UNIT 1

Introduction of Computer

Computers are everywhere at home, at work and at school. Most of our daily activities either involve the use of or depend on information from a computer. Activities such as learning to read, finding a job, looking up a product, or planning a trip, could involve the use of computers. With a home computer, you can balance your checkbook, pay bills, track personal income expenses (operating cost) transfer funds, buy or sell stocks, and evaluate financial plans. People deposit or withdraw funds through an ATM (automated teller machine). At the grocery store, a computer tracks your purchases and calculates the amount of money you woe. Most hi tech cars include an onboard navigation system. That provides directions, signals for emergency services, and tracks the vehicle if it is stolen.

In office, People use computers to create correspondence such as memos (note) and letters, calculate payroll, track inventory, and generate invoices (demand). Both schools and homes have computers for educational purposes. Teachers use them to assist with the instruction. Student complete assignments and do research on computers in lab rooms and at home. On the computer many people find hours of entertainment. They play games, listen to music, watch a movie, read a book or magazine, compose a video, re touch a photograph, or plan a vacation. Through computers, society has access to information from all around the global. Instantaneously, you can find local and national news, weather reports, sports scores, stock prices, medical records, credit report and countless forms of educational material. We can send messages to others, meet new friends, shop, fill prescriptions, file taxes, or take a course, at your fingertips.
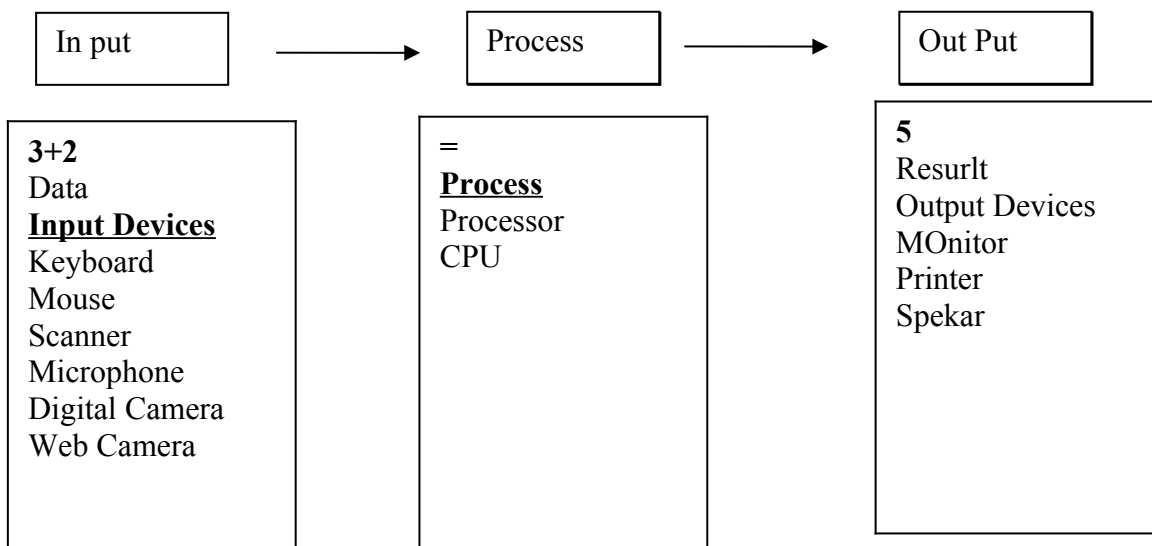
People use computers as sources of communication. These communications are not limited to text. We also can transmit voice. Sounds, video and graphics with today's technology. With the use of computer you can see others while communicating with them. We can also send videos or photographs to our family, friends or clients. The digital revolution is upon us. Technology continues to advance and computers have become an integral part of our lives. To be successful in this digital world, It is essential we are computer literate. Being computer literate means we have knowledge and understanding of computers and their uses.

What is computer?

Computer is an advance/Modern electronic device. Its derived from Latin word 'Computare' this means calculate. which takes raw data as input from the user then processes these data as per given instruction then gives output (result) and store these data for future use. In other word, it is a data processing machine, which can process any kind of numerical and non-numerical (arithmetic & logical) operation under the control of sequential instruction called program. It is totally user dependent device. It has no its own brain, so it cannot think its own.

In one word, any electronic machine that can perform 'IPO' cycle is known as Computer system.

IPO cycle:

In put	→	Process	→	Out Put

3+2 Data **Input Devices** Keyboard Mouse Scanner Microphone Digital Camera Web Camera	**=** **Process** Processor CPU	**5** Resurlt Output Devices MOnitor Printer Spekar

Input:

Input (Data) is the raw information. Data is the collection of facts, figures (numbers), and statistics given to the computer to produce meaningful value (result).

Process:

Process is the manipulating of data as per given instruction. It is totally internal process of the computer system .CPU (Central processing unit) is main processing device.

Output:

Output is the proceed data given by computer at final stage. It is also called Result (Information). We can save this information for our future use.

Characteristics of computer:

i.   Speed and Accuracy Capabilities

Computer performs complex calculation at a very high speed. Computer takes a few micro/nano second to execute an operation.

1 Millisecond   = $1/1000^{th}$ of a Second (10^{-3})

1 Microsecond   = $1/1000000^{th}$ of a Second (10^{-6})

1 Nanosecond   = $1/1000000000^{th}$ of a Second (10^{-9})

1 Pico Second   = $1/1000000000000^{th}$ of a Second (10^{-12})

Computer always gives 100% accuracy output (result), if the user provides correct output and instruction. If any mistake occurs in any calculation they are due to manual error not of computer. Since it is very accurate, definitely it is reliable.

ii.   Storage Capacity

The storage characteristic of a computer has made it distinct from a calculator because calculator cannot store the data in only processes the given data and produce output. But computer store a huge amount of data in its storage unit for the future use. The storing capacity of computer expressed in Bytes. A byte stores one character of data.

0, 1 = 1 Bit

4 Bits = 1 Nibble

8 Bit (2 Nibble) = 1 Byte

1 Byte = 1 Character

1024 Byte = 1 Kilobyte

1024 KB = 1 Megabyte

1024 MB = 1 gigabyte

1024 GB = 1 Terabyte

1024 TB = 1 Perabyte

1024 PB = 1 Exabyte

iii.   <u>Versatility</u>

Versatility is an ability to perform various task related to different fields like Science and Technology, Business, Education etc. a computer can process any kind of data.

iv.   <u>Diligence</u>

Diligence is a capacity of performing repeated operation without any tiredness and any mistake. A computer is capable of performing the required task continuously with the same speed, accuracy and efficiently without any error. Computer never gets tired, bored and laziness to do the task.

v.   <u>Reliability:</u>

Computer output is generally very reliable, if the input data and instruction is correct. Incorrect data and unreliable program give us computer errors and wrong result. Since the computer is 100% accurate, it is reliable.

Evaluation of Computers-

10. Electro Numerical Integrator And Calculator (ENIAC):

In 1964, J. Presper Eckert and John Mauchly with the help of Atanasoff and Berry design and build the Electro Numerical Integrator And Calculator (ENIAC). 18,000 vacuum tubes were used in ENIAC. There were 70,000 resistors, 10,000 condensers and 6,000 switches. It weighed 30 tons and occupied a space 3,000 cubic feet. It could calculate 300 times faster then any calculating device at that time and it was based on decimal number system.

11. Electronic Discrete Variable Automatic Computer (EDVAC):

In 1952, the first electronic computer was developed by John Mauchly and John Presper Eckert with the help of A. Burks, Goldstine and Neuman. This machine was used to store the data and information as well as the instruction. This computer operated electronically.
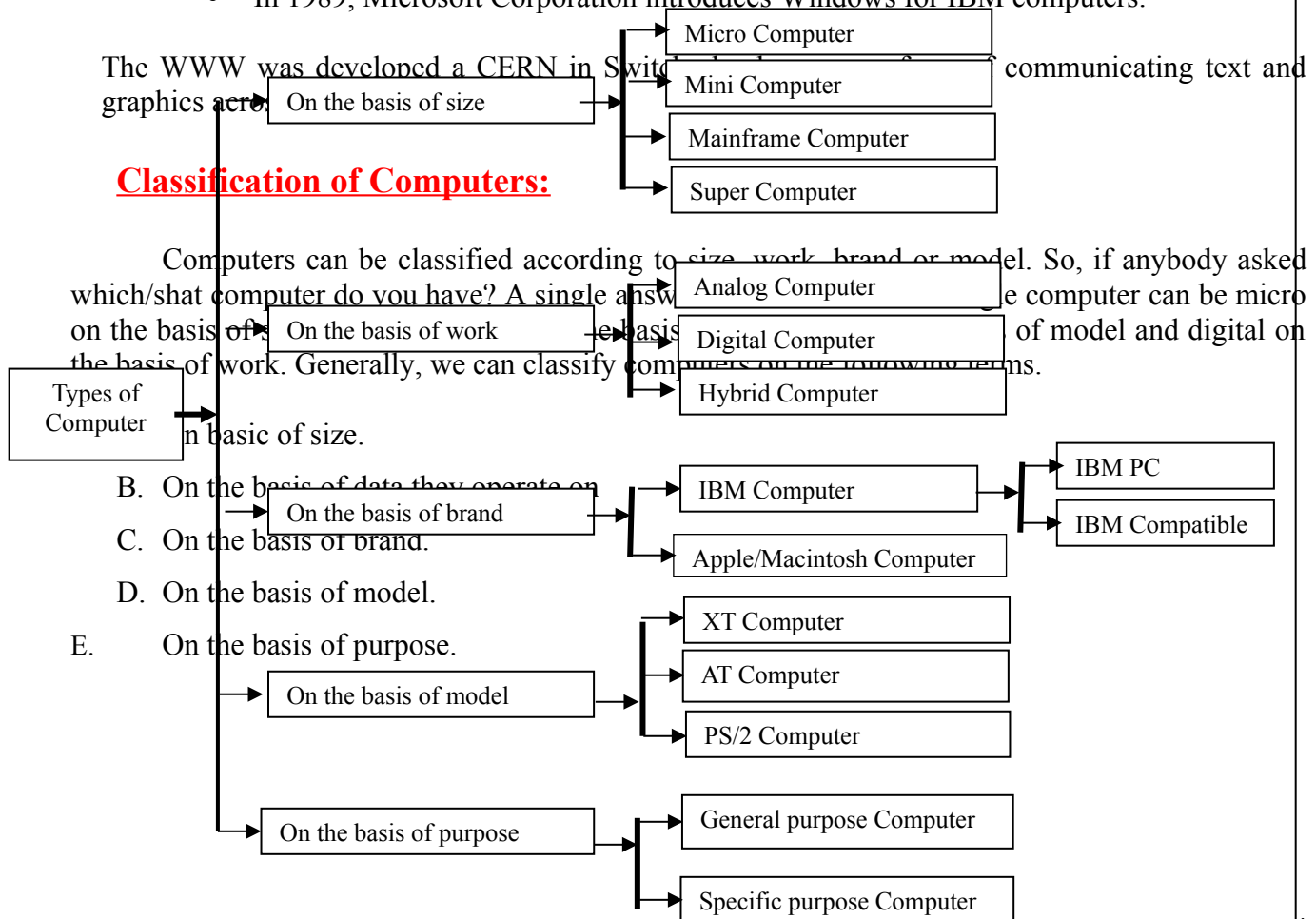
12. UNIVAC - I (Universal Accounting Computer):

John Mauchly and John Presper Eckert founded their own company in 1946 and began to work on the Universal Automatic Computer (UNIVAC): general purpose commercial computer in1951. It was the first commercially used electronic computer in the world.

