

Chapter - 1

IT Concepts

Introduction to Computer System

Computers are making a great impact on our day to day activities. In the current technological world, they are playing an important role in all the functions of our day to day life. Computer has numerous advantages in the field of science and technology. Some of its characteristics make it so amazing that it has made its way to even space science.

History of Computer

The development of modern day computer is the result of a series of various generations of computers. In each generation, some extra features and technical advancement have been added.

Generation of Computer

First Generation Computers (1940-1956): The first generation computers used vacuum tubes for circuits and magnetic drums for the memory storage. First generation computers were very large and take enormous space. These computers consumed large amount of electricity, and generated a lot of heat. First generation computers used machine language. The Universal Automatic Computer (UNIVAC) and Electronic Numerical Integrator Analyzer and Computer (ENIAC) computers are examples of first generation computing devices.

Second Generation Computers (1956-1963): The second generation computers used transistors and magnetic core for memory storage. Use of transistors made the computers smaller, faster, cheaper, energy efficient and more reliable than the first generation computers. Transistors were a vast improvement over the vacuum tubes but still generated great amount of heat that subjected computer to damage. Second generation computers used assembly language.

Third Generation Computers (1964-1971): The third generation computers used integrated circuits. They were smaller and cheaper than the previous generation computers.

Fourth Generation Computers (1971-Present): The fourth generation computers used microprocessor. Microprocessor consisted of thousands of integrated circuits built onto a single silicon chip.

Fifth Generation Computers (Present): The fifth generation computers are based on artificial intelligence. They are still in their developmental phase.

Characteristics of Computer

The following are the characteristics of computer:

- **Hard Work:** A computer works very hard and does not get tired.
- **Accurate:** A computer is always correct. It commits mistake only if we commit mistake. If we don't commit mistake, the computer will also not commit mistake.
- **Speed:** A computer is very fast in its work and does everything correctly and quickly.
- **Storage Capacity:** A computer has a large memory and it can remember many things for a long time.
- **Abilities:** We can do many things on the computer like sums, drawing pictures, writing letters, etc.

Types of Computer

Microcomputers or Personal computers: Microcomputers are small in size. They can fit on a desk top. These computers are used by a single person at a time.

Minicomputers: Minicomputers have large memory and are costlier than microcomputers. These computers can be used by many people at the same time.

Mainframe computers: Mainframe computers are very large in size. These computers have very large memory and are very costly. They operate at very high speed. They can be used by several persons at the same time. They are used at places such as banks, research organisations, etc. The largest and fastest Mainframe computers are called Super computers.

Applications of computers in various fields

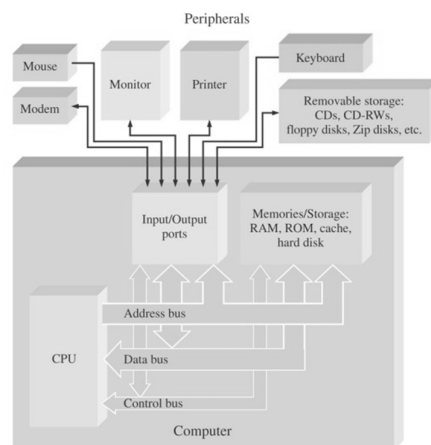
Computers have their application or utility everywhere. We find their applications in almost every sphere of life—particularly in fields where computations are required to be done at a very fast speed and where data is so complicated that the human brain finds it difficult to cope up with.

Computers now-a-days are being used almost in every department to do the work at a greater speed and accuracy. They can keep the record of all the employees and prepare their pay bill in a matter of minutes every month. They can keep automatic checks on the stock of a particular item. Some of the prominent areas of computer applications are: Railway / Airlines, Science and research, Tourism, Banks, Industry, Transportation, Education, Entertainment and so on

Understanding Computer System

A computer is an electronic machine that is used for manipulating data according to a list of instructions provided by the user. A computer system can be explained in easy way by describing its four basic operations. These operations are:

- **Input:** Is supplied to the computer with the use of a keyboard, a mouse or another input device. These input devices may be called as peripheral devices.
- **Processing:** Is done inside the computer in an area called the Central Processing Unit (CPU). Processing is the process of converting input to the desired output.
- **Storage:** Is the area to store information in the system.
- **Output:** Is the result of computer processing. Output may be viewed on a monitor screen, heard through speakers, printed on printers and so forth. Output devices may be considered as hardware and peripheral devices.



