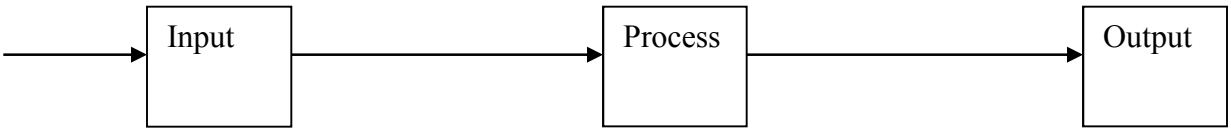
UNIT-4

➢ Overview of computer architecture and organization:

- Computer organization: - it concern with the hardware component operate and the way they are connected together to form the computer system.
- Computer architecture: - it concern with three major structure and behaviour of the computer as seen by user. It includes the information, format, instruction set and technique for address memory.
- Basic function of computer: - the entire computer performs the following basic function.
- Inputting: - saving data and instruction in to the computer system is called inputting.
- Storing saving data instruction make then readily available for initial or additional process as and when required.
- Processing: - performing arithmetic operation (*,-, +) useful information.
- Outputting: - the process of producing useful information or result for the user such as a printed report on visual display.
- Controlling: - directly the member and sequence in which all the above operation are perform.

▪ Basic block diagram



▪ Input unit

Data and instruction must entire the computer system before any computation can be performing. The task is performed by the input unit for example:-data are entered from a keyboard in a manner similar to typing ex: keyboard, mouse, joystick, and scanner.

▪ Central processing unit

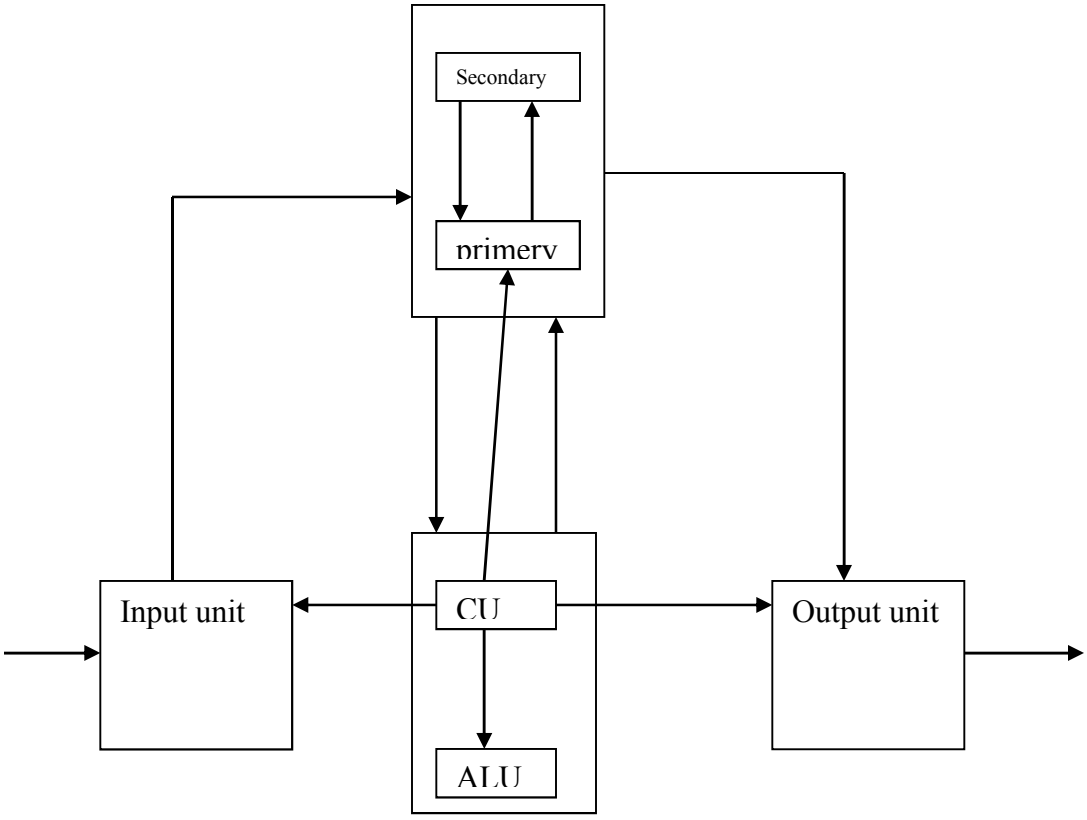
Central processing unit is called brain of computer. It is blind and Heard combined with the central nerves system of a computer. So the computer performs function similar to cerebellum and card and combined function of human body. It process the data and storing.

- Output unit

The job of an output unit the just reverse of that option input unit. It supply the information obtains from the data processing to that outside of computer system. It converts the information to acceptable form.

Ex: - monitor, printer, flop disk.

- Storage unit



- Storage unit

Data and instruction which are entered into the computer system through input unit have to be stored in the computer system before actual processing start. It provides space for storing data or instruction, space for intermediate result and for final result.

The storage unit divided in to parts:

a) Primary memory
b) Secondary memory

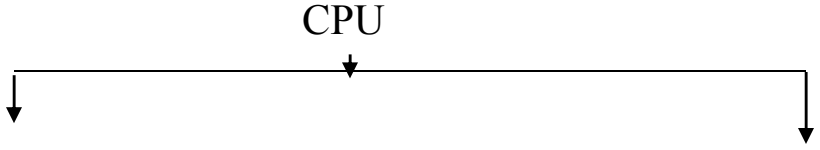
a) Primary memory

- It is also known as main memory real memory or volatile memory
- It is used to hold peaces of information and data which the computer system is currently switch on.
- The primary memory can hold information or data only which the computer system is on, as soon as the computer system switched off or reset, the information hold in the primary memory disappears.
- This memory has limited storage capacity because it is expensive.
- It is made up of semiconductor or material.

b) Secondary memory

- It is also known as auxiliary memory.
- It is a permanent storage hold the device. Secondary storage must cheaper comparison of primary memory.
- It can hold information even then the computer system switch of or reset.
- The secondary storage holds the date and information if the computer system is not working on currently but needs to hold then for the processing letter.