- In 1958, the first computer to use the transistor as a switching device, the IBM 7090, is introduced.
- In 1964, the first computer to use integrated circuit, the IBM 360 is announced.
- In 1975, the first microcomputer, the Altair is introduced. In the same year, the first Super Computer, the Cray-1 is announced.
- In 1976, Digital Equipment Cooperation introduces its popular Minicomputer, the DEC VAX 11/780.
- In 1977, Steve Wozniak and Steve Jobs establish the company Apple Computer.
- In 1979-82, Bjame Stroustrup of Bell Laboraties in New Jersey introduces "C with Classes."
- In 1984, Apple Introduces the Macintosh, the first widely available computer with a "user- friendly" graphical interface using icons, windows, and a mouse device.
- In 1989, Microsoft Corporation introduces Windows for IBM computers.

The WWW was developed a CERN in Switch... communicating text and graphics across...

On the basis of size → Micro Computer / Mini Computer / Mainframe Computer / Super Computer

Classification of Computers:

Computers can be classified according to size, work, brand or model. So, if anybody asked which/shat computer do you have? A single answe... le computer can be micro on the basis of s... e basis... of model and digital on the basis of work. Generally, we can classify computers on the following terms.

On the basis of work → Analog Computer / Digital Computer / Hybrid Computer

Types of Computer

...n basic of size.

B. On the basis of data they operate on.

C. On the basis of brand.

D. On the basis of model.

E. On the basis of purpose.

On the basis of brand → IBM Computer → IBM PC / IBM Compatible / Apple/Macintosh Computer

On the basis of model → XT Computer / AT Computer / PS/2 Computer

On the basis of purpose → General purpose Computer / Specific purpose Computer

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Types on the basis of Size

On the basis of size computers can be classified into three groups. They are.

1. Mainframe computer
2. Mini computer
3. Micro computer.
4. Super computer.

Mainframe Computer:

These are the largest computers on the basis of size. A centrally located CPU is connected with more these 1000 terminals. Example of these computer are: IBM 1401, ICL 2950/10 etc. Some of the major characteristics of these computers are listed below.

1.   Very large in size with approximately 1000 Sq feet area.

2.   Central processor, central administration.

3.   More than 100 terminal, large capacity storage devised used.

4.   Fastest and most expensive system in comparison to contemporary machines.

5.   General purpose computers.. Used by large organization and governments for large scale
data   processing.

Mini computer:

These are the medium sized computer on the basis of size. A centrally located CPU is conn4ected with around 50 terminals. Example of these computes are Prime 9755, Vax36 etc. Some other major characteristics of this type of computers are listed below.

1. Medium sized computer occupying approximately 10 sq. feet of area.
2. Around 50 terminals and large capacity storage devices than micro computers but smaller than mainframes.
3. Used for general purpose
4. Used in medium sized and corporations.

Micro computer:

These are the smallest computer system on the basis of size. These computers called micro because microprocessor is used as CPU and they are very small. The smallest of this category are laptop note book and palmtop computers. the size is reducing day-by-day. Examples of this category are: IBM Pentium PC, Apple/Macintosh, sun spark workstation etc. Some major characteristics of this category are as follows.

1. Smallest in terms of size. Can be kept on top of desk(Desktop), on palm(palmtop),on top of our lap(Laptop)and like a notebook.

2. Speed is higher and cost lower.

3. Since a single user system is used, storage devices and memory are smaller sized.

Click image to
view computer
attached to stem

Super Computers

Supercomputer is a computer that can process a great deal of information or make involved in extensive calculation very quickly. It processes the data and instructions in millionths of a second, or microsecond's .Super computers can resolve complex mathematical equations in a few hours, which would have taken a scientist and engineering research.

Supercomputers traditionally gained their speed over conventional computers through the use of innovative designs that allow them to perform many tasks in parallel, as well as complex details engineering,. They tend to be specialized for certain types of computation, usually numerical calculations, and pe4rform poorly at more general computing tasks. their memory hierarchy is very carefully designed to ensure the processor is kept fed with data and instructions at all times in fact much of the performance difference between slower computers and supercomputers is due to the memory hierarchy design. Their I/O systems tend to be designed to support high bandwidth, width latency less of an issue, because supercomputers are not used for transaction

processing. Examples of super computer are CRY-1, Deep Blue, and CM5 CYBER 205 etc.

Types on the basis of Data They Operate On

On the basis of the Data they operate on computers can be classified as follows;

1. Analog computer.

2. Digital computer.

3. Hybrid computer.

Analog computer:

The computers, which work with the natural phenomena and physical values like frequency, earthquake volcano, water flow, current flow etc, are known as analog computers. they are based on continuous changer values or voltage levels. These types of computers are used in scientific work , commercial and person purpose. Examples of analog computer are Lesley, odometer, speedometer, seismograph voltmeter, pressure gauge etc. Some of its characteristics are presented below

1. Based on continuous varying data.

2. Measure only natural or physical values.

3. Used for special purpose.

4. Generally, no storage facility is available because they work on real time basis. If provided, then on a little amount of storage is available in it.

5. Accuracy of theses types of computers is very less because of noise and filtering facility, Increasing accuracy is costly.

6. Output of those signals is also not well known by general public because they are in form of wave lines, curves lines or graphs.

7. The wave form of analog signals is represented in figure below.
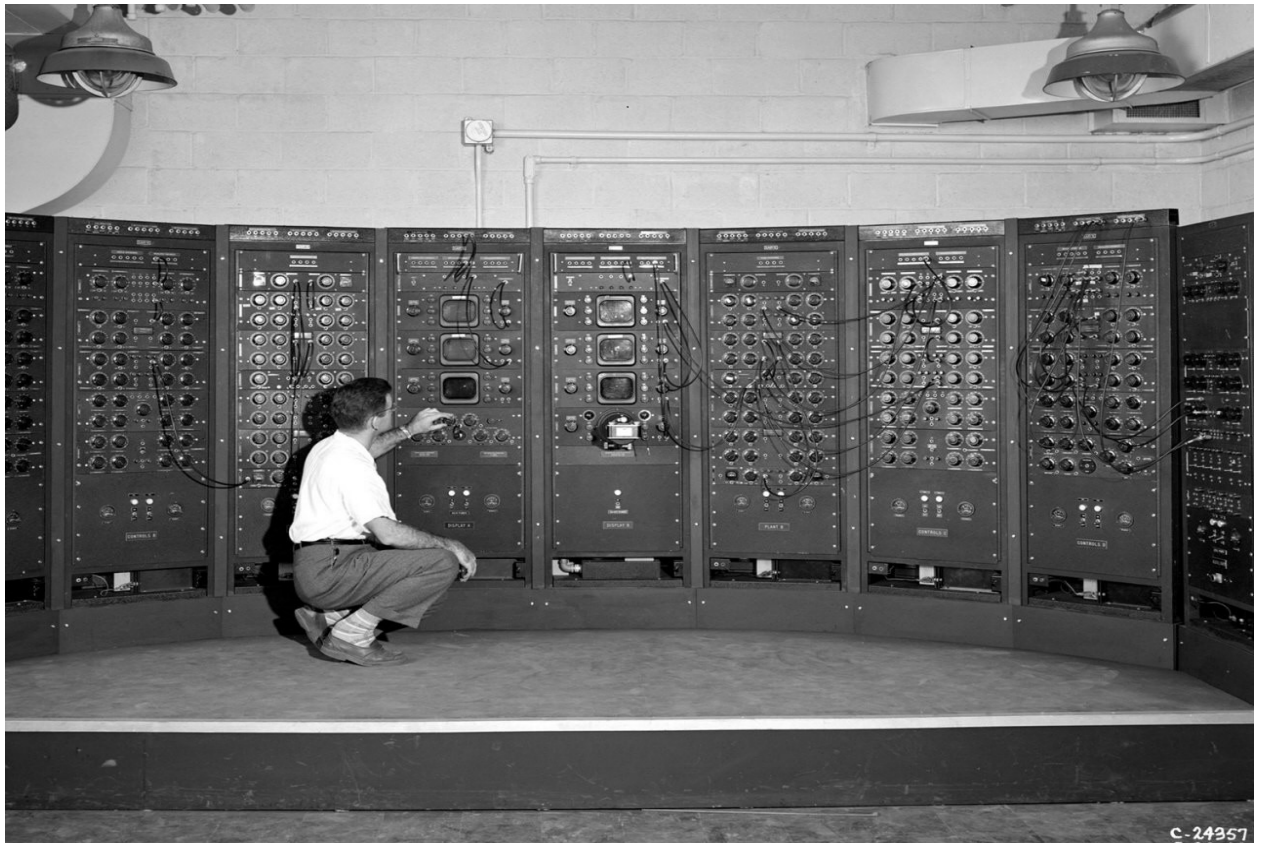
Digital computer

These computers are based on discrete quantities and are represented with binary number. They are based on binary digits. Binary system is such system of numbering in which only 2 digits are used 0 and 1 Meaning of 0 is either OFF, FALSE, NO etc and 1 is ON, TRUE, YES etc. So the basic principle of these computers is either present or absence of electrical pulses in the signals. Examples of these computers are IBM PC, Apple/Macintosh etc. Some major characteristics of these computers are listed below:

1. Based on discrete data which are not continuous with time.

2. Based on principle of logic 1 and 0 (high and low voltage).

3. Used for general purpose.

4. They are more reliable because of less noise and filtering facility.

5. It has large memory capacity because the calculations are to be stored internally for future use and re-programming.

6. It is multipurpose and programmable. So, it is of high cost and faster processing.

7. Signal representation of digital pulses is shown in figure below.

Difference between Analog and digital computers:

Basis for difference	Analog	Digital
Working Principle	This computer work with natural or physical values.	This computer work with digits.
Types of data	This computer work with continuous data.	This computer work with discrete data.
Accuracy	Low	High
Storage/ Memory	Low	High
Purpose of use	Special	General
Cost	Low(Generally)	High
Programming	No possibility of re-programming For that total circuitry system and hardware parts is to be replaced with new ones.	Totally flexible and can be re-programmed.

