

SYBAF

Information Technology in
Accountancy Paper I

Computer

- Computer is an electronic device, it receives input, performs processing and produces output.
- Advantages of Computer
 - Speed
 - Accuracy
 - Reliability
 - Automation
 - Storage
 - Versatility
 - Consistency
 - Diligence
 - No Feelings
 - Precision
 - Communication

- Disadvantages
 - Human Instructions
 - Curtail Human Capabilities
 - No Decision Making Power
 - No Intelligence
 - No Emotions

Classification of Computer on the Basis of Working Principle

- Analog
- Digital
- Hybrid

On the Basis of Size and Data Processing Power

- Super Computer
- Mainframe Computer
- Mini Computer
- Workstation
- Microcomputer

Super Computer

- Fastest and Largest
- Not for Commercial Use
- Defense, Aircraft design, Weather research, computer generated movies etc
- Contains several processors
- 10,000 million instruction per sec. to 1.2 billion instructions per sec.
- 10000 terminals
- First Super Computer ILLIAC IV and India's Param
- Dr. Vijay Bhatkar.

Mainframe

- Less powerful and cheaper than supercomputers
- Scientific and business application
- Airport, Railway Reservation
- High speed cache memory than mini and microcomputers
- Multiprogramming and time sharing
- Speed some millions instruction per sec.
- 1000 terminals
- IBM (International Business Machine) , Honey well etc.

Mini Computers

- Less powerful and cheaper than mainframe
- Small scientific and business applications
- FoxPro, Word etc.
- Can work on LAN (Local Area Network) and WAN (Wide Area Network)

Workstations

- Between mini and micro computers in terms of processing power
- More powerful than personal computers
- Scientific and engineering applications
- RISC (Reduced instruction set computing)
- Unix
- Can work LAN

Micro Computer / Personal Computer

- Smallest general purpose computer
- Microprocessor technology
- Several peripheral devices can be connected printers, modem, scanner, digital camera etc.
- User friendly and single user
- Capable networking

Generations of Computers

- First Generation Computers (1946-1959)
- Second Generation Computers (1959-1965)
- Third Generation Computers (1965-1971)
- Fourth Generation Computers (1971- Present)
- Fifth Generation Computers (Present and Beyond)

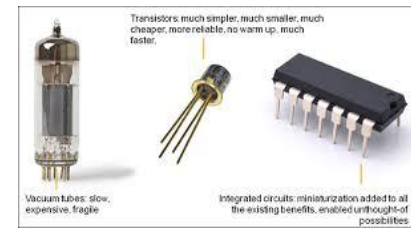
First Generation Computers



- Its time period was from 1946-1959
- In this generation **Vacuum Tubes** were used as Components
- Machine Level Language was used.
- Data was stored on punch cards.
- As vacuum tubes were used those computers were bulky & caused frequent heating problems.
- These computers were required lot of space & needed air conditioning.
- They also consumed more power & were relatively slow.
- The first computer in first generation was ENIAC (Electronic Numerical Integrator And Calculator).
- ENIAC has 18000 Vacuum Tubes.
- It weighted about 30 tons & occupied about 1500 Sq. ft. of area & consumed more power.
- The speed was measured in Milli-seconds (10^{-3} Sec.) (Thousand of a second)(0.001)

Second Generation Computers

- Its time period was 1959-1965.
- In this generation **transistors** were used in place of Vacuum tubes as Components.
- Assembly Level Language used.
- Advantages of transistors over vacuum tube are smaller in size, less heat generation, consumed less power.
- Advantages over First Generation computer were Smaller in size, Faster, More reliable, less power requirement
- The speed was measured in Micro-seconds (10^{-6} Sec.) (Millionth of a second)(0.000001)



Third Generation Computers

- Its time period was 1965-1971.
- In this generation **Integrated Circuits (IC)** were used in place of transistor as Components.
- Operating System and High Level Language used.
- Also used Secondary storage devices like magnetic tapes, magnetic disks, magnetic cores, VDU, printers.
- The speed was measured in Nano-seconds (10^{-9} Sec.) (Billionth / Thousand Millionth of a second)(0.000000001)

Third Generation of Computers

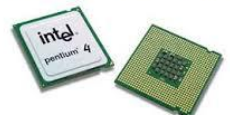


Integrated Circuit

Fourth Generation

- The time period 1971- Present.
- In this generation **Large Scale Integrated Circuits (LSIC)** were used in place of Integrated Circuits as Components.
- Time sharing, multiprocessing, more powerful operating system, high speed printers, specialized input/output devices.
- Fourth generation language are used.
- In 1981, IBM (International Business Machine) introduced its first computer for the home user and in 1984, Apple introduced the Macintosh.
- They also saw the development of GUIs (Graphical User Interface) the mouse and handheld devices.
- The speed was measured in Pico-seconds (10^{-12} Sec.) (Million Millionth of a second) (0.00000000000001)

Fourth Generation of Computers



Microprocessor

Fifth Generation

- Fifth generation computers are being planned by country like USA, Japan.
- A lot of research work has been put involving large scale funds and brains.
- Fifth generation computing devices based on Artificial Intelligence are still in development, through there are some applications, such as voice recognition, that are being used today.
- This generation will use Artificial Intelligence (AI) which would cause the computers to now **THINK** like humans and **TAKE DECISION** on their own, based on past experience.
- The use of parallel processing and superconductors is helping to make AI as a reality.
- Quantum computation and molecular and nanotechnology will radically change the face of computers in years to come.
- The goal of fifth-generation computing is to develop devices that respond to natural language input and are capable of learning and self-organization.
- The entire world is likely to become dependent on its machines for greater efficiency.

