

UNIT-I

1. Introduction to Computers

History of Computer:

What is Computer?

“A computer is an electronic device used to store retrieve and manipulate data.”

A computer also defines as a programmable electromechanical device that accepts instruction (program) to direct the operations of the computers. Four words can be deducted from the above definition for further illustration. Examples

- i. Store: To put data somewhere for safe keeping
- ii. Retrieve: To get and bring the data back.
- iii. Process: To calculate compare arrange.

What is Computer Science?

Computer science (sometimes called computation science or computing science, but not to be confused with computational science or software engineering) is the study of processes that interact with data and that can be represented as data in the form of programs. It enables the use of algorithms to manipulate, store, and communicate digital information. A computer scientist studies the theory of computation and the practice of designing software systems.

Its fields can be divided into theoretical and practical disciplines. Computational complexity theory is highly abstract, while computer graphics emphasizes real-world applications. Programming language theory considers approaches to the description of computational processes, while computer programming itself involves the use of programming languages and complex systems. Human– computer interaction considers the challenges in making computers useful, usable, and accessible.

Historical Background of Computer:

The history of computer dated back to the period of scientific revolution (i.e. 1543 – 1678). The calculating machine invented by Blaise Pascal in 1642 and that of Goffried Liebniits marked the genesis of the application of machine in industry.

This progressed up to the period 1760 – 1830 which was the period of the industrial revolution in Great Britain where the use of machine for production altered the British society and the Western world. During this period Joseph Jacquard invented the weaving loom (a machine used in textile industry).

The computer was born not for entertainment or email but out of a need to solve a serious number-crunching crisis. By 1880, the United State (U.S) population had grown so large that it took more than seven years to tabulate the U.S. Census results. The government sought a faster way to get the job done, giving rise to punch-card based computers that took up entire rooms. Today, we carry more computing power on our smart phones than was available in these early models. The following brief history of computing is a

timeline of how computers evolved from their humble beginnings to the machines of today that surf the Internet, play games and stream multimedia in addition to crunching numbers. **The followings are historical events of computer.**

1623: Wilhelm Schickard designed and constructed the first working mechanical calculator.

1673: Gottfried Leibniz demonstrated a digital mechanical calculator, called the Stepped Reckoner. He may be considered the first computer scientist and information theorist, for, among other reasons, documenting the binary number system.

1801: In France, Joseph Marie Jacquard invents a loom that uses punched wooden cards to automatically weave fabric designs. Early computers would use similar punch cards. [Home](#) / [News](#) / [Tech](#) / [Health](#) / [Planet Earth](#) / [Strange News](#) / [Animals](#) / [History](#) / [Culture](#) / [Space & Physics](#).

1820: Thomas de Colmar launched the mechanical calculator industry when he released his simplified arithmometer, which was the first calculating machine strong enough and reliable enough to be used daily in an office environment.

1822: English mathematician Charles Babbage (Father of Computer) conceives of a steam-driven calculating machine that would be able to compute tables of numbers. The project, funded by the English government, is a failure. More than a century later, however, the world's first computer was actually built.

1843: During the translation of a French article on the Analytical Engine, Ada Lovelace wrote, in one of the many notes she included, an algorithm to compute the Bernoulli numbers, which is considered to be the first published algorithm ever specifically tailored for implementation on a computer.

1885: Herman Hollerith invented the tabulator, which used punched cards to process statistical information; eventually his company became part of IBM.

1890: Herman Hollerith designs a punch card system to calculate the 1880 census, accomplishing the task in just three years and saving the government \$5 million. He establishes a company that would ultimately become IBM.

1936: Alan Turing presents the notion of a universal machine, later called the Turing machine, capable of computing anything that is computable. The central concept of the modern computer was based on his ideas.

1937: J.V. Atanasoff, a professor of physics and mathematics at Iowa State University, attempts to build the first computer without gears, cams, belts or shafts.

1937: One hundred years after Babbage's impossible dream, Howard Aiken convinced IBM, which was making all kinds of punched card equipment and was also in the calculator business to develop his giant programmable calculator, the ASCC/Harvard Mark I, based on Babbage's Analytical Engine, which itself used cards and a central computing unit. When the machine was finished, some hailed it as "Babbage's dream come true".