- C.P.U



➢ ALU

- ALU stands for arithmetical logical unit.
- During data processing the accentual execution of the instruction takes places in the ALU of a computer system.
- It perform and processed all the expression arithmetical (+,-,*) and logical (<,>, =) operation.

➢ CU

- CU stands for control unit.
- The control unit of a computer manages or control the operation of all the other component of a computer system that is how the input device known that does. It is the time for it to enter the data and storing, how does the final result given by the output unit.
- It obtains the instruction from the program stored in the main memory.

➢ Major component of computer

- Computer is not a single operator's machine and a computer system is not something that just does calculation. The world computer means a group of virus machine which are utilised for processing a set of program.
    - A computer has two major parts: -
        1. Hardware 2. Software
        1. Hardware

- Its represent the physical and tangible component of the computer system.
- The part which can be touched and seen.
- It includes:
    - A. Input device
    - B. Output device
    - C. CPU
    - D. Storage device
- Electronic circuit consisting of register wires, IC etc.

2. Software

- It is set of program associated with the computer system. S/W just like a car without petrol and TV without film.
- It is intangible in nature.
- S/W are two types: -
    - System software &
    - Application software

System software

- By the system means computer system.
- It is a S/W for system.
- It control and maintain the performance of the computer system.
- It is provide by the computer manufacturer or supplier for the computer system.
- Certain example of system S/W: - operating system translator, device driver.

Application software

- It is software for the user.
- Application S/W is providing by the computer manufacturer or supplier for the user to work in it.
- It is also developed by the user for it self or other, ex: - payroll system, student information, online examination system, office automatic system.
- Certain example of application S/W: - MS-office, visual studio.

Computer language

- A language that is acceptable by the computer system is called a computer language.
- It is also known as programming language.
- It can be classified as following categories: -
    - Machine language ⟷ low-level language
    - Assembly language
    - High level language

    - Machine language

- Al through computer can be program to understand many different computer languages. There is only one language that is directly understood by the computer system without any translation program, this language is known as machine language.
- Machine language of a computer is written as either binary 1's or 0's.
- The circuitry of a computer wired in a manner that it recognizes the machine language instruction immediately and convert them in to electronic signal needed too be execute.

    - Assembly language

- Assembly language programming introduced help in overcoming the above limitation of machine language programming.
- A language which allows data and instruction to be represented and storage by alphabet or symbol instead of a number.
- A language which is represented in the form of alphanumeric code.

    - Both machine & assembly language have following limitation: -

- They are machine dependent.
- They don't programmer to have a good knowledge of central structure computer system.
- It is difficult to programming and errors.
- This limitation is take care by high level language.

- High level language

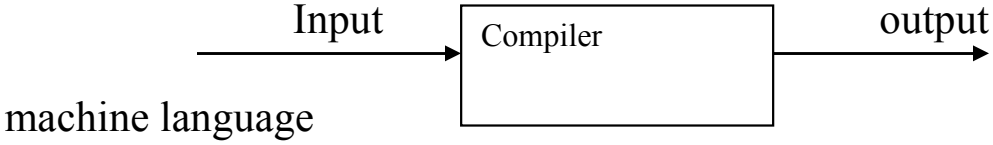
- They are machine dependent.
- They don't require programmer too have any thing about entered structure of the computer.
- It is not too much difficult and error.

➢ Translator

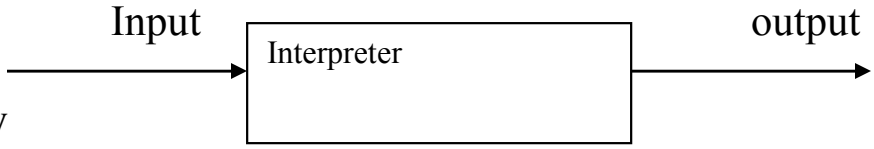
- It is an s/w or program which translates or converted the assembly language or high level language in to the computer language that is machine language.
    i There is three type of translator.
        i. Assembler
        ii. Compiler
        iii. Interpreter

i Assembler: - it is a program or s/w or system s/w translating program which translator or converted the assembly language into machine language which is acceptable or executes the computer system.

ii Compiler: - it is a program or s/w or system s/w translating program or type of translator which converted the high level language in to machine language.



iii Interpreter: - it is a program s/w, system s/w, translation program which translate statement of a high level language in to machine language line by line.



statement by statement into machine language.

➢ Input unit

- It is a part of computer system.
- Program and data are entered in to computer system with the help of input unit.
- Certain example of input unit; - keyboard, mouse, joystic, scanner, and its types.