Generations of Computers in Short

GENERATIONS	FIRST	SECOND	THIRD	FOURTH
PERIOD	1940-59	1959-65	1965-71	1971- PRESENT
TECHNOLOGY / COMPONENT	VACUUM TUBES	TRANSISTERS	INTEGRATED CIRCUITS (IC)	LARGE SCALE INTEGRATED CIRCUITS (LSIC)
STORAGE DEVICES	PUNCH CARD	MAGNETIC TAPES	MAGNETIC DISK	HARD DISK, CD, DVD etc.
LANGUAGE	MACHINE (0,1)	ASSEMBLY (ABBREVIATIONS)	HIGH LEVEL LANGUAGE (ENGLISH LIKE COBOL, FORTRAN)	HIGH LEVEL LANGUAGE (ENGLISH LIKE JAVA, VISIUAL BASIC)
SPEED	MILLI SECONDS (10 ⁻³ SECOND)	MICRO SECONDS (10 ⁻⁶ SECOND)	NANO SECONDS (10 ⁻⁹ SECOND)	PICO SECONDS (10 ⁻¹² SECOND)
OPERATING SYSTEM	NO	NO	SIMPLE	POWERFUL (DOS, WINDOWS)
APPLICATION	SCIENTIFIC PURPOSE	SCIENTIFIC AND BUSINESS PURPOSE	DATABASE SHARING	NETWORKING , SIMULATION, GRAPHICS etc.

Parts of Computers

- Input Device
- Central Processing Unit (CPU)
 - Control Unit
 - Arithmetic and Logic Unit (ALU)
- Memory
- Output Device

Input Device

- The entry of program statements and a data into a computer occurs by means of an input device.
- i.e. Keyboard, Mouse, Microphone, scanner, web camera etc.

Central Processing Unit (CPU)

– Control Unit

- The control unit, as the name implies, supervises the operations of the entire computer.

– Arithmetic and Logic Unit (ALU)

- Arithmetic and Logic unit performs mathematical calculations, compares numeric and non-numeric values and makes decisions.

Memory

Computer memory is divided into

- Primary
- Secondary
- Network

Primary Memory

- There are two types of Primary Memory
 - RAM (Random Access Memory)
 - ROM (Read Only Memory)
- RAM:- It can be read and written to anytime the CPU commands it.
- This is the actual memory where the instructions and data are stored during execution of a program.
- Contents of this area exists as long as power is on; therefore this memory called as temporary memory or volatile memory.
- In most of the computers there is cache memory, which is slower than registers but fast than main memory.
- Generally computers with this sort of cache are designed to move frequently needed data into the cache automatically, often without the need for any intervention on the programmers part.



Read Only Memory (ROM)

- The term read only means that the storage cannot be altered by regular program instructions.
- ROM is preloaded with data and software that never changes, therefore the CPU can only read from it.
- The information is stored permanently in such memory during manufacture.
- The information from the memory may read out but fresh information cannot be written into it.
- The micro-programs in read-only-memory may be used for a variety of purpose, but a common use is to hold a set of instructions that are needed frequently, for executing small, extremely basic operation, which are not otherwise available in the computer circuitry.
- ROM contains a specialized program called BIOS (Basic Input Output System) that coordinates loading the computers operating system from hard disk into RAM whenever computer is switched on or reset.
- Contains of this memory is not lost even if the power is switched off i.e. its permanent or non volatile.
- ROM is further classified into three types
 - PROM (Programmable Read Only Memory)
 - EPROM (Erasable Programmable Read Only Memory)
 - EEPROM (Electrically Erasable Programmable Read Only Memory)



Primary Memory

- It is compulsory
- It is temporary i.e. volatile.
- It is limited in size.
- Also called as main / Internal Memory

Secondary Memory

- It is optional.
- It is permanent i.e. non volatile.
- It is unlimited in size.
- Also called as auxiliary / external memory.

RAM

- Used to store instructions, data and result during execution of a program.
- RAM is temporary i.e. volatile.
- User can read or write on to RAM.
- It is larger than ROM.

ROM

- Used to store pre-written set of instructions provided by manufacturer for the basic functioning of a computer. e.g. Booting instructions
- ROM is permanent i.e. non volatile.
- User can only read.
- It is very small compared to RAM

DRAM (Dynamic RAM)

- Dynamic because each memory cell quickly loses its charge so it must be refreshed hundreds of times, each second to prevent data from being lost.
- Commonly used RAM because it is cheaper
- Slower than SRAM

SRAM (Static RAM)

- Static because it doesn't need to be continuously refreshed, each memory cell will hold the value till the power is on.
- Not so commonly used because it is expensive.
- Faster than DRAM.

Secondary Memory

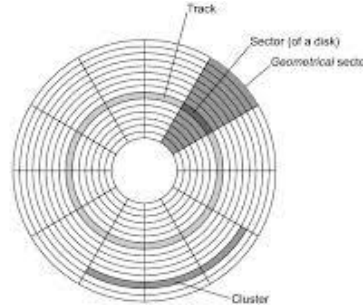
- There are four types of Secondary Memory
 - Tertiary Storage
 - Off-line Storage
 - Robotic Storage
 - Network Storage
 - Direct Attached Storage (DAS)
 - Network Attached Storage (NAS)
 - Storage Area Network (SAN)

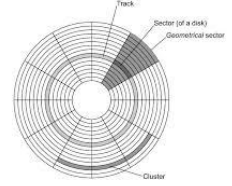
Output Device

- Output devices like input units are instruments of communication between people and machines.
- They are used to record the results obtained by the computer and present them to the outside world.
- They take information in machine coded form from storage unit and convert it typically into a form that can be used by human or as machine input in another processing operation.
- The most commonly used output devices are Printers, Visual Display Unit (Computer Monitor), Pen drive, PC Speakers.
- I/O is the means by which computer exchanges information with the outside world.
- Devices that provide input or output to the computer are called peripherals.
- Typical peripherals on a personal computer include input devices like keyboard and mouse, output devices like computer monitor and printer.
- Peripheral devices like Hard Disk, Pen drive, touch screen etc. serve as both input and output devices.