Input Devices

The devices used for entering data into a computer are called input devices. These devices receive instructions and transfer them for processing. The devices also translate the given instructions into electrical signals (digital signals) which are understood by the computer.

One can communicate with a computer using the I/O devices interfaced to it. Various input devices used by computers are:

- Mouse
- Joystick
- Web camera
- Keyboard
- Digital camera
- Microphone

Mouse

A mouse is a pointing device that is used to control the movement of the cursor or pointer on a display screen. When a mouse is rolled on a flat surface, the mouse pointer on the screen also moves in the corresponding direction. The movement of the mouse ball is translated into signals that tell the computer how and where to move the screen pointer.

Mouse contains at least one button and sometimes as many as three, which have different functions depending on what program is running. Some latest mouse also includes a scroll wheel for scrolling through long documents.

The three basic types of mouse are:

- **Mechanical mouse:** Is a mouse that has a rubber or a metal ball on its underside, which can roll in all directions. The mechanical sensor within the mouse detects the direction of the rolling ball and makes the movement of the screen pointer accordingly.
- **Optomechanical mouse:** Is a type of mouse, which is very much similar to mechanical mouse, except that it uses an optical sensor to detect the movement of the ball.
- **Optical mouse:** Uses a laser beam to detect the movement of the mouse pointer. It responds more quickly and precisely than any other mouse.

Keyboard

The keyboard is an input device. It looks like a typewriter. It allows you to communicate with the computer by passing your data or instruction into the computer. The output of the key switches is fed to electronic circuit known as the keyboard encoder, which converts them into binary coded values. The values are then fed into the computer, which interprets the key that is pressed.



Joysticks

A joystick is a control device that enables a user to move an object on the screen. It is also known as a paddle. It is mainly used for playing video games. It contains a small vertical lever, also called the stick, which is set into two crossed grooves and can be moved left, right, forward and backward. The movement of the stick is sensed by a potentiometer and the instructions are sent to the CPU for the movement of the object on the screen.



Digital Camera

The digital camera is an input device, which stores images digitally. It converts light intensities into discrete numbers for storage on a storage media such as a hard disk or a flash disk (a type of secondary storage device). It does not require film to store or record the images as it stores images digitally, which can be downloaded to a computer system and can be printed. The main difference between a film based camera and a digital camera is that the digital camera has no film. Photo making is inexpensive and fast because it does not require film processing. Instead of film, digital cameras use a solid state device called an image sensor, which is usually a Charge Couple Device (CCD). It records colour images as intensities of red, green and blue that are stored as variable charges in a CCD matrix. The size of the matrix determines the resolution and colour depth.



Web Camera

The Web camera is growing as an integral input device of computer, which is used for taking instant picture of the object. It is very much similar to a digital camera as it works in the same way as the digital camera with digitised images. The only difference is you cannot use Web camera without attaching it to the computer system but digital camera can be used with or without attaching it to the computer system. Web camera is specially used for video conferencing or conversation on the Internet.



Microphone

The microphone is a special input device that converts spoken words into computer understandable code and vice versa. This device converts data from the computer to the spoken words or sentences as well. Speech is digitised first then matched against the dictionary of coded waveforms, and finally matches are converted into text.

The microphone works in tandem with a sound card. You can speak your words or input a sound using microphone. In some speaker dependent systems, you need to enunciate samples into the system in order to tune it to your individual voice. The sound card translates the electrical signal from microphone into a digitised form that the computer can store and process. Microphones are useful because such systems have replaced human operators for telephone services. They also provide help to convert the typed text into speech and broadcast it over the speakers.

