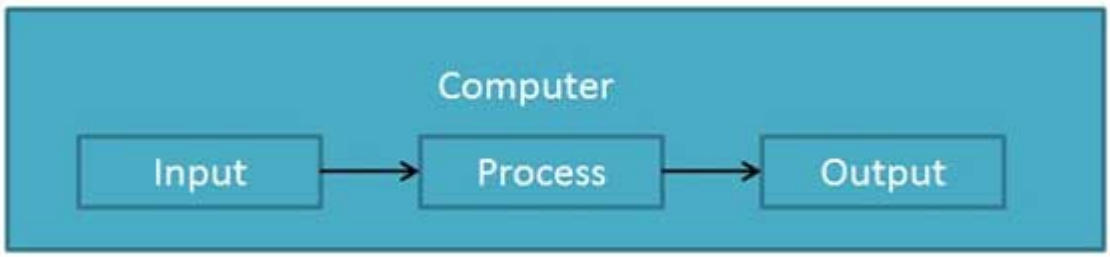
COMPUTER

Functionalities of a computer

Any digital computer carries out five functions in gross terms:

- Takes data as input.
- Stores the data/instructions in its memory and can use them when required.
- Processes the data and converts it into useful information.
- Outputs the information.
- Controls all the above four steps.



Definition

Computer System is an electronic data processing device, which does the following:

- Accept and store an input data.
- Process the data input.
- And output the processed data in required format.

Advantages

Following list demonstrates the advantages of Computers in today's arena.

HIGH SPEED

- Computer is a very fast device.
- It is capable of performing addition of very big data.
- The computer has units of speed in microsecond, nanosecond and even the picosecond.
- It can perform millions of calculations in a few seconds as compared to man, who can spend many months for doing the same task.

ACCURACY

- In addition to being very fast, computers are very accurate.
- The computer has performed calculations 100% error-free.
- Computers perform all jobs with 100% accuracy.

STORAGE CAPABILITY

- Memory is a very important characteristic of computers.

- The computer has much more storage capacity than human beings.
- It can store large amount of data.
- It can store any type of data such as images, videos, text, audio and any other type.

DILIGENCE

- Unlike human beings, a computer is free from monotony, tiredness and lack of concentration.
- It can work continuously without creating any error and boredom.
- It can do repeated work with same speed and accuracy.

VERSATILITY

- A computer is a very versatile machine.
- A computer is very flexible in performing the jobs to be done.
- This machine can be used to solve the problems relating to various different fields.
- At one instant, it may be solving a complex scientific problem and the very next moment it may be playing a card game.

RELIABILITY

- A computer is a reliable machine.
- Modern electronic components have failure-free long lives.
- Computers are designed to make maintenance easy.

AUTOMATION

- Computer is an automatic machine.
- Automation means ability to perform the task automatically.
- Once a program is given to computer, i.e, stored in computer memory, the program and instructions can control the program execution without human interaction.

REDUCTION IN PAPER WORK

- The use of computers for data processing in an organization leads to reduction in paper work and speeds up the process.
- As data in electronic files can be retrieved as and when required, the problem of maintenance of large number of files gets reduced.

REDUCTION IN COST

- Though the initial investment for installing a computer is high but it substantially reduces the cost of each of its transaction.

Disadvantages

Following list demonstrates the disadvantages of Computers in today's arena.

NO IQ

- A computer is a machine and has no intelligence of its own to perform any task.
- Each and every instruction has to be given to the computer.
- A computer can not take any decision on its own.

DEPENDENCY

- It can perform function as instructed by user, so it is fully dependent on human being

ENVIRONMENT

- The operating environment of computer should be dust-free and suitable to it.

NO FEELING

- Computer has no feeling or emotions
- It cannot make judgement based on feeling taste, experience and knowledge unlike a human being

Applications of Computer

Business

The computer's characteristic as high speed of calculation, diligence, accuracy, reliability, or versatility has made it an integrated part in all business organisations

Computer is used in business organisation for:

- Payroll Calculations
- Budgeting
- Sales Analysis
- Financial forecasting
- Managing employees database
- Maintenance of stocks, etc.

Banking

Today Banking is almost totally dependent on computer.