Secondary Storage Devices

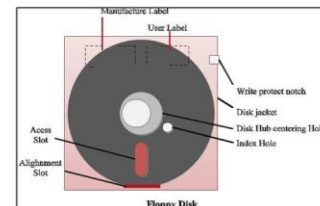
- Floppy Disk
- Hard Disk
- Compact Disk
- Digital Video Disk
- Blu-Ray Disk
- Pen Drive

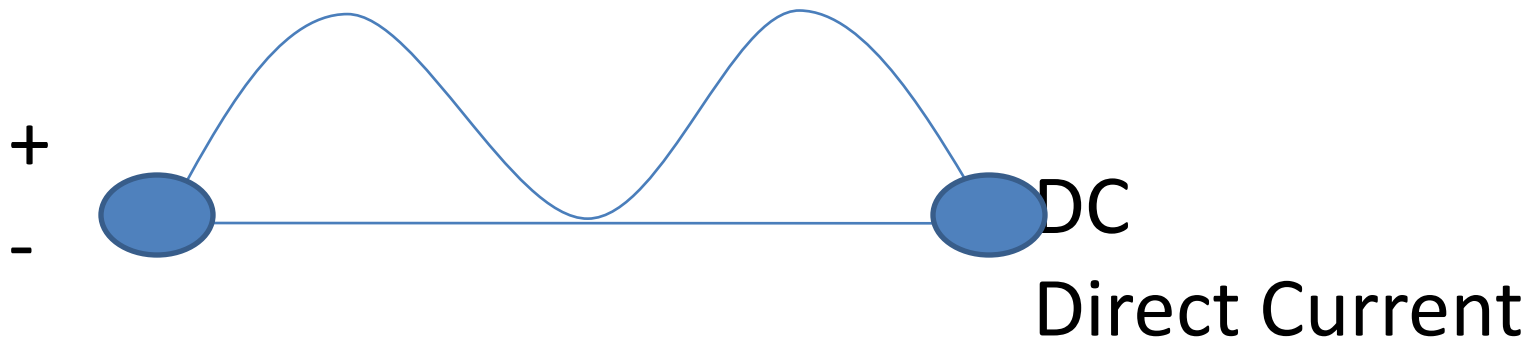
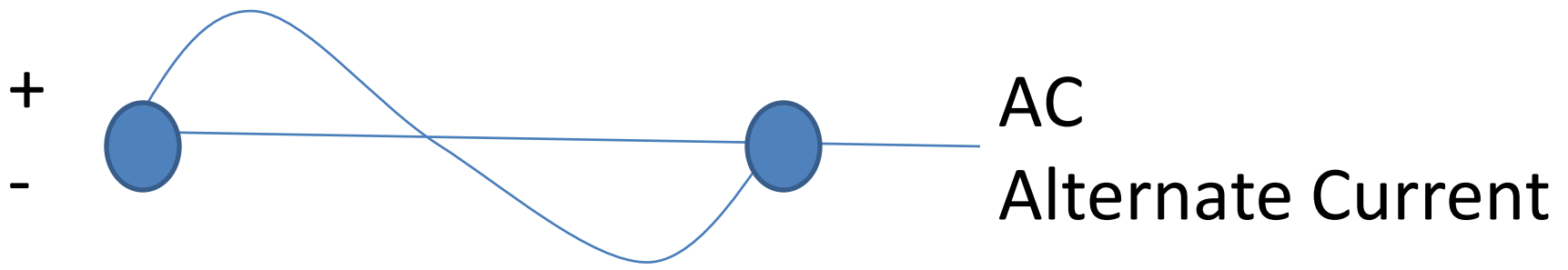




Floppy Disk

- It is secondary storage device. It is outdated now and it is replaced by pen drive.
- It is made up of Mylar Plastic and has magnetic coating on both sides. In order to work with a floppy, it has to be inserted into a floppy drive.
- They were available in 3 sizes: 8” (Floppy), 5.25” (Mini Floppy) and 3.5” (Micro Floppy). Smaller the size, higher the capacity.
- Before using a floppy for the first time it has to be formatted by software called FORMAT.COM. Formatting divides a floppy into tracks and tracks are further divided into sectors.
- Formatting further divides floppy into four areas:
 - Boot Sector
 - FAT (File Allocation Table)
 - Root Directory (Folder)
 - Data Area