Hybrid Computer

Hybrid means combination or cross-link of two or more types. So, as the name suggest, it is combination of analog and digital computer. It can perform the works done by analog computers as well as by digital computer. Example of these types of computer is: computer used in hospitals, computers used in jet planes etc. The best example of hybrid device is Modem. It consists of both analog and digital parts. Some other major characteristics of this computer are presented below:

1. Combination of good qualities of analog as well as digital computer.

2. Can process both continuous and discrete data. It has capacity to convert one type of data into another.

3. These are special purpose machines.

4. Mostly used in airplanes, hospitals etc.

5. High cost.

Types on the Basis of Brand:

On the basis of brand computers can be classified into following categories:

1.   IBM computers

       (a) IBM PC

       (b) IBM Compatible

2.   Apple/Macintosh computer.

Explanation of each is presented below:

IBM Computer

IBM. Which was established by Dr. Herman Hollerith in 1923 AD, is the largest computer manufacture company in the world till today? It was leading the market of mainframe and PCs. Nowadays it uses processors, multimedia devices and some other hardware pats developed by some other companies Intel but use the principle of its own. So, all the computers developed by IBM company are called IBM computer. It has two categories; (a) IBM PC and (b) IBM Compatible.

The computers developed by IBM company itself are called branded or IBM PC. Computer which developed or assembled by other companies using the parts and principle of IBM PCs are called IBM compatible. So, IBM Compatibles are also called duplicate of IBM PCs.

Differences between IBM PC and IBM Compatible

Basis for difference	IBM PC	IBM Compatible
Developed by	These computer are developed by IBM Company itself.	These computer are developed by the companies other than IBM company but compatible with IBM.
Generally called	These computers are also called Branded or Original PCs.	These computers are generally called assembled or duplicate of PCs.
Cost	Generally expensive	Comparatively cheaper.

Apple/Macintosh Computers

Apple Corporation was established in 1970 AD in USA. By far it has gone much forward and product PCs with good qualities and user friendly. So, all the computers that are developed by Apple Corporation are called Apple/Macintosh (Mac) computers. These computers are architecturally totally different than the of IBM's. Not only hardware part, but their software architecture is also totally different. Software man for IBM PC can't be run in Macintosh or vice versa. Floppy disks or hard disks formatted in one can't recognized by other. Before 2006 they used power PC processor like G3, G4. But nowadays they are using Intel Processor.

Types on the Basis of model

On the basis of model computers can be classified in to following categories.

1. XT computers

2. AT computers

3. PS/2 computers

Each of them is explained below:

XT Computers

XT(Extra Technology) computer are the old technology computers with much slower processing speed (not more than 4.77Mhz). Advanced GUI based software like (windows) can't be run in these computer. Everything was based on text based system. Serial number of processor are like 8086, 8088 which were developed by Intel and were 16 world length. Complex calculation and large processing couldn't be done. I/O devices were not flexible and faster.

AT Computer

AT (Advanced Technology) computer are the new technology computer. They are faster in processing than XT and can run any type of software whether that based or GUI based. Serial number of processor are 80286, 80486, Pentium, Pentium 2 etc. Any type of complex and long processing can be done depending on the capacity of the computer. I/O devices are interactive, flexible and faster. World length exceeds 16 bits. Co-processors are used to help the main processor for complex mathematics.

PS/2 Computers

Actually, these are not totally different models of computers but are refinement of AT computers. These models were built after 1990s and mostly used in laptop computers. Rechargeable and battery operated systems with faster and flexible I/O devices are some important characteristics of these computers. OS/2 operating system was used at the beginning but now-a-days. Windows operating system is leading.

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Types on the Basis of Purpose

On the basis of purpose computer can be classified into two types
1)   General purpose computer

2)   Specific purpose computer

Each of these computer types is explained below:

General Purpose Computer

The computer that can be used for verities of purposes are called general purpose computer. The general purpose computers can be used for world processing, spread sheet applications, multimedia applications, publications etc. The desktop computers are considered as the general purpose computers because they can be used for verities of applications.

Specific Purpose Computer

The computers that are used for some specific application are called specific computers. The computers that are used to control the traffic light, the single chip computers used in automatic systems such as microwave oven, television set, automatic air conditioning systems and many other automatic systems are specific purpose computers. They are called specific purpose computer because they are used for one or some limited purpose.

Generation of Computer:

Depending on the device used, system architecture processing mode and language used in the computers are categorized in the following five generation. The development of different types of memory devices has given a sequence of development of computers from mainframe to microcomputers. In the development of computers there is a lot o changes from 1946 to 1990. This time is divided in different generation by scientists in a conference in 1962.

1. First Generation Computer (1946 - 1958)

These computers used vacuum tubes as memory. The vacuum tube consumes a lot of power. The vacuum tube was developed by Lee DeForest in 1908. MARK-I and ENAIC are the computers of first generation. First generation computers used machine language. The machine language uses Os and 1s (Binary Codes).
Features:
- Vacuum tubes were used for electronic circuits.
- Storage capacity was limited (1KB to 4 KB)
- Slow processing speed (Milli Second)
- Large in size (1500 square feet)

2.

Second

Generation Computer (1959 **to** **1964)**

The invention of Semi- conductor transistor had made big revolution in the field of computer. The transistor replaced the Vacuum tube. Transistor was invented in 1948-1949 by a team led by William Shockley. The two other members of the team were : John Bardeen and Walter H. Brattain. A transistor could do the work of 1000 Vacuum tubes. There were 18000 vacuum tubes in MARK-I, which could be replaced by 18 transistors. IBM 1401, IBM 650, UNIVAC are the example of Second Generation Computer.

Second Generation computers are smaller in size. They are more reliable and faster than generation computers. Assembly language was used for programming in second generation computers.
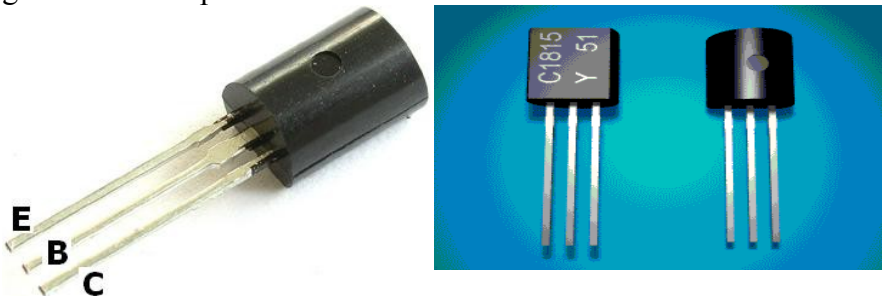
Feature:

- Transistors were used instead of Vacuum Tube.
- Processing speed is faster than First Generation Computers (Micro Second)
- Smaller in Size (51 square feet)
- The input and output devices were faster

3Third Generation Computer (1956 to 1974)

By the development of a small chip consisting of the capacity of the 300 transistors called Integrated Chip (IC), the computer designed using ICs are of the Third generations. They were smaller in size and efficiency in speed and memory capacity. The size of computers was reduced, speed was increased, power consumption decreased and reliability increased. Very soon ICs were replaced by LSI (Large Scale Integration), which consisted about 100 components. An IC components, is called as VLSI (Very Large Scale Integrated). The computers using ICs fall in third generation group. IBM 360, UNIVAC 1108, UNIVAC 9000 is third generation computers.

Feature:
- ICs were used in place of Transistor
- Processing speed is faster than Second Generation Computers (Nano Second)
- Mini computers were introduced during this generation.
- Storage capacity increased in Mega Byte.

4Fourth Generation Computers (1975 to 1990)

The development of VLSI circuit built in wafer thin slices of extremely purified silicon crystals and microprocessor enhances the performances of Fourth Generation Computers. The first microprocessor 8008 was developed by American Company (Intel) in 1971 and in 1974 another more powerful microprocessor 8080 was developed. The

microprocessor 8080 was used in early XT computers. Microprocessor based computers fall in fourth generation computer group.

The first microprocessor was designed by Steve Wonzniak and Steve Jobs, named Apple- I in 1976. IBM also developed microcomputers and it led Apple Corporation by producing home computers or personal Computers commercially in 1984. They were XT machines, which have been replaced by 80286.

IBM PCs, Acer, Gateway, Apple are the example of Fourth Generation Computers.
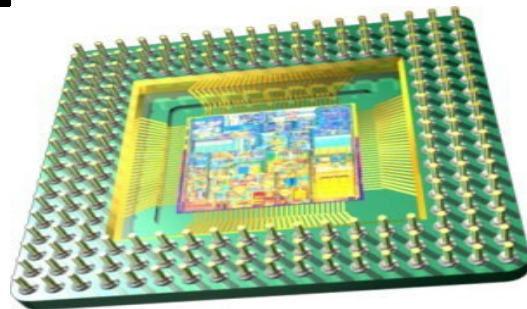
Feature:
- VLSI and microprocessor are used.
- Processing speed is very high in Pico Second.
- Storage capacity is very high in Giga Byte.
- Very smaller size varies from a desktop to a laptop.
- Input-Output devices were versatile.