Output Devices

The output devices receive machine understandable (binary code) output from the processor and convert it into user understandable form. The output generated by the output devices is used by the users as final output or a machine input for another processing cycle.

Various output devices are:

- Visual Display Unit (VDU)
- Printer
- Scanner

Visual Display Unit (VDU)

VDU is the most popular output device, usually called as monitor, which is used to display the text or other objects on the screen. It is used to display the images generated by the computer's video adaptor. It provides a way to you for communicating with the computer. The monitor is attached to the video adaptor by a cable and the term monitor usually refers to a VDU. On the monitor, you can see the input data or information supplied to the computer, as well as the final result obtained after processing.



Printer

The printers are the primary output devices, which are used to prepare permanent documents of output, called hard copy of output. It is one of the most conventional and useful methods for delivering information using printed characters. The types of printers can be classified on the basis of two distinct methods of producing print:



- **Impact printers:** The printers, which print through striking the characters against the ink pads or ribbons so that the impressions are printed on the paper, are known as impact printers. These printers have a mechanical contact between the printer head and paper, such as line printer and character printer.
- **Non impact printers:** The printers, which print using laser, magnetic or thermal technology, are known as non impact printers such as electromagnetic printers, thermal printers, desk jet printers and laser printers.



Scanners

A device that captures a text document or an image and converts it into a digital image is called a scanner. Two types popular scanner are handheld scanners and flatbed scanners. The flatbed scanner is more popular now a day.

A flatbed scanner has a glass pane. When the images are placed on this pane, a bright light illuminates the pane and the scanner head moves across the image. It reads as a series of light and dark spots. Only charge coupled devices can see the image because the light is reflected on that device. If the image is transparent then flatbed scanner can not work, it requires special accessories that illuminate them from the upper side.



Handheld scanners work like a manual device. When the scanning starts, it drags across the surface. It has a start button which is held by the user for the scanning duration. Some handheld scanners also have a small window that use for scanning the document.

Central Processing Unit

The computational and control unit of a computer is known as Central Processing Unit (CPU). It is the device that interprets and executes instructions.

Single chip central processing unit is called microprocessor. It made the existence of personal computers and workstations possible. The CPU or microprocessor, in the case of a microcomputer, has the ability to fetch, decode and execute instructions. It also transfers information to and from other resources over the computer's main data transfer path known as bus. By definition, the CPU is the chip that functions as the brain of a computer. Microprocessor or CPU is a piece of electronic circuit that uses digital logic to perform the instructions of program. The various components of CPU, which control the whole processing of the system, are:

- **Semiconductors:** Is a material that is neither a conductor nor an insulator but can be chemically altered to be either one, when required. A microprocessor is made of layer upon layer of electronic circuits that are liberally carved out of silicon. Silicon is the primary building block used in manufacturing the electronic circuits (chips). These silicon chips are used to conduct the processor and ultimately the computer or electronic circuits because it is an excellent semiconductor.
- **Conductors and insulators:** A conductor is the material or element or object, which allows electric current to pass through it such as copper or aluminum. These elements have free electrons through which the current can pass. While insulator does not allow an electrical current to pass through such as rubber or glass. Both the conductor and insulator are used in microprocessor accordingly.
- **Integrated circuit:** An Integrated Circuit (IC) is a combination of electronic components such as transistors, capacitors and resistors. It is designed to perform some logical functions based on timer, counter and memory. The basic building block of an IC is a logic gate. A logic gate performs the Boolean algebra.