Banks provide following facilities

- Banks on-line accounting facility, which includes current balances, deposits, overdrafts, interest charges, shares and trustee records
- ATM machines are making it even easier for customers to deal with banks

Insurance

Insurance companies are keeping all records up-to-date with the help of computers The Insurance Companies, Finance houses and Stock broking firms are widely using computers for their concerns

Insurance Companies are maintaining a database of all clients with information showing

- how to continue with policies
- starting date of the policies
- next due instalment of a policy
- maturity date
- interests due
- survival benefits
- bonus

Education

The computer has provided a lot of facilities in the Education System.

- The uses of computer provide a tool in the Education system known as CBE (Computer Based Education).
- CBE involves Control, Delivery and Evaluation of learning.
- The computer education is very familiar and rapidly increasing the graph of computer students.
- There are number of methods in which educational institutions can use computer to educate the students.
- It is used for prepare a database about student performance and analyses are carried out.

Marketing

In Marketing uses of computer are following

- **Advertising** With computers, advertising professionals create art and graphics, write and revise copy, and print and disseminate ads with the goal of selling more products.
- **At Home Shopping** Home shopping has been made possible through use of computerised catalogues that provide access to product information and permit direct entry of orders to be filled by the customers.

Health Care

Computers have become important part in all Medical Systems.

The computers are being used in hospitals to keep the record of patients and medicines. It is also used in scanning and diagnosing different diseases. ECG, EEG, Ultrasounds and CT Scans, etc, are also done by computerised machines.

Some of major fields of health care in which computers are used:

- **Diagnostic System** Computers are used to collect data and identify cause of illness.
- **Lab diagnostic System** All tests can be done and reports are prepared by computer.
- **Patient Monitoring System** These are used to check patient's signs for abnormality such as in Cardiac Arrest, ECG, etc.
- **Pharmal information System** Computer checks Drug Labels, Expiry dates, harmful drug side effects, etc.
- Nowadays, computers are also used in performing surgery.

Engineering Design

Computers are widely used in Engineering purposes.

One of major area is CAD (Computer aided design). CAD provides creation, edition, and modification of image. Some fields are:

- **Structural Engineering** Requires stress and strain analysis required for design of Ships, Buildings, Budgets, Airplanes, etc.
- **Industrial Engineering** Computers deal with design, implementation and improvement of Integrated systems of people, materials and equipments.
- **Architectural Engineering** Computers help in planning towns, designing buildings, determining arrange of buildings on a site using both 2D and 3D drawings.

Military

Computers are largely used in defence. Modern tanks, missiles, weapons, etc, employ computerised control systems. Some military areas where a computer has been used are:

- Missile Control

- Military Communication
- Military operation and planning
- Smart Weapons

Communication

Communication means to convey a message, an idea, a picture or speech that is received and understood clearly and correctly by the person for whom it is meant. Some main areas in this category are:

- E-mail
- Chatting
- Usenet
- FTP
- Telnet
- Video conferencing

Government Applications

Computers play an important role in government applications. Some major fields in this category are:

- Budgets
- Sales tax department
- Income tax department
- Male/Female ratio
- Computerization of voters lists
- Computerization of Driving Licensing system
- Computerization of PAN card
- Weather Forecasting

Computer Generations

Generation in computer terminology is a change in technology a computer is/was being used. Initially, the generation term was used to distinguish between varying hardware technologies. But nowadays, generation includes both hardware and software, which together make up an entire computer system.

There are totally five computer generations known till date. Each generation has been discussed in detail along with their time period, characteristics. We've used approximate dates against each generations which are normally accepted.

Following are the main five *generations* of computers

First Generation

The period of first generation was 1946-1959.

First generation of computers started with using vacuum tubes as the basic components for memory and circuitry for CPU (Central Processing Unit). These tubes like electric bulbs produced a lot of heat and were prone to frequent fusing of the installations, therefore, were very expensive and could be afforded only by very large organisations.

The main features of First Generation are:

- Vacuum tube technology
- Unreliable
- Supported Machine language only
- Very costly
- Generate lot of heat
- Slow Input/Output device
- Huge size
- Need of A.C.
- Non-portable
- Consumed lot of electricity

Second Generation

The period of second generation was 1959-1965.

This generation using the transistor were cheaper, consumed less power, more compact in size, more reliable and faster than the first generation machines made of vacuum tubes. In this generation, magnetic cores were used as primary memory and magnetic tape and magnetic disks as secondary storage devices.

