UNIT-1

UNDERSTANDING OF COMPUTER

What is Computer?

→ A machine that can recieve and store information and change or process it.

→ A device capable of performing a series of arithmetic or logical operations.

→ The Hull form of computer is -
C = commonly , O = operated , M = machine
P = Purposely / Particularly , U = used for
T = Technology , E = Education / Entertainment
R = Research

→ computers are also called data processing unit or data processor or data processing system

⇒ characterstics of computer System

• Speed = The computer is a very high speed electronic device. The operations on the data inside the computer are performed through electronic circuits according to the given instruction. Computer can perform million or billion of operation on the data in one second. Diff. computers have diff speed.

• Accuracy = In addition to being very fast, computer is also a very accurate device. It gives accurate output result provided that correct input data and set of instruction and input data. In computer terminology it is known as garbage-in

Paragraph - all

- **Reliability** = The electronic components in modern computers in modern computers they have very less failure rate. The modern computer can perform very complicated calculation without creating any problem and produces consistent (reliable) result.

  In general computer are very reliable. Many PC have never had needed a service call.

- **Storage** = A computer has internal storage (memory) as well as external or secondary storage. In secondary storage a large amount of data and programs (set of instructions) can be stored for future use. The stored data and programs are available at any time for processing

- **Versatility** = Versatile means flexible, modern computer can perform different kind of tasks one by one or simultaneously. It is the most important feature of computer. At one moment we are playing games on computer, the next moment we are composing and sending emails etc. The talent of computer is dependent on the software.

- **Communication** = Today's computer are mostly used to exchange messages or data through computer network all over the world for example - the information can be received or send through the internet with the help of computer

- **Consistency** = People often have difficulty to repeat their instruction again and again for example, a lecturer feels difficult to repeat a same instruction in a class room again and again computer can repeat action consistently without loosing its concentration

- **Diligence** = A computer can continuously work for hours without creating any error, It does not get tried while working after hours of work. It performs the operation with the same accuracy as well as speed as the first one.

Generations of Computer

▶ First generation (1940 - 1956)

- Vacuum tube was used at that time
- Size : size was equivalent to room
- Density : one component per circuit
- Speed : Hundred instruction per second
- language : Machine language
- Cost : very high
- Example : ENIAC, EDVAC and UNIVAC

▼ First Generation (1956 - 1963)

⇒ Advantages of first generation computer at that time
  1) fastest computer at that time
  2) Efficient way to solve problems at that time

⇒ Disadvantages

1) ... of vacuum tube
2) high maintenance is required
3) only used for specific purpose
4) not easy to program

→ Second Generation (1956 - 1963)
• Around 1956 an electronic device called transistor
  replaced by the bulky vacuum tubes
• It is a small device made up of a semiconductor
  material like germanium and silicon.
• A single transistor contained circuit produced
  by several hundred vacuum tubes
• Speed = thousandth instructions per seconds
• Language = Assembly language and high level language
  like (FORTRAN, COBOL etc.)
• Ex:- PDP-8, IBM1401 and IBM7090

⇒ Advantages of 2nd generation at that time
1) Reduce the Heat Generation
2) Light weight   3) Cheaper
4) Efficient   5) reliable
6) Reduce the size

⇒ Disadvantage:-
1) No improvement in input/output
2) required to be placed in AC places
3) High costs
4) Special purpose computers

→ Third generation (1961-1975)
• Integrated circuit (IC) was used
• Small in size, portable and produce minimum
  amount of heat
• The consume less power and more efficiency and
  increased the speed as compared to second gen
• Speed = Million instructions per second (MIPS)
• Memory = Hundreds of thousand capacity in chara...
• language = High level language (COBOL, BASIC, PAS...
  , C etc)
• Example = NCR 395 & B6500

⇒ Advantages of 3rd Generation at that time
1) Easily transportable   2) fast
3) installed very easily   4) Reliable
5) execute any type of application

⇒ Disadvantages :- 1) Required to place in AC
2) High cost   3) Its storage

→ fourth Generations (1972-1989)
• In this Generation millions of components built
  be fit into a small chip with the help of
  very large scale Integration (VLSI) technology
  microprocessor came into existence
• Speed = Ten millions instructions per second
• Language = Improved high level language like c++
  (C++, RPG, SQL etc)
• Example = Apple 11, Attari800 and CRAY-1,
  P404 microprocessor made by intel

⇒ Advantages of 4th Generation at that time
1) fast   2) highly reliable
3) the of GUI   4) Interactive I/O devices
4,5) Programs are portable due to use of HLL
6) Requires less power

⇒ Disadvantages
i) Soldering of LSI (Large Scale integration) &
VLSI (Virtual Large infrastructure) on running
board is not easy.

▽ Fifth Generation (1989 to present)
• the ultra large scall intigration (ULSI)
technology is used
• These system uses parallel processing and
Super conductor is helping to make AI
a reality
• speed = Billions of instructions per second

• language = AI language like (LISP, PROLOG)

• Examples = Laptops, palmtops, notebooks, PDA
(Personal digital assistance) etc.

⇒ Advantages of 5th generation computers
1) fast   2) cheaper   3) efficient
4) Many apps can be open at one time

Middle age computers

a) z_1 = The z_1 was a first binary computer design
by konrad zuse in 1938 in Germany. It was
an electrically driven mechanial calculator with
limited programmability, reading instructions
from punched tape. He used it to explore various
ground breaking technologies in this calculator
like Floating point arithmetic high capacity memo
and modules or relays operating on the yes/no
binary

b) Atanasoff - Berry Computer (ABC)
ABC is considered as the first electronic digit
computer and was the first machine to use vacu
tube. prof. John vincent Atanasoff and graduate
student cliff berry developed the ABC in 1937.
This machine was not programmable being design
only to solve systems of linear equations. The
ABC pioneered important elements of modern comput
including binary arithmetic and electronic
switching elements but the special stored program
and lack of a changeable stored program
distinguish it from modern computer

c) Howard Mark I = Mark was a first fully automatic
calculating machine designed by Howard H.
Aiken of Howard university. It is also known
as Automatic Sequence controlled calculator (ASCC).It
was an electro mechanical device.

d) ENIAC = In 1946 John mauchly and john presper
Eckert developed the electrical mechanical numerica

Integrator and calculator (ENIAC) at the university of pennsylvania. It was the first electronic general purpose computer and capable of being reprogrammed to solve a full range of computing problem.

- ENIAC was developed because of military probl and was used for many years to solve balliatic problem. It took up the wall space in a 20×20 square feet room and used 18000 vacuum tube.

e) The EDVAC = Electronic Discrete Variable Automatic computer (EDVAC) was designed on stored program concept for Dr. John Von Neumann also has a credit for introduce the idea of storing both instruction and data in the binary from (only two digit 0 and 1 to represent all characters) instead of the decimal numbers or human readable words. In EDVAC is the successor of the ENIAC.

f) The UNIVAC = The universal automatic computer was a computer milestone achieved by Dr. presper Eckert and Dr. John mauchly. It was the first commercial computer produced in the united states. The UNIVAC handled both numbers and alphabetic characters equally well. The UNIVAC I was unique in that it separated the complex problems of input and output from the actual computation facility.

classification of computers
we can classify the computers in their criteria.
1. Based on operating principle
2. Based on application
3. Based on size and capability

→ Based on operating principle :- On the basin of operations performed and method used to store and process the data and information computer can be classified into the following categorica

- Analog computers = The analog computer represent data in the form of continuous electrical signal having a specific magnitude. These computers are very fast in their operations and allow several other operation to be carried out at the same time. However, the results produced by these computers are not very accurate. Therefore, the analog computers are widely used in application in which the accuracy of result in not a major conce They are powerful tools to solve differential eqn. The electronic circuit in modern analog computers is generally an operational Amplifier (op-Amp). It is made up of semiconductor integrated circuits. The 3 diff characteristic feature of op-Amps are as follows.
1. They have large voltage gain. The voltage gain of an amplifier is defined an the ratio of the output voltage to the input voltage. They have infinite input resistance. The input resistance is defined an the ratio of change in

the input voltage to the change in input current, the resistance is zero output resistance. The output current carried out by the in-built components are generally

3. They have zero output resistance. The output resistance is the nominal resistance measured with no load.

Digital computer are generally faster and more reliable them the analog computer system and prove more accurate results. The computer used by a home user is a typical example of a digital computer. The digital computers are also employed in college, universities and small and medium sized businesses.
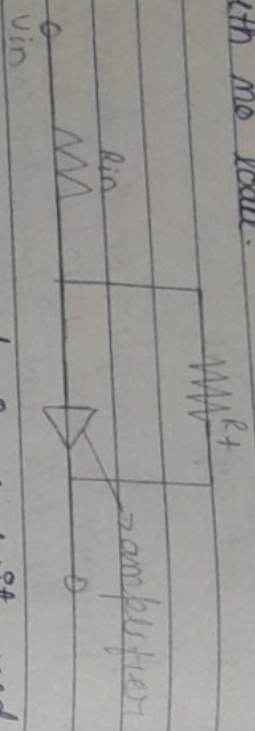
figure shows the basic circuit used in analog computers. In this figure the triangle represents an amplifier that is used to inject the incoming signal. If the incoming signal is +ve signal, then it will inverted into a -ve output signal and vice versa. R4 and Rin are used to represent the feedback resistor and the input resistor respectively.

The diff. hardware components of a digital computer are ALU, CU, a memory unit and I/o unit. The ALU of a digital computer is used to perform various arithmetic operations and various logic operations such as AND, OR, NOT etc. CU helps in directing the operation of ALU. The memory unit is used to store the data on temporary or permanent basis. The input units are used to enter the data into the computer and the output unit is used to display the information generated by the computer to the user.

• Digital Computers = The digital computer, also known as the digital information processing system is a computer that stores and process data in the digital form. Therefore, each type of data to usually stored in these computer in terms of Os and 1s. The output produced by these computers is also in the digital form. The digital computers are capable of processing the analog data. However, the analog data should be first converted to the digital form before being processed by these computers. Similarly, if we want the output produced by these computers in the analog form, then the digital information should be first converted

• Hybrid computers = The hybrid computer is a combination of analog computer and digital computer because it encompasses the best features of both these computers. Therefore the hardware components of the hybrid computer are usually the mixture of analog and digital computers. These features make the hybrid computers very fast, efficient, and reliable. In these computer, data is generally measured and processed in the form of electrical signals and stored with the help of digital components in the analog form then the digital information should be first converted

→ Based on Application-

- **General Purpose Computers** = They are designed in such a manner that they can work in all environment. The general purpose computers are versatile and can store a no. of programs meant for performing distinct tasks. However the general purpose computer are not efficient and consume a large amount of time in generating the result.

- **Special Purpose Computers** = "They are designed in such a manner that they can perform only specified task. The special purpose computers are not versatile and their speed and memory size depends on the tasks that is to be performed. These computers are less extensive as they do not contain any redundant information. The special purpose computers are efficient and consume less amount of time in generating the result.

→ Based on Size and Capability:-

- **Microcomputers** = A microcomputer is a small cheap digital computer that designed to be used by individuals. It is built around a microprocessor. It consist the other part that a microcomputer includes are power supply, connectivity cables, keyboard, mouse, printer and monitor. The computer also include several software program such

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as operating system, system software and utility software. The microcomputers are generally available in the form of PCs, workstation and notebook computer.