Introducing Primary Memory

The storage system of computers includes primary memory and secondary memory. Primary memory or Random Access Memory (RAM) or temporary memory is the main memory of computer, which is used to store data temporarily while the secondary memory provides a means of permanently storing the information. Memory is a circuitry that allows information to be stored and retrieved. In general, memory can refer to external systems such as disk or tape drives. It is basically the fast semiconductor storage or RAM, which is directly connected to the processor. The two types of memories are:

- Random Access Memory (RAM)
- Read Only Memory (ROM)

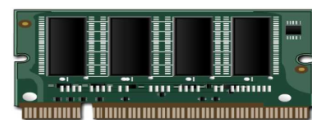
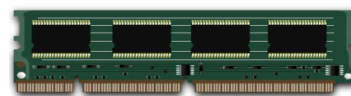
Random Access Memory (RAM)

RAM is the main memory of the computer. RAM provides permission to read and write over the memory chip. While the ROM permits only read permission, RAM is volatile by nature, which means that it needs continuous flow of electricity to keep its content safe. Otherwise, as soon as the power is off, the content in the RAM is lost. Therefore, due to its volatile nature it is also referred to as temporary memory.



Various types of RAM are:

1. **Dynamic RAM (DRAM):** Is a form of semiconductor RAM. Dynamic RAM stores information in integrated circuits that contain capacitors. DRAMs are more commonly used than static RAMs even though they are slower. A DRAM can hold approximately four times as much data as a static RAM chip of the same complexity.
2. **Static RAM (SRAM):** Is a form of semiconductor memory. SRAM storage is based on the logic circuit known as a flip-flop, which retains the information stored in it as long as there is enough power to run the device. A static RAM chip can store only about one fourth as much data as a DRAM chip of the same complexity. It does not require refreshing and is usually much faster than DRAM. It is also more expensive. SRAMs are usually reserved for use in caches.
3. **Rambus DRAM (RDRAM):** Is a new powerful memory technology produced by Rambus Inc. It is very expensive RAM chip. It provides high data transfer speed; it can transfer data at up to 800 MHz.

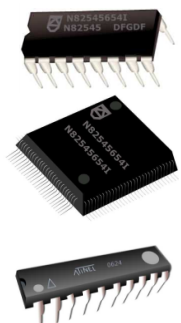


Read Only Memory (ROM)

ROM is a type of memory that stores the instructions, which are necessary for starting up the computer. It cannot be written like RAM because as the name implies they are read only memories. But, now few versions of ROM have been launched that include multiple enhanced features of reading and writing.

Various types of ROM are:

- **Programmable Read Only Memory (PROM):** Is a type of ROM chip, which allows you to write. But, it provides permission to write on chip only once. The PROM cannot be updated further, if it has been used.
- **Erasable Programmable Read Only Memory (EPROM):** Is a special type of PROM that provides update permission on a PROM memory chip. Unlike PROM, here you can erase the already programmed chip by exposing it to ultraviolet light.
- **Electrically Erasable Programmable Read Only Memory (EEPROM):** Is again a special type of PROM. It also allows you to erase the instruction and reprogram the chip like EPROM. But, here you can erase the chip by exposing it to an electrical charge.



Introducing Secondary Memory

There are several types of secondary storage devices. The most common type of secondary storage device is disk. It is the permanent storage medium for either storing data or a program. The disk can be an internal hard disk, which is housed within the system unit or an external floppy disk. In addition, the Compact Disk - Read Only Memory (CD-ROM) is another type of secondary storage device commonly available in all the computer systems. The data storage devices include:

- Floppy Disk Drive (FDD)
- Hard Disk Drive (HDD)
- Compact Disk (CD)
- Universal Serial Bus (USB) Drive
- Thumb Drive – A USB Drive
- Tape Drives

Hard Disk Drive (HDD)

The hard disk is a permanent storage media, which is used to store huge volume of data. It is the most important and commonly used storage device. It is used to record computer data magnetically. A hard disk is physically composed of a series of flat and magnetically coated platters stacked on a spindle. A hard disk drive consists of a stack of inflexible magnetic disks mounted on a motor. As the disks spin at high speed, read/write heads at the end of a metal fork swing in and out to access the sectors of the disks.