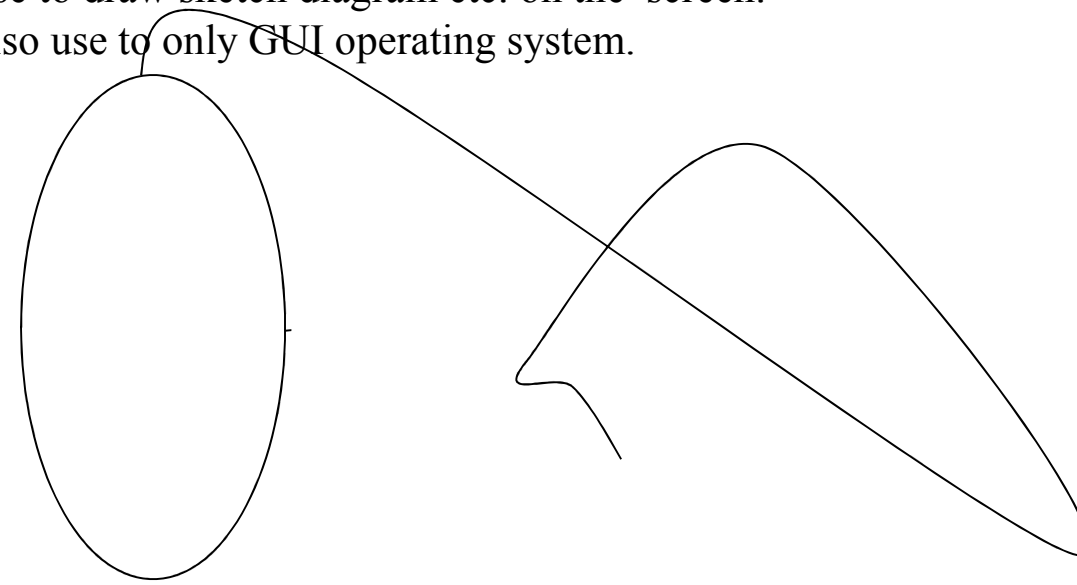
➢ Keyboard

- Data and program entered computer system through a keyboard.
- It is attached with the micro computer and technical of mini computer and large computer.
- It is just like a type writer.
- It contains alphabet keys, control keys; digit keys, special character keys, and function keys.
- QWERTY type of keyboard contains 102/105 keys.
- When a key is press and electronic signal is produced through a electronic circuit when is inside the keyboard known as keyboard encoder.
- It is connection oriented and connection less.

➢ Mouse

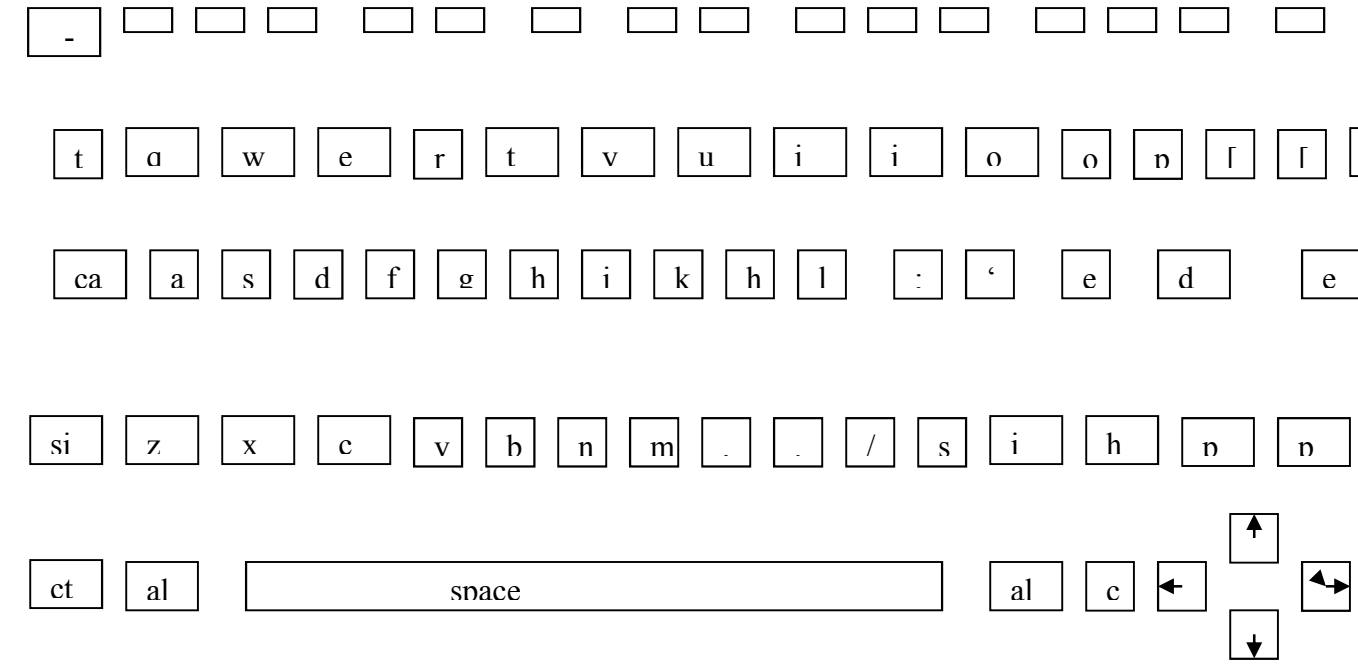
- It is an input device.
- A mouse is also called a pointing device.

- It is held in one hand and moved across a felt surface.
- It movement and direction, movement is read by two rotating on the under size of the mouse. The wheel has x-axis at right angle.
- Each wheel is connected to a soft encoder which emit electrical for every increment of the wheel.
- A mouse has one or more button on the surface for the control purpose.
- The mouse is use to draw sketch diagram etc. on the screen.
- The mouse is also use to only GUI operating system.