The main features of Second Generation are

- Use of transistors
- Reliable as compared to First generation computers
- Smaller size as compared to First generation computers
- Generate less heat as compared to First generation computers
- Consumed less electricity as compared to First generation computers
- Faster than first generation computers
- Still very costly
- A.C. needed
- Support machine and assembly languages

Third Generation

The period of third generation was 1965-1971.

The third generation of computer is marked by the use of Integrated Circuits (I C's) in place of transistors. A single I C has many transistors, resistors and capacitors along with the associated circuitry. The I C was invented by Jack Kilby. This development made computers smaller in size, reliable and efficient.

In this generation, Remote processing, Time-sharing, Real-time, Multi-programming Operating System were used.

The main features of Third Generation are

- I C used
- More reliable

- Smaller size
- Generate less heat
- Faster
- Lesser maintenance
- Still costly
- A.C. needed
- Consumed lesser electricity
- Support high-level language

Fourth Generation

The period of Fourth Generation was 1971-1980.

The fourth generation of computers is marked by the use of Very Large-Scale Integrated (VLSI) circuits VLSI circuits having about 5000 transistors and other circuit elements and their associated circuits on a single chip made it possible to have microcomputers of fourth generation. Fourth Generation computers became more powerful, compact, reliable, and affordable. As a result, it gave rise to personal computer (PC) revolution.

The main features of Fourth Generation are

- VLSI technology used
- Very cheap
- Portable and reliable
- Use of PC's
- Very small size
- Pipeline processing
- No A.C. needed
- Concept of internet was introduced
- Great developments in the fields of networks
- Computers became easily available

Fifth Generation

The period of Fifth Generation is 1980-till date

In the fifth generation, the VLSI technology became ULSI (Ultra Large-Scale Integration) technology, resulting in the production of microprocessor chips having ten million electronic components

AI includes

- Robotics
- Neural networks
- Game Playing
- Development of expert systems to make decisions in real life situations

- Natural language understanding and generation.

The main features of Fifth Generation are

- ULSI technology
- Development of true artificial intelligence
- Development of Natural language processing
- Advancement in Parallel Processing
- Advancement in Superconductor technology
- More user friendly interfaces with multimedia features
- Availability of very powerful and compact computers at cheaper rates

CLASSIFICATION OF COMPUTERS

Computer can be classified into three aspects

Representation of numbers

Degree of specialization

Types of application

Representation of Numbers

There are three basic aspects of Computers, which are digital, analog and hybrid.

Digital Computer. This aspect of computer operates on numbers directly. It handles numbers

discretely and precisely rather than approximately.

Examples of digital computers are digital watch, digital phone and digital radio

Analog Computer. This aspect of computer deals with quantities that are continuously variable eg speedometer, electric meter, water meter, thermometer.

Hybrid Computer. This computer combines the features of both analog and digital computers They handle data in both quantities and variable

Degree of Specialization

There are two basic types – special and general-purpose computer.

Special Purpose Computer: This aspect of computer is designed to perform one or specific task. The program of this aspect of computer is in-built into the machine permanently. For instance, special purpose computers are used for solving navigation problems in aircraft and ships

General Purpose Computer: These computers have the ability to handle a wide variety of different programs and to solve many different problems

Types of Application

There are two types – Scientific and Business Applications

Scientific Applications: These computers are designed to handle scientific application more effectively.

They require small volume of data input and output.

Business Data-Processing Application: These computers are designed to handle business data processing applications. They need a large data file, input storage, output storage devices and large storage capabilities

Types of Computers

They are many types of computers and they include

Mainframe computers

Mini - Computers, now often called "Mid-Range" Computers

Micro- Computers, now commonly called Personal Computers (PC)

Super computers

Mainframe Computer system is one that has at its heart a very powerful central computer linked by cable or telecommunications to hundreds or thousands of terminals and capable of accepting simultaneous input from all of them. A mainframes has many times more processing power than a PC and offers very extensive data storage facilities. Mainframe Computers are used by organizations such as banks that have very large volumes of processing to perform and have special security needs

Many organizations have now replaced their old mainframe with network "client server" systems of Mini Computers and PCs because this approach - called downsizing is thought to be cheaper and offer greater reliability, functionality and data security than networked systems

Minicomputer is a computer whose size, speed and capabilities lie between those of a mainframe and a PC. The advent of more powerful chips now means that some 'Super Minis' and even PCs linked in a network can run more powerfully than small mainframe. The advent of PCs and with mainframes now being physically smaller than in the past, the definition of a Mini-Computer has become rather vague. There is really no definition, which distinguishes adequately between a PC and a mini computers include I B M with its AS400, I C L and D E C.