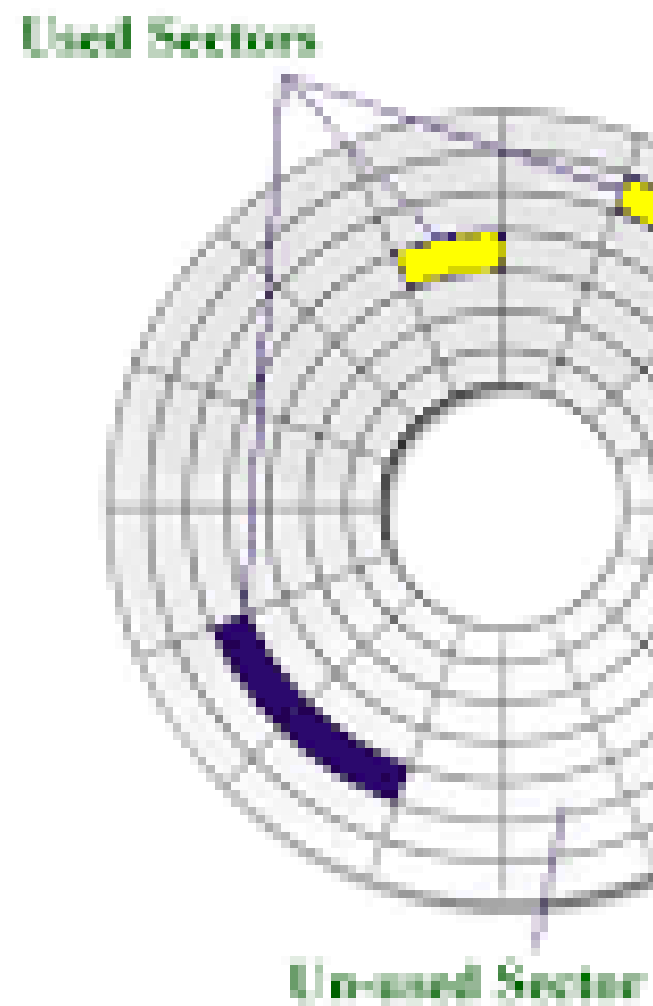
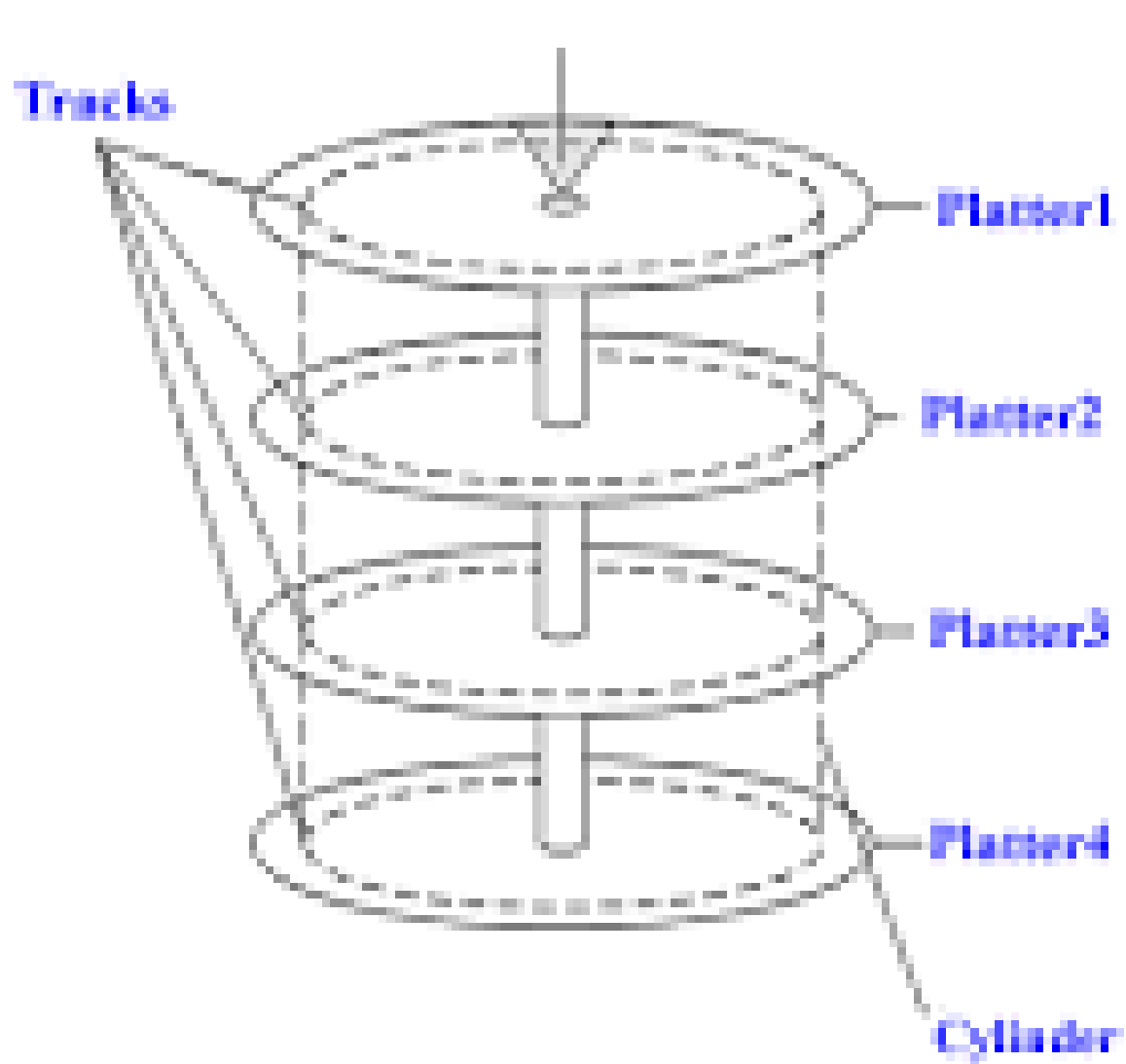


Fig: Showing Concept of Cylinder, Tracks and Se

CPU frequency Speed

- 1 Cycle = 1 Hertz
- 1000 Hz = 1 Kilo Hertz
- 1000KHz = 1 Mega Hertz (10,00,000 cycles)
- 1000MHz = 1 Giga Hertz (1,00,00,00,000 cycles)
- 1000 GHz = 1 Teraflops (Floating Point Per Sec)

Memory

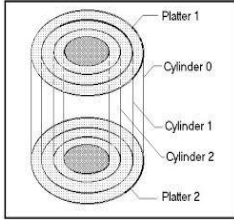
- 1 Bit (0,1) Binary
- 8 Bit = 1 Byte (e.g. R = 01001101)
- 1024 Byte= 1 Kilo Byte
- 1024KB = 1 Mega Byte
- 1024MB= 1 Giga Byte
- 1024 GB= 1 TeraByte
- 1024 TB= 1 Petta Byte
- 1024 PB= 1 ExaByte
- 1024 EB= 1 ZettaByte
- 1024 ZB= 1 YottaByte
- 1024 YB= 1 BrontoByte
- 1024 BB= 1 GeopByte

Network Speed

- 1 Bit
- 1000 Bit = 1 Kilobit (Kbps)
- 1024 Byte= 1 Kilobyte (KBPs)
- 1000Kb= 1 Mega bit
- 1000Mb= 1 Giga bit
- 1000 Gb= 1 Terabit

Hard Disk

- It is secondary storage device.
- It is made up of aluminum and has magnetic coating on both side.
- Theoretically it is optional but practically it is present in each and every computer.
- A hard disk is a stack of one or more aluminum platters that spin on one spindle like a stack of rigid diskettes.
- Unlike floppy disk, where the disk and drive are separate, the hard disk and drive is a single unit.
- Each disk is having two sides but all the sides cannot be used. Generally top side of the last disk is not used but the top side of the first disk is used.