Compact Disk (CD)

The Compact Disk (CD) is a data storage device used for containing data recorded in digital form. It is a type of storage medium that resulted from audio technology. A standard CD can hold a huge amount of information about 650 Megabytes (MB). This means that a single disk can carry more than an hour of high quality music or an entire feature film. It can store huge amount of text, graphics, audio and video. The most common type of CD, the audio CD, is

increasingly popular as a means of providing the consumer with high quality recordings of music. The Compact Disk - Read Only Memory (CD-ROM) is ideal for distributing information such as encyclopedias and other reference materials. The two types of CDs available are:

- **Compact Disc - R (CD-R):** Is recordable CDs, called CD-R, which can be written only once and after writing they become read-only discs.
- **Compact Disk-RW (CD-RW):** Can be overwritten repeatedly by a computer. You can erase the previous data and write the new content on the disc.

The following figure shows the CD & CD-ROM drive:



Universal Serial Bus (USB) Drive

The Universal Serial Bus (USB) drive is a serial bus standard based interface, which is used to connect the portable memory devices in various systems such as video game consoles, Personal Digital Assistants (PDAs), portable Digital Versatile Disks (DVDs), media players, cell phones, televisions, home stereo equipments and car stereos. USB does not require any expansion card or device driver to connect any peripheral devices to the computer. The host enumerates and recognises USB and loads the device driver that it needs. It can connect peripherals such as mouse devices, keyboards, PDAs, game pads, joysticks, scanners, digital cameras, printers, external storage and networking components. For many devices, such as scanners and digital cameras, USB has become the standard connection method.



Thumb Drive - A USB Drive

A thumb drive is a portable memory storage device. It is a re-writeable storage device, which can store the memory data without a power supply unlike RAM. Thumb drive can fit into any USB port on a computer. It is also known as flash drive. A user can plug the drive into a computer and will not have to restart it to access the thumb drive. The drives are small in size like a human thumb and are very stable memory storage device. The thumb drive is available in storage size of up to 8 gigabytes.

Tape Drives

The tape drive is a storage device that reads data from one location and writes it onto a tape such as magnetic tape or a punched card. It is typically used for storage of data, which is stored on hard drives. Tape media generally has a favourable unit cost and long archival stability. Various features of tape media are:

- Is used as a data transfer media but its transfer speed is varying considerably. The fast tape drives can transfer as much as 20 MB per second.
- Has data capacity that ranges from a few hundred kilobytes to several gigabytes.
- Is typically used for archival storage of data stored on hard drives.



The disadvantage of tape drives is that they are sequential access devices. Sequential access means if you want to read any particular block of data, you need to read all the preceding blocks. This makes them too slow for general purpose storage operations. However, they are the least expensive media for making backups.

Units of Memory

A bit is a binary representation; either 0 or 1 and combination of bits make up the bytes, kilobytes and so on, where:

- 1 Nibble = 4 Bits
- 1 Byte = 8 Bits
- 1 Kilo Bytes (KB) = 1024 Bytes
- 1 Mega Bytes (MB) = 1024 KB
- 1 Giga Bytes = 1024 MB

The more memory you have in general, the more each program can do. Memory is measured in small groups of data called bytes. Each byte consists of eight bits. The byte is the basis of all the measures dealing with the computer.

Describing the Basic Concepts of Direct Data Entry

There are devices, which read or detect the information and convert it into an electronic signal directly. These are known as direct entry devices. This whole phenomenon includes some kinds of sensors, which make it possible.

Magnetic Ink Character Recognition (MICR)

MICR is a technique, which is used to verify the originality of paper documents, especially cheques. It provides a secure and high speed method of scanning and processing information. It is a character recognition system that uses special ink and characters. When a document that contains this special ink needs to be read, it passes through a machine called MICR. This machine magnetises the ink and then translates the magnetic information into characters. It is used in bank for verifying cheques and deposit slips. In other words, MICR readers detect the characters and convert them into digital data. The use of MICR can enhance security and minimise the losses caused by various types of crimes.