Mouse

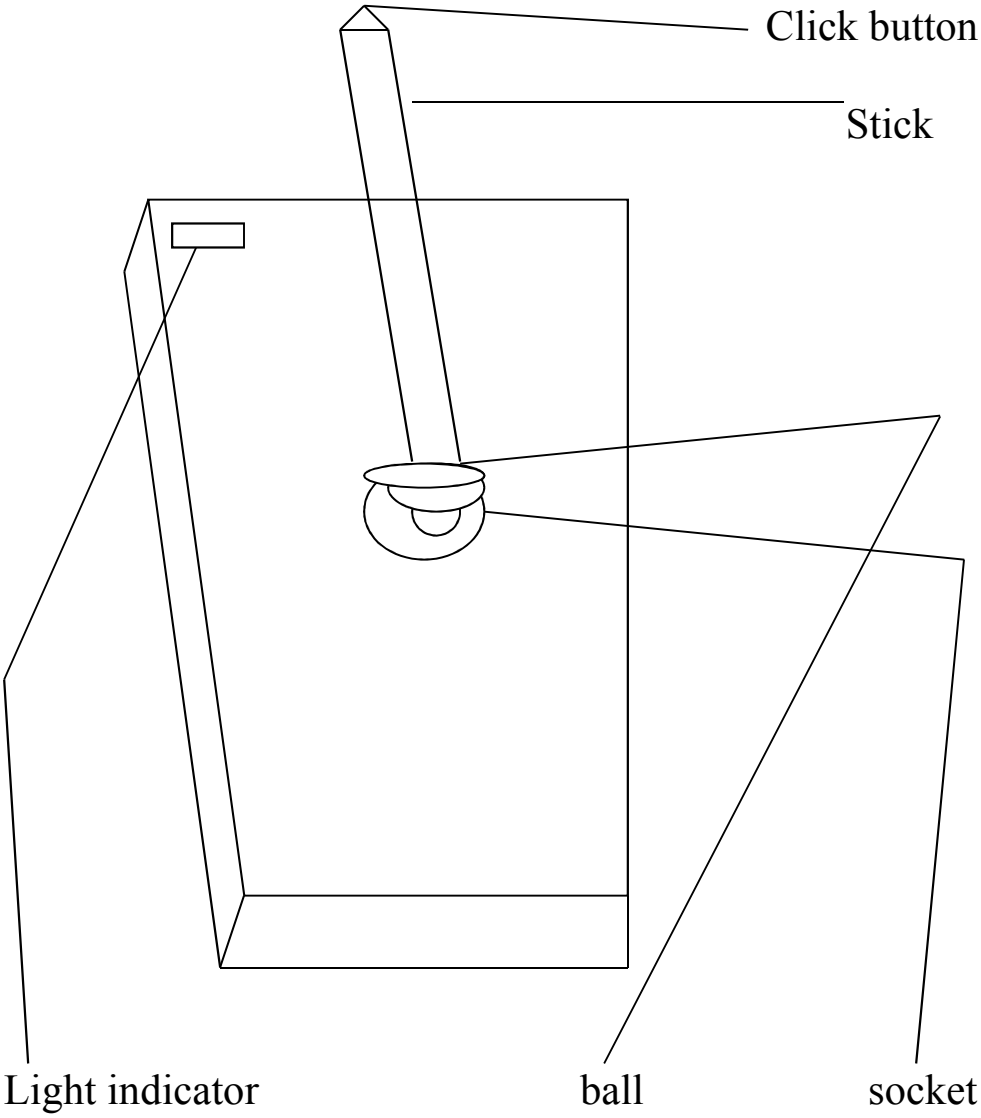
QWERTY keyboard



- Joystick

- It is an input device.
- It is a pointing device.
- It is work like a mouse.
- The movement is based on spherical ball to make movement easier. The spherical ball moves in socket has a stick mounted.
- The stick can be move forward or backward and left or right in value at position the cursor at the desire position.
- Joystick consist of a button on the top is provide to select option.
- Typical uses of a joystick include video games, flight simulators training simulator and remotes control.

JOYSTICK



➢ SCANNER

- It is a special part of input device.
- They are capable of entering data and information directly in to the computer system.
- The main advantage of direct entering of information is that user don't have to press any key for information. too provide faster and moves accurate data entry.
- Scanner are divided into two types: -
  i. Optical scanner
  ii. Magnetic ink character reader.

i Optical scanner

- Optical scanner is capable of coding information recorded on the paper employing legal source and legal sensor.
- The information to be scan is type written information code and ink or pencil makes or information codes in the base.
- It is divided into three types.
  i. Optical character reader(OCR)
  ii. Optical mark reader(OMR)
  iii. Optical bar code reader(OBCR)

➢ OCR

- OCR stands for optical character reader.
- OCR scanner scan alphanumeric character printed or type written in paper.
- It may be a hand held scanner or page scanner to scan light reflection to right reflection page of the text. The change in the reflected light to convert binary data.

- OCR can scan several thousand of character per second.
- It is used in large volume application such as computer oriented repaired by public utility.

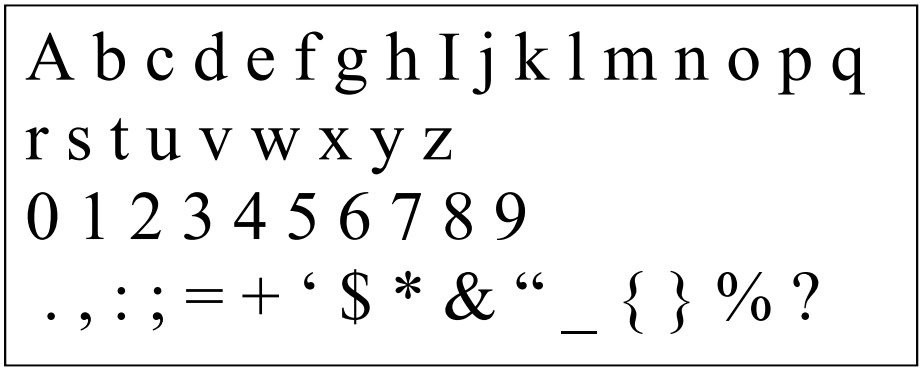
➢ OMR

- Omr stands for optical mark reader.
- The special mark such as square or bubal is prepared on the examination answer sheet.
- The user fills these square or bubals with the soft pencil. Ballpoint pen to include three choices.
- These marks are scan by omr and the corresponding signal is send to the processor.
- If the marks are present it includes the amount of reflected light.
- It the marks is not present the amount of light is not pro produce.
- The change in the amount of reflected light is used to scan the presence of mouse.
- It is used in population serve, market serve, objective answer sheet etc.