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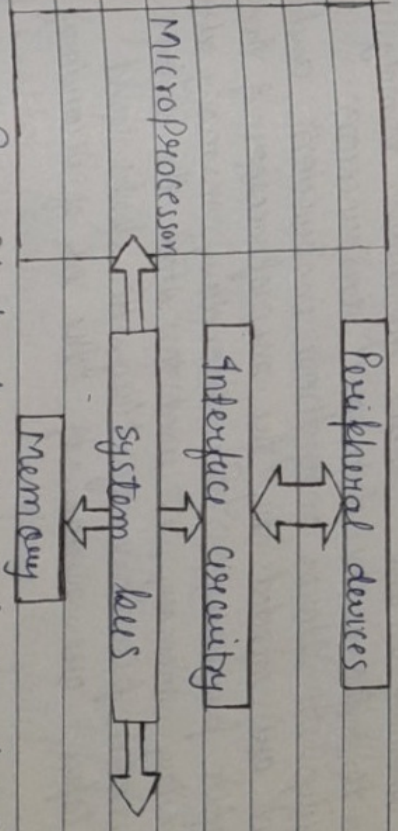
The Block diagram of a microcomputer.

1) **Microprocessor** = It is the heart of the microcomputer. It incorporate all the functions of a CPU unit in a single IC in a microcomputer. The basic unit of microprocessors are ALU, register unit and CU. ALU is used to perform various arithmetic and logical operators. The register is used to store the data and instruction temporarily needed by the ALU. The various registers heavily needed by a microcontroller are Accumulator register, Memory address register (MAR) and basically directs the operation performed by the microcomputer.

2) **Memory** = It is used to store the data and

instructions on temporary or permanent kean.

A microprocessor generally employes two types of memories i.e. primary and secondary memory. Primary memory also called the main memory, is used to store the data and instruction temporarily. It stores only those instructions and data that are needed by the microprocessor of the computer for processing. The secondary memory also called auxiliary memory, is used to store the data and instruction permanently. Magnetic disks and Magnetic tapes are some of the ex. of secondary storage.

3) **Peripheral devices** = They are generally the input and output devices attached to the computer. The various input devices such as keyboard and mouse are used to enter program and data into the computer before performing any kind of operations. They are used to transfer data and instruction from the external environment into the computer. The various output devices such as monitor and printer are used to display the results computed by the computer to the users. The major function performed by the output device is to need of multiple users at a single instant of time. These computers are generally designed for small a called the binary result computed enth a form that can be easily understand by the user.

4) **System bus** = It is also referred to as the frontside bus, memory bus, local bus or a host bus. The system bus in the micro computer is used to connect microprocessor, memory and peripheral device into a

single unit. The system bus in a collective name given to address, data and control bus. The address bus is a unidirectional bus that is used to identify a peripheral device or a memory location. The data bus is a bidirectional bus that is used to identify a peripheral device or a memory location that is used to send and control bus is used by the microprocessor to send control signals to the various devices within the computer.

Depending on the size, the microcomputer can further classified into the following type-
i) Desktop computer   ii) Laptop computer
ii) Hand-Held computer (Smau) in Diy and can be kept in

- **Mini computers** = A mini computer was first introduced in the year 1960 by Digital equipments corporation (DEC). They were called mini computer because of their smaller size than the other computers of those time. They can handle more data and more inputs and outputs than micro computer. Mini computer are less powerful than mainframe computer but more powerful than micro computers. Therefore they are referred the midrange computer. They are able to store the need of multiple users at a single instant of time. These computers are generally designed for small medium sized business environment.

After implementing the mini computer as the network server hundred of desktop computer can be connected to it. Mini computer can also be used as web servers that can handle thousands transact

in a day. These computers are less expensive than mainframe computers and hence suitable for those organisations that cannot afford high priced powers.

Example of mini computers are - PDP 11, IBM (1000 series), VAX 7500 etc.

- Mainframe computers = A mainframe computer are very large computer that is employed by large business organisation for handling major applications such as financial, transaction processing, Enterprise resource planning (ERP) Industry and consumer statistics and census. They are capable of handling almost millions of records in a day. The mainframe computer can also be centralised computer with several user terminals connected to it. The mainframe computers are actually considered as the predecessor of followers. These computers are bigger and more expensive than other computers.

Some of the characteristics of mainframe computers are as follows:

1) A typical mainframe computers generally has a maximum of 16 microprocessors. However, some modern mainframe computers can have more than 16 microprocessor.

2) The RAM capacity of these computers lies b/w 128 Mb and 8 Gb

They are able to run multiple operating system, and therefore termed as 'virtual machine'. They have different cabinets for primary storage, Mcmdas

- Output computer = A output computer is the fastest type of computer that can perform complex operation at a very high speed. Developed in 1960 by Seymour cray at control data corporation (CDC). They are more expensive than the other categories of computer and are specially designed for the application in which large number of complex calculations have to be carried out to get the desired output.

$Ex = CRAY3$, $cyber 205$, $NEC SX-3$ and $PARAM from India$

Applications of supercomputer are as follows:-

1) Weather forecasting 2) Animated graphics
3) Fluid mechanics 4) Nuclear energy research

5) Petroleum exploration

The design of supercomputer use two diff. method of processor, to execute the second instruction before the execution of the first instruction is completed.
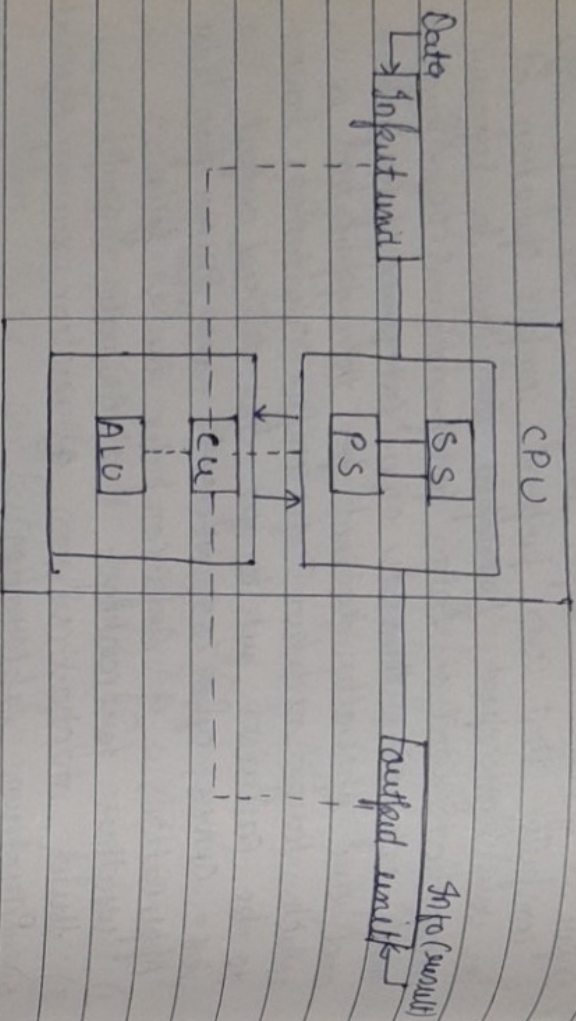
1) Pipelining - It is a technique that allows the micro processor to execute the second instruction before the execution of the first instruction is completed

2) Whereas parallelism allows the microprocessor to execute several instruction at the same time

- Storage and I/O units: they can handle huge amount of I/O operations at the same time

Chapter - 02 - COMPUTER ORGANISATION AND ARCHITECTURE

Von neuman (1945)

→ Memory unit = The memory unit store the program and data. There are of two Type

● Primary memory (Main memory) :-

1. Contain large number of semiconductor cell each capable of storing one bit of information.

2. These cells are processed in Group of fixed memory in organised containing n bit, the main on word can be stored or retrieved in one basic operator

3. For accessing data a distinct address associate with each word located

4. Data and program must be in the primary memory for execution

● Secondary memory = They are used when large amount of data has to be stored ex= Hard disk, compact disk.

→ Processor unit :-

● The heart of the computer system is in the processor unit.

● In consist of ALU (Arithmetic section or logical section) and control unit

⇒ ALU = Most computers operations (Arithmetic and logical) are executed in ALU of the processor. Access time to registers are 5-10 time faster than acess time to memory.

[register is the most smallest unit of the memo-

├ Input unit ┤ CPU ├ Into (result)
├ SS ┤
├ PS ┤
├ CU ┤ ├ output unit ┤
├ ALU ┤

Data
→ Input unit

⇒ solid lines are used to indicate the flow of instruction and data.

⇒ Dotted lines represents the control flow

→ Input unit = It accepts coded information from human operation through electromechanical device such as keyboard, auxy digital communicat- on line. The information received in either -altered in the memory for later reference or immediately used by the arithmetic and logic circulatory to perform the desired operations finally the result is sent back to the outside through the output unit

- The operation of all the units are coordinated by the CU (acts as the nerve center) that sends control signal to the other unit.

‡ Timing signals that governs the I/O transfer are generated by the CU.
- Synchronization are also generated by the CU.
- By selecting, interpreting & executing the program instruction the CU is able to maintain order and direct the operation of the entire system.

→ Output unit :-
- Counter part of input unit
- Output device accept binary data from the computer, decodes into original form and supply this result to the outside world.

Internal organization of processor

→ Instruction Register (IR) = Hold the instruction that is currently being executed

→ Program counter (PC) = It contains the address of the instruction currently being executed of the next instruction to be executed.

→ N-General purpose register (R0 to Rn-1) = facilitate communication with the main memory access to

data in these register in much faster than to data stored in the memory location because the registers are inside the processor, Modern computer have 8 to 32 General purpose registers.

→ Memory Address Register (MAR) = Holds the address of the location to or from which data are to be transferred.

→ Memory Data Register (MDR) = contains the data to be written into or read out of the address location.

Main Memory

MAR	MDR	Control
PC		
	R1	ALU
	R2	
IR	Rn	

→ General purpose registers
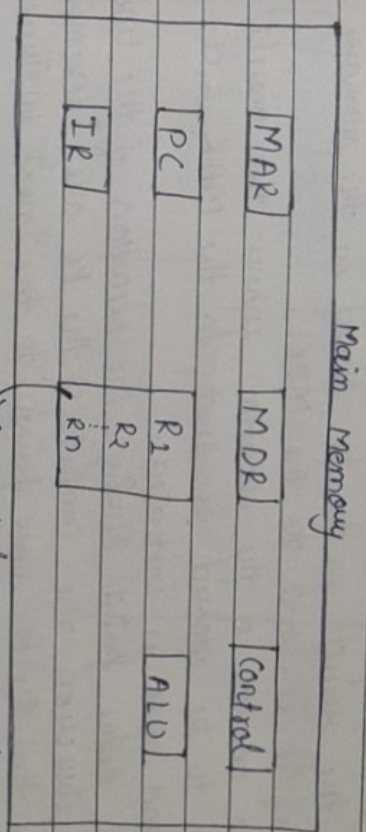
⇒ Steps involved:-
1. Program is stored in the main memory and a read control signal sent to the memory
2. PC is said to point to the 1st generation of the computer.
3. Contents of the PC are transferred to the MAR and a read control signal sent to the memory
4. After the excess time, the address word (An of the memory l is read out 1st instruction) is read out
5. Contents of the MDR are transferred into the MDR Now the instruction is ready to the instruction

5. executed.
6. If the instruction involves any operations to be performed ALU, the required operands are to be fetched from the memory (or CPU registers). This is done by sending its address to the MAR and initiating a read cycle.
7. operands are read from the memory into the MDR and are transferred from MDR to the ALU.
8. ALU will perform desired operation.
9. If the result is to be stored in the memory, then it is sent to the MDR.
10. The address of the location where the result is to be stored is sent to the MAR & a read cycle is initiated.
11. At some point during the execution of the current instruction, the content of the PC are incremented so that the PC now points to the next instruction to be initiated.
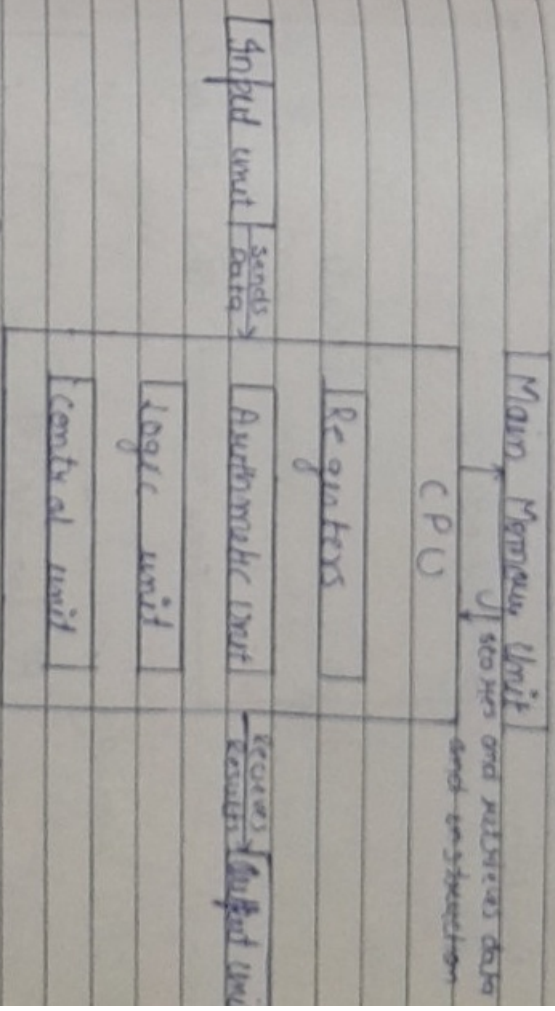12. As seen as the execution of the current instruction is completed, a new execution will start.