Micro Computer market was first developed by companies like APPLE COMPUTERS, but a key event was the launch of the I B M PC in August 1981. In the early year of the development of the PC, the Apple Macintosh (technically not a PC) became the standard for graphics - based applications and the I B M PC and a host of I B M-Compatibles, were chosen for text-based

(business) applications. However, as chips have become more powerful, the difference in emphasis has become less important. Apple have recently introduced the power PC, which is IBM-Compatible. PCs are now the norm for small to medium-sized business computers. Today microcomputers are Personal Computer system or stand-alone computer. They are being distinguished from other computer systems because of possessing a single microprocessor. Other business computers are

File server

Portables

Workstations

FILE SERVER is more powerful than the average desktop PC and it is dedicated to providing additional services for users of network PCs. A very large network is likely to use a 'Mainframe' computer as its server and indeed mainframes are beginning to be referred to as 'enterprise server'.

PORTABLES: The original portable computers were heavy, weighing around five kilograms and could only be run from the main electricity supply. Subsequent developments allow the true portability.

a) Laptop is powered either from the electricity supply or using a rechargeable battery. It uses 3½ disks and CD-ROMs, a liquid crystal or gas plasma screen and is fully compatible with desktop PCs.

b) The Notebook is about the size of an A4 pad of paper. Some portables are now marketed as 'sub notebooks'.

c) The Palm Or Handheld Computer, may or may not be compatible with the PCs. They range from machines which are little more relatively powerful processors with DOS compatibility and communications features.

WORKSTATION was originally a computer used by one person, particularly for graphics and design applications and was used primarily in engineering. It had a fast and powerful central processor, a high-resolution monitor and large memory. This enabled complex designs to be easily manipulated. These characteristics however are no longer unique to Workstations. High performance personal computer can offer very similar services, so the distinction is a historical one. Personal computers are generally fitted with some kind of graphics expansion card - a circuit board containing the necessary electronics.

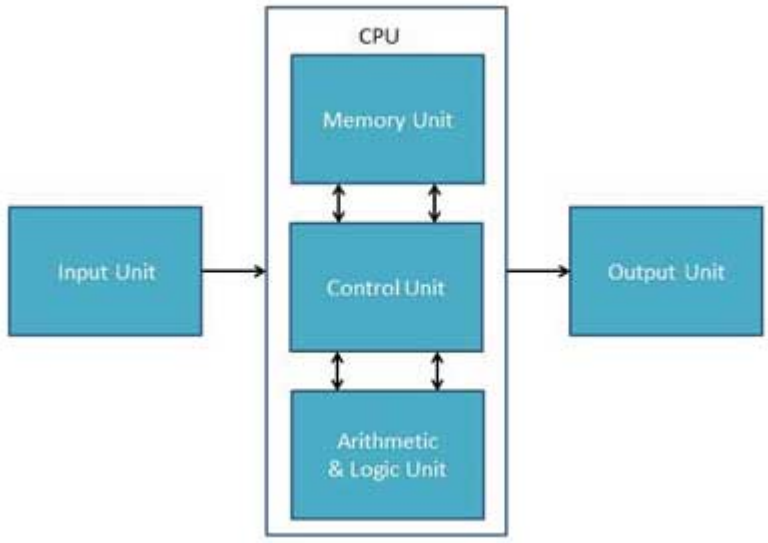
Super Computer is used to process very large amount of data quickly. They are particularly useful for occasions where high volumes of calculations need to be performed. For example in meteorological or astronomical applications,

Computer – Components

All types of computers follow a same basic logical structure and perform the following five basic operations for converting raw input data into information useful to their users.

Sr. No.	Operation	Description
1	Take Input	The process of entering data and instructions into the computer system.
2	Store Data	Saving data and instructions so that they are available for processing as and when required.

3	Processing Data	Performing arithmetic, logical operations on data in order to convert them into useful information.
4	Output Information	The process of producing useful information or results for the user, such as a printed report or visual display.
5	Control the workflow	Direct the manner and sequence in which all of the above operations are performed.