1939: Hewlett-Packard is founded by David Packard and Bill Hewlett in a Palo Alto, California, garage, according to the Computer History Museum.

1941: Atanasoff and his graduate student, Clifford Berry, design a computer that can solve 29 equations simultaneously. This marks the first time a computer is able to store information on its main memory.

1943-1944: Two University of Pennsylvania professors, John Mauchly and J. Presper Eckert, build the Electronic Numerical Integrator and Calculator (ENIAC). Considered the grandfather of digital computers, it fills a 20-foot by 40-foot room and has 18,000 vacuum tubes.

1946: Mauchly and Presper leave the University of Pennsylvania and receive funding from the Census Bureau to build the UNIVAC, the first commercial computer for business and government applications.

1947: William Shockley, John Bardeen and Walter Brattain of Bell Laboratories invent the transistor. They discovered how to make an electric switch with solid materials and no need for a vacuum.

1953: Grace Hopper develops the first computer language, which eventually becomes known as COBOL. Thomas Johnson Watson Jr., son of IBM CEO Thomas Johnson Watson Sr., conceives the IBM 701 EDPM to help the United Nations keep tabs on Korea during the war.

1954: The FORTRAN programming language, an acronym for FORMula TRANslation, is developed by a team of programmers at IBM led by John Backus, according to the University of Michigan.

1958: Jack Kilby and Robert Noyce unveil the integrated circuit, known as the computer chip. Kilby was awarded the Nobel Prize in Physics in 2000 for his work.

1964: Douglas Engelbart shows a prototype of the modern computer, with a mouse and a graphical user interface (GUI). This marks the evolution of the computer from a specialized machine for scientists and mathematicians to technology that is more accessible to the general public.

1969: A group of developers at Bell Labs produce UNIX, an operating system that addressed compatibility issues. Written in the C programming language, UNIX was portable across multiple platforms and became the operating system of choice among mainframes at large companies and government entities. Due to the slow nature of the system, it never quite gained traction among home PC users.

1970: The newly formed Intel unveils the Intel 1103, the first Dynamic Access Memory (DRAM) chip.

1971: Alan Shugart leads a team of IBM engineers who invent the "floppy disk," allowing data to be shared among computers.

1973: Robert Metcalfe, a member of the research staff for Xerox, develops Ethernet for connecting multiple computers and other hardware.

1974 -1977: A number of personal computers hit the market, including Scelbi & Mark-8 Altair, IBM 5100, Radio Shack's TRS-80 — affectionately known as the "Trash 80" — and the Commodore PET.

1975: The January issue of Popular Electronics magazine features the Altair 8080, described as the "world's first minicomputer kit to rival commercial models." Two "computer geeks," Paul Allen and Bill Gates, offer to write software for the Altair, using the new Beginners All Purpose Symbolic Instruction Code (BASIC) language. On April 4, after the success of this first endeavor, the two childhood friends form their own software company, Microsoft.

1976: Steve Jobs and Steve Wozniak start Apple Computers on April Fool's Day and roll out the Apple I, the first computer with a single-circuit board, according to Stanford University.

1977: Radio Shack's initial production run of the TRS-80 was just 3,000. It sold like crazy. For the first time, non-geeks could write programs and make a computer do what they wished.

1977: Jobs and Wozniak incorporate Apple and show the Apple II at the first West Coast Computer Faire. It offers color graphics and incorporates an audio cassette drive for storage.

1978: Accountants rejoice at the introduction of VisiCalc, the first computerized spreadsheet program.

1979: Word processing becomes a reality as MicroPro International releases WordStar. "The defining change was to add margins and word wrap," said creator Rob Barnaby in email to Mike Petrie in 2000. "Additional changes included getting rid of command mode and adding a print function. I was the technical brains — I figured out how to do it, and did it, and documented it. "The first IBM personal computer, introduced on Aug. 12, 1981, used the MS-DOS operating system. (Image: © IBM).

1981: The first IBM personal computer, code-named "Acorn," is introduced. It uses Microsoft's MSDOS operating system. It has an Intel chip, two floppy disks and an optional color monitor. Sears & Roebuck and Computer land sell the machines, marking the first time a computer is available through outside distributors. It also popularizes the term PC.