Hard Disk

- Before using the hard disk it has to be formatted by using software FORMAT.COM.
- Formatting will divide hard disk into tracks and tracks are further divided into sectors.
- Each useable side of every disk is having tracks; a particular track of each side forms a cylinder.
- Hard disk can be reformatted; but reformatting will erase previous data.
- If required hard disk can be partitioned; this divides a hard disk into two or more parts.



Hard Disk

- Partitioning of hard disk has to be done at beginning i.e. before writing anything on the disk otherwise earlier data will be erased.
- While reading or writing the head does not make a physical contact with the disk.
- All read/write heads perform the read / write operations of one cylinder although only one read/write head is active at one point of time.
- After reading of one cylinder is over then the head move to next cylinder and so on.
- Hard disk provides sequential as well as random access.
- Cost, capacity and Reliability are more compared to a floppy disk.
- Now-a-days, even removable hard disk and Hot Swappable Hard Disk is also available.
- Removable Hard Disk can be removed or inserted only if computer is off whereas Hot Swappable Hard Disk can be removed or inserted even if the computer is on.

Hard Disk

- Access Time:- Time required for accessing a record.

Access Time=Seek Time + Rotation Time + Data Transfer Time

- Seek Time:- This is the time required to position the read write / head over the recording track to be used.
- Rotation Time:- This is rotational delay also termed as latency, to move the storage medium underneath the read/write head.
- Data Transfer Time:- This is the time taken to activate the read/write head and then read the requested data & transmit it to the primary memory of processing.

CD (Compact Disk)

- It is secondary storage device.
- It is outdated now and it is replaced by pen drives.
- CD is made up of 3 parts
 1. Plastic Disk (For Support)
 2. Aluminum Film (For Recording Data)
 3. Clear Resin (For protection)
- Generally capacity of a CD is 700 MB.
- Only one side of CD can be used i.e. Bottom Side.
- Reading and writing on a CD done through Laser.
- Reading Laser and Writing Laser is different.

- Data is recorded on a CD with the help of PITS (0) and LANDS(1).
- CD provides sequential as well as random access.
- CD is divided into three parts/ areas
 1. Lead in (Starting Point)
 2. Program Area (Actual Data)
 3. Lead out (Ending Point)
- There are three types of CD
 1. CD-ROM i.e. Pre-recorded CD. (Read Only)
 2. WORM CD (Write Once Read Many) i.e. Recordable
 3. CD-RW i.e. Re-writable CD

DVD (Digital Video Disk) (Digital Versatile Disk)

- It is an optical disk storage media format that can be used for data storage, including movies with high video and sound quality.
- Capacity 4.7 GB to 17 GB.
- DVD resemble CD as their physical dimensions are the same 4.72 inches or occasionally 3.15 inches in diameter but they are encoded in a different format and a much higher density.
- Data is recorded with the helps PITS(0) and LANDS(0) but much smaller and are encoded much closer together than those on a CD-ROM.
- Types of DVD are
 - DVD-ROM pre-recorded
 - DVD-R (Write Once Read Memory)
 - DVD-RW

Blue Ray Disk

- It is an optical disk storage media format that can be used for data storage, including movies with high video and sound quality.
- Capacity 4.7 GB to 17 GB.
- DVD resemble CD as their physical dimensions are the same 4.72 inches or occasionally 3.15 inches in diameter but they are encoded in a different format and a much higher density.
- Data is recorded with the helps PITS(0) and LANDS(0) but much smaller and are encoded much closer together than those on a CD-ROM.
- Types of DVD are
 - DVD-ROM pre-recorded
 - DVD-R (Write Once Read Memory)
 - DVD-RW

Pen Drive

- It is secondary storage device.
- A pen drive also known as USB drive, USB stick, thumb drive, USB Flash Drive or USB memory, is a data storage device that includes flash memory with an integrated USB interface.
- Pen Drive is a portable device which allows user to transfer data (text, images, video etc) to and from computer quickly.
- Users can easily read and write data on the Pen Drive by plugging it into the USB port on the computer.
- Pen Drives are quite compact and can fit easily into the pocket; they run without battery and draw power from the USB connection itself.
- Most weigh less than 30 grams.

- Some allow up to 1,00,000 write/erase cycles, depending on the exact type of memory chip used and have a 10 year shelf storage time.
- Both Floppy disk and CDs are now replaced by Pen Drive as a preferred means of data storage.
- Pen drive is preferred because it offers mass data transfer and storage capability and at much faster rate.
- USB flash drives are more durable and reliable because they have no moving parts.
- Additionally, they are immune to electro magnetic interface (unlike Floppy Disk), and are unharmed by surface scratches (unlike CD).

- Until about 2005, most desktop and laptop computers were supplied with floppy disk drive in addition to USB ports, but floppy disk have become obsolete after widespread adoption of USB ports and the larger USB drive capacity compared to the 1.44MB 3.5 inch floppy disk.
- Flash driver with anywhere from 8 to 256 GB are frequently used now-a-days and less frequently 512 GB to 1 TB units.
- Storage capacity as large as 2 TB are planned.
- USB flash drives use the USB mass storage device class standard, supported natively by modern operating system such as Windows, Linux, mac OS and other Unix like systems.

- Pen drive can be used in a number of handheld devices such as smart phones and tablet computers, though the SD card is better suited for those devices.
- A flash drive consists of a small printed circuit board (PCB) carrying the circuit elements and a USB connector, insulated electrically and protected inside a plastic, metal or rubberized case which can be carried in a pocket or on a key chain.
- The USB connector may be protected by a removable cap or by retracting into the body of the drive, although it is not likely to be damaged if unprotected.
- Most flash drives use a standard type A USB connection allowing connection with a port on a personal computer but drives for other interfaces also exist.

- Pen drives are robust and scratch free thus ensuring maximum security for you data as compared to other traditional means of data storage.
- Many available PC software suites permit the launch of an operating system from the bootable pen drive.
- Moreover companies selling Pen Drives nowadays also couple it with other devices like MP3 Music, LED's or Swiss Knife etc.