Input Unit

This unit contains devices with the help of which we enter data into computer. This unit makes link between user and computer.

The input devices translate the human being information into the form understandable by computer.

Output Unit

Output unit consists of devices with the help of which we get the information from computer. This unit is a link between computer and users

Output devices translate the computer's output into the form understandable by users

CPU (Central Processing Unit)

CPU is considered as the brain of the computer. CPU performs all types of data processing operations It stores data, intermediate results and instructions (program). It controls the operations of all parts of computer.

CPU itself has the following three components

- ALU (Arithmetic Logic Unit)
- Memory Unit
- Control Unit

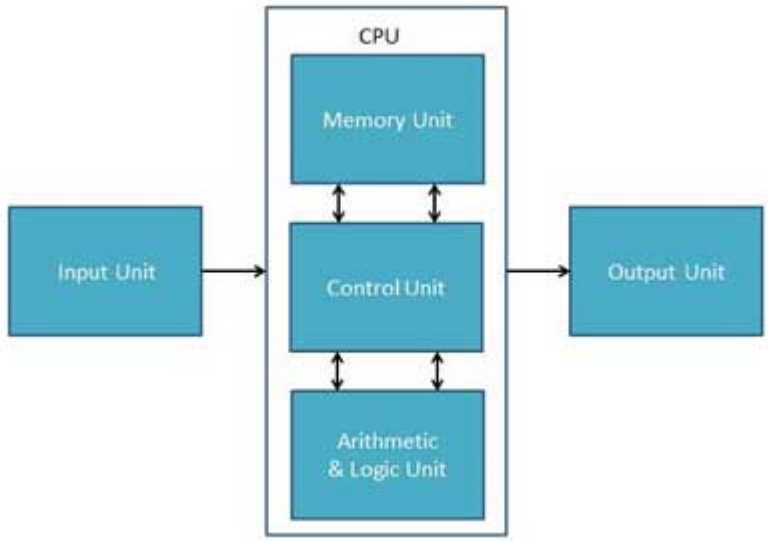
Also

- CPU is considered as the brain of the computer.
- CPU performs all types of data processing operations

- It stores data, intermediate result and instructions (program).
- It controls the operations of all parts of computer.

CPU itself has the following three components

- Memory or Storage Unit:
- Control Unit
- ALU (Arithmetic Logic Unit)



Memory Or Storage Unit:

This unit can store instructions, data and intermediate results. This unit supplies information to the other units of the computer when needed. It is also known as internal storage unit or main memory or primary storage or Random access memory (RAM).

Its size affects speed, power and capability. There are primary memory and secondary memory, two types of memories in the computer. Functions of Memory Unit are

- It stores all the data to be processed and the instructions required for processing
- It stores intermediate results of processing
- It stores final results of processing before these results are released to an output device.
- All inputs and outputs are transmitted through main memory.

Control Unit

This unit controls the operations of all parts of computer. It does not carry out any actual data processing operations.

Functions of this unit are

- It is responsible for controlling the transfer of data and instructions among other units of a computer.
- It manages and coordinates all the units of the computer.

- It obtains the instructions from the memory, interprets them and directs the operation of the computer.
- It communicates with Input/Output devices for transfer of data or results from storage.
- It does not process or store data.

ALU (Arithmetic Logic Unit)

This unit consists of two subsections namely.

- Arithmetic Section
- Logic Section

ARITHMETIC SECTION

Function of Arithmetic section is to perform arithmetic operations like addition, subtraction, multiplication and division. All complex operations are done by making repetitive use of above operations

LOGIC SECTION

Function of logic section is to perform logic operations such as comparing, selecting, matching and merging of data.

Computer – Memory

A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in computer where data is to be processed and instructions required for processing are stored.

The memory is divided into large number of small parts. Each part is called cell. Each location or cell has a unique address, which varies from zero to memory size minus one.

For example, if computer has 64k words, then this memory unit has 64 * 1024 = 65536 memory location. The address of these locations varies from 0 to 65535.

Memory is primarily of three types

- Primary Memory/Main Memory
- Secondary Memory

Primary Memory (Main Memory)

Primary memory holds only those data and instructions on which computer is currently working. It has limited capacity and data gets lost when power is switched off.