1983: Apple's Lisa is the first personal computer with a graphical user interface (GUI). It also features a drop-down menu and icons. It flops but eventually evolves into the Macintosh. The Gavilan SC is the first portable computer with the familiar flip form factor and the first to be marketed as a "laptop." The TRS-80, introduced in 1977, was one of the first machines whose documentation was intended for non-geeks.

1985: Microsoft announces Windows, according to Encyclopedia Britannica. This was the company's response to Apple's graphical user interface (GUI). Commodore unveils the Amiga 1000, which features advanced audio and video capabilities.

1985: The first dot-com domain name is registered on March 15, years before the World Wide Web would mark the formal beginning of Internet history. The Symbolics Computer Company, a small Massachusetts computer manufacturer, registers Symbolics.com. More than two years later, only 100 dot-coms had been registered.

1986: Compaq brings the "Deskpro 386" to market. Its 32-bit architecture provides as speed comparable to mainframes.

1990: Tim Berners-Lee, a researcher at CERN, the high-energy physics laboratory in Geneva, develops Hyper Text Markup Language (HTML), giving rise to the World Wide Web.

1993: The Pentium microprocessor advances the use of graphics and music on PCs.

1994: PCs become gaming machines as "Command & Conquer," "Alone in the Dark 2," "Theme Park," "Magic Carpet," "Descent" and "Little Big Adventure" are among the games to hit the market.

1996: Sergey Brin and Larry Page develop the Google search engine at Stanford University.

1997: Microsoft invests \$150 million in Apple, which was struggling at the time, ending Apple's court case against Microsoft in which it alleged that Microsoft copied the "look and feel" of its operating system.

1999: The term Wi-Fi becomes part of the computing language and users begin connecting to the Internet without wires.

2001: Apple unveils the Mac OS X operating system, which provides protected memory architecture and pre-emptive multi-tasking, among other benefits. Not to be outdone, Microsoft rolls out Windows XP, which has a significantly redesigned graphical user interface GUI.

2003: The first 64-bit processor, AMD's Athlon 64, becomes available to the consumer market.

2004: Mozilla's Firefox 1.0 challenges Microsoft's Internet Explorer, the dominant Web browser. Facebook, a social networking site, launches.

2005: YouTube, a video sharing service, is founded. Google acquires Android, a Linux-based mobile phone operating system.

2006: Apple introduces the MacBook Pro, its first Intel-based, dual-core mobile computer, as well as an Intel-based iMac. Nintendo's Wii game console hits the market.

2007: The iPhone brings many computer functions to the smart phone.

2009: Microsoft launches Windows 7, which offers the ability to pin applications to the taskbar and advances in touch and handwriting recognition, among other features.

2010: Apple unveils the iPad, changing the way consumers view media and jumpstarting the dormant tablet computer segment.

2011: Google releases the Chromebook, a laptop that runs the Google Chrome OS.

2012: Facebook gains 1 billion users on October 4.

2015: Apple releases the Apple Watch. Microsoft releases Windows 10.

2016: The first reprogrammable quantum computer was created. "Until now, there hasn't been any quantum-computing platform that had the capability to program new algorithms into their system. They're usually each tailored to attack a particular algorithm," said study lead author Shantanu Debnath, a quantum physicist and optical engineer at the University of Maryland, College Park.

2017: The Defense Advanced Research Projects Agency (DARPA) is developing a new "Molecular Informatics" program that uses molecules as computers. "Chemistry offers a rich set of properties that we may be able to harness for rapid, scalable information storage and processing," Anne Fischer, program manager in DARPA's Defense Sciences Office, said in a statement. "Millions of molecules exist, and each molecule has a unique three-dimensional atomic structure as well as variables such as shape, size, or even color. This richness provides a vast design space for exploring novel and multi-value ways to encode and process data beyond the 0s and 1s of current logic-based, digital architectures." [Computers of the Future May Be Minuscule Molecular Machines].