➢ OBCR

- OBCR stands for optical bar code reader.
- This method use in no of bar (line) of varying thickness between them to indicate the dissert information.
- Bar code is used on grocery item. Analytical bar code reader can read such bar (line) and convert them into electronic pulses to be processed by a computer.
- The most commonly bar code reader is used in UPC.
- UPC stands for Universal Product Code.
- The UPC code use a series of vertical bar (line) of varying thickness.
- These bars are scan as thirteen (13) digits. The first six (6) digits indicate the supplier or manufacturer of the item and second six digits indicate the individual product.

- The code also contains a check digit to insured that the read is correct or non-correct product.



➢ MICR

- MICR stands for magnetic ink character reader.
- It is widely used by bank to process large volume cheque or deposit form.
- Special ink called magnetic ink (which contains iron oxide particles) is used to written character in the cheque or deposited which is detected by micro.
- Micro MICR is capable of process these cheque or deposit form.
- When a cheque is entered into MICR. It passes through a magnetic field. The iron oxide particles are magnetized under the magnetic field. The reads head reads the character written on the cheque or deposit form with the magnetic.

➢ OUTPUT

- It is a part of computer system.
- Different types of message, picture, image or text display through output device.
- Example of output device: - monitor, printer.

➢ MK

- Up to 2600 cheque or deposit form are processed by MICR within one minute.

➢ Monitor

- It is a output device. It is just like a TV. Monitor is also called VDO. It size is margin diagonal length of screen monitor are available “9”,”12”,”14”, “17”, “17”,”19” and even in “21” in size, it show text or picture in colour or black and white depending upon your type colour. Colour monitor more costly than black and white monitor. Whatever you type on the keyboard. You can see it on the monitor.

➢ printer

- Printer is most popular device they provide information a permanent readable form on the paper. Printer can be classified as-
  - i impact printer
  - ii non-impact printer

i. impact printer : - impact printer are use electro mechanical mechanism strike against ribbon that calls hammer or collection of pins strike against ink ribbon or paper print the text.

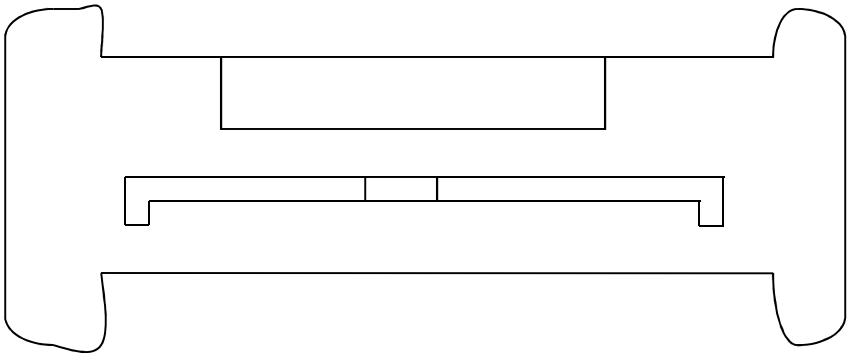
ii. Non-impact printer: - it doesn’t use electro mechanical mechanism head or strike against ribbon and paper. They use third, chemical electro conductivity laser or inkjet technology for printing the text.

- Usually the non-impact printer is faster than impact-printer.
- The disadvantage of non-impact printer it produce a single copy of the text where impact printer produce multiple copy of the text.

➢ Dot matrix printer

- It is a character printer that prints one character at a time.
- Dot matrix printer forms the character and all kind of image as a pattern of dots.
- It printer has a print head which move horizontally right to left or left to right across the paper .

- The printer heads contains collection of pins which can be activated independent of each other to extend and strike against an inked ribbon to form a pattern of dots.
- It printers is an impact printer because they print by hammers or pins on the ink ribbon to give the expression on the paper.
- It can be used to produce multiple copies using carbon or equivalent.
- It prints 30-600 character per second.



ABC

➢ Inject printer

- Inject printer are character printer which term of character and all kinds of image by spraying small drop up ink on the paper.
- The printer head of inject printer contains up 64 tinny noels that can be hetsrest of selectivity in a few micros second by an integrated circuit register when the resistor heats up the mk inequity vaporizes and us ejected through the nozzle and makes a character on the paper.
- The printer heads move horizontally to paint the text or image on the paper.
- It is a non-impact printer because they print text or image using sprying on the paper don't with collection of pin or ribbons.
- Inject printer produce higher quality output than dot matrix printer.

- It prints 30-400 character per second.

➢ Laser printer

- It is a non impact printer. It is a page printer.
- The printer uses laser or some light source to produce an image into a photo sensitive drum.
- The laser printer produces higher quality output.
- These printers are expensive and required periodic maintained.
- Low speed laser printer produce up to 30 pages per minute and use with micro computer.
- High speed laser printer produces up to 400 pages per minute and use with mini or large computer.