It is generally made up of semiconductor device. These memories are not as fast as registers. The data and instructions required to be processed earlier reside in main memory. It is divided into two subcategories RAM and ROM.

Characteristic of Main Memory

- These are semiconductor memories.
- It is known as main memory.
- Usually volatile memory.
- Data is lost in case power is switched off.
- It is working memory of the computer.

- Faster than secondary memories
- A computer cannot run without primary memory.

Secondary Memory

This type of memory is also known as external memory or non-volatile. It is slower than main memory. These are used for storing Data/Information permanently.

CPU directly does not access these memories, instead they are accessed via input-output routines. Contents of secondary memories are first transferred to main memory and then CPU can access it. For example, disk, CD-ROM, DVD, etc.

Characteristics of Secondary Memory

- These are magnetic and optical memories
- It is known as backup memory.
- It is non-volatile memory.
- Data is permanently stored even if power is switched off.
- It is used for storage of the data in the computer.
- Computer may run without secondary memory.
- Slower than primary memories

Computer – RAM

A RAM constitutes the internal memory of the CPU for storing data, program and program result. It is read/write memory. It is called random access memory (RAM).

Since access time in RAM is independent of the address to the word that is, each storage location inside the memory is as easy to reach as other location & takes the same amount of time. We can reach into the memory at random & extremely fast but can also be quite expensive.

RAM is volatile, i.e, data stored in it is lost when we switch off the computer or if there is a power failure. Hence, a backup uninterruptible power system (UPS) is often used with computers. RAM is small, both in terms of its physical size and in the amount of data it can hold.

RAM is of two types

- Static RAM (SRAM)
- Dynamic RAM (DRAM)

Static RAM (SRAM)

The word **static** indicates that the memory retains its contents as long as power remains applied. However, data is lost when the power gets down due to volatile nature. SRAM chips use a matrix of 6-transistors and no capacitors. Transistors do not require power to prevent leakage, so SRAM need not have to be refreshed on a regular basis.

Because of the extra space in the matrix, SRAM uses more chips than DRAM for the same amount of storage space, thus making the manufacturing costs higher.

Static RAM is used as cache memory needs to be very fast and small.

Characteristics of the Static RAM:

- It has long data lifetime

- There is no need to refresh
- Faster
- Used as cache memory
- Large size
- Expensive
- High power consumption

Dynamic RAM (DRAM)

DRAM, unlike SRAM, must be continually **refreshed** in order for it to maintain the data. This is done by placing the memory on a refresh circuit that rewrites the data several hundred times per second. DRAM is used for most system memory because it is cheap and small. All DRAMs are made up of memory cells. These cells are composed of one capacitor and one transistor.

Characteristics of the Dynamic RAM:

- It has short data lifetime
- Need to refresh continuously
- Slower as compared to SRAM
- Used as RAM
- Lesser in size
- Less expensive
- Less power consumption

Computer – ROM

ROM stands for Read Only Memory. The memory from which we can only read but cannot write on it. This type of memory is non-volatile. The information is stored permanently in such memories during manufacture.

A ROM stores such instructions as are required to start computer when electricity is first turned on, this operation is referred to as bootstrap. ROM chip are not only used in the computer but also in other electronic items like washing machine and microwave oven.

Following are the various types of ROM:

MROM (Masked ROM)

The very first ROMs were hard-wired devices that contained a pre-programmed set of data or instructions. These kinds of ROMs are known as masked ROMs. It is inexpensive ROM.

PROM (Programmable Read only Memory)

PROM is read-only memory that can be modified only once by a user. The user buys a blank PROM and enters the desired contents using a PROM programmer. Inside the PROM chip, there are small fuses, which are burnt open during programming. It can be programmed only once and is not erasable.

EPROM (Erasable and Programmable Read Only Memory)

The EPROM can be erased by exposing it to ultra-violet light for a duration of up to 40 minutes. Usually, an EPROM eraser achieves this function. During programming an electrical charge is trapped in an insulated gate region. The charge is retained for more than ten years because the charge has no leakage path. For erasing this charge, ultra-violet light is passed through a quartz crystal window (lid). This exposure to ultra-violet light dissipates the charge. During normal use the quartz lid is sealed with a sticker.