Optical Character Reader (OCR)

OCR is a device, which scans the printed textual material then converts it into an electronic form and stores it in a file on the computer or disc. It follows the mechanism in which scanned images are electronically read and converted into editable text such as American Standard Code for Information Interchange (ASCII) format. OCR performs multiple operations, such as:

- Creates text searchable files for digital collections in libraries, businesses and government agencies.
- Provides help to process cheques and credit card slips.
- Scans stylised fonts or text found in magazines and newspapers into a computer.

Optical Mark Reader/Recognition (OMR)

OMR is a device that detects predefined marks on a certain portion of a paper. It allows electronically extracting intended data from marked fields such as checkboxes and fill-in-fields on printed forms or documents. OMR devices are generally used in applications where large numbers of hand filled forms need to be processed quickly and with great accuracy such as surveys, reply cards and questionnaires.

Light Pen

The light pen is a pointing device, which is used to choose objects or commands on the screen either by pressing or moving it on the surface of the screen or by pressing a small switch on its side. It is a small pen shaped wand that uses light sensor. The light sensor senses the light emitted from a limited field of view when it comes in front of a graphic element or object of the screen.



The light coming from the screen causes the photocell to respond by generating a pulse. This electric response in shape of a pulse is transmitted to a processor that identifies the pixel, the light pen is pointing. To identify a specific location, the light pen is very useful. It is also used to draw images on the screen.

Bar Code Reader

The bar code reader is an optical input device, which is used to read the values or quantities printed on the products in the form of vertical bars known as bar code. Bar code is recorded on the product by the manufacturers and usually carries the inventory stock number or unique product number. The coding scheme called Universal Product Code (UPC) for recording the data is based on the width of the bars and the space between them. The bar code reader uses a laser beam to read and interpret bar code. The reader emits a laser beam that reflects on the bar code. The bar code reader consists of a light sensitive detector that identifies the bar code image and converts it into a numeric code that can be processed further.



Computer Languages

To communicate with the computer, you need to know a language that a human and computer can understand. A programming language is designed to express calculations that can be performed by a machine, particularly a computer. Programming languages can be used to create programs that specify the behaviour of a machine. Many programming languages have some form of written specification of their syntax and semantics since computers require precisely defined instructions. Therefore, a programming language is a set of instructions that a computer can understand to perform a task. In early ages, the Beginner's All-purpose Symbolic Instruction Code (BASIC), Common Business Oriented Language (COBOL) and Formula Translation (FORTRAN) are some of the programming languages that were developed.

Introducing Computer Languages

A computer programming language is a language that enables you to write programs to control the operations of a computer. When you write a program using a particular programming language, you need to follow the syntax of that language. A programming language also provides operators that enable you to perform various tasks, such as computing and manipulating values of variables, compare values of different variables of same data types, and test multiple conditions.

Low Level and High Level Languages

Low level language is a type of programming language that provides little or no abstraction from a computer's microprocessor. Machine and Assembly languages are the common examples of low level programming language. The main features of low level programming languages are:

- Specifications according to the Central Processing Unit (CPU) which is the brain of any computer.
- Writing a low level program requires time, as well as a clear understanding of the inner workings of the processor.
- Low level programming is mainly used only for very small programs or for segments of code that are highly critical.
- A program written in a low level language can be efficient, making efficient use of both computer memory and processing time.

High level language is a type of advanced computer programming language. C, FORTRAN, BASIC and PASCAL are some common examples of high level language. The main features of high level languages are:

- Help in faster development of large programs.
- Provide string handling routines.
- Provide object-oriented programming features.
- Provide file input/output.

Assembly Language

Assembly language is a low level programming language. It is a symbolic representation of machine code. Assembly language is designed for specific processors. Main features of assembly languages are:

- Allow symbolic designation of memory locations.
- Program first must be translated into machine code by a separate program called an assembler.
- Critical sections of programs written in higher level languages can be written in assembly to speed up sections.
- Changes should first be made in the source code of assembly language and then reassemble it to create a new object program.