‡ Central processing Unit (CPU).
The function of any computer system around a central components known as CPU.
The CPU, which is popularly referred to as the "brain" of the computer, is responsible for processing. The data inside the computer system. It is also responsible for controlling all other components of the system.

a typical block diagram of the computer system illustrating the arrangement of CPU with the input and output units, as well as the memory of the computer system.

Main Memory Unit	
stores data and retrieves data and instruction	
CPU	
Registers	
Arithmetic Unit	sends → Output unit
Logic unit	Input unit sends data →
Control unit	

The Block diagram of computer system.

The main operations of the CPU include four phases:
• Fetching instructions from the memory
• Decoding the instruction to decide what operation to be performed.
• Executing the instructions
• storing the result back in the memory

These 4 phase process is known as the CPU cycle which is illustrated in the next fig.

Depending on the next fig, the central processing unit consists of the following subsystem
• Arithmetic Unit (AU)
• logic Unit (LU)

- Central unit (CU)

6. The CPU makes use of the following memory subsystems for carrying out its processing operation.
   - Main memory unit   • Cache memory
   - Registers

7.

→ Decode

fetch ↑   ↓ Execute

→ store ←

=> CPU working

11

[CU ←→ ALU]

12 Program

↓ MEMORY ↓

② Enter the   ⑤ Enter the   ④ [1,0]   ③ [4]
   1st No.   2nd No.

⑧ Multiply   ⑫ Print the   ⑪ [40]
   1st & 2nd   result

End ⑮

↓

input③ ⑥
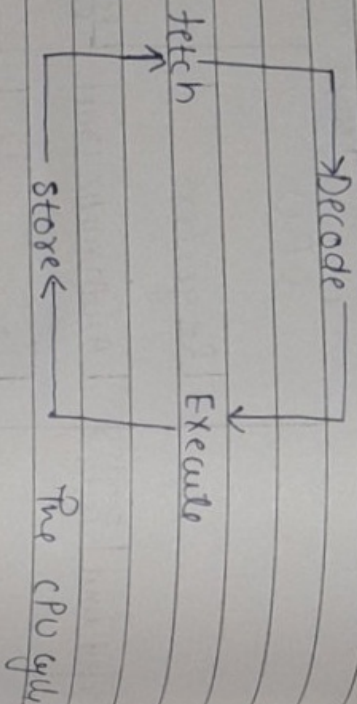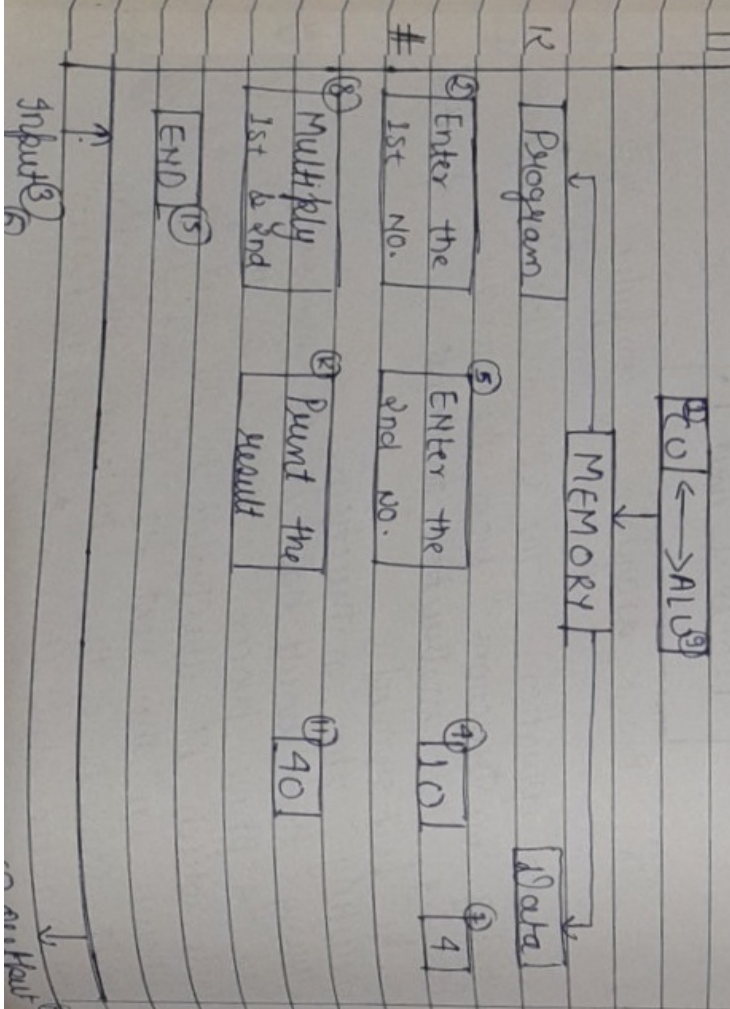
Chapter 03 Memory & Storage System

=> Computers are used not only for processing of data for immediate use, but also for storing of large volume of data for future use.

=> There two types of storage requirement computers use two types of storage location one for storing the data that are being currently handled by the CPU and the other, for storing the results and the data for future use.

=> The storage location where the data are held temporary is referred to as the primary memory while the storage location where the program and data are stored permanently for future use referred to is the secondary memory.

=> The primary memory is generally known as 'memory' and the secondary memory 'storage'.

=> The data and instruction stored in the primary memory can be directly access by the CPU CMDR is used in this type of work) using the data and the address buses. However the information stored in the secondary memory is not directly accessible to the CPU firstly the information has to be transferred to the primary memory using input/output channel and then, to the CPU.

=> Computer also use a third type of storage location known as the internal process memory (IPM). This memory is place either inside the CPU or near the CPU connected

through special fast bus)

6.
```
        ┌─ Memory ─┐
        PM        SM
```
SM ✓
PM ──────── IPM
Law ──── cost ────── res
slow ──── speed ──── High → fast
High ──── capacity ── → law

7. High ──────────── law
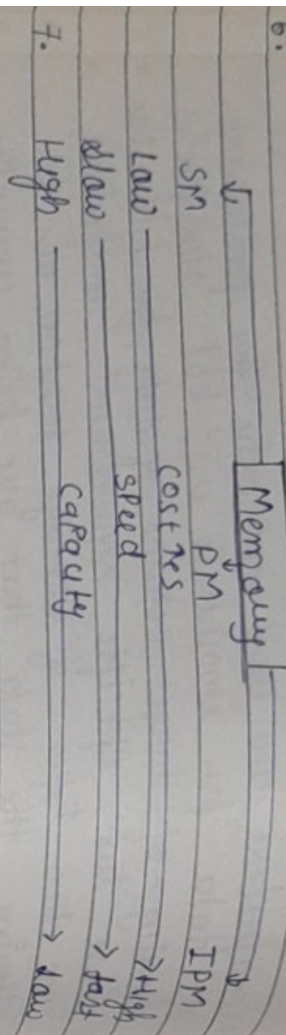
8. PM is also known as Main memory (includes two types RAM and ROM). The data stored in RAM are lost when the power is switch off

9. In RAM are lost when the power is switch off & therefore it is a non volatile memory,

10. however the data stored in ROM is permanent even when the power is switched & therefore ROM is a non volatile
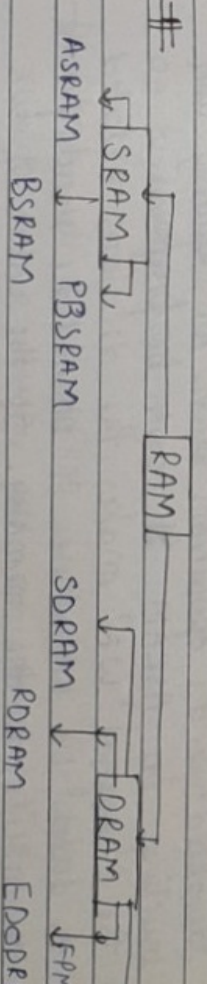
11. SM is also known as auxilary memory. include primarily magnetic disk & magnetic tape. These storage devices have much larger storage capacity than PM, the information remains permanent until we erase it.

12. Internal process usually include only memory and registers which works
data temporarily and are accessible directly by the CPU. This memory is placed inside or near the CPU for the fast access of data

Memory Representation = Data will work on is stored in the computer. In the memory values are represented by sequence of binary data known as bits. Most computer use a

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Group of 8 bits known as a byte, to represent a character. How does the computer know what any particular sequence of bits represent, we can think of memory as a bunch or a byte as all into which we can place data. Each cell known as data item it is assign a unique number known as address (which is like the index in any array)

⇒ The byte is defined as the smallest addressable unit of memory. Most computer in group of bytes, usually 2 or 4 known as words to represent information

#
```
        ┌─ SRAM ─┐        ┌─ RAM ─┐
      ASRAM  PBSRAM      SDRAM   ┌─ DRAM ─┐ PM
      BSRAM              RDRAM   EDODR
```

→ SRAM = Static RAM (cache memory). It is a type of RAM in which data is stored till the power of the computer is switched on.
i) SRAM uses a no. of transistors to store a single bit of digit information.
ii) SRAM are fast and expensive

b = bit, lini
ws = word, lini
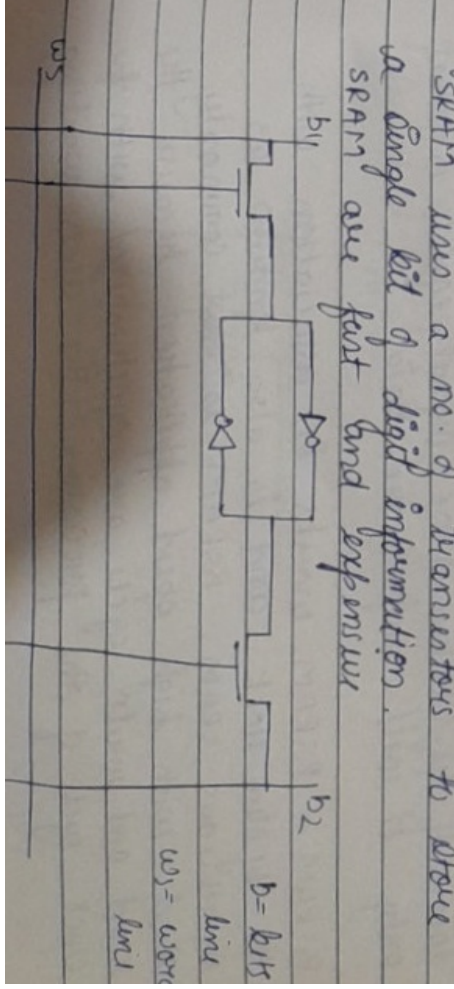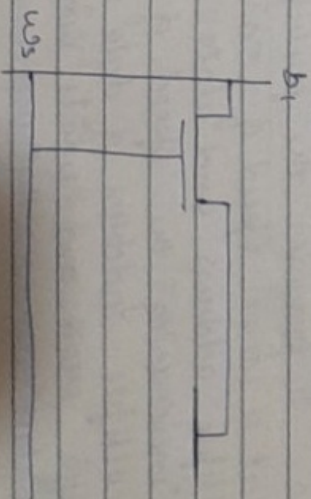
Types of SRAM are as follows:-

6.
• AsRAM = It performs the operation without the use of system clock. It makes of 3 signals of working chip select (CS), write enable (WE) & output enable (OE).