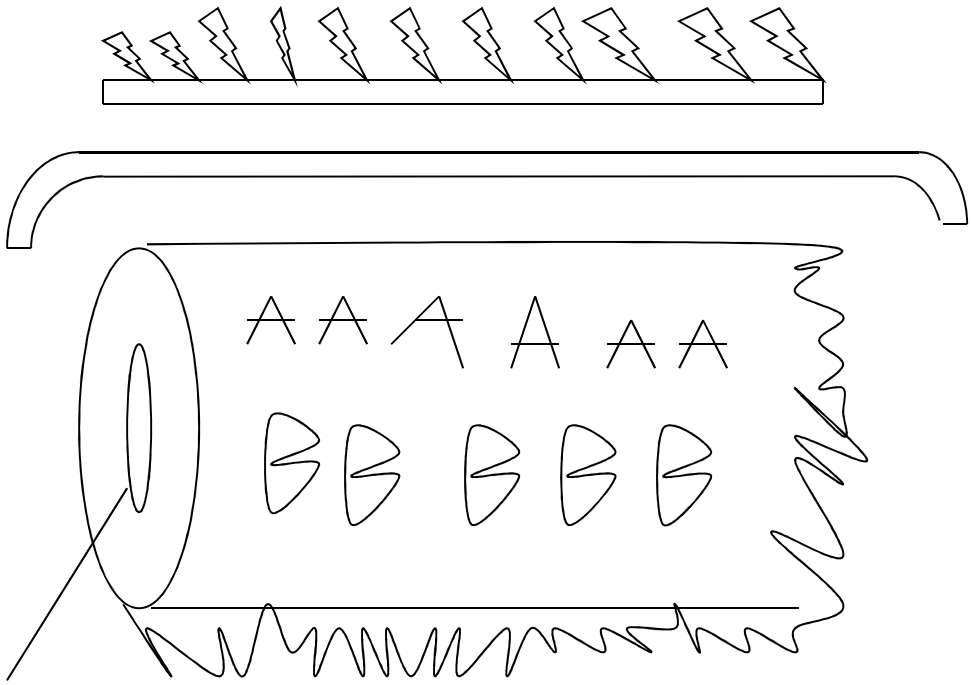
➢ Line printer

- It is part of impact printer.
- Line printer print one line at a time.
- It's printing speed line in the range of 300-3000 per minute.
- It is use for large. Volume of printing work.
- It may be used with mini and mainframe computer.

➢ Drum printer

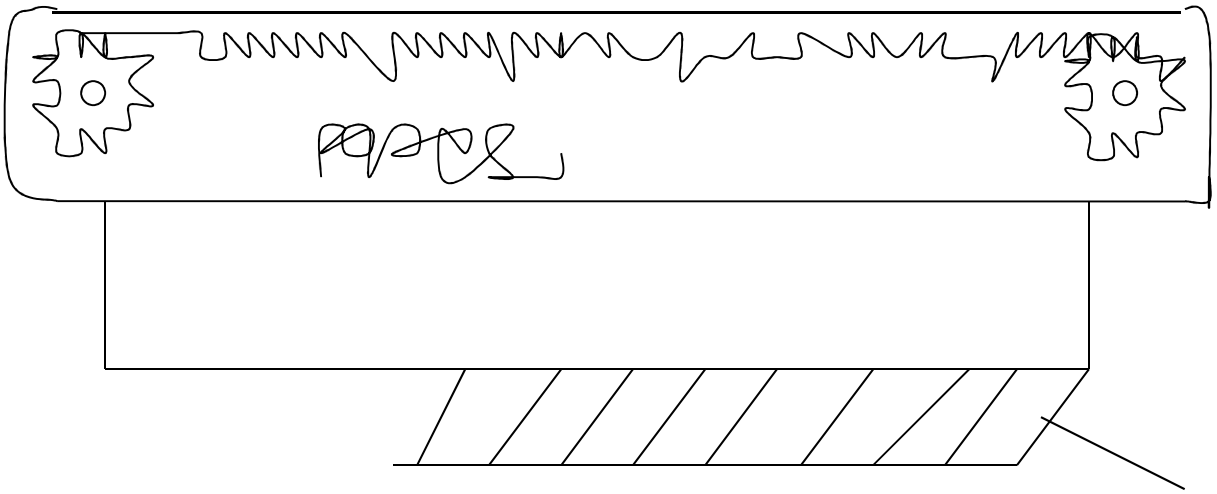
- It is part of line printer.
- A drum printer consists of cylindrical drum. A drum printer uses rapid ally rotating drum.clynder which contains a complete set raised character an each band around the cinder.
- Each character position along the text line contains a band of roused character set.
- This is magnetically driven hammer an each character position on the line.
- They printer receive all character to be printed in one line from the processor.
- The hammer hits the ribbon and paper against the desire character. When it come in the printing option.
- It is an impact printer. It noise level is high.

- It speed varies from 200-2000 line per minute.



