stdio.h>
/* n = 10 to 1 */
main()
{
    int n;
    for (n=10; n>=1; n--)
        {
            printf("number: %d", n);
            printf("\n");
        }
}
```

Ques Program to print numbers from 10 to 1, which is multiple
of 2. $(n=2)$

→

Ques Program to multiply two numbers using without using *.

```
# include <stdio.h>
main()
{
    int a, b, i;
    int result = 0;
    printf(
```

Ques Find the sum of this series upto n-terms.

$$1 + 2 + 4 + 7 + 11 + 16 + \dots$$

```
{ int i, n, sum = 0, term = 1
    printf ("enter unit")
    scanf ("%d", &n);
    for (i = 1; i <= n; i++)
        {
```

```
    sum = sum + term;
    term = term + i
}
printf ("%d", n, sum);
```

```
}
```

*

while (condition)	{ int i = 1, while (i <= 10) { printf ("%d", i); i = i + 1 }
---------------------	--

do	{ int i = 1 ; do { printf ("%d", i); i = i + 1 } while (i <= 10);
----	--

Ques Program to sum print the numbers from 1 to 10 using while loop.

```
#include <stdio.h>
main()
{ int i = 1 → printf ("Number from 1 to 10 : \n");
  | while ( i <= 10 )
  | { printf ("%d", i );
  | }
  | return 0;
```

1+no

Fibonacci Series

1, 1, 2, 3 5 8 13 21 34, ...

```
x=0  
y=1  
for ( z=x+y  
      printf ( x=y  
              y=z )
```

```
z=0+1=1  
x=1  
y=1  
z=1+1=2  
x=1  
y=2  
z=3
```

Class

* *
* *
* *
* *

```
#include <stdio.h>  
int main()  
{  
    int n1=0, n2=1, n3; // numbers  
    printf ("Enter the number of element  
    find Number Fibonacci;  
    printf ("In Please enter the number to find the  
    Jacobian Fibonacci number: ");  
    scanf ("%d", &n3);  
    Fibonacci = fibonacci_series (number);  
    printf ("The %d Fibonacci number = %d ", number,  
    Fibonacci);
```

divide by

3, 5, 7

return 0;

a = b
b = c
c = a

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Ans

* *
* * *
* * *

i, j, n
for (i, i <= n)
for (j, j <= 1)

Break Statement (break;)

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Page _____

User
pw

- Break statement is used inside loops, sometimes it becomes necessary to come out of the loop even before the loop condition becomes false.
- In such situation break statement is used to terminate the loop.
- This statement causes an immediate exit from that loop in which this statement appears.

written (break;)

- When break statement is encountered loop is terminated and the control is transferred to the statement immediately after the loop.
- The break statement is generally written along with the condition.
- If break is written inside a nested loop structure then it causes exit from the innermost loop.

Continue Statement:- (continue;)

Continue statement is used when we want to go to the next iteration of the loop after skipping some statements of the loop.

Switch Statement:- Sometimes, there is a need in program to make choice among number of alternatives for this choice, we use the switch statement.

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(17)

Users of large-scale computer application in government such as
public records system (census, vehicle registration).

Ques Write a program to print sum of digits.

#include <stdio.h>
int main()
{ int n, i, sum = 0;
printf("Enter a positive number:");
scanf("%d", &n);
i = 1;
while (i <= n) {
sum += i;
++i;
}
printf("Sum = %.d", sum);
return 0;
}

Information Technology

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1 2 3 4 5 6
7 8 9

Intro ~~10-slide~~
Flow chart
Advantages / Disadvantages

→ Modern technologies have become the foundation for process improvement and increased accuracy, effectiveness and efficiency in most organizations today.

Records management is one area in which the use of technology has become unavoidable (inevitable).

Rapidly grow'