5Fifth Generation Computers (1990 to incomplete…..):

After 1990, a new generation of computer called the Fifth generation has been under developed stage. As microprocessor were developed, huge numbers of personal computers were applied in offices, houses, many companies attempts are being made to produce mare efficient and fast computers. It is estimated that these computers of fifth generation will have an Artificial Intelligence (AI) with a little thinking capacity and they will understand the natural language.
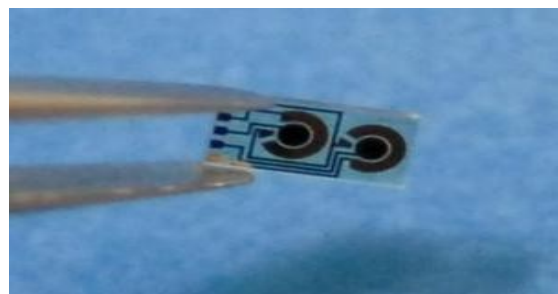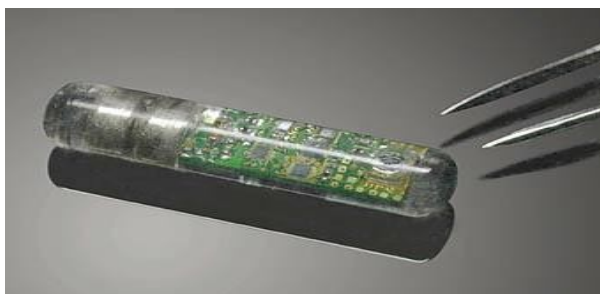
Feature:
- Intelligent programming.

- High performance multiprocessor system

- Easy Human - Computer Interface

- They will be used BIO CHIPS, ULSI (Ultra Large Scale Integration).

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- Computer will understand natural language.
- They have Artificial Intelligence.

COMPUTER SYSTEM

All of the components of a computer system can be summarized with the simple equations.
COMPUTER SYSTEM = HARDWARE + SOFTWARE+ HUMANWARE
•Hardware =Internal Devices + Peripheral Devices All physical parts of the computer (or everything that we can touch) are known as Hardware
• Software = Programs: Software gives "intelligence" to the computer.
• Human ware = User

Hardware:

The physical parts of the computer, which can be seen and touched is known as Hardware. It is just the mechanical parts of the Computer. All the devices attached to the Computer system like: Mouse, Keyboard, Monitor, CPU, Motherboard, Hard Disk are hardware. It includes all the components used to make the computer. It also includes the cables, connectors and computer peripherals.

Software:

Software, simply are the computer programs. The instructions given to the computer in the form of a program is called Software. Software is the set of programs, which are used for different purposes. All the programs used in computer to perform specific task is called Software.

TYPES OF SOFTWARE

Computer Software is basically categorized into three types:
1. System Software
2. Application Software
3. Programming Language & Scripting

1. System software:

The software that control and direct the operation of the computer hardware is called system software. System software is the collection of the programs written for computer, which allows the user to develop and run programs. The system software starts up the computer, makes it ready and allows the user to work on different program.
The system software consists of Operating System and Utility software.
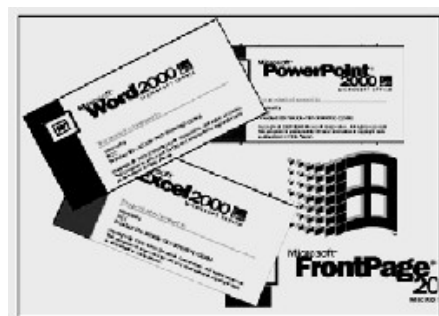
a) Operating System Software:
An operating system is a set of programs that controls and supervises a computer system and provides services to computer users. Operating system software controls overall activities of the

Computer. It acts as an interface between a user, program and the hardware. DOS, UNIX, XENIX, Windows are the examples of Operating System.

b) Utility Software:

The software, which helps the users to manage files & folders, checking viruses, keeping PC healthy and system settings is called Utility Software. These are also the software tools which help to users while preparing programs. PC TOOLS, Scandisk, Disk Defragmenter, Norton Antivirus, Language Processors (Assembler, Compiler…) are the examples of Utility Software.

C) Language Processors:

The programs that translate the program written in high level and low level language to machine codes are called language processors.

Assembler: It translates the programs written in low level language (assembly) to machine code.

Compilers: It translates the programs written in high level language to machine codes. The compiler translates the whole program at a time that makes the execution faster.

Interpreter: It also translates the program written in high level language to machine codes. Unlike compiler, it translates a single statement of a program at a time. Due to this it is easier to locate errors and debugging becomes easier.

2. Application software:

The software used for special purpose (specific task) written in a specific language is known as Application Software. It also may be defined as software that acts as interface between the user and the system software to allow the user to perform specific tasks. These programs perform certain task with respect to related program. Basically, there are two types of Application Software:

a) Package Software:

This software is the set of the pre-written programs by another person or group and made available to computer users. Many kinds of related works can be performed by using any required software. Ms. Word, Ms. Excel, Ms. Access, Adobe PageMaker, Auto Cad are the examples of Package Software.

b) Tailored or Custom Software:

The tailored software are used to perform the specific tasks only like Accounting,

Super Market Billing, Mark sheet Preparation, Inventory Control etc. They are developed on demand of the clients. GMACC, Point of Sale, MEDI-PRO, TALLY etc. are the examples of Tailored Software.

3. Computer Programming Languages & Scripting:

A language is a set of codes, which are used to write the programs. There are basically two levels of programming languages. These are:

a) Low Level Language
i) Machine Level Language
ii) Assembly Language
d) High Level Language

a) Low Level Language:
i) Machine Level Language:
This is computer's language. Computer understands information composed of only zeros (0s) and ones (1s) and hence it uses binary digits for its operation. Programs written in machine language only understood by the computer. The programming in this language is highly complicated. So, only software experts and only one personnel related to inner system can program in this language. These program codes or statements can be loaded directly into the computer's memory. Today,

programs are written in special programming language, but these programs must still be translated into the machine language before the program can be executed.

ii) Assembly Language:

The writing of programs in machine language is very difficult, tiresome and boring job for a programmer. To solve this problem and to facilitate programmer, easily understandable languages have been developed. Assembly language is one of them. Programs can easily be written in alphanumeric symbols instead of 0s and 1s. Meaningful and easily remember able symbols are selected for this purpose. For example, ADD for addition, SUB for subtraction, CMP for comparison etc. Such symbols are known as mnemonics. A program written in mnemonics is called assembly language program. The writing of programs in assembly language is easier and faster as compared to the writing of programs in a machine language.
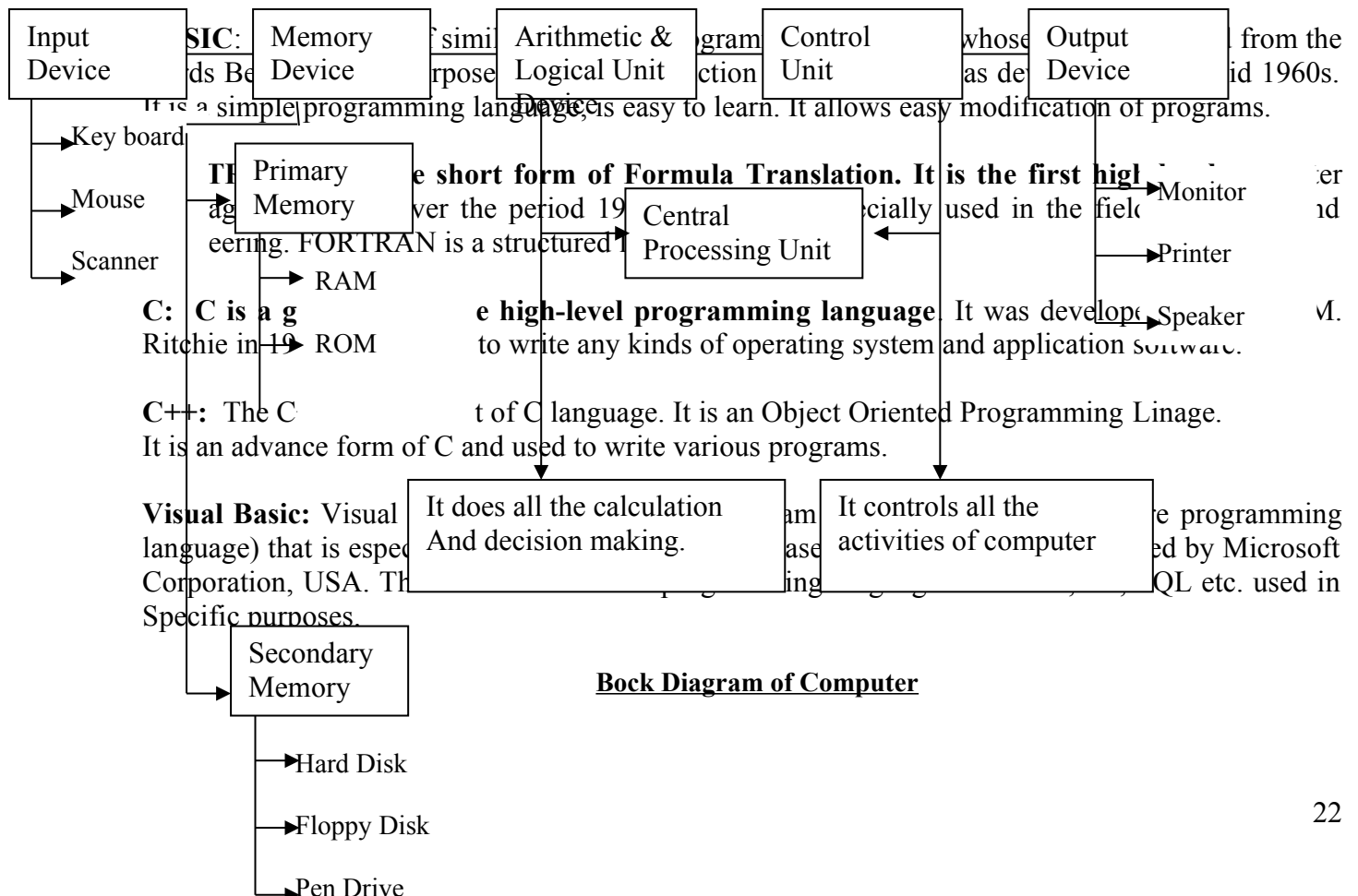
However, programming in this language must be translated into machine language before the program can be executed. An Assembler is a program, which converts this language into the machine code. So it is also sometimes called Assembly Language.
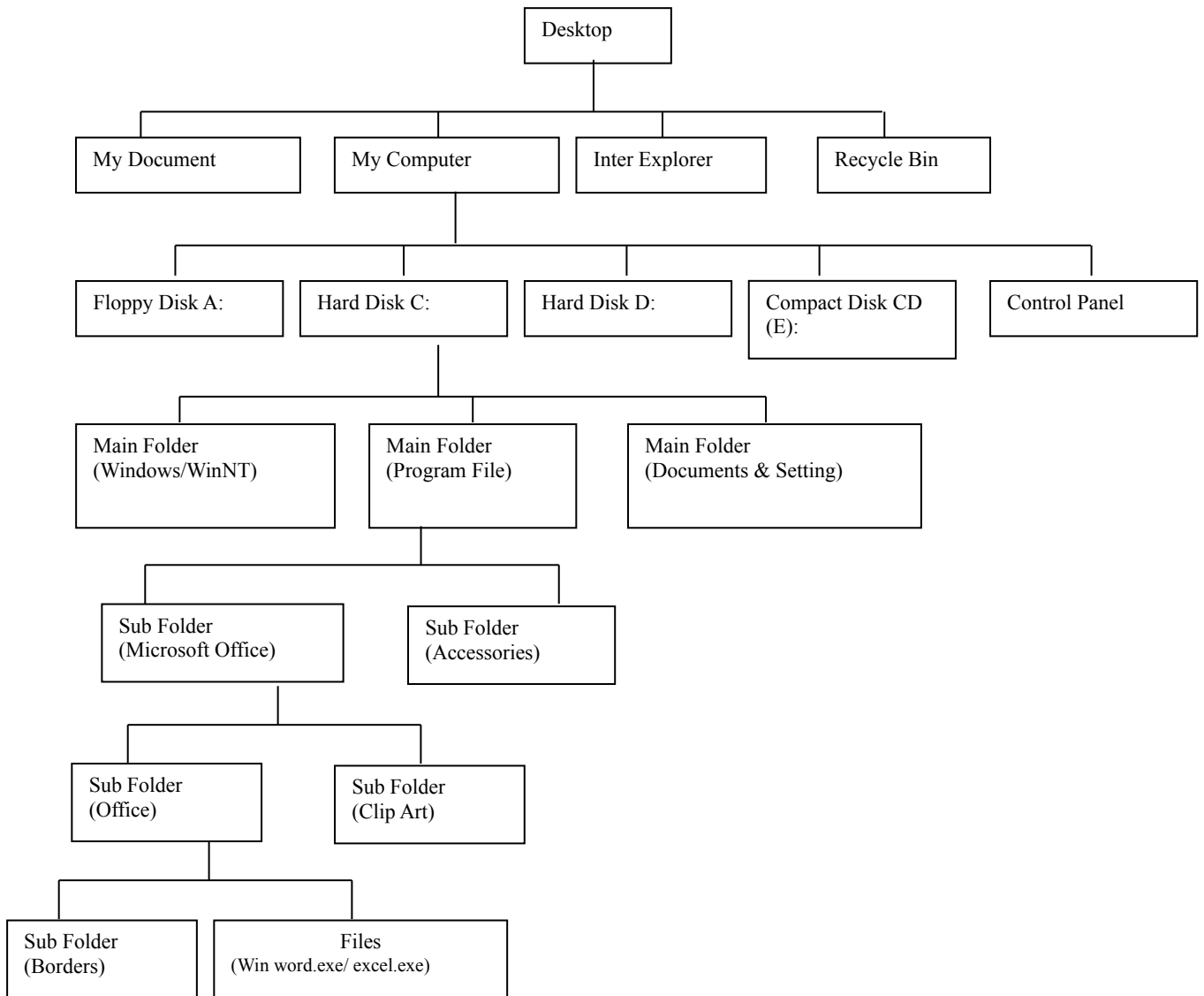
b) High Level Language:

These types of language are written in English Language with set of rules, called Syntax. Thus, it is easier to program than the other languages. These are easy to write, read and understand. Mistakes can be easily found and corrected in this language. Programs in this language also must be translated into machine language before the program can be executed. A Compiler is a program, which translates into binary digits (i.e. machine language). COBOL (Common Business Oriented Language), FORTRAN (Formula Translation), BASIC (Beginner's All-purpose Symbolic Instruction Code), C, C++ etc. are the examples of High Level Language.

The advantages of high-languages are:
i. They are easier to learn as compared to assembly languages.
ii. They make programs easier and faster to write.
iii. Provide better documentation.
iv. The programmer does not have limitations to use a single type of machine.
v. Programs are portable, i.e. they will run on any computer, which has a similar compiler.

SIC: ... ds Be ... simi ... purpose ... from the ... id 1960s.
It is a simple programming language, is easy to learn. It allows easy modification of programs.

The ... **e short form of Formula Translation. It is the first higl** ... **:er** ag ... ver the period 19 ... cially used in the field ... d eering. FORTRAN is a structured ...

C: C is a g ... **e high-level programming language** It was develop ... M. Ritchie in 19 ... to write any kinds of operating system and application software.

C++: The C ... t of C language. It is an Object Oriented Programming Linage. It is an advance form of C and used to write various programs.

Visual Basic: Visual ... language) that is espe ... am ... e programming ... ase ... d by Microsoft Corporation, USA. Th ... ing ... QL etc. used in Specific purposes.

Block diagram labels:
- Input Device
  - Key board
  - Mouse
  - Scanner
- Memory Device
  - Primary Memory
    - RAM
    - ROM
  - Secondary Memory
    - Hard Disk
    - Floppy Disk
    - Pen Drive
- Arithmetic & Logical Unit (Device) — It does all the calculation And decision making.
- Control Unit — It controls all the activities of computer
- Central Processing Unit
- Output Device
  - Monitor
  - Printer
  - Speaker