EEPROM (Electrically Erasable and Programmable Read Only Memory)

The EEPROM is programmed and erased electrically. It can be erased and reprogrammed about ten thousand times. Both erasing and programming take about 4 to 10 ms (milli second). In EEPROM, any location can be selectively erased and programmed. EEPROMs can be erased one byte at a time, rather than erasing the entire chip. Hence, the process of re-programming is flexible but slow.

Advantages of ROM

- Non-volatile in nature
- These can not be accidentally changed
- Cheaper than RAMs
- Easy to test
- More Reliable than RAMs
- These are static and do not require refreshing
- Its contents are always known and can be verified

Hardware

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

Examples of Hardware are following

- **Input devices** -- keyboard, mouse, etc.
- **Output devices** -- printer, monitor, etc.
- **Secondary storage devices** -- Hard disk, CD, DVD, etc.
- **Internal components** -- CPU, motherboard, RAM, etc.

Relationship between Hardware and Software

- Mutually dependent. Both of them must work together to make computer produce a useful output.
- Software cannot be utilized without supporting hardware.
- Hardware without set of programs to operate upon cannot be utilized and is useless.
- To get a particular job done on the computer, relevant software should be loaded into the hardware.
- Hardware is a one time expense.

- Software development is very expensive and is a continuing expense.
- Different softwares can be loaded on a hardware to run different jobs.
- A software acts as an interface between the user and the hardware.
- If hardware is the 'heart' of a computer system, then software is its 'soul'. Both are complimentary to each other.

Software

Software is a set of programs, which are designed to perform a well-defined function. A program is a sequence of instructions written to solve a particular problem.

There are two types of softwares

- System Software
- Application Software

System Software

The system software is a collection of programs designed to operate, control and extend the processing capabilities of the computer itself. System software are generally prepared by computer manufacturers.

These softwares comprise of programs written in low level languages which interact with the hardware at a very basic level. System software serves as the interface between hardware and the end users.

The different types of system software are

a) Operating system software

An operating system is a program that acts as an interface between the user and the computer hardware.

b) Utility programs

Utility software is a type of system software designed to help analyse, configure, optimize and maintain the computer. A single piece of utility software is usually called a utility or tool.

Examples of utility software include:

Virus scanner - to protect your system from trojans and viruses

Disk defragmenter - to speed up your hard disk

System monitor - to look at your current system resources

File managers - to add, delete, rename and move files and folders

c) Library programs

Library programs are collections of resources used to develop software. These include pre-written code and subroutines.

d) Translator software

The final type of system software that you need to know is translator software. This is software that allows new programs to be written and run on computers, by converting source code into machine code. There are three types that we'll cover in a lot more detail shortly.

- ✓ Assembler - converts assembly code into machine code
- ✓ Interpreter - converts 3rd generation languages such as javascript into machine code one line at a time
- ✓ Compiler - converts 3rd generation languages such as C++ into machine code all at once

Application Software

Application softwares are the softwares that are designed to satisfy a particular need of a particular environment. All softwares prepared by us in the computer lab can come under the category of Application Software.

Application software may consist of a single program, such as a Microsoft's notepad for writing and editing simple text. It may also consist of a collection of programs, often called a software package, which work together to accomplish a task, such as a spreadsheet package.

Types of applications software

Applications come in several different types:

- **Utility programs** - examples include *virus scanners*, *disk defragmenters* and *backup* utilities.
- **Generic** - general purpose software that is not written for any particular type of business. Examples of this include word processors and spreadsheets.
- **Integrated** - a collection of software that has a common set of commands/icons. Usually they include word processors, spreadsheets and graphics software, but they can contain databases as well. They tend to be cheaper than purchasing each application separately.
- **Specific** - software written for a defined purpose. Accountancy software is a good example of this that can be bought by anyone.

Bespoke (also known as **Customs software**) - bespoke software is written when a company requires a piece of software to perform a very specific task or function and there's no existing software that does what they need. It can be very expensive.

OPERATING SYSTEM

- An operating system is a program that acts as an interface between the software and the computer hardware.
- It is an integration set of specialised programs that are used to manage overall resources and operations of the computer.
- It is a specialised software that controls and monitors the execution of all other programs that reside in the computer, including application programs and other system software.