7.⇒ The CS signals enables the processor to select the memory for performing read & write operations if the value of CS signals is equal to 0 then memory is enabled to perform

8. the operation. on the other hand if the value of CS signals equals to 1 then the memory is

9. disabled and operations such as reading and writing in ASRAM. It can't be perform

10.

⇒ The signal 'WE' makes the decisions related

11. to data. i.e wheather it should be read from or write to the memory. If the value of WE signals equals 0 then no data can be read from or written to the memory.

12.⇒ The signal OE is an active low signal that enables the processor to give the output for the data. if the value of OE signal equals 0, then only it will output the data

‡

• BSRAM = BSRAM works in association with the system clock and is also known as synchronous SRAM. BSRAM is most commonly used with high speed application because the read and write cycle are synchronized with the clock cycle of the processor. The acess waiting

(Burst Bsrm)

time gets reduced after the read and write cycle are synchronized with the clock cycle the speed and the loss are increased as decreased simultaneously.

• PBS RAM = Pipeline Burst RAM makes use of the pipeline technology in which a large amount of data are broken up in the form of data packets containing data these packets are arranged in a sequential manner. in the pipeline and are send to the memory simultaneously PBMSRAM can handle a large amount of data at very high speed it is fastest SRAM because it can operate as high as 66 MHZ

➡ DRAM = It is the RAM in which the data is stored in a storage cell, consisting of a transistor and a capacitor unlike SRAM the DRAM needs to be continuously refreshed with power supply because the capacitor has the tendency to get discharged DRAM retains the data for a very short spain of time even after the power supply is switched off.
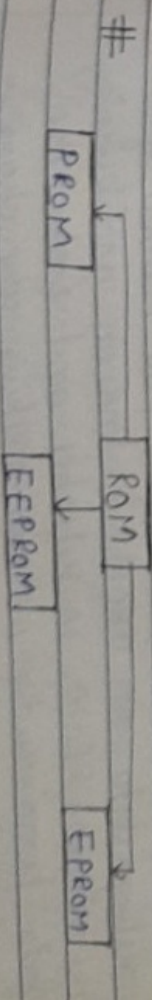
Types of DRAM are as follows :-

- **SDRAM** = SDRAM performs its operation in the synchronous mode in association with the clock cycle of the processor bus. It consists of internal memory bank of such that if the address line are send from the 1st bank then the address can be read by using the 2nd bank. The internal bank are used because the row and columns address line needs to be charged for reading any address. SDRAM provides a synchronous interface in which it wait for a clock signals before responding to control input. Generally it is used with the processor for driving the data on a continuous basis. The continuous form of data storage help in processing more no. of instructions per unit time that increases the speed of data

- **EDODRAM** = Extended data out DRAM can access more than 1 bit of data at one time which help in achieving faster data access rate. It provides the facility to perform various operation at one time such as Reading & writing etc. It start accepting the next bit of data immediately after getting the first bit of data for performing read/write operation.

- **FPMDRAM** = Fast Paced Mode DRAM make use of paging in which read/write operation is performed by collecting the address of the data from the rows and the columns of a matrix. once the data is read, the address of the particular column is incremented to that the user can read the next part of the data. The use of paging concept in FPMDRAM doesn't allow to work with the buses at the memory speed more than 66MHz. As the result a lot of time is consumed in reading/writing the data from the matrix.

RDRAM = RDRAM designs by Rambus I&C works at a faster speed as compared to SDRAM. It is compact in size and uses 16 bit address bus. It provides the facility to transfer data at a max speed of 800MHz. It contains multiple address and data line that helps in increasing the speed of data access. Thus multiple address of data line helps in performing diff. read and write operation among the users because it is not

ROM = ROM is the memory that stores the data permanently. It can retain the data even when it is not...

```
#          PROM
            |
ROM ------> ROM
            |
          EPROM ---> EEPROM
```

the power of the computer system is switched off. The data can be easily read from these types of memory but cannot be change.

It is most commonly used in device such as laser printer, calculator, etc. ROM doesn't allow the random access of data rather it allow sequential access of data. It is less expensive as compared to RAM and other devices storage devices such an Magnetic disk

Types of ROM are as follows:-

Program ROM (PROM)
Electrical PROM (EPROM)
Electrical Erasable PROM (EEROM)
(i) UV (ii) flash ROM/flash memory

PROM = PROM is a memory chip on which the write operation of data can be performed only once. The data is stored on this chip permanently i.e once a program is written on the PROM, it cannot be erased or destroyed. To write the data on PROM chip, a device known as PROM programmer or PROM burner is required. The method of writing data on PROM is known as burning the PROM. PROM is reliable and stores the data permanently without making any change in it. It is mostly used in video games and electron dictionary.

• EPROM = EPROM is a type of a ROM in which data can be erased or destroyed using ultraviolet light. Erasable ROM provides the facility of changing the content of the data i.e, it can be reprogrammed. It contains the floating gate transistor which have a capability to hold an electric charge even when the power of computer is switched off. It also facilitate the storage of data for a longer period of time.

• EEPROM = EEPROM is a type of ROM in which data can be erased or destroyed by exposing it to an electric charge. it has the ability to retain the data stored in it, even if the power of the computer system is switched off. It stores the data permanently but allows to make changes in the data by erasing it with the help of electric charges. In this type of memory, the data can be written or erased only one byte at a time because of which it works very slowly.

⇒ Flash ROM = flash ROM is a type of EEPROM that stores the information using floating-gate transistors, which can store electric charge for a longer period of time as compared to the normal transistors. This memory is mainly used in the memory card of mobile phone, digital camera and ipad for storing data. The data stored in flash ROM memory can be

easily transferred using transmission medium such as data cables, bluetooth and infrared technology. For example- we can transfer the data stored in flash ROM memory of mobile phone to the memory of a computer using data cable we can easily erase the data stored in flash ROM memory and reprogram this type of memory. Flash ROM has faster speed of reading data as compared to any other type of ROM. It uses continuous memory cells for storing data. The memory cells of a flash ROM are made of floating gate transistor, a single level cell (SLC) can store only one bit of data where multilevel cell (MLC) provides the facility of storing more than one byte.

The two types of flash memory are:-
1) NAND flash
2) NOR flash

> Drawbacks of ROM
- we can't delete/modify the inbuilt program in PROM programmer can make the program but can't destroy that program

- Storage System = storage system are the device such as hard disk, optical disk and magnetic disk used for data storage.

The main objective of the storage system is to permanently store data which can be of any type such as text data, image data etc.

→ for future use. The storage system provides the facility to use the data at any time.

Diff. storage system have varying storage capacities for example:- the normal storage capacity of compact disk is 700mb.

Storage Device
├── Magnetic
│   ├── Tapes
│   └── Disks
└── Solid state
    ├── Memory
    │   └── optical
    └── optical

Read only disk
Read once write many disk
Read many write many disk
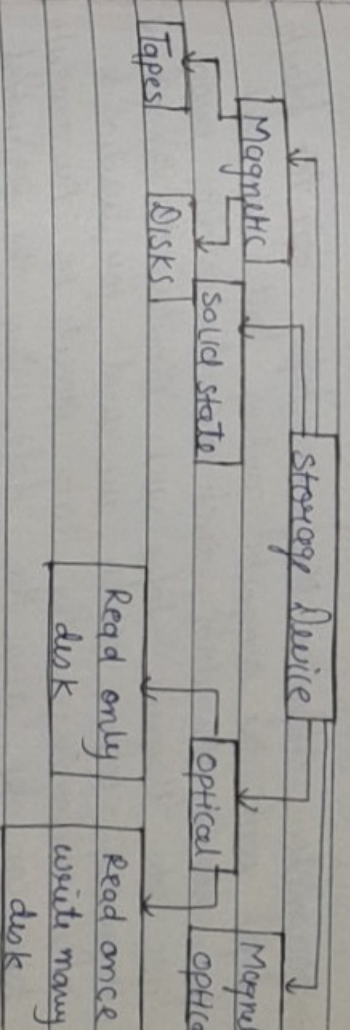
classification of storage system

⇒ Magnetic storage system = It can be defined as the storage system that stores the data on a magnetised medium, with the help of magnetised particle Ex= magnetic tape, magnetic disks, floppy disks are some of the examples. Magnetic storage system are non volatile and provides the facility to store any type of data such as audio, video, text image etc.

In case of magnetic storage system, data can be access randomly such as magnetic tape in a sequential way and magnetic disk in a random way, where data in accessed sequentially the access time is directly proportional to the search point. If a searching point is near, then the access time is less & if the searching

point in memory, then the access time is less & if the reading point is far than the access time is more.
where data is accessed randomly then the access time will be less.

→ Magnetic Tapes = Magnetic tapes are the plastic tapes with the magnetic coating that are used for storing the data, such as text video, music doc etc. Magnetic tapes are similar to the natural regarding tapes, which are used for audio & video recordings. The data stored in the magnetic tapes can be access the data using the sequential method. Magnetic tapes could be compared with a cassette in which in order to access method. Hence the first song we have to go learn similarly in the magnetic tape we cannot directly jump over the third song therefore magnetic tapes are used in the case where a large amount of data needs to be stored but performance is not a major issue. Magnetic tapes best suited as the backup device for storing large amount of data.

magnetic tapes usually consist of a tape of 1/2 & 1/4 inch wide, 600 - 3000 ft long and is wound on a spool in the form of cartridge and reel. A metal foil called marker, is used to determine the beginning of Tape (BOT). When a write command is given a block of data is written on the tape. The next Block is then written after a Gap called Inter Block Gap (IBG) on block may contain one or more records that are again separated by blank space known as inter record gap (IRG). A series of block are written in the manner and the end-of-tape is described by the marker known an End of Tape (EOT). After the data is written, the tape is rewound and kept ready for reading. The data is stored in the form of tiny magnetized segment. A magnetized position either to the binary digit '1' while the non-magnetized position refers to '0'.

Reading can be done on a magnetic tape in order to retrieve any particular information when required. Magnetic tape is easy to store and is less prone to damage as compared to the other storage drive such as hard disk, floppy disk, etc.

Generally 1/2 inch magnetic tape, consisting of either seven or nine tracks, is used for storing data. These tracks are mainly decided by the read/write heads of the tape unit that help in reading or writing the data from or to the magnetic tape.