Anatomy of Computers

- Clock Speed
- Slot
- Density
- MMX
- Cooling FAN
- Motherboard
- BIOS
- CMOS
- Expansion Slot
- SCSI (Small Computer System Interface)
- Ports and Connectors
- Parallel ports and serial ports
- IDE drive connector
- Floppy drive connector
- USB Connector
- P/S2 Connector
- BUS
- Cache Memory
- Virtual Memory
- Sound Card
- Colour / Color Card
- Video Card

Clock Speed

- Clock speed is the speed at which the processor executes instructions.
- It is measured as a frequency in hertz.
- Generally MHz (Mega Hertz) i.e. million cycles per second or GHz (Giga Hertz) i.e. billion cycles per second.
- 480 MHz processor can perform 480 million instructions per second whereas 2.4 GHz computers running at 2,400,000,000 cycles per second
- Some microprocessors are super scalar, which means that they can execute more than one instruction per clock cycles.

Slot

- Different processors use different sockets or slot to fit onto the motherboard.
- Based on the type of processors, there are two main types of slots for connecting to the motherboard – Socket 7 and Slot 1.
- Socket 7 is a 321 pin socket for Pentium class CPU.
- However Pentium II / III CPU was using slot 1 for connecting to motherboard.

Slot

- Different processors use different sockets or slot to fit onto the motherboard.
- Based on the type of processors, there are two main types of slots for connecting to the motherboard – Socket 7 and Slot 1.
- Socket 7 is a 321 pin socket for Pentium class CPU.
- However Pentium II / III CPU was using slot 1 for connecting to motherboard.

Density

- A CPU is made up of millions small transistors.
- i.e. 5,00,00,00,00,000 OR 500000000000 (500 Billions)
- All calculations and comparison operations are performed by the CPU by synchronizing between the transistors.
- Shorter the distance between the transistors on CPU, faster the performance.
- Now-a-days the CPU is having 0.35 micron distance between two transistors delivering faster performance.

MMX

- It stands for Multimedia Extension.
- MMX is a set of instructions built into the CPU.
- The main aim is to improve the performance of multimedia or graphics applications, mainly games, movies, audio.
- MMX technology is inbuilt in all the latest processors of INTEL.

Cooling FAN

- CPU generates lots of heat when in operation.
- If the CPU is not cooled properly then it might lead to all sort of errors, including system crashes.
- The CPU is therefore covered by a heat sink and small cooling fan to drive away the heat generated by the CPU (Processor).

Motherboard

- It is a large printed circuit board of a computer.
- Motherboard holds most of the main electronic parts such as processor, RAM, ROM, BIOS, CMOS and many other devices.
- These Devices are called as “On Board”.
- Motherboard is channel for various components to interact and communicate with each other devices.
- As number of slots on the motherboard are limited, additional circuitry may be mounted on “Daughterboard” which simply plug into the motherboard.

BIOS

- It stands for Basic Input Output System.
- It is a small chip on the motherboard that loads the hardware setting required to load various devices like keyboard, mouse, disk drive.
- Now-a-days the PC comes with flash BIOS i.e. these BIOS can be software upgraded to support new devices.

CMOS

- It stands for Complementary Metal Oxide Semiconductor.
- TO store date, time etc. CMOS is used.
- It is loaded automatically every time computer is switched on.

Expansion Slot



- A PC(Personal Computer) is designed in such a way that expansion can be done easily i.e. increase memory, add additional devices etc.
- Expansion slots are available on the motherboard.
- To expand your basic system the appropriate expansion cards can be purchased and slotted into the place provided.
- Examples: Network Interface Card, Video Graphic Card, Internal Modem Card etc.
- Numbers of expansion slots are limited Generally 5.

SCSI (Small Computer System Interface)

- It is a device that used to solve the problem of possibility of insufficient number of expansion slots.
- Instead of plugging interface cards into the computer bus via the expansion slots, the SCSI extends the bus outside the computer via a cable i.e. the SCSI acts as an extension cord for the computer bus.
- Up to 7 devices can be chained on single SCSI port.

EXTERNAL SCSI CONNECTORS





Port & Connectors

- Port is a hardware device that allows a series of bits to be transferred to a bus for the data input or transfer of data from bus to the port of data input.
- Connector is an end point of a hardware device which is connected to a particular port.
- Connector can be Male or Female.
- With the help of ports and connectors user can connect various external devices to a computer
- e.g. Keyboard, Monitor, Mouse, Printer, Scanner etc.
- The physical interfaces for the ports and connectors are located on the outside i.e. at the back side of a PC, but they are directly or indirectly connected to a motherboard.
- There are various types of Ports and Connectors to connect various external peripherals.



Parallel Ports and Serial Ports

Parallel Port	Serial Port
These are unidirectional.	These are bidirectional.
These are faster than serial port.	These are slower than parallel port.
At a time byte/s is/are transferred.	At a time a bit is transferred.
They are used to connect printer, scanner etc.	They are used to connect modem, mouse etc.



- IDE (Integrated Drive Electronics) Driver Connectors
 - It is used to connect devices like Hard Disk or CD-ROM to a motherboard.
- Floppy Drive Connectors
 - It is used to connect Floppy Disk Drive to motherboard.
- USB Connector
 - USB stands for Universal Serial Bus.
 - It is used to connect devices with high speed data transfer like keyboard, mouse, scanner, digital cameras, pen drives etc.
 - Devices can be connected when the computer is ON.
 - USB can be connected to 127 different devices.

- IDE (Integrated Drive Electronics) Driver Connectors
 - It is used to connect devices like Hard Disk or CD-ROM to a motherboard.
- Floppy Drive Connectors
 - It is used to connect Floppy Disk Drive to motherboard.
- USB Connector
 - USB stands for Universal Serial Bus.
 - It is used to connect devices with high speed data transfer like keyboard, mouse, scanner, digital cameras, pen drives etc.
 - Devices can be connected when the computer is ON.
 - USB can be connected to 127 different devices.