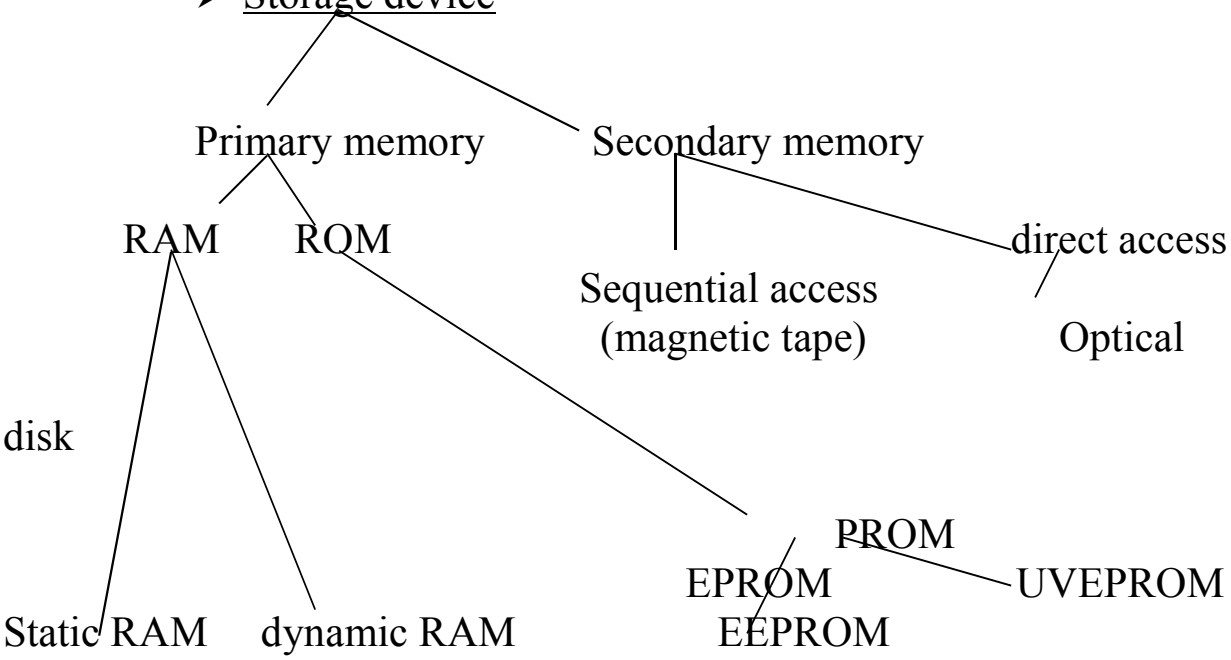
➢ Chain printer

- It is a part of line printer.
- The chain printer use rapid ally rotating chain which is called print chain. Print chain contains character.
- Each line of the change is character form.
- Magnetically driven hammer are located in each print position.
- The printer receives au character and print in one line from the processor.
- The printers print one line at a time.
- It is a impact printer.
- Noise level is high.
- It speed line in the range of 400-2400 per minute.



Hammer

- Storage device



- RAM

RAM stands for random access memory. It is main memory and temporary memory of a computer. The desire data which is

processed and available in the main memory for the user. It is divided into types-

a. Static RAM

- It is written stored information any as long as the power supply is on.
- It has a very high speed.
- It is expensive.
- It consumes more power.

b. Dynamic RAM

- Dynamic RAM losses it stored information is very short time (a few mili- second) even through the power supply is on.
- It is cheaper.
- It consumes less power.

➢ ROM: -

ROM stands for read only memory. Program held in ROM are called firmware. They are stored information permanently in the ROM and ROM is read for used when the computer is switch on. The user cannot write into a ROM. It contents are written into at manufacturer time. It store function such as cos, sine square root, log etc.

➢ PROM:-

Prom stands for program read only memory. Prom become after a ROM and it only possible to read the stored information permanently even it power supply is switch of program and data stored in it.

➢ EEPROM: -

EEPROM stands for erasable prom once information stored in ROM or PROM chip cannot be erased. Hour ever the type of EPROM which erased the stored information and or program. It has two part EEROM and UVEPROM.

➢ EEPROM: - erase electrically high voltage electrically.

- UVEPROM: - erased by ultra volt light.

Secondary memory

- Sequential access memory: - a sequential access storage device is one in which the arrival at the location desired may be sequentially through the location.

EX: - magnetic tape.

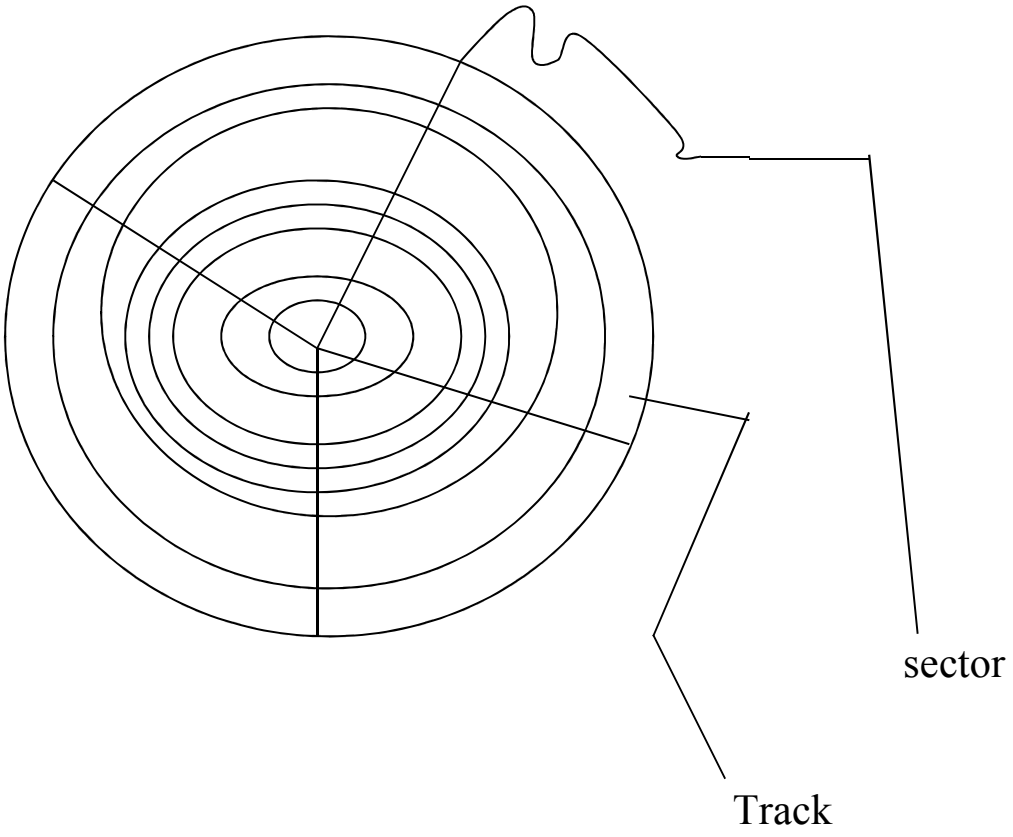
- Direct access memory: - the information is stored or available at random that is available in any order.