Functions of Operating System

- **Memory Management** -- It keeps track of primary memory, i.e, what parts of it are in use by whom, what parts are not in use, etc. Allocates the memory when the processor program requests it.
- **Processor Management** -- Allocates the processor (CPU) to a process. Deallocate processor when processor is no longer required.
- **Device Management** -- Keeps tracks of all devices. This is also called I/O controller. Decides which process gets the device when and for how much time.
- **File Management** -- Allocates the resources. Deallocates the resource. Decides who gets the resources.
- **Security** -- By means of passwords & similar other techniques, preventing unauthorized access to programs & data.
- **Job accounting** -- Keeping track of time & resources used by various jobs and/or users.
- **Control over system performance** -- Recording delays between requests for a service & from the system.
- **Interaction with the operators** -- The interaction may take place via the console of the computer in the form of instructions. Operating System acknowledges the same, do the corresponding action and inform the operation by a display screen.
- **Error-detecting aids** -- Production of dumps, traces, error messages and other debugging and error-detecting methods.
- **Coordination between other software and users** -- Coordination and assignment of compilers, interpreters, assemblers and other software to the various users of the computer systems.

Computer Networks

A computer network is a system in which multiple computers are connected to each other to share information and resources.

Characteristics

- Share Resources from one computer to another
- Create files and store them in one computer, access those files from the other computer(s) connected over the network
- Connect a printer, scanner or a fax machine to one computer within the network and let other computers of the network use the machines available over network.

Following is the list of hardwares required to set up a computer network:

- Network Cables
- Distributors
- Router
- Internal Network Cards
- External Network Cards

Network Cables

- Network cables are used to connect computers. The most commonly used cable are Category 5 cable RJ-45.

Distributors

- Each and every computer can be connected to another one via a serial port, but if we need to connect many computers to produce a network, this serial connection will not work. The solution is to use a central body to which other computers, printers, scanners, etc., can be connected and then this body will manage or distribute network traffic.

Router

- A router is a type of device, which acts as the central point among computers and other devices that are part of a network.
- A router is equipped with holes called ports
- Computers and other devices are connected to a router using network cables
- Nowadays, router comes in wireless modes using which computers can be connected without any physical cable

Network Card

- Network card is a necessary component of a computer without which a computer cannot be connected over a network.
- Also known as network adapter or Network Interface Card (NIC).
- Most of branded computers have network card pre-installed.
- Network cards are of two types Internal and External Network Cards

Internal Network Cards

- Motherboard has a slot for internal network card where it is to be inserted.
- Internal network cards are of two types
- First type uses Peripheral Component Interconnect (PCI) connection.
- Second type uses Industry Standard Architecture (ISA).
- Network cables are required to provide network access

External Network Cards

- Comes in two flavors Wireless and USB based.
- Wireless network card needs to be inserted into the motherboard but no network cable is required to connect to network.

- USB cards are easy to use and connect via USB port.
- Computer automatically detects USB card and can install the drivers required to support the USB network card automatically.

INTERNET & INTRANET

Internet

- Internet is a world-wide/global system of interconnected computer networks.
- Internet uses the standard Internet Protocol (TCP/IP).
- Every computer in internet is identified by a unique IP address.
- IP Address is a unique set of numbers (such as 110.22.33.114) which identifies a computer location.
- A special computer DNS (Domain Name Server) is used to give name to the IP Address so that user can locate a computer by a name.
- For example, a DNS server will resolve a name **http://www.tutorialspoint.com** to a particular IP address to uniquely identify the computer on which this website is hosted.
- Internet is accessible to every user all over the world.

Intranet

- Intranet is system in which multiple PCs are networked to be connected to each other.
- PCs in intranet are not available to the world outside of the intranet.
- Usually each company or organization has their own Intranet network and members/employees of that company can access the computers in their intranet.
- Each computer in Intranet is also identified by a IP Address, which is unique among the computers in that Intranet.

Similarities in Internet & Intranet

- Intranet uses the internet protocols such as TCP/IP and FTP.
- Intranet sites are accessible via web browser in similar way as websites in internet. But only members of Intranet network can access intranet hosted sites.
- In Intranet, own instant messengers can be used as similar to yahoo messenger/gtalk over the internet.

Differences in Internet & Intranet

- Internet is general to PCs all over the world where Intranet is specific to few PCs
- Internet is wider access and provides a better access to websites to large population whereas Intranet is restricted.
- Internet is not as safe as Intranet as Intranet can be safely privatized as per the need.