In magnetic tape, the data is stored in

form of records i.e. set of diff. records is known as a file. The data of any size can be recorded on a magnetic tape. But the length & storage capability of magnetic tape should be considered. While storing the data, the speed of the magnetic tape should be predetermined for reading & writing the data. When the magnetic tape is too high speed/slow down and store the data cannot be read & written to the tape.

⇒ Advantages of Magnetic tape

1. data cost   2. large storage capacity
3. easily transferable   4. easy to use

⇒ Disadvantages of Magnetic tape

1. slow data transmission speed due to sequential method
2. not suitable for random aces.
3. Required particular environment for storage
4. updating such as insertion & deletion

⇒ Magnetic disk = It is a flat disk that is coated with magnetic coating for holding information. It is a type of secondary memory that is to store diff. programs and files (audio video, text, imag, doc etc.) It is used to store digital information in the form of data and into the form of a unit of data and into the form of small and magnetic media. This media helps

in encoding a single bit of information with opting polarized in one direction represent by 1 and opposite direction represented by 0. Magnetic disk can store a large amount of data and is less expensive than RAM. As it takes more time to head the information for a specified location, it data and acess rati is slow compared to the main memory (RAM & ROM). It allows the random aces of data and provide a facility of erasing and recording the data as many time as required
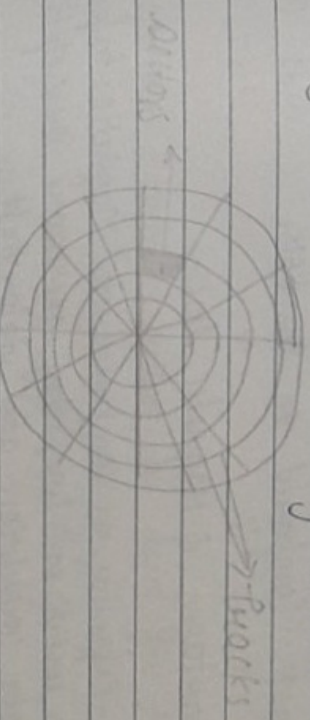
Tracks are concentric circles on the magnetic disk having a common centre and containing a block of recorded data. The thickness b/w two tracks affect the storage capacity of a magnetic disk. If the thickness b/w the two tracks is less, than the magnetic disk can store a large amount of data on the other hand if the thickness b/w the two tracks is more, then the less amount of data can be stored in magnetic disk in the form of tiny dots on the tracks which are known as bit. The size of their spot should be small in order to hold large amount of data and into the form of small and in the tracks or sectors on the data stored on the sectors

in in the form of very small unit, which can be read or written. The size of a disk sector in a magnetic disk is 512 bytes (ex= hard disk, floppy disk...)

Advantages of Magnetic disk:-

1. High storage capacity
2. Easy, direct access to data
3. Better data transfer rate as compared to magnetic tape
4. Low cost compared to the RAM

Disadvantages of Magnetic disk:-

1. May expensive as compared to magnetic tapes
2. When used on-line, they are more susceptible to data corruption and data theft
3. Requires dust free environment
4. Not ideally suitable, when the data files are to be read sequentially

Optical storage system
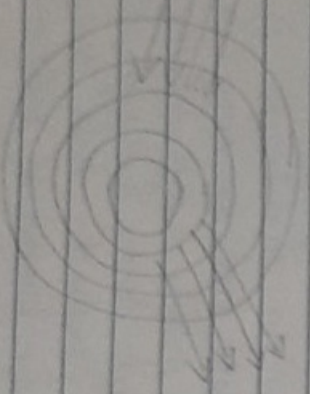
→ Reflected laser beam

CD = Compact disk (storage 700 mb)
DVD = Digital video disk (storage 4 GB)

⇒ Types of optical disk are as follows:-

Name of Disk	CD read	CD-W	DVD-Read	DVD
CD-ROM	Y	N	N	N
CD-RWR	Y	Y	N	N
Combo	Y	Y	Y	N
DVD-Rom	Y	N	Y	N
DVD-RW	Y	Y	Y	Y

The optical storage system are used for the same purpose as the magnetic storage system. However, like magnetic storage system, the optical storage system do not employ the magnetism motor to read and store data. It uses the laser beam as the optical medium to retrieve as well as to record data, ex= CD, DVD, CD-R, CD-WR, DVD-R etc.

The optical storage system are non volatile in nature, also the optical storage system are more reliable to the magnetic storage system because they are less prone to mechanical storage. Unlike magnetic storage system, which are fully read & write capable storage device, the optical storage device are either read-only or writable. Among the writable optical device, those device that can be used for writing data multiple times are termed as rewritable optical

storage device some ex of Read only optical storage disk
DVD, CD-ROM.
while some ex- of writable optical device are CD-R
DVD-R, CD-RW

⇒ Properties:-

1. storage = • It refers to the amount of data that can be stored in any optical storage system. It is directly proportion to the spot size and geometrically dimension of disk

2. Data transfer rate = It refers to the speed at which data can be read from the optical storage system. It depends on the linear density and the rotational speed of the drive.

3. Access time = It defines the time taken to access the desired data from the optical storage system. It is directly proportional to the weight of head and rotation speed of the disk.

⇒ Advantages of optical storage system

1. large storage capacity
2. longer life span as compared to magnetic disk
3. low cost per bit of storage
4. easily portable and stored

⇒ Disadvantages

1. low data access speed as compared to magnetic

2. Deriv mechanism is more complicated compared to that of magnetic disk

⇒ Read only optical Disk = It is a storage device that provides the facility of storing data such as audio, video and text. It stores the data permanently and allows it to be accessed randomly whenever required. Read only optical disk can store the data in the range of 700mb. The data is burnt into the read-only optical disk from a master disk. The end users can read the data by using a normal disk drive.

⇒ Write once Read many Disk= (WORM) disk allow the end user to write the data onto the disk only once. The burn data can later be read as many numbers of time. A worm disk is also called a blank disk, since initially it doesnot contain any data to burn the data onto the worm disk. A CD-writer device is required (need a disk, A CD-writer device is required can ex of CD writer). Together with the CD-writer the appropriate burning software, data can be written on the disk. The main objective of worm optical disk is to store the data for backup use, these disk read for writing the data once, allowing it for a long periods of time. Worm disk are much cheaper than the Read only optical disk, which contain the data already burnt by the manufacturer.

Number System

Addition of Binary Numbers:-

A	B	Sum	carry
0	0	0	
0	1	1	0
1	0	1	0
1	1	0	1

ex:-

①
```
  1 1
  0 1 0 0 1 0
  1 1 1 0 0 1
 ─────────────
1 0 0 1 0 1 1
```

②
```
   1 1  1
   1 0 1 1 0 1
   1 0 1 1 0
  ──────────
 1 0 0 0 0 1 1
```

③
```
 1 1    1
 1 0 1 0 1 1
 1 1 0 0 1 0
────────────
1 0 0 1 0 0 0 1
```

④
```
  1 0 1 0 1 1
  1 1 0 0 0 1
 ────────────
1 0 1 1 1 0 0
```

⑤
```
  1 1 1 1 1 1
  1 0 0 1 0 1
  0 1 0 0 1 0
 ────────────
1 0 0 1 0 1 1 1
```

⑥
```
    1 1 1 1 1
  1 1 0 0 1 0 1
  0 0 1 0 1 1 1
 ──────────────
1 0 0 1 0 1 1 1
```

③
```
  1 1 0 1
  0 1 1 1
 ───────
```

④
```
  1 1 1 1 1 1
  1 1 0 1 1 1
  0 0 1 0 1 1
 ──────────
```

Addition & Subtraction & Multiplication of Hexadecimal numbers :-

→ Addition of Hexadecimal Numbers :-

①
```
  5 6 8 9
  4 5 7 4
 ─────────
9 11 15 13
```
⇒ 9 B F D ans//

A=10   D=13
B=11   E=14
C=12   F=15

②
```
  7 A 6
  2 8 A
 ──────
9 21 16
```
∵ 21 & 16 are not the Hexadecimal no. so we'll convert it into Hexadecimal.

⇒
```
  1 1
  7 A 6
  2 8 A
 ──────
  A 6 0
```
⇒ A 6 0 ans//

16 ⌐ 22
16 ⌐ 1   6 → 16
    0   1

16 ⌐ 16
16 ⌐ 0 1   0 → 10
    0 . 1

Subtraction of Binary Numbers:-

A	B	difference	carry
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

ex:- ①
```
  1 1 0
  0 0 1
 ──────
  1 0 1
```

②
```
  1 0 1 0 1 0
  0 0 1 0 1 1 0 0
 ──────────────
1 0 0 0 0 1 0
```

→ Multiplication in Hexadecimal :-

①
```
    4 3
  × 2 5
  -------
  1 4 F
  8 6 X
  -------
  9 A F  ans//
```
∵ 5×3 = 15 = F
5×4 = 20 CNot (Hexadecimal)

16|20
16|1 — 4 → 14 → F
 0 — 1

②
```
    2 8 5
  ×   4 3
  -------
  1 A 1 F
  X 8 X
  -------
  2 2 D 4 X
  2 4 7 5 F  ans
```
Rough work of ques②
∵ B = 11 , B×3 = 11×3 = 33
16|33
16|2 — 1 = 21
 0 — 2

∵ 8×3+2 = 26 = 33
16|26
16|1 — 10 → 1A
 0 — 1

③
```
    3 3 A
  ×   1 5
  -------
  1 2 2
  3 A X
  -------
  5 2 2
```
∵ 5×A = 20 [as in upper ex 20 = (14)₁₆]
∵ B×3 = 11×4 = 45
16|45
16|2 — 13 → 2D
∵ 8×4+2 = 34
16|34
16|2 — 2
 0 — 2

④
```
    9 4
  ×   2
  -------
  1 2
  =16+2
  =18
  1 2 8
  9 4 X
  -------
  A 6 8  ans//
```
∵ 9×2 = 18
∵ A+D = 23 → 16|23 ⇒ (17)₁₆
 16|1 — 7

Rough work of ③
∵ 5×A = 50
16|50
16|3 — 2 ⇒ (32)₁₆
 0 — 3

∵ 5×3+3 = 18
16|18
16|1 — 2 → (12) =

→ Subtraction in Hexadecimal :-

①
```
    7 B 6
  - 6 C 5
  -------
    0 F 1
```
∵ B = 11+16 ⇒ 27
∵ B−C = 27−12 = 15 = F
∵ C = 12

②
```
    F 9 A C
  - D 4 C 7
  -------
    2 4 E 5
```
∵ A = 10+16 ⇒ 26
∵ C = 12 ∵ 26−12 = 14 = E

③
```
    4 5 3 2
  - 3 A 1
  -------
    1 9 1
```

④
```
    8 9
  × B
  -------
    7 C D 4
    E C
```

 # Addition & Subtraction of Octal number :-

→ Addition in Octal number

---

⑧
```
    7 F 5
    5 8 D
  -------
  1 3 8 2
```
∵ D = 13 ⇒ 14+5 =19
⇒ 1 3 8 2 ans
⇒ D82 ans//

∵ F = 15 & B = 11
15+11+1 ⇒ 27

16|19
16|1 — 3 ⇒ 13
 0 — 1

16|27
16|1 — 11 = B ⇒ 1B
 0 — 1

⑦.