Introducing Translators

Translators are the programs / utilities, which are basically used by programmers to convert high or middle level language to lower level language. We need this conversion because computer understands instructions only in the form of low level language (machine language). Translators come in the following three variants:

- Assemblers
- Interpreter
- Compilers

Assemblers

Assemblers translate the assembly language code (source program) into machine language code (object program). After assembling, a linker program is used to convert the object program into an executable program. The Microsoft Assembler program (MASM) and Borland Turbo Assembler program (TASM) are two popular assemblers. Assemblers are used mainly in development of system software.

Interpreters

Instructions of a high level language are coded in many statements. At the time of their execution, they are converted statement by statement into machine code using system software, called Interpreters. For example, programs written in BASIC language are executed using Advanced BASIC (BASICA) or GWBASIC interpreters. There are certain disadvantages of interpreters. As instructions are translated and executed simultaneously using interpreters, they are very slow for executing large programs. Hence, interpreters are not suitable for most of the applications development.

Compilers

As contrast to interpreters, compilers provide faster execution speed. Compilers do not translate and execute the instructions at the same time. They translate the entire program (source code) into machine code (object code). The object code is converted into executable code using linker. Compilers are widely used in translating codes of high level languages (e.g. COBOL, FORTRAN, PASCAL, Turbo/ Quick BASIC, Turbo/ Microsoft C, Java, etc.). As compared to interpreters or assemblers, compilers are preferred in development of application software.

Difference between Assembler and Compiler

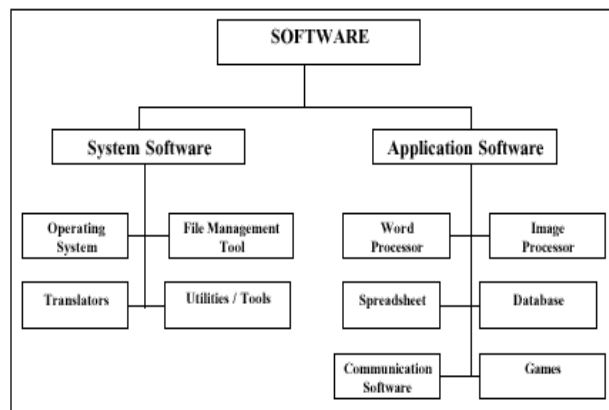
An assembler refers specifically to such a program that takes as its input assembly language. Assembly language is a very "low-level" programming language, where short acronyms are used to represent machine instructions. Thus, assembly language, very closely mirrors the actual machine code that is being executed, and is only very mildly human readable. Assemblers do little more than directly translate the assembly source code into machine code - that is, they don't do optimization of their own, as assembly language is meant as a direct representation of the machine code, and thus no optimization is required (or, desired).

A compiler generally refers to any other instance of this concept, but usually means something that take a higher-level language (i.e. anything above assembly language) and translates that to machine code. Compilers generally need to be significantly smarter than an assembler, as the compiler does a whole lot more work, and thus, has the opportunity to make significantly optimizations when doing the source machine code translation. That is, high-level languages allow for the expression of concepts of ideas, which make them ideal for humans to write programs in. The compiler must be sophisticated enough to take these ideas and convert them into concrete machine code instructions. In addition, better compilers notice places where shortcuts can be taken (optimizations) given the overall structure of the input source code.

Explaining Types of Software

A computer is hardware and it is useless unless it is provided with the necessary software. Therefore, all computer users must be aware of the basic software concepts besides hardware. Software is a program or set of instructions, which is required to use the computer. Various types of software are available for various applications. The software development field is so advanced that day by day existing software are becoming outdated and new software are coming in the market. Therefore, we must get aware of the latest developments in the software industry. Software can be categorised basically into the following two categories:

- System software
- Application software



System Software

Software that is required to control the working of hardware and aid in effective execution of a general user's applications are called System software. This software performs a variety of functions like file editing, storage management, resource accounting, input/output (I/O) management, database management, etc. Some of the examples of system software are Disk Operating System (DOS), Windows, Drivers, etc. This software is developed by System programmers.