- **PS/2 Connectors**

1. PS/2 stands for Personal System / 2.
2. It is used to connect PS/2 based input unit devices like keyboard and mouse.





• BUS

1. BUS is a collection of wires through which the data is transmitted between the various components of a PC.
2. A BUS connects various components of PC with the CPU and main memory (RAM).
3. Typically a bus is having 8/16/32 wires; one wire can transfer one bit at a time and therefore known as 8 BITS / 16 BITS / 32 BITS bus.
4. There are 3 types of BUS.
 - a. Data Bus
 - b. Address Bus
 - c. Control Bus
 - a. Data Bus:- To transfer data between memory and processor.
 - b. Address :- To transfer address of the memory.
 - c. Control Bus:- It is used to ensure that the data is read or written to the location at the correct time.

• **CACHE MEMORY**

1. Cache means hidden. Cache memory cannot be used by the user of the computer directly.
2. Cache memory is a high speed memory, capable of keeping up with the speed of ALU.
3. It acts as a buffer between ALU and main memory which is comparatively slower.
4. It is used to boost processing power, It comes in 3 types
 - a) L1 Cache
 - b) L2 Cache
 - c) L3 Cache
5. It is expensive; therefore normally very small. (Actually it is small amount of SRAM).
6. It comes in size of 256KB, 512KB, 1 MB, 2 MB, 3MB, 6MB, 8 MB.

• **VIRTUAL MEMORY**

1. Virtual means not actual.
2. If a program is large than memory then the programmer has to use virtual memory.
3. A program is divided into small parts. Only one part is loaded into memory and the other parts remain on the disk, when second part is required, first part is removed out of memory and the second part from the disk is loaded into the memory and so on.
4. Virtual memory is an extension of primary memory by treating disk storage as logical extension of RAM.



• **SOUND CARD**

1. It facilitates the input and output of audio signals to and from a computer under control of computer program.
2. Many computers have sound capabilities built in, while others require additional expansion cards to provide for audio capabilities.
3. Typical uses of sound cards include music composition, editing audio / video presentation, education, games etc.
4. The older sound cards were 8 bit. Now-a-days 32 bit or more sound cards are being used.

• **COLOUR / COLOR CARD**

1. It allows computers to produce colours and graphics on the screen.
2. The first colour cards were 2 bit which produced 4 colours (CGA) Colour Graphic Adapter, the next was 4 bit and 6 bit allowing 16 and 64 colours (EGA) Enhanced Graphic Adapter then came 8 bit allowing 256 colours (VGA) Video Graphic Adapter.
3. When MCGA (Multi Colour Graphic Adapter) was introduced which is similar to VGA, had a 256-colour mode but it has increased the abilities of 17 million colours and now XGA(Extended Graphic Adapter) allowing monitors to display almost a billion separate colours.

• **VIDEO CARD**

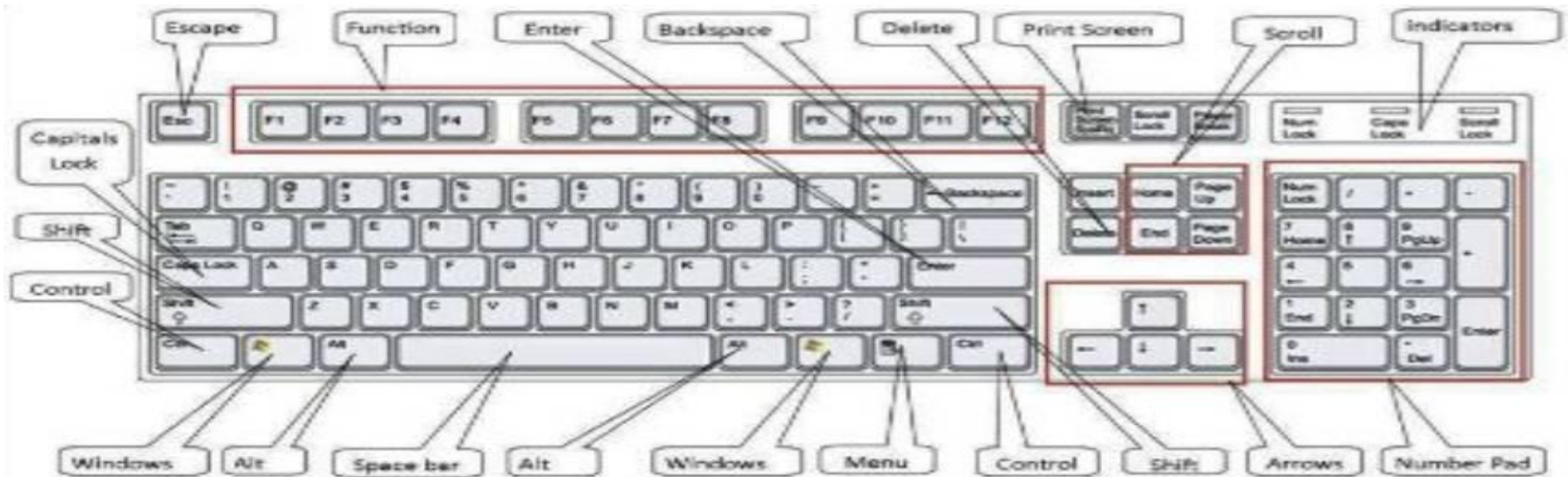
1. It allows computer to display video and animation.
2. It generally allows 3D (Dimension) and 2D graphics, TV – Tuner Adapter, MPEG (Motion Picture and Extended Graphics) coding.
3. A video card with a digital video camera allows computer users to produce live video.
4. A high speed network connection is needed for effective video transmission.

• **INPUT DEVICES**

1. KEYBOARD
2. MOUSE
3. TRACKBALL
4. LIGHT PEN
5. JOYSTICK
6. TOUCH SCREEN
7. SCANNER
8. CAMERA
9. MICROPHONE AND SPEECH RECOGNITION
10. DIGITIZING TABLETS

• KEYBOARD

1. Its is a primary input device.
2. It is must with every computer.
3. It is divided into 3 parts
 - i. Function Keys
 - ii. Alphanumeric Keys
 - iii. Numeric Key Pad
4. There may be some extra keys also.