- It is a direct access memory which is made-up of optical fibber.
    - Ex: - CD-ROM, WORM: - write only read mod.

- Magnetic disk: -

- It is direct secondary memory device which is made of magnetic cores.

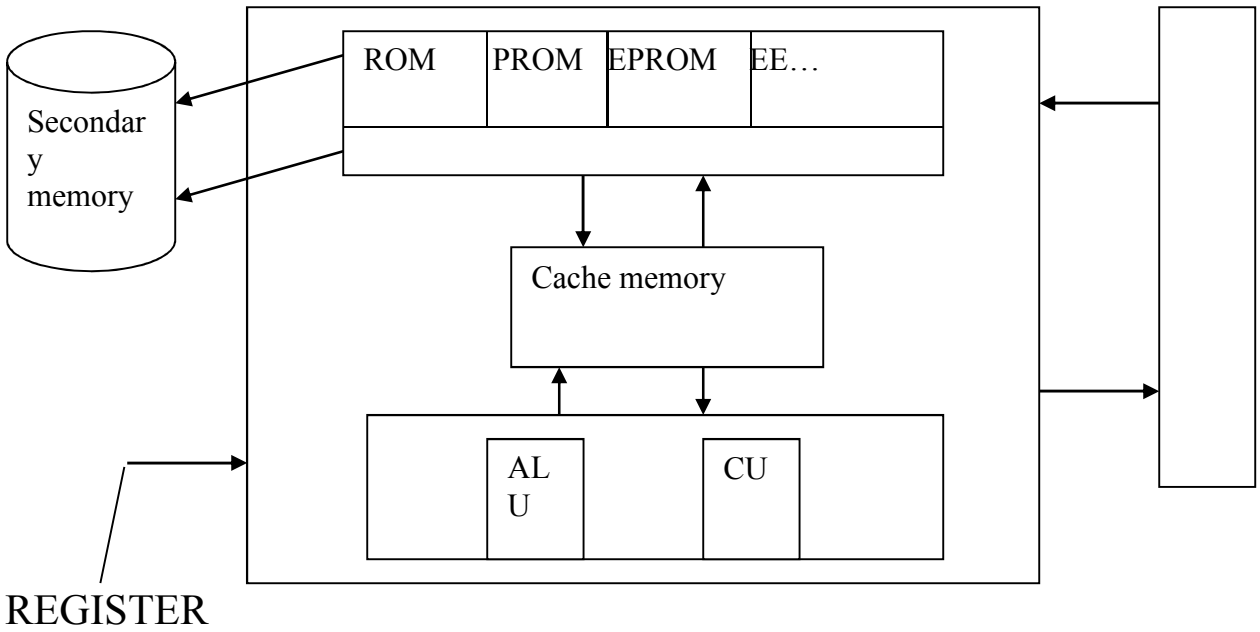
Ex: - hard disk, floppy disk.



- Track
  - The surface of disk is divided into number of concentric circle which is called track.
    - Sector: - each track is further sub divided into number of further sub divided into number of segment which is called sector.
    - Seek time: - it is the time taken to position of the read and write head from the one track to another track.
    - Latency time: - it is time taken to one sector to another sector of the same head.
    - Access time: - seek time+ latency time. It the head is fixed the seek time is head is fixed the seek time is equal to (0) zero, therefore access time= latency time.

- <u>Cache memory</u>

- Cache memory pronunciation as 'cache' memory.
- Cache memory is stimuli very fast and small memory.
- It is in between CPU and main memory and its access time is called to the processing speed of CPU.
- It act is a high speed. Buffer between CPU and main memory.
- It is used to temporary store active data and instruction during processing speed of CPU.
- It is very expensive than other memory.



- REGISTER

- Register is to handle the process and to speed up to the rate of information transfer, computer uses a number of special memory unit called register.
- It is a memory unit which hold information as a temporary basis and are the part of cup (not main memory).
- Length of register= number of bit
  It can store.
- Hence a register than can store 8 bit register most CPU hold today 64-bit,32-bit register.

- Input/output organisation

- Binary operation received from an external device is usually store in memory unit called processing.
- Information transferred from the central computer into external device organise in the memory unit.
- Data transfer the central computer and I/0 devices may handle of verity of mode.
- Some modes uses the CPU as an intermediate path, transfer the directly to the and from unit.

- Data transfer to and from peripheral device may be handle of three fonts.
  - Program input/output
- These are the result of input/output instruction written in the computer program.

Each letter transfer is incited by an instruction in the program.

  - Interrupt driven I/O
- In the programmed I/O method the CPU stays in a program loop until input output unit indicates that it is read for data transfer that is time consuming process since it keeps the processor busy until it a voided the interrupt facilities this is call interrupt I/O.
  - DMA stands for direct memory access. Transfer of data under program I/O is between CPU and peripheral an DMA, the interface transfer data into out of the memory. Until by the memory bus. Removing the CPU from the path and memory bus directly transfer for the I/O programs this technique is called DMA.
  - Memory bus
- Contain data and address and read and write (r/w) controlling for access memory.