⑤
```
    9 B 5
    1 A C
  -------
    B 6 1  ans//
```
∵ C = 12 ⇒ 12+5 = 17
16|17
16|1 — 1 ⇒ 11
 0 — 1

∵ A = 10 , B = 11 ⇒ 10+11+1 = 22
16|22
16|1 — 6
 0 — 1

①
```
   7 2
 + 2 5
 1 1 7 ans//
```
$\because 7+2=9=8+1$
$=11$

②
```
  6 7
  3 3
  1 1 2
```
$6+2+1=9=8+1$

$\because 7+3=10=8+2$
$=12$

③
```
   6 3 4
 + 4 7 5
 1 3 3 1
```
$\because 5+4=9=8+1=11$
$7+3+1=11=8+3=13$
$6+4 1 = 11=8+3=13$

④
```
   5 2 7
 + 2 7 3
 1 0 2 2
```
$\because 7+3=10=8+2=12$

⑤
```
  1 2
  3 2 5
  2 3 1 6 2 ans//
```
$4\times3+1=13=8+3=13$

②
```
  4 1 2
    4 5
  2 4 6 2
```
$\because 5\times4=20=8|20$
$8|2\cdot4$
$0\cdot2$

→ **Subtraction of octal number:-**

①
```
  6 7 2^8
- 2 5
  4 5 ans
```
$\begin{cases}\because 8+2=10\\10-5=5\end{cases}$

②
```
  1 2^8  5  3
-    1   6   8
  0  6   3
```

③
```
  2  3^7  0^8
- 1  0    6    5
  1  2    1    7
```

④
```
  0 1 0^7 4^8
-     6    8
  0 1,  4
```

⑥
```
  6  7^8 5
- 2    6
  4    7
```

⑥
```
  7  1  6
- 2    6
  1  1  2
  6  0  4
```

→ **Multiplication in octal number system**

①
```
  3 2 2
  × 3 5
  2 0 3 2 ans
  1 1 6 6 ×
```
$\because 5\times2=10=8+2=12$
$5\times2+1=11=8+3=13$
$5\times3+1=16=8|16$
$=20$

Conversion in Number system

① $(300)_{10} = (?)_2$
⇒ $(100101100)_2$

2	300	
2	150	0
2	75	0
2	37	1
2	18	1
2	9	0
2	4	1
2	2	0
2	1	0
	0	1

② $(1024)_{10} = (?)_2$

2	1024	
2	512	0
2	256	0
2	128	0
2	64	0
2	32	0
2	16	0
2	8	0
2	4	0
2	2	0
2	1	0
	1	0

⇒ $(10000000000)_2$

③ $(102.9842)_{10} = (?)_8$

8	102	1
8	127	
8	15	7
8	1	7
	0	7

$0.9842\times8 = 7.8736 = 7$
$0.8736\times8 = 6.9888 = 6$
$0.9888\times8 = 7.9104 = 7$

6.

(a) $(2345)_6 = (?)_{10}$

→ $2\times6^3 + 3\times6^2 + 4\times6^1 + 5\times6^0$ ⇒ $2\times216 + 3\times36 + 24 + 5$

→ $432 + 108 + 29$ ⇒ $(569)_{10}$ ans//

(b) $(2346)_7 = (?)_{10}$

⇒ $2\times7^3 + 3\times7^2 + 4\times7^1 + 6\times7^0$ ⇒ $2\times343 + 3\times49 + 28 + 6$

⇒ $686 + 147 + 34$ ⇒ $(861)_{10}$ ans//

(c) $(0.1010110)_2 = (?)_{10}$

⇒ $0\times2^0 + 1\times2^{-1} + 0\times2^{-2} + 1\times2^{-3} + 0\times2^{-4} + 1\times2^{-5} + 1\times2^{-6} + 0\times2^{-7}$

⇒ $0 + \frac{1}{2} + \frac{10}{8} + 0 + \frac{1}{32} + \frac{1}{64} + 0 + \frac{1}{256}$

$+ 1\times2^{-3}$

⇒ $128 + 32 + 8 + 4 + 1$ ⇒ $\frac{173}{256}$

$\dfrac{256}{256}$

⇒ $(0.67)_{10} = (?)_{16}$

$0.67\times16 = 10.72 = 10 = A$ ↑

$0.72\times16 = 11.52 = 11 = B$

$0.52\times16 = 8.32 = 8$

⇒ $(A8B)_{16} = (?)_{10}$

⇒ $10\times16^2 + 5\times16^1 + 11\times16^0$ ⇒ $2560 + 80 + 11$

⇒ $(2651)_{10} = (?)_8$

8	2651	
8	331	3↑
8	41	3↑
8	5	1
	0	5↓

⇒ $(5133)_8$ ans//

Date 21/11 and page no

OPERATING SYSTEM (OS)

 # Microsoft Disk Operating System (MS-DOS)

MS DOS stands for Microsoft Disk Operating system. MS-DOS is an OS. An OS is collection of system programmes that manages the hardware and software resources of computer. An OS is a software program.

⇒ A OS is used for controlling input and output operations. A OS also known as interface b/w hardware and user.

⇒ An operating system may be considered as long term translate. work readable; usable source machine lvl language or binary digit.

⇒ C:\> This symbol to known as C drive or C prompt. Similarly A:\> is called A prompt. Generally A:\ is used as floppy drive i.e when we are working on floppy disk and C:\ are used for local disk or hard disk. A small blinking bar in disk on the screen is cursor, it is waiting for your instructions. There are few predefined words for instructions. These are known as DOS command. Our OS can only understand these predefined commands.

DOS these are predefined commands. divided into two parts:-

① Internal command. ② External command.

⇒ Properties:- Some of the properties are as follows

→ File = A file may be known as container of information.

→ Directory = A directory may be considered as a structure on a document which given one or more files. Directory are usually create for keeping one or more identical files together. Two or more files which help to recognize them, then a file name which help to recognize them, then divided into two parts :-

1) File name or primary name
2) Extension or secondary name

ex = Pavan . Raf

    File name   extension

⇒ The primary can be from 2 to 8 characters long, & extension contain 1 to 3 character long. A file name and extension are separated by using a dot symbol.

→ Internal command = Into the memory these commands are automatically loaded when OS is loaded in memory. Thus these are also called memory resident command. The command available are all combine together and are stores in command .com file, which is executable command file. Their internal commands are further Grouped according to their properties. ex = CLS, DIR, VER, VOL, Date, Time, copy con, type, Ren, Del, MD, CD, RD
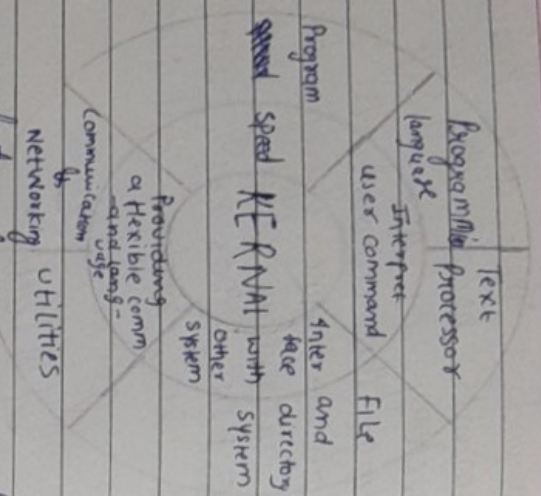
✳ Internal commands = These are known as driver resident commands because they can be stored with DOS directory on any disk which is used for getting these commands. These commands are used to perform some specific task. There are stored in a secondary storage drive.

examples = MORE, FIND, DOS KEY, MEM, FC, DISKO, format, HK disk, SyS, XCOpy, Sort, label, Attrib Move
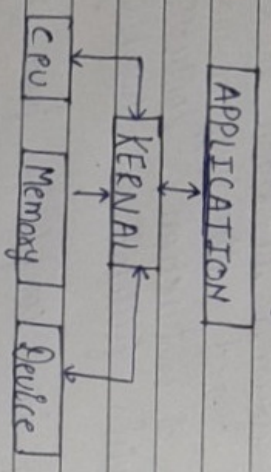
Operating System :-

⇒ An OS is a software program that manage the Hardware and software resources of a computer.

- The OS performs the basic task such as controlling and allocating memory, prioritizing processing of instruction, controlling input and output devices facilitating networking and manage file.

⇒ OS vary in complexity from then that support single user (micro-computer) to those that handle multi user (mainframe) their complexity different on the computer system size and speed type of filperformance produces with the type of filperformance produces used.

Kernal also called Nucleus

Text

Programming Processor
Language
User Command
Interface
File

Program
Inter and face directory

KERNAL with
other system

Providing
a flexible comm
-and lang-
uage

System

Communication
& usage

Networking
& Utilities

storage capability. they require an available and schedules and finally sums each job at the appropriate moment.

- Kernal is a computer program that constituted that the central core of the computer OS. It has completed control over everything.

- Batch processing = System software is available to support the different methods of processing a job with batch processing the most basic method data are accumulated and processed in group.

- On-line processing = In online processing that are processed instantaneously.

- Data management :-

① OS software also manage the storages and retrieval of data

② as the system software handles many of the details associated with this process. Such details are not a primarised concern for users or programming writing application program.

APPLICATION

KERNAL

| CPU | Memory | Device |

A kernal is the central part of any OS. It manages the task of the system & the Hardware.

⇒ features of operating system.

- Virtual storage :-

① OS also manages the allocation of main memory to specific jobs. Some OS have a feature called virtual storage (ex = cloud computing) with this software it is possible to increase the capacity of main memory without actually increasing its size.

② This is accomplished by breaking a job into sequence of instructions called pages of program and keeping only a few of these in main

- Job management = The job management software manage the jobs waiting to be processed. It organised the jobs waiting to be processed. It organised the jobs: identify this priority determine within the appropriate main memory and sequence
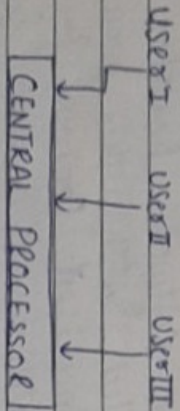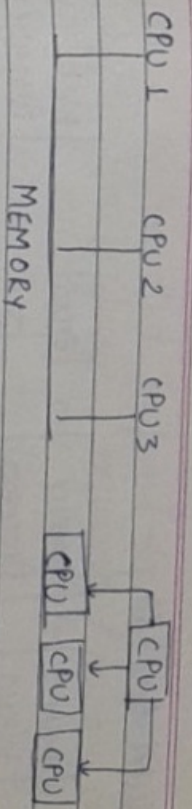
Memory at a time.

• Input/Output management :-

① OS also manages the Input to output from
Computer system
② free access to the flow of data among computer
Terminals and other devices such as printer
    in minimal and other devices such as printer
    in a reasonable
    manner.

⇒ Classification of Operating System

• Multiusers = It allows two or more users to
    run program at the same time. Some OS formed to
    hundred or even thousands of concurrent users.
    Ex = Mainframe & Minicomputers etc

```
CPU 1      CPU 2      CPU 3      ┌──[CPU]
                                 │ [CPU]
          MEMORY                 └[CPU]
```

⇒ Multiprocessing System care more complicated than
    single process system because the OS must allocate
    resources to competing process in a reasonable
    manner.