System software can be further categorised into the following three types:

- System Management Software (operating systems, DBMS, operating environments, etc.)
- System Development Software (language translators, application generators, CASE tools, etc.)
- System Software Utilities (Undelete command, disk fragmentation tools etc.)

Application Software

Software that is required for general and special purpose applications like database management, word processing; accounting, etc. are called as application software. Some of the examples of application software are MS Office, Games, etc. Application software is developed using system software by application programmers. Application software can be further classified into the following two types:

- **General Purpose Application Software:** Database Management Packages, Word Processors and Spreadsheets.
- **Special Purpose Application Software:** Accounting, Inventory, Production and Management.

Basics of Operating System

A computer consists of various components such as input device, storage device, output device and CPU. All these components together make a computer system. To utilise and manage this system properly, all its components should be managed properly. The computer can understand only machine language and the user can communicate only by human understandable language. Therefore, there is a need to manage the basic hardware resources and provide an interface to users and their programs. This is done by special system software known as an Operating System (OS). It has bridged the gap between the user and the computer.

Introducing Operating System

The operating system is a master program, which controls the functioning of the system. The main works of an operating system are:

- Input/Output management
- Memory management
- File management

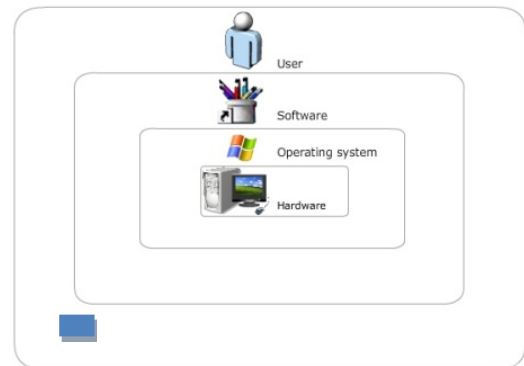
There are many operating systems in the Information Technology (IT) industry, but some of the popular operating systems are: UNIX, Linux, MS-DOS, Windows 95/98, Windows NT, Windows 2000 and Windows XP, etc.

The User Interface

The user interface can be defined as the way the user tells the computer what to do and how the computer displays information and options to the user.

The two types of user interfaces are:

- **The Character User Interface (CUI):** A text-based interface or Command Line Interface (CLI) means typing in all the commands. Commands / instruction are given to computer in the form of characters. If there is a typing mistake, you need to backspace to the error, which erases what you already typed.
- **The Graphical User Interface (GUI):** Uses pictures. It is more user friendly.



Operating System, an Interface
between user and Hardware

Open Source Operating System

Open source refers to a program or software in which the source code (the form of the program when a programmer writes a program in a particular programming language) is available to the general public for use and/or modification from its original design free of charge. Open source code is typically created as a collaborative effort in which programmers improve upon the code and share the changes within the community. The basics behind the Open Source Initiative is that when programmers can read, redistribute and modify the source code for a piece of software, the software evolves.

EduBOSS

EduBOSS is an open source operating system developed by C-DAC to make the best distribution for educational purposes. This operating system localizes into all 22 official Indian languages, benefits non-English speakers to reach technology that bridge digital divide in India. It contains educational applications that are useful for school students.

OpenOffice

Open-source software is software whose source code is published and made available to the public, enabling anyone to copy, modify and redistribute the source code without paying royalties or fees. OpenOffice is an open-source office productivity software suite whose main components are for word processing, spreadsheets, presentations, graphics, and databases.

EXERCISE

Short Answer Type questions

- Q1.** What do you understand by Computer System? Explain its Operations.
- Q2.** Name the different types of Mouse and write their functions.
- Q3.** What are Output Devices? Explain the function of following devices:
1. Visual Display Unit
 2. Printer
 3. Scanner
- Q4.** Write the full form of ROM, also explain it with example?
- Q5.** What is Computer Language? Write short notes on:
1. Low Level Language
 2. High Level Language
 3. Assembly Language
- Q6.** What do you mean by Assembler and Compiler?
- Q7.** Write difference between Assembler and Compiler.