Bock Diagram of Computer

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Structure of computer's System

```
                              ┌──────────┐
                              │ Desktop  │
                              └────┬─────┘
        ┌──────────────┬──────────┴──────┬──────────────┐
  ┌───────────┐  ┌───────────┐  ┌────────────────┐  ┌────────────┐
  │My Document│  │My Computer│  │ Inter Explorer │  │Recycle Bin │
  └───────────┘  └─────┬─────┘  └────────────────┘  └────────────┘
     ┌──────────┬──────┴─────┬──────────────┬──────────────┐
┌───────────┐┌──────────┐┌──────────┐┌──────────────┐┌────────────┐
│Floppy Disk││Hard Disk ││Hard Disk ││Compact Disk  ││Control     │
│   A:      ││   C:     ││   D:     ││CD (E):       ││Panel       │
└───────────┘└────┬─────┘└──────────┘└──────────────┘└────────────┘
       ┌──────────┼──────────────┐
┌────────────┐┌────────────┐┌──────────────────┐
│Main Folder ││Main Folder ││Main Folder       │
│(Windows/   ││(Program    ││(Documents &      │
│WinNT)      ││File)       ││Setting)          │
└────────────┘└─────┬──────┘└──────────────────┘
          ┌─────────┴────────┐
   ┌────────────┐     ┌────────────┐
   │Sub Folder  │     │Sub Folder  │
   │(Microsoft  │     │(Accessories)│
   │Office)     │     └────────────┘
   └─────┬──────┘
     ┌───┴─────────────┐
┌────────────┐  ┌────────────┐
│Sub Folder  │  │Sub Folder  │
│(Office)    │  │(Clip Art)  │
└─────┬──────┘  └────────────┘
  ┌───┴──────────────┐
┌────────────┐ ┌──────────────────┐
│Sub Folder  │ │Files             │
│(Borders)   │ │(Win word.exe/    │
│            │ │excel.exe)        │
└────────────┘ └──────────────────┘
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Media, devices and peripherals

      Different input, output and auxiliary devise that are connected with the computer are called computer devices, the different devices that help to input, output, store etc in the computer is called as compute media and peripherals. Peripheral devices are connected to the computer through ports or sockets that are mounted outside. Some peripherals (e.g. disk drives) are located inside the computer case, so they are connected via expansion slots.

The number of computer peripherals differs according to requirement. Some computer media. Devices and peripherals are discussed below.

INPUTS DEVICES

Devices which transfer data, programs, or signals into a computer system are called Input Devices. These devices are used to give raw data (input) to the computer to perform the specific tasks. Firstly, the data, programs, or signals are fed into the input devices in a suitable form, and are then converted by the device into electrical signals from human readable format that are transmitted to the central processing unit of the computer. Some input devices are as follows:

- Mouse
- Scanner

- Web camera

- Track Ball

- Light pen

- BCR

- Keyboard

- Digital Camera

- Joysticks

- Touch Screen

- OCR

- MICR etc.

MOUSE

The mouse is an input device that is used to give the command and sometimes input to the computer. It is a small box with a round ball at the bottom and more than one buttons on the top. It is held in one hand and moves across a flat surface. Movement of the mouse on a flat surface moves the ball which in turn controls movement of a cursor on the monitor. In addition to moving the cursor, the mouse can be used to select text or commands and to manipulate data on the screen by clicking the buttons.
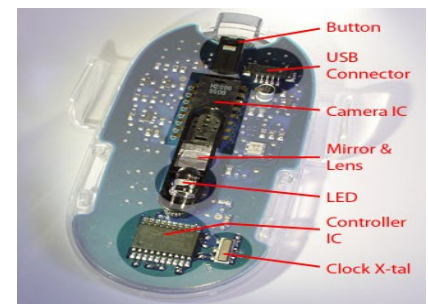
In other worlds, a device that controls the movement of the cursor or pointer on a display screen. A mouse is a small object you can roll along a hard, flat surface. Its name is derived from its shape, which looks a bit like a mouse, its connecting wire that one can imagine to be the mouse's tail, and the fact that one must make it sash along a surface. As you move the mouse, the pointer on the display screen moves in the same direction. Mouse contain at least one button and sometimes as many as three, which have different functions depending on what program is running. Some newer mice also include a scroll wheel for scrolling through long documents.

The mouse is one of the great breakthroughs in computer ergonomics because it frees the user to a large extent from using the keyboard. In particular, the mouse is important for graphical user interfaces because you can simply point to options and objects and click a mouse button. Such applications are often called point –and – click programs. The mouse is also useful for graphics programs that allow you to draw pictures by using the mouse like a pen, pencil, or paintbrush.

According to the working principle, mouse can be divided into three categories:

a)   Mechanical:-

A mechanical mouse works by the mechanical action of its different parts. It has a rubber or metal ball on its underside that can roll in all directions. Mechanical sensors within the mouse detect the direction the ball is rolling and move the screen pointer accordingly.
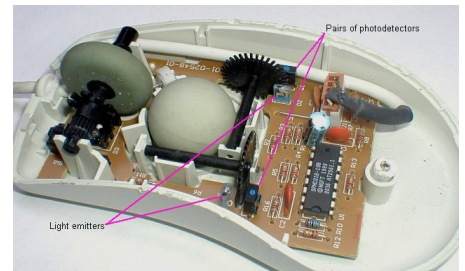
When this mouse is rolled across a flat surface, different rollers inside the mouse move and generate electric signals. These signals are given to the computer and computer converts them into proper action on the screen.

b)   Opto-mechanical:-

The basic construction of the Opto-mechanical mouse is same as that of the mechanical mouse. Only difference is in the sensing circuit used to detect the movement of the mouse. In a mechanical mouse, a detector is used to detect the distance, when it is moved on the flat surface, whereas, in an Opto-mechanical mouse, a combination of LED and photo detectors (optical sensors) are used to sense the distance traveled the mouse (motion of the ball). Most of the mouse are of this types, we are using.

Optical:-

Optical mouse uses a laser to detect the mouse's movement. You must move the mouse along a special mat with a grid so that the optical mechanism has a frame of reverence. Optical mice have no mechanical moving parts. They respond more quickly and precisely than mechanical and opt mechanical mice, but they are also more expensive. In this type of mouse, instead of the normal ball and rollers, a light source and photo detector is used with a special mouse pad. When the optical mouse is moved on this special pad, light from the light source gets reflected from the pad and special photo detectors inside the mouse detector the horizontal and vertical movement based on the reflected light received. Based on the method used to interface or to connect the mouse to the main computer system, mouse can be divided into following categories.
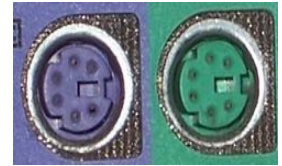
Serial mouse

A mouse that connects to a computer via a serial port is a serial mouse. This is the simplest type of connection.

A serial mouse is connected to either COM1 or COM2 i.e. any one of the available serial port on the computer. Connecting a serial mouse is very easy as one need to just plug in the connector attached to the mouse wire to the vacant serial port on the computer. It has 9 pin and D type in shape.

PS/2 mouse (Bus Mouse)

The other common type of mouse is a PS/ mouse, which plugs into a PS/2 mouse port. Only difference between a bus mouse and a serial mouse is a serial mouse is connected to a serial interface card or some type of I/O card with a serial interface option, whereas the bus mouse is connected to a special card made just for the mouse. This interface was introduced with the IBM PS/2 series of computer, and was therefore, called PS/2. It has 6 pin and circular type in shape.

USB Mouse

USB Mouse connects to USB Port. USB stands for universal serial bus, an external bus standard that supports data transfer rates of 12 Mbps. A single USB port can be used to connect up to 127 peripheral devices. USB also supports Plug-and-Play installation and hot plugging.

Keyboard

Keyboard is the most common, familiar and most important input device. It looks like a typewriter. It has got various keys, which are used to give data and commands to the computer. Commonly, we use a standard QWERTY keyboard with letters arranged in the same order as those on a typewriter.

The most important thing to watch out for is the keyboard connector. If you build an ATX system, you'll need a keyboard with a PS/2 connector, if you build an AT system, you'll need one with a DIN connector (Germany's Deutsche Industries Norm, a committee that set German Standard).

There are main three types of connector on keyboard

- PS/2 connector
- DIN connector

- USB connector

A typical computer keyboard contains all letters, number, symbols of a regular typewriter, plus other keys which may include:

Image Scanner:

An electronic device that generates a digital representation of an image for data input to a computer

Alphanumeric keys

Joystick:

A **joystick** is an input device consisting of a stick that pivots on a base and reports its angle or direction to the device it is controlling. Joysticks, also known as 'control columns', are the principal control in the cockpit of many civilian and military aircraft, either as a center stick or side-stick

Digital Camera:

A **digital camera** (or **digicam**) is a camera that takes video or still photographs, or both, digitally by recording images via an electronic image sensor. It is the main device used in the field of digital photography. Most 21st century cameras are digital so that it is related to input device.

Web cam:

A **webcam** is a video camera which feeds its images in real time to a computer or computer network, often via USB, Ethernet or Wi-Fi.

Their most popular use is the establishment of video links, permitting computers to act as videophones or videoconference stations. This common use as a video camera for the World Wide Web gave the webcam its name. Other popular uses include security surveillance and computer vision.

Light pen:

A **light pen** is a computer input device in the form of a light-sensitive wand used in conjunction with a computer's CRT TV set or monitor. It allows the user to point to displayed objects, or draw on the screen, in a similar way to a touch screen but with greater positional accuracy.
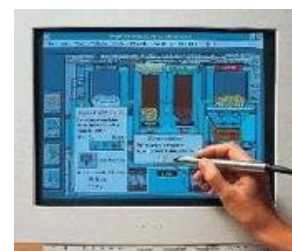
Bar code reader (BCR):

A **barcode reader** (or **barcode scanner**) is an electronic device for reading printed barcodes. Like a flatbed scanner, it consists of a light source, a lens and a light sensor translating optical impulses into electrical ones. Additionally, nearly all barcode readers contain *decoder* circuitry analyzing the barcode's image data provided by the sensor and sending the barcode's content to the scanner's output port.

Optical character reader (OCR);

Optical character recognition, usually abbreviated to **OCR**, is the mechanical or electronic translation of scanned images of handwritten, typewritten or printed text into machine-encoded text. It is widely used to convert books and documents into electronic files, to computerize a record-keeping system in an office, or to publish the text on a website. OCR makes it possible to edit the text, search for a word or phrase, store it more compactly, display or print a copy free of scanning artifacts, and apply techniques such as machine translation, text-to-speech and text mining to it.

Track Ball:

A **trackball** is a pointing device consisting of a ball held by a socket containing sensors to detect a rotation of the ball about two axes—like an upside-down mouse with an exposed protruding ball.

Touch screen:

A **touch screen** is an electronic visual display that can detect the presence and location of a touch within the display area. The term generally refers to touching the display of the device with a finger or hand. Touch screens can also sense other passive objects, such as a stylus. Touch screens are common in devices such as all-in-one computers, tablet computers, and smart phones.

Point Of Sale Terminal (Pos)

It is a terminal that consists of keyboard, CRT screen and internal printer. It is used for issuing customer slip in departmental stores. It contains item codes, rate, quantity, total amount etc.

The Motherboard

The Main Printed Circuit Board Inside The PC That Controls The Components That Are Responsible For Processing Data.

1. Holds the Processor
2. Memory
3. Expansion Slots
4. Connects Directly or Indirectly to Every Part of the PC
5. BIOS

Form factor means the size and shape of the actual motherboard there are two types of from factors AT and ATX, AT older version called Baby AT which was smaller than ATX newer version
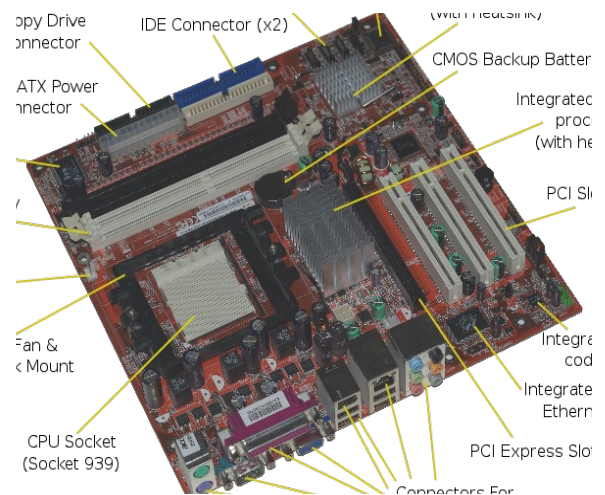
CENTRAL PROCESSING UNIT (CPU)

The main unit inside the computer is the CPU. This unit is responsible for all events inside the computer. It controls all internal and external devices, performs arithmetic and Logic operations. The CPU (Central Processing Unit) is the device that interprets and executes instructions.