⇒ Multiprocessing also refers to the utilisation of
    multiple CPU in a single computer system This
    is also called 'parallel processing'

• Multitasking :-

```
           ┌→┌─────────┐←┐
APPLICATION1  │   OS    │  APP'2   APP'3
              └─────────┘
              [ALL PROCESSOR]
              [CPU]
```

• Multiprocessing = It refers to a computer ⇒ It allows more than one program to run
system ability to support more than one   concurrently
processing unit (CPU/processor) at the same time ⇒ It is the ability to execute more than one task
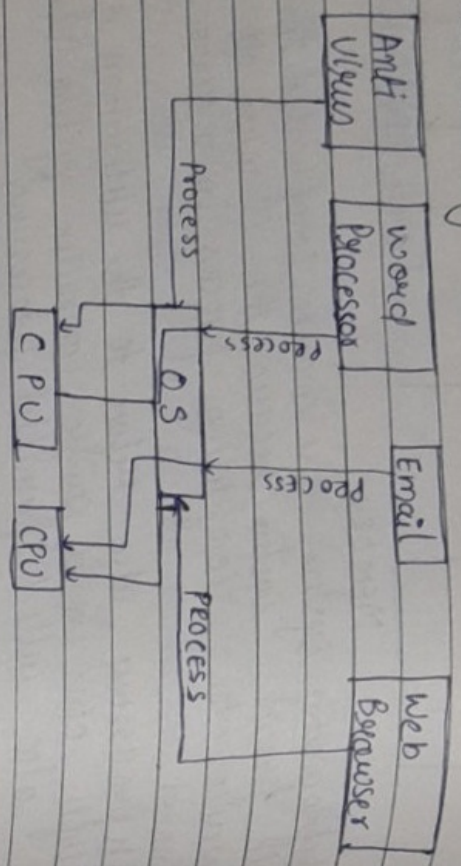Multiprocessing OS enable several program to   at the same Task. A task being a program
run concurrently   ⇒ Multitasking sometime implies that more than
                                                  one CPU is involved

```
       ┌──┬──┐
USER I  USER II  USER III
   ↓    ↓    ↓
[CENTRAL PROCESSOR]
```

Multi processing = It refers to a computer ⇒ It allows more than one program to run
system ability to support more than one
processing unit (CPU/processor) at the same time
Multiprocessing OS enable several program to
run concurrently

CPU and UNIX is two of the most widely used
multiprocessing system

⇒ These are of two type :-
① Preimitive   ② co-operative

• Multi threading:-

Anti Virus → | word | Email | web Browser |
Processes

Process → O.S → CPU | CPU → PROCESS

⇒ It allows diff. part of a single program to run concurrently. It is the ability of an OS to execute diff. part of program called 'Thread' simultaneously. The programmer must carefully design the program in such a way that all the threads can run at the same time without interfering with each other.

• Real time OS (RT OS)
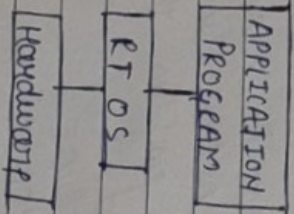
⇒ RTOS is a system that respond to input immidiately. Place application for specific requirement on any OS. Policies and mechanism are gued to ensuring jobs needs meet their deadlines.

⇒ example → CTOS, CCP, Basic Real time, monitor

⇒ function of any Operating System

Resource Management

① Time management = Temporal Properties CPU and disk transfer scheduling

② Space management = main and secondary storage allocation.

③ Synchronization and deadlock handling

④ Accounting and status information

Way environment

① User environment = OS layer transform bare Hardware machines into higher level abstractions.

② Execution environment = Process management, File manipulation, interrupt handling, I/O operation language

③ Error detection & handling

④ fault to tolerance & failure recovery

⑥ Protection and Handling Protection and security

	APPLICATION PROGRAM	
User		
	RT OS.	
	Hardware	

DBMS:- 1) DB

Data storage traditionally used individual unreadable files sometime called 'flat file'

A DB is a collection of related logically where Data used by the application program in organization.

⇒ Advantages:-

- **Redundancy:-** In a flat file system there is a lot of redundancy, for example, in the system for a University - name of professor and student are stored in the most than one file

- **Inconsistency avoidance:-** If the same piece of information is stored in more than one place then they can change the data need to other in all place the data is stored.

- **Efficiency:-** A database is usually more efficient that a flat file system because a piece of information is stored in fewer location.

- **Data integrity:-** In a database system it is easier to maintain data integrity because a piece of data is store in fewer location.

- **Confidentiality:-** It is easier to maintain the confidentiality of the information if the storage of data is centralized in one location.
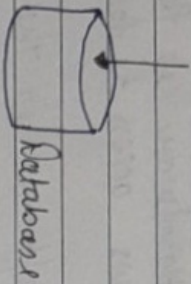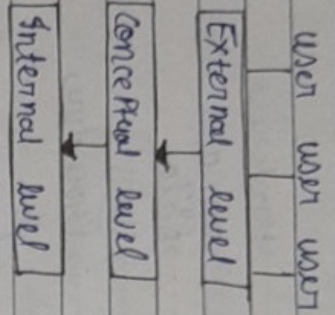

DBMS

Data Base Management System

DBMS allow, create and maintain a database, the database also allows control acess to data in the database & DBMS is combination of 5 components:-

---

Date __/__/__ Page no:___

1) Hardware   2) Software   3) Data   4) Users
5) Procedure

DBMS → Hardware
→ Software
→ Data
→ Users
→ Procedure
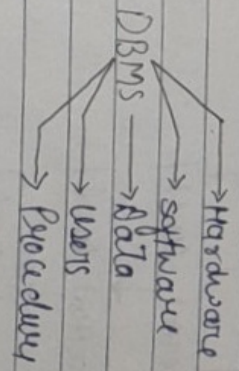
1) **Hardware** = The Hardware is the physical computer system that allows access to data

2) **Software** = The software is the actual program that allows users to acess, maintain & update the data. The software control which user can acess which part of data in the database

3) **Data** = The data in a database is store in physically on a storage device. In a DB, data is a separate entity form the software that recieves it.

4) **Users** = In a DBMS the term user has a broad meaning, we can divide users in two category
(i) Application program (ii) End user.

5) **Procedure** = The procedure or rules that should be clearly defined and followed by the users of the database.

⇒ Database Architecture :-

```
              User    User    User
              ┌──────────────────┐
              │  External level  │
              └──────────────────┘
                      ↓
              ┌──────────────────┐
              │ Conceptual level │
              └──────────────────┘
                      ↓
              ┌──────────────────┐
              │  Internal level  │
              └──────────────────┘
```

```
        ┌──────────┐
        │          │
        │ Database │
        │          │
        └──────────┘
```

➤ Internal level = The internal level determines where data is actually stored on the storage device. This level deals with the low level access method and how bytes are transfer to and from storage device.

➤ Conceptual level = It define logical view of data. The data model is define on these level and the main function of DBMS such as queries are also on these level. The database change the internal views of data to the external views. The user needs to see the conceptual level is any intermediatory and keep user from dealing with the internal level.
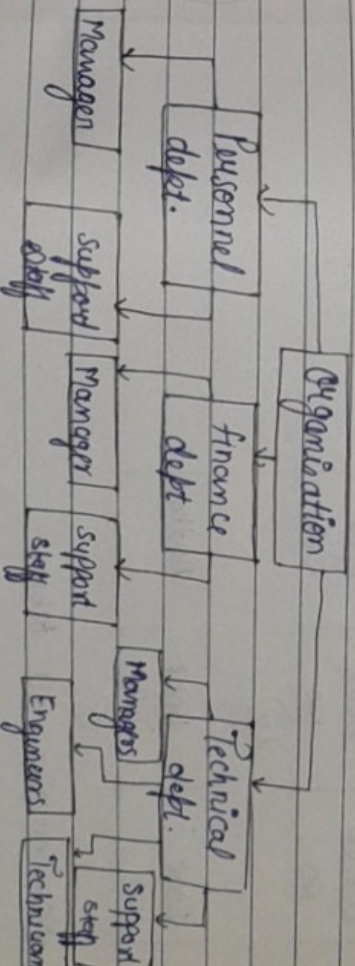
➤ External level = A internal directory with its every

Application program (a end user) if change the data coming from the conceptual level to a formal and view what is familiar to the user.

#Database Models = Database models define the logical design of data. The models also describe the relationship b/w the diff. part of the data. There are g three types of the data database.
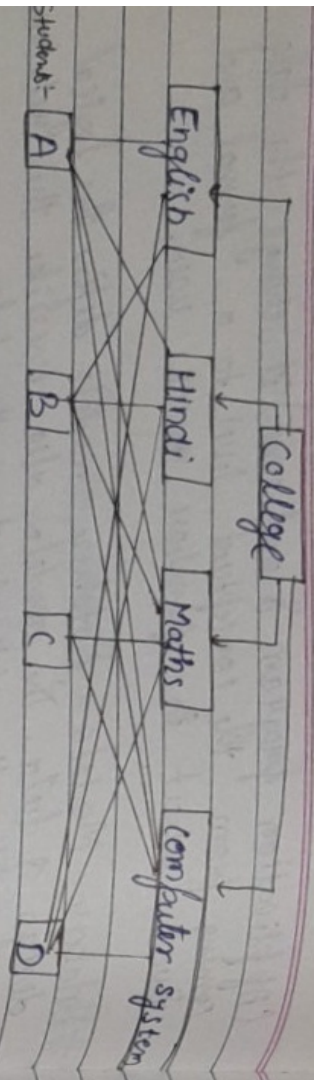
1) Hierarchical   2) Network   3) Relation
database.   Model   Model

➤ Hierarchical database = In the Hierarchical model, data is organized as an inverted tree. Each entity has only one parent but can have several children's. At the top of the hierarchy, there is one entity, which is called the 'root'.

```
        ┌──────────────┐
        │ Organization │
        └──────────────┘
          ↓         ↓
    ┌───────────┐ ┌─────────┐
    │ Personnel │ │ finance │
    └───────────┘ └─────────┘
      ↓      ↓       ↓        ↓
  ┌──────┐┌──────┐┌──────┐ ┌───────────┐
  │Manager││dept.││dept ││Technical dept.│
  └──────┘└──────┘└──────┘ └───────────┘
    ↓        ↓       ↓
┌───────┐┌───────┐┌───────┐ ┌────────┐
│Support││Manager││Support││Managers│ dept.
│ staff ││       ││ staff ││        │
└───────┘└───────┘└───────┘ └────────┘
                              ↓
                          ┌────────┐
                          │Engineers│ Support
                          └────────┘ staff
                                      ↓
                              ┌──────────┐
                              │Technicians│ sep
                              └──────────┘
                                  Technician
```

➤ Network model = The entities are organized in a graph in which some entities can be accessed through several path

Let us see an example :-

→ object oriented data base structure

College
- English
- Hindi
- Maths
- Computer System

Students:- A | B | C | D

Vehicle
- ID, color
- Manufacture

Vehicle SPEED
- Length, Width
- Height

Account

employee

Two WHEEL | Four WHEEL

COMPANY NAME, LOCATION

Domestic | foreigner

→ Relational Model :- In this model, data is organised in 2D tables called Relations. The tables of relations are however related to each other, as we will see shortly.

Member No.	Member Name	Member address

(a)

Borrow No.	Book No.	Due Date

(b)

Book No.	Book Title	Author

(c)

Now merging all tables

Member no.	Member Nam	Member Adds	Due Date	Book Title	Book author

Merged Table.

INTERNET

What is Internet

The Internet is a huge network of computers which links many different types of computers all over the world. It is the network which share a common mechanism for addressing (identifying) computers and a common set of protocol b/w two computer in the network.

Brief History :-

The Internet has its root in the APRANET network of USA department of defence. APRANET was the first WAN (Wide Area Network) and had only 4 sites in 1969. The internet involves from the basic idea APRANET for internet computers if were initally used by research organisation to share and exchange information.