• **MOUSE**

1. It is an input device.
2. It is generally used for GUI (Graphical User Interface) i.e. communication with the computer with the help of graphs and picture.
3. When you move the mouse on the table the corresponding movement of the pointer is done on the screen and when the pointer is at the proper place user has to click to select a program or double click to start a program.
4. Following are the different types of mouse.
 - i. Mechanical Mouse:
 - ii. Optical Mouse
 - iii. Serial Mouse
 - iv. USB Mouse
 - v. Scroll Mouse
 - vi. Coreless Mouse or Wireless Mouse

• **MOUSE**

- i. Mechanical Mouse:- This kind of mouse is what we generally have at home which has a ball at the bottom which detects movement of the mouse.
- ii. Optical Mouse:- This mouse uses light beam instead of ball to detect movement of the mouse.
- iii. Serial Mouse:- This mouse is connected to serial port.
- iv. USB Mouse:- This mouse is connected to USB port. Also called a Bus mouse.
- v. Scroll Mouse:- This mouse has a scroll button in middle which is used for scrolling.
- vi. Coreless Mouse or Wireless Mouse:- This mouse works with wireless technology.

- **TRACK BALL**

1. It is an input device.
2. It is an pointing device that works like an upside down mouse.
3. To move the pointer around the screen, the ball is rolled with the fingers.
4. Since the whole device is not moved, the track ball required less space than mouse.
5. Generally it is used with laptops.

- **LIGHT PEN**

1. It is an input device.
2. It is an pointing device which can be used to select an option on the screen by simply pointing at it.
3. It is also used to draw figures directly on the screen. Even you can edit drawing.
4. Light pens are generally used in fields like Engineering, Architect, Fashion Designing, CAD etc.

- **JOYSTICK**

1. It is an input device.
2. It is consisting of movable rod-the stick and two buttons the triggers.
3. Joysticks are mostly used for game programs.



- **TOUCH SCREEN**

1. It is an input/output device.
2. It consists of a computer screen that allows the user to select the task by simply touching the screen at the appropriate spot.
3. Two popular technologies exist for touch screens. Is one, the screen is lined with light emitting devices on its vertical sides; photo-detectors are places on the horizontal sides. When the user's finger approaches the screen, light beam is broken and is detected by the photo detectors.
4. Touch screen are becoming popular in the fields like railway reservation, ATM, stock exchange etc.

- **SCANNER**

1. It an input device.
2. It is used for optically scans images, printed text, handwriting or an object and converts it into digital form.
3. It used to convert analog images into digital images.

- **CAMERA**

1. It is an input device.
2. There are two types of camera
 - i. Digital Camera
 - ii. Web Camera
3. Digital camera stores digital image to memory. The user then connects camera to computer where images are uploaded and saved.
4. Web cam is connected to computer. Web cams are ways for people to take images from the computer and communicate visually with other users on the internet.

• **MICROPHONE AND SPEECH RECOGNITION**

1. It is speech input device.
2. Sound is often used in Multimedia, where the presentation can benefit from narration, music or sound effects.
3. In software, sounds are used to alert the user to a problem or to prompt the user for input.
4. A sound translate the electrical signals from the microphone into digitized form that the computer can store and process. The sound card can also translate digitized sound back into analog signals that can then be sent to speakers.
5. There is a great demand for translating spoken words into text, much as there is a demand for translating handwriting into text. Translating voice to text is a capability known as voice recognition (Speech Recognition).
6. With voice recognition one can speak to the computer rather than having to type. The user can control the computer with oral commands, such as “Shut Down” etc.
7. A sound can have several different meanings (“wait” versus “weight” for example) making reliable translation difficult.

- **DIGITIZING TABLETS**

1. It is an input device. It is used to input hand-drawn images, graphics and even handwritten signatures into computer.
2. A graphical tablet consist of a flat surface upon which the user may “draw” or trace an image using an attached stylus, a pen-like drawing apparatus.
3. The image generally dose not appear on tablet itself but, rather is displayed on the computer monitor.

- **DIRECT DATA ENTRY DEVICES**

1. MICR (Magnetic Ink Character Recognition)
2. OCR (Optical Character Reader)
3. OMR (Optical Mark Reader)
4. BCR (Bar Code Reader)
5. Smart Card

• **OUTPUT DEVICES**

1. Monitor

- i. CRT (Cathode Ray Tube)
- ii. LCD (Liquid Crystal Display)
- iii. LED (Light Emitting Diode)

2. Printer

- i. Impact
- ii. Non-Impact

3. Plotters

4. Speakers

- **OUTPUT DEVICES**

- Computer provides result of processed data on output devices.
- If the output is displayed on monitor then it is called as **soft copy**; if it is printed on a paper then it is called as **hard copy** and if it is send electronically then it is called as **digital copy**.
- Various output devices are as follows:-

1. Monitor

- i. CRT (Cathode Ray Tube):- A vacuum tube that uses an electronic gun (cathode) to emit a beam of electrons that illuminates phosphors on the screen as the beam sweeps the screen repeatedly. A monitor is often called CRT.
- ii. LCD (Liquid Crystal Display):- A low-powered display where rod-shaped crystals molecules change their orientation when an electronic current flows through them.
- iii. LED (Light Emitting Diode):- A LED display is a flat panel display, which uses an array of light emitting diodes as a video display.

• OUTPUT DEVICES

1. Printer:-

- i. Impact:- In case of impact printer, an inked ribbon exists between the print head and paper; the head striking the ribbon prints the characters.
 - a. Character (Serial)
 - I. DOT MATRIX
 - II. DAISY WHEEL
 - b. Line
 - I. CHAIN TYPE
 - II. DRUM TYPE
- ii. Non-Impact:- They use techniques other than the mechanical method of head striking the ribbon.
 - a. Thermal
 - b. Ink-Jet
 - c. Laser

2. Plotters:- A printer that uses computer-directed pens for creating high quality blue prints.

3. Speakers:- Gives audio output.