The operations, a microprocessor performs are called the instruction set of this processor. Processors differ from one to another by the instruction set. If the same program can run on two different computer brands they are said to be compatible. Programs written for IBM compatible computers will not run on Apple computers because these two architectures are not compatible. Mainframes and early minicomputers contained circuit boards full of integrated circuits cards that implemented the central processing unit. Today's single-chip central processing units, called microprocessors, make personal computers and workstations possible. The CPU has the ability to fetch, decode, and execute instructions and transfer information to and from other resources over the computer's main data-transfer path, the bus. By definition, the CPU is the chip that functions as the "brain" of a computer. In some instances, however, the term encompasses both the processor and the computer's memory or, even more broadly, the main computer console (as opposed to peripheral equipment). All processors use transistors as switches to produce signals, much like a light switch, which digitizes the information and breaks them up into small chunks. If you have one transistor you can perform two signals - on and off. If you have two transistors you can perform four signals - both on, both off, first on, second off, first off, second on. This is interpreted in binary, such as: 00111001 - 0 for off, 1 for on. The CPU is composed of several units.

A simplified diagram of the CPU

The Control Unit (CU) directs and controls the activities of the internal and external devices. It interprets the instructions obtained into the computer, determines what data are needed, where it is stored, where to store the results of the operation, and sends the control signals to the devices involved in the execution of the instructions. The Arithmetic and Logic Unit (ALU) is the part where actual computations take place. It consists of circuits, which perform arithmetic operations (e.g. addition, subtraction, multiplication, division) over data received from memory and capable to compare numbers.

OUTPUT DEVICES

Output devices are used to get Final Result from the computer. Firstly, Output is displayed on Monitor. Then we can printout these outputs on a paper with the help of Printer. The purpose of the output devices is to translate data and information from electrical impulses to human-readable format. The output device, which is necessary for the computer to display messages to the user, is a monitor. If we want to keep the copy of the work on paper, we use printers. Plotters are devices that are more suitable for the large scale outputs like engineering drawings and high quality graphics.

MONITOR

Monitor is the most important peripheral of all the components within a computer system. It is the most important output device. It is also known as Screen or Visual Display Unit (VDU). All information is displayed on the Monitor. The information shown on the monitor is called Soft Copy i.e. temporary. But when it is printed on the paper then it is called **Hard Copy**

When we use a computer we need some device to see the results of the work we are doing. Presently our first choice for this is Monitor. Monitors have now become an integral part of modern day computers. They are available in many different size and screen resolution. Most monitors in

the current market can produce 'watch able' resolutions of at least 800 x 600 pixels. But that was not always the case.

Classification of the monitor

1. On the basis of working principle
i. Cathode Ray Tube (CRT)
ii. LCD (Liquid Crystal Display)
Iii. Gas Plasma

2. On the basis of Display Adapter Used
i. Monochrome
a. Composite Monochrome
b. VGA Monochrome
c. Multi- scanning Monochrome

ii. Color Monitor
a. Composite Color
b. EGA Monitor (Enhanced RGB)
c. VGA Monitor
d. Multi- scanning Monitor

PRINTER

Printer is a hard output device. A printer produces output usually in the form of text, on paper. There are lots of different printers available in the market. The most commonly used types of printers are:
1. Dot Matrix Printers
2. Ink Jet Printers
3. Laser Printers

• Dot Matrix Printers:
A type of printer that produces characters and illustrations by striking pins against an ink ribbon to print closely spaced dots in the appropriate shape. Dot-matrix printers are relatively expensive and do not produce high-quality output. However, they can print to -page forms (that is, carbon copies), something laser and ink-jet printers cannot do. It forms characters on a page according to patterns set for each character. It is mostly used in commercial environments for invoice and report printing, where quality and speed are not important. They are cheap to run and to maintain but do not produce high quality output. It gives an output by striking its head onto the paper through ribbon cartridge.

• Ink Jet Printers:

A type of printer that works by spraying ionized ink at a sheet of paper. Magnetized plates in the ink's path direct the ink

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onto the paper in the desired shapes. Ink-jet printers are capable of producing high quality print approaching that produced by laser printers. A typical ink-jet printer provides a resolution of 300 dots per inch, although some newer models offer higher resolutions.

Normally, Inkjet printer holds two cartridges (color and black) produces much better results of black prints. Inkjet printers that only take one cartridge at a time will either not be able to print in color (when the black cartridge is inserted) or have to produce the color black by heavily mixing its primary colors cyan, yellow and magenta. This will slow down the printing process and achieve less quality but these types of inkjets are the cheapest. Don't be misleading though, as the individual cartridges can be more expensive and they don't last as long, making the printer less economical in the long run. We recommend a printer that takes two cartridges. They're also easier to use and less troublesome.

• Laser Printers:

A type of printer that utilizes a laser beam to produce an image on a drum. The light of the laser alters the electrical charge on the drum wherever it hits. The drum is then rolled through a reservoir of toner, which is picked up by the charged portions of the drum. Finally, the toner is transferred to the paper through a combination of heat and pressure. This is also the way copy machines work. It uses laser technology to create an image that is transferred to a paper or film. Laser printers are more expensive but are much stronger than inkjets. Laser toner can be as low in cost as inkjet cartridges. They are faster and give higher quality printing.

Laser Printers are an entirely different breed.
They are non-impact printers. Using a combination of light, electricity pressure and head, they have the ability to create very high quality images and text on the printer page.

PLOTTER:

A device that draws pictures on paper based on commands from a computer. Plotters differ from printers in that they draw lines using a pen. As a result, they can produce continuous lines, whereas printers can only simulate lines by printing a closely spaced series of dots. Multicolor plotters use different-colored pens to draw different colors. In general, plotters are considerably more expensive than printers. They are used in engineering applications where precision is mandatory.

In other words, a plotter is a vector graphics printing device that connects to a computer. Plotters print their output by moving a pen across the surface of a piece of paper.

This means that plotters are restricted to line art, rather than raster graphics as with other printers. They can draw complex line art, including text, but do so very slowly because of the mechanical movement of the pens. (Plotters are incapable of creating a solid region of color; but can hatch an area by drawing a number of close, regular lines.) When computer memory was very expensive, and processor power was very slow, this was often the fastest way to produce color high-resolution vector-based artwork, or very large drawings efficiently.

Generally, it is used in the field of Engineering and Medical, where large size of outputs is required. Reports generated by Medical equipments, Engineering Maps are produces with the help of Plotters.

Memory devices:

Computer use memory to hold the programs and data in use by the CPU Most computers have several type of memory. The main purpose of the memory is to store programs and data so that the CPU may access and process it. It also can store partial solutions during the Computer run. Mainly, there are two general categories of memory device inside the computer, commonly used today.

PRIMARY MEMORY (MAIN MEMORY)

Though the CPU has calculating capability, it needs some space in which it can actually store the data or to perform calculation. This space in computer is called Primary Memory.
Primary Memory is also known as Main Memory. There are two types of Primary Memory:

RAM (Random Access Memory/Read-Write Memory)

Random Access Memory (RAM) is what most of us think of when we hear the word memory associated with computers. It is the running workspace of computer. Initially, every task is stored in RAM, when we save information; they are stored in Secondary Memory (Storage Devices). It is also called Volatile Memory because the information is erased when the power is switched off. 128 MB, 256 MB, 512 MB, 1GB are the sizes of RAM available in market.

RAM is often referred to as main memory or primary storage. RAM usually occupies a number of chips connected together. It is used to store programs and data during the execution of program. But when the computer is turned off any information is erased from the RAM. It is electrically dependent.
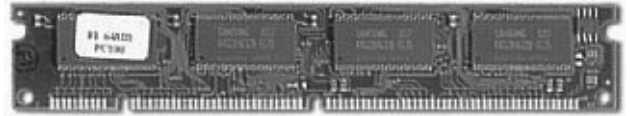
ROM (Read-only-memory)

It is the programming chip, where all of the system information is kept at the time of manufacture. We can see the information of ROM at the time of booting the computer. We can only read the information of ROM; we can't write/edit or delete the information available on it. The ROM allows you to read the content of that memory as many times as desired but does not allow modifications. The contents of this memory cannot be edited by the users. ROMs are non-volatile and non-destructive. They are permanent. When we turn on the computer, the CPU gets its first instructions from the ROM. These instructions are burnt into the chip with the help of special equipment before the chip is installed inside the computer. Users do not have access to the ROM, so they can't change these instructions. It is electrically independent. The data stored in ROM is called Firmware.

SECONDARY MEMORY (STORAGE DEVICES):

Secondary Memory i.e. Storage Devices hold files that are not currently being used.
For a file to be used it must first be copied to main memory first. After any modifications files must be saved to secondary storage. It is advisable to save your data files at the regular intervals as you work on them as data can be lost unexpectedly because of various reasons interruption in power supply, memory management problems, freezing keyboard, etc.
As secondary storage media can be damaged and files on them become corrupted, it is suggested to make back-up copies of valuable files on a regular basis.
There are mainly three types of memory devices:
A. Flexible or Floppy Disks (A: or B :)
B. Solid or Hard Disk (C: or D: or E :)
C. Optical Disk-CD, DVD (D: or E: or F: - depends upon the partition of hard disk.)

A. Flexible or Floppy Disks (A: or B :)

2
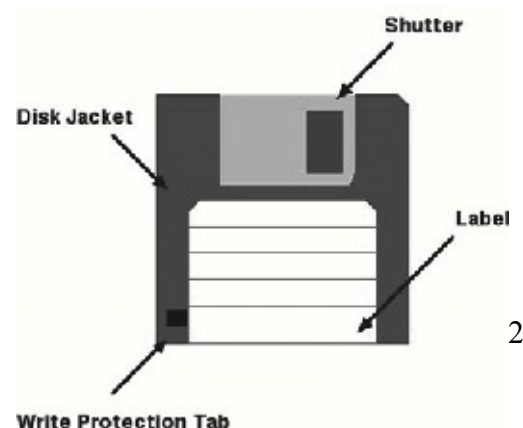
A floppy disk is small data storage device which is generally used to transfer data from the hard disk. It is also called as Removable Disk. It is a flexible or portable type. It has 1.44 MB capacity till now. Its drive also lies inside the System Board. Diskettes, often called floppy disks, are single platter plastic disks in a plastic jacket. The plastic jacket is quite hard on modern 3½" diskettes. Floppy disks are characterized by several parameters:

A) On the basis of Size:
i. 3 ½ Micro floppy disk
ii. 5 ¼ Mini floppy disk
Size

Size means the diameter of the disk. Because floppy disks were developed in the USA, the sizes are still in imperial measurements. The first floppy disks were 8". They are not in use any more.
The next size was 5¼". These disks are getting out of date and used mainly in older systems.
The standard size of floppy disks today is 3.5".

B) On the basis of Density:

i. 2DD (Double Sided Double Density)
ii. 2HD (Double Sided High Density)
Single or double-sided in addition, on 5¼" disks they have a ring around the hub and on 3½" disks the hole near the bottom right corner is filled in. Single-sided disks are not in use any more. Floppy drives have two read/write heads – one for each surface. Appeared on the market but they are not widely used**.**

Density is the number of bytes that can be stored on each track.