In 1989 the US government lifted instructions on the use of the internet and allow it to be used for commercial purpose as well. The internet often access to data, graphics, sound, software that, people through a variety of devices to tools for communication and data topics access such as

① Remote login (Telnet)   ② File transfer (FTP)
③ Electronic mail (e-mail)   ④ News (Uk net or network access)
⑤ Hyper text (www)

→ Uses :-
- Get information   • Provide information
- Compile information

Internet access
→ Dialing into an internet service provider (ISP) (Dial-up-connection)
→ Wired connection to an internal device provider

Internet backbone

service provider

Dial up :-

MODEM

Internet

to internal connection

ethernet/serial/parallel/
special-purpose
USB

computer/PC

INTERNET PROTOCOL

- TCP/IP :- Transmission control protocol
- FTP :- File Transfer protocol
- HTTPS :- Hyper text transfer protocol allows
- Telnet
- Gopher
- WAIS

computer   IP

letter in address   Postal system

→ TCP/IP :-

If stands for transmission control protocol. Internet protocol is actually connection of protocol or rules that governs the way data travel from one machine to another across network , The internet is based on TCP/IP

IP :-

It envelopes and address the data, enable the network to read that envelope and forward the data to destination. It defines how much data can fill single envelope

envelope

TCP :-

It breaks data up into packets that the network can handle efficiently verify all the packet have arrive their destination Resembles the data
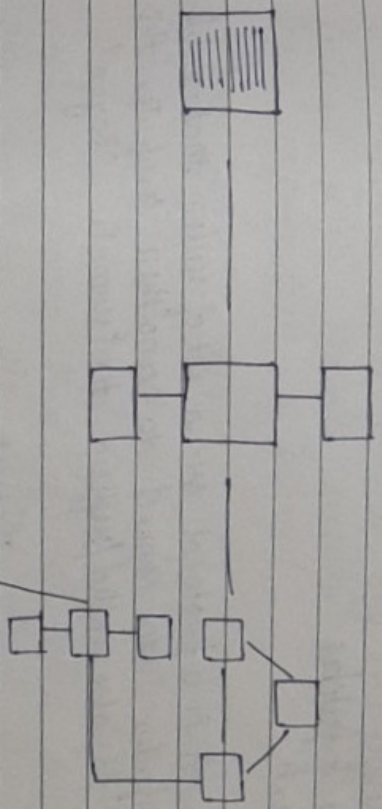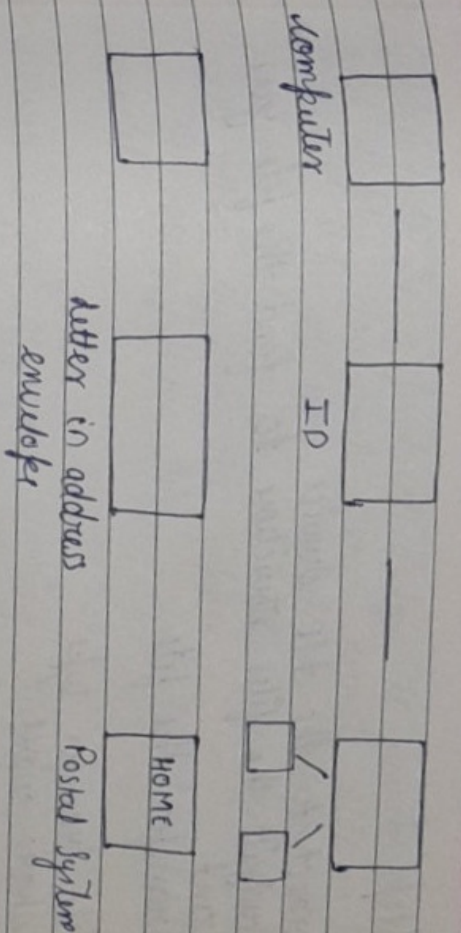
→ FTP = File Transfer protocol. FTP works on client server principle. A client program enables the users to interact in order to access information & device to the computer file that can be transfer are called FTP device

PCA ⟶ FTP ⟶ PCB
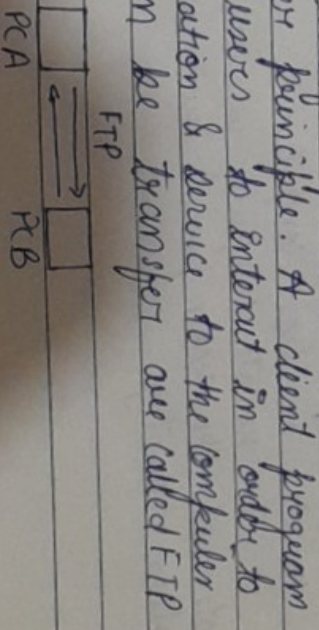
Steps :-

① Connect to the FTP device

② Navigate the file structure to find the file you want

③ Transfer the file

File transfer type :-

① Share files
② Free user
③ Upgrade files
④ Documents.

→ Telnet = It is a protocol or a set of rules that enables one computer to connect to another computer. This process is also called/referred to as 'remote login'.

| local computer |───┤ Telnet
| Host computer |
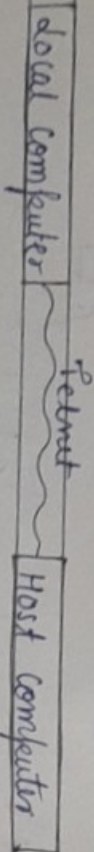
The user computer that initiates the connection to a local computer and the machine being connect to which accept the connection is referred to as the remote or host computer.

The remote computer can be far physically locati at the room, next town or in any another country.

→ Gopher = It is a protocol design to search, retrieve and display document from remote side on the internet. In addition to document display, document retrieval. It is possible to initiate online connect with other system via Gopher.

It accomplishes this using the client/server model.

⇒ Server model of users running client software that local machine that provide any interface that interact with remote servers or computers that have information of internet.

⇒ Information accessible via Gopher is stored on many computers all over the internet these are Gopher servers. Information stored on many kind of non gopher servers is also available via special gopher servers that acts as gateway (protocol translator) there are works on the internet tools such as WAIS (Wide Area Information service)

→ WAIS (pronounced as "Ways")
It stands for Wide Area Information service.
Ways is an internet search tool that is based on Z39.50 standard describe a protocol or set of rules computer to computer information retrieval.

WAIS also works on the client/server principle. A WAIS client program enables the user computer to contact to a ways server, submit a search query and receive a response to that query.

CLIENT			WAIS server
user sends query and read result	☐	☐	server process the query and send back the result
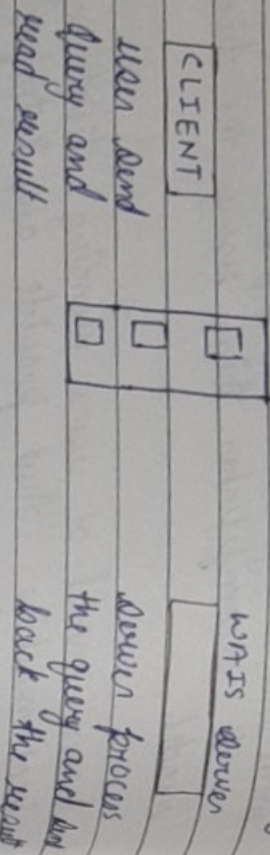
INTERNET ADDRESSING

It is a systematic way to identify computer and internet resources. On the internet the term "address" is used socially address can mean many different things from any electronic mail address to a URI (Uniform Resource Locator)

⇒ IP Address = If you want to connect to another computer. To transfer files to or from another computer or send one mail message, you first need to know where the other computer is, you need the other computer address.

Any IP address consist of 4 section separated by periods, each section containing a number ranging from 0 to 255. xxx₁g = 202.54.
[*example* = 202.54.]

⇒ Characteristics of IP address
• IP address are unique
• No two machine can have the same number
• IP address are also Global and standardized

Computer Security

What is Computer Security
Any crime in which computer related technology is encountered. The commission of illegal acts through the use of a computer or against a computer system.

⇒ Types of Computer Crime
• Business attacks   • financial attacks
• Terrorist attacks   • Grudge attacks
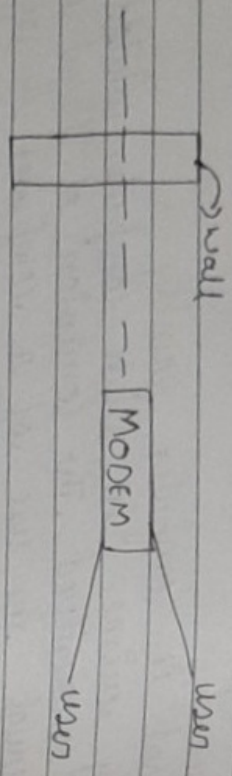• fun attacks   • software piracy

⇒ Computer Security
* Physical Access Restriction
  • By human security guard
  • Depending on the security system you might be granted access to a computer based on your

identify card username & password
your voice print. finger print and so on

⇒ Computer Crime

* Passwords = Passwords are the most common tools for restricting access to computer passwords are effective only if they are chosen carefully

• Authorized users = There are several ways any authorized user of computer such as any employee using the company computer can accomplishing unauthorized and illegal objective one such way involve altering data as it is entered into the computer

* firewall :-

⇒ Preventing employee Crime
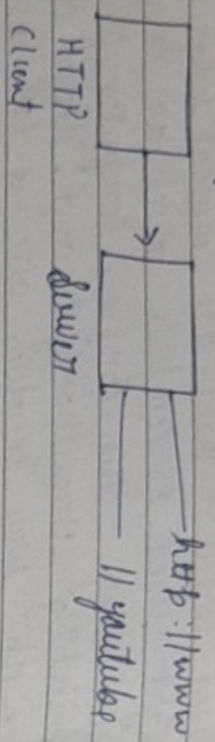(•) check preferences
(ii) Don't give two week notice
(iii) keep employee lists up to date
(iv) Don't give more access than necessary.

Many organization uses firewall to keep their internal network secure by allowing communi-
-cation with rest of the internal

They are all designed to serve the same function to guard against unauthorized access to any internal network

A firewall is a gateway with a lock. The locked gate is opened for information packet that passes one or more security instructions

• Unauthorized Users
⇒ social engineering
⇒ cracking password
• A good hacker is an effective researcher

Here are some passwords to avoid
i) Anything that resemble your username
ii) Your name
iii) Dictionary words
iv) words of less than 6 characters

* Backups

* Human security control

Scanned by Scanner Go

HTTP [Hyper Text Transfer protocol]

HTTP
Client ———→ Server ———— http://www
                              || youtube

→ Hypertext is a text which contains link to other text, the term was invented by 'Ten Nelson' around 1965.

Normal
text

□

□ →→ □ →→ □
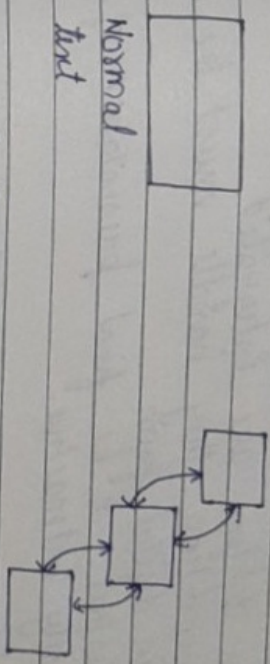
→ Hypertext navigation transversal through pages of hypertext is therefore usually non linear.

→ Hypermedia is not constraint to be text based

  → It can include other media (example graphics, images) and specially continuous media (sound & video)

Multimedia

→ It means that computer information can be represented through audio, video and animation in addition to traditional media (such as text, drawing, animation)

→ Multimedia is a field centered with a computer integration of text, graphics, drawing, text and moving images, videos, animation, audio and any other media where way types of information can be represented, story, transmitted and processed digitally form.

→ A multimedia application is an application which uses collection of multimedia image, sound, animation video)

→ for multiple media device such as text, graphics,

Graphics ↔ sound ↔ video ↔ Text

→ Multimedia system is a system capable of processing multimedia data and application.

  Multimedia system is characterised by the processing, storage, generation and manipulation

Is what is hypertext & hypermedia

⇒ Characterstics of Multimedia System

Multimedia System must be computer controled
Multimedia System are integrated
The information they handle must be represented in digital form
The interface to be final presentation of media is usually interactive.

⇒ Components of Multimedia System

Capture device :- keyboard, mic graphical cables

storage device :- Harddisk, pendrive, dvd

Communication network :- LAN, Internet, Intranet

Computer system :- Multimedia dekstop machine workstations

Display device :- Monitor, quality speaker.