As diskettes were developed there have been changes in the density. Originally on
DOS computers the density was 1.25 kilobytes per inch of track. As disk drive and disk technologies were improved disks that could hold 2.5 kilobytes per inch were released and called (logically) double density disks. Later again further improvements permitted quad density, now commonly called high-density disks and drives. The original low-density disks have now disappeared, leaving only double and high-density disks. This results in some confusion for new users, as the name double density seems to imply it holds more than the other current type - high density. Double density diskettes are no longer common. They are generally labeled DD or 2D. High-density disks are usually labeled HD. 3.5" high-density disks can hold up to
1.44M of data. In the past couple of years the density was increased and disks that can hold 2.88M

C) On the basis of Capacity:
i. 360 KB (5 ¼ – 2DD)
ii. 1.2 MB (5 ¼ – 2HD)
iii. 720 KB (3 ½ – 2DD)
iv. 1.44 MB (3 ½ – 2HD)

The details about the various types of floppy disks used on DOS/Windows computers are summarized in the table below:

Size Density Tracks per Side Sectors Total KB	
5¼" Double	40, 9, 360
5¼" High	80 , 15, 1,200
3½" Double	80, 9 ,720
3½" High	80 , 18 , 1,440

The total capacity of a disk is a multiplication of surfaces by tracks by sectors. So, a 3½" high-density disk can hold 2 x 80 x 18 x 512 = 1,474,560 bytes (1,024 = 1,440K).
All disk drives have indicator lights that show when the disk is actually being used. A diskette should never be removed while this light is on. You should always glance at this light before removing a diskette.

Floppy disks, like audio and videocassettes, can be delete-protected. On diskettes it is called write protection. It protects data from deletion and alteration. If the diskette is never to be altered or contains important data this is a useful facility. If you are attempting to save onto a diskette and DOS responds with the message Write Protect Error, this indicates the diskette has been write-protected. To write protect a 3½" disk, the notch on the bottom left corner should be opened. To remove write protection you reverse these actions.

Advantages of using floppy disks:
• They allow copying files from one computer to another;
• They are quite cheap.

Disadvantages of using floppy disks:
• They have a limited capacity (graphics files often don't fit on a disk);
• They are relatively slow;
• They are less reliable than hard disks so proper care should be taken to prevent loss of Data.
It is important to take proper care of your disks to minimize the danger of losing data.

B. Hard Disk or Fixed Disk or Solid Disk (C: or D: or E :)

It is the main storage device. It consists of all of the Computer's item as well as documents created by using all software. It lies inside the System Board (CPU Box).Technically microcomputer hard disks are called or fixed disks, as they are a pack of disks permanently sealed inside a disk drive. The sealed case contains platters fixed in place, read/write heads and other part of mechanisms. It overcomes much of the danger of dust, magnetism and fingerprints interfering with the data. The read/write heads do not actually touch the surface of the disk (as in floppy disk drives) but fly over it on a cushion of air. Fixed disks have much greater capacity than floppy disks and can access data faster than any other storage devices. Today's hard disks capacities are measured in gigabytes.

The increased capacity is in part because of the metal surface, in part because they are sealed inside a case and in part because the disks are multi-layered.

To connect a hard disk to a microcomputer, a hard disk controller card must be installed on the motherboard. This card includes circuitry that serves as an interface between the motherboard and the hard disk. The circuitry must conform to standards. Two most common standards today are Small Computer System Interface (SCSI) and Integrated

Drive Electronics (IDE). The IDE standard has a size limit of 528M, which is too small for modern PCs. EIDE super ceded IDE and has increased the maximum size allowing up to 4 hard drives to be connected at once.

It is possible to have more than one hard disk inside your computer. In this case the main disk is called master, and the second is called slave.
Invention of hard disks certainly eliminated the difficulties faced by microcomputer users of a few years ago of having to locate and insert a number of different floppy disks whenever they wished to use their computer.
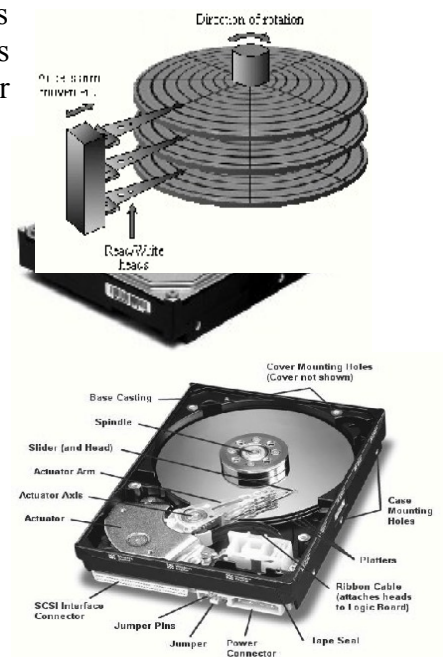
The disadvantage of storing everything on a hard disk is that data, if not programs, is often required to be transferable between computers. In consequence, floppy disks retain value as a means of moving data. But on the other hand modern files are often bigger than a floppy disk can hold. So new technologies like zip drive and jazz drive appeared on the market.

Optical Disks (D: or E: or F :)

Optical disks are produced using laser technology, and as a result offer much higher density and reliability than magnetic disks. Disks are made of plastic or metal with highly reflective coating, usually aluminum. Like magnetic disks, they allow direct access to data.

There are mainly three types of optical disks available in the market.
• CD-ROM (Compact Disk - Read Only Memory)
• CD-RW (Re-writeable memory)
• DVD (Digital Video/Versatile Disk)

CD-ROM (Compact Disk Read-Only Memory) is the most popular and the least expensive type of optical disks. As the name indicates they come prerecorded with data, which cannot be altered. It is an offshoot of the CD audio disk. The advantage of CD-ROM over other optical disks is that the introduced standard ensures that any CD-ROM drive will read any CD-ROM disk.

They can store up to 750M and are used for distribution of massive quantities of data (e.g., encyclopedias, document archiving, manuals, statistics, and software packages) at relatively low cost. Today when you buy a software package, you have a choice between one CD-ROM and a bundle of floppy disks.

A CD-ROM has one track that spirals from the center to the outside edge. The track is divided into sectors of equal length and density. Files are stored on contiguous sectors. Fragmentation of files cannot happen because data can be written only once.

A CD-ROM drive reads disks differently from a music disk, in that it spins at a constant linear velocity (CLV), instead of a constant angular velocity (CAV). This means that there is not a constant data transfer rate across the CD (more data per rotation can be stored in the outer regions). By utilizing CAV techniques, the data transfer rate can be significantly increased for the majority of your data. Another way of doing that is by increasing the rotation speed of the drive itself. Each multiplier of the standard 150 KB/sec. makes the data transfer rate faster, so a 2X drive reads 300 KB/sec., a 4x 600 KB/sec and so forth.

However, top reading speed can only be achieved at the outer regions of the CD. Therefore the transfer rate may start at 3600 KB/sec (24X) at the inner regions and increase to 7200 KB/sec (48X) at the end of the disc, giving an overall performance of about 36X.

Re-writable optical disks (CD RW) typically are used for data backup and archiving very big amounts of data, such as image databases.

Digital Versatile Disks (DVD): Like CD ROM drives, DVD drives are optical storage devices that use lasers to write to and read from their media, and essentially DVDs use the same principles as CDs. When writing to a DVD, a laser creates pits on its surface to represent data. Areas not burned into pits by the laser are called lands. The laser reads back the data on the optical disk by scanning for pits and lands. There are, however a number of differences that make the DVD superior to the CD.

Caring for CDs:

Although CDs are sturdy, they can become scratched and unreadable. A scratch on the label side on the disk can be more damaging than on the data side because the protective coating on the label side is

thinner than that on the data side. A scratch on a data side can often be compensated by an error correction whereas a scratch on the label side can damage pits and lands into unrecoverable errors. So protect your disks from scratches, strong sunlight, heat, humidity, and extreme. Store your disks in the cases in which you purchase them. To avoid fingerprints, always handle your disks by the outside edges

Other secondary storage devices:

ZIP Drive:

     A small portable disk drive supplied by Iomega Corporation. Disks come in two sizes, 100 Mb and 250 Mb. A
Zip drive is needed to read and write 3.5 inch Zip disks; t is available in either a parallel or SCSI version. When using a parallel Zip drive a printer can be chained off the drive so both can use the same parallel port. A disk drive from Iomega Corporation which takes removable 100 megabyte hard disks. Both internal and external drives are manufactured, making the drive suitable for backup, mass storage or for moving files between computers. Software is included to help with file organization. The internal SCSI model offers up to 60 MB / minute transfer rate.

     The Zip drive was awarded Byte's Readers' Hardware Choice Award 1996. The company has started to manufacture a larger Jazz drive, which one gigabyte
disks

Jazz Drive:

     A high-capacity removable hard disk system from Iomega. The Jazz has been very popular. In 1997, 2 GB drives were introduced, which support 1 GB and 2 GB disks.

Pen Drives (Memory Stick/Flash Drive):

     When using PC's and very often while building or upgrading PC's, you'll need to transfer some data between machines. No problems, just throw in a floppy disk, copy all your data onto it and copy it off again at the other PC. Easy

     But is it ever that simple? With the increasing complexity and size of today's applications and file sizes, our old friend the floppy disk just doesn't seem to have the capacity to keep up. At 1.44MB, you're usually going to need to compress your files, and even then you'll need to make sure that the compressed file is lacteally fit. Less than 1.44MB so it wills "No problem!" you say, "I'll get myself a Zip Drive." Fine With up to 250MB capacity you can store everything you want and more on it. But already those nasty problems have started to creep in. The most significant of those being "Does the other PC has a Zip drive?" To solve these problems, Pen Drive is in your hand. Using this device you can easily transfer the files more than 1 GB easily.

Pen Drive is a small key ring-sized device that can be used to easily transfer files between USB-compatible systems. Available in a range of capacities (and in some cases, with an MP3 player built-in) this handy little gizmo can save all those data-transfer hassles. It looks like a pen and contains memory more than 100 Mega Bytes. 32MB, 64MB, 256MB, 512MB, 1GB, 2GB, 4GB are the available Pen Drive Size in the Market.

STARTING SYSTEM OF COMPUTER

We know that a computer is simply a machine which works under the control of a set of instructions called program. For a computer to be ready to work, all its peripherals should be checked and activated, and the relationship between hardware and software needs to be established. For this purpose, a special type of software is used, which is called as an Operating System.

Starting process of Computer varies from one operating system to another. There are different processes to enter into the programs. It depends upon the operating system installed into the computer. So, you have to know about operating system of computer before running the programs.

There are mainly two types of operating system used in the computer:
1. Ms. DOS (Microsoft Disk Operating System)
2. Ms. Windows (Microsoft Windows 3.11, '95, '98, 'Me, '00, 'XP.)

However, the inner process of starting your Computer is same, which is called Booting.

Booting:

 The process of loading the system files of the operating system from the disk into the computer memory to complete the circuitry requirement of the computer system is called booting. The system files of MS. DOS are:

• IO.SYS: It checks all the input and output devices and their activities and makes them ready.

• MS. DOS.SYS: It builds the relation between the hardware and the application software-acting as interface.

• COMMAND.COM: It helps to make the instructions given to the computer using the different programs executable.

IO.SYS AND MSDOS.SYS are hidden files but COMMAND.COM is visible.

Types of Booting:

There are two types of booting:

• Cold Booting: If the computer is in off state and we boot the computer by
Pressing the power switch 'ON' from the CPU box then it is called as cold booting.

• Warm Booting: If the computer is already 'ON' and we restart it by pressing the
'RESET' button from the CPU box or CTRL, ALT and DEL key simultaneously from the keyboard then it is called warm booting.