Generations of Computers:

The history of computer is considered with the generations of a computer from first generation to fifth generation. In 19th century English mathematics professor name Charles Babbage referred as a “Father of Computer”. He designed the Analytical Engine and it was this design that the basic framework of the computers of today are based on. Generally speaking, computers can be classified into five generations. Each generation lasted for a certain period of time and each gave us either a new and improved computer or an improvement to the existing computer. The generations of computer are as follows:

First Generation of Computer (1937 – 1946):

In 1937 the first electronic digital computer was built by Dr. John V. Atanasoff and Clifford Berry. It was called the Atanasoff-Berry Computer (ABC). In 1943 an electronic computer name the Colossus was built for the military. Other developments continued until in 1946 the first general– purpose digital computer, the Electronic Numerical Integrator and Calculator (ENIAC) was built. It is said that this computer weighed 30 tons, and had 18,000 vacuum tubes which was used for processing. When this computer was turned on for the first time lights dim in sections of Philadelphia. Computers of this generation could only perform single task, and they had no operating system.

Characteristics:

- i. Sizes of these computers were as large as the size of a room.
- ii. Possession of Vacuum Tubes to perform calculation.
- iii. They used an internally stored instruction called program.
- iv. Use capacitors to store binary data and information.
- v. They use punched card for communication of input and output data and information
- vi. They generated a lot of heat.
- vii. They have about One Thousand 1000 circuits per cubic foot.

Examples:

- i. Mark I developed by Aiken in 1944.
- ii. Electronic Numerical Integrator and Calculator (ENIAC) built at the Moore School for Engineering of the University of Pennsylvania in 1946 by J. Presper Eckert and William Mauchley.
- iii. Electronic Discrete Variable Automatic Computer (EDVAC) also developed in 1947 by Eckert and Mauchley.

Second Generation of Computer (1947 – 1962):

Second generation of computers used transistors instead of vacuum tubes which were more reliable. In 1951 the first computer for commercial use was introduced to the public; the Universal Automatic Computer (UNIVAC 1). In 1953 the International Business Machine (IBM) 650 and 700 series computers made their mark in the computer world. During this generation of computers over 100 computer

programming languages were developed, computers had memory and operating systems. Storage media such as tape and disk were in use also were printers for output.

Characteristics:

- i. The computers were still large, but smaller than the first generation of computers.
- ii. They use transistor in place of Vacuum Tubes to perform calculation.
- iii. They were produced at a reduced cost compared to the first generation of computers.
- iv. Possession of magnetic tapes as for data storage.
- v. They were using punch cards as input and output of data and information. The use of keyboard as an input device was also introduced.
- vi. These computers were still generating a lot of heat in which an air conditioner is needed to maintain a cold temperature.
- vii. They have about one thousand circuits per cubic foot.

Examples:

- i. Leprechaun, IBM built by Bell Laboratories in 1947
- ii. Transis produced by philco, GE and RCA.
- iii. UNIVAC 1107, UNIVAC III.
- iv. RCA 501.
- v. IBM 7030 stretch.

Third Generation of Computer (1963 – 1975):

The invention of integrated circuit brought us the third generation of computers. With this invention computers became smaller, more powerful more reliable and they are able to run many different programs at the same time.

Characteristics:

- i. They used large-scale integrated circuits, which were used for both data processing and storage.
- ii. Computers were miniaturized, that is, they were reduced in size compared to previous generation.
- iii. Keyboard and mouse were used for input while the monitor was used as output device.
- iv. Use of programming language like COBOL and FORTRAN were developed.
- v. They have hundred thousand circuits per cubic foot.

Examples:

- i. Burroughs 6700, Mini computers
- ii. Honeywell 200
- iii. IBM system 360
- iv. UNIVAC 9000 series.

Fourth Generation of Computer (PC 1975 – Current):

At this time of technological development, the size of computer was re-divided to what we called Personal Computers, PC. This was the time the first Microprocessor was created by Intel. The microprocessor was a very large-scale, that is, VLS integrated circuit which contained thousands of transistors. Transistors on one chip were capable performing all the functions of a computer's central processing unit.

Characteristics:

- i. Possession of microprocessor which performs all the task of a computer system use today.
- ii. The size of computers and cost was reduced.
- iii. Increase in speed of computers.
- iv. Very large scale (VLS) integrated circuits were used.
- v. They have millions of circuits per cubic foot.

Examples:

- i. IBM system 3090, IBM RISC6000, IBM RT.
- ii. ILLIAC IV.
- iii. Cray 2 XMP.
- iv. HP 9000.
- v. Apple Computers.

Fifth Generation of Computers (Present and Beyond):

Fifth generations computing devices, based on artificial intelligence (AI) are still in development, although there are some application such as voice recognition, facial face detector and thumb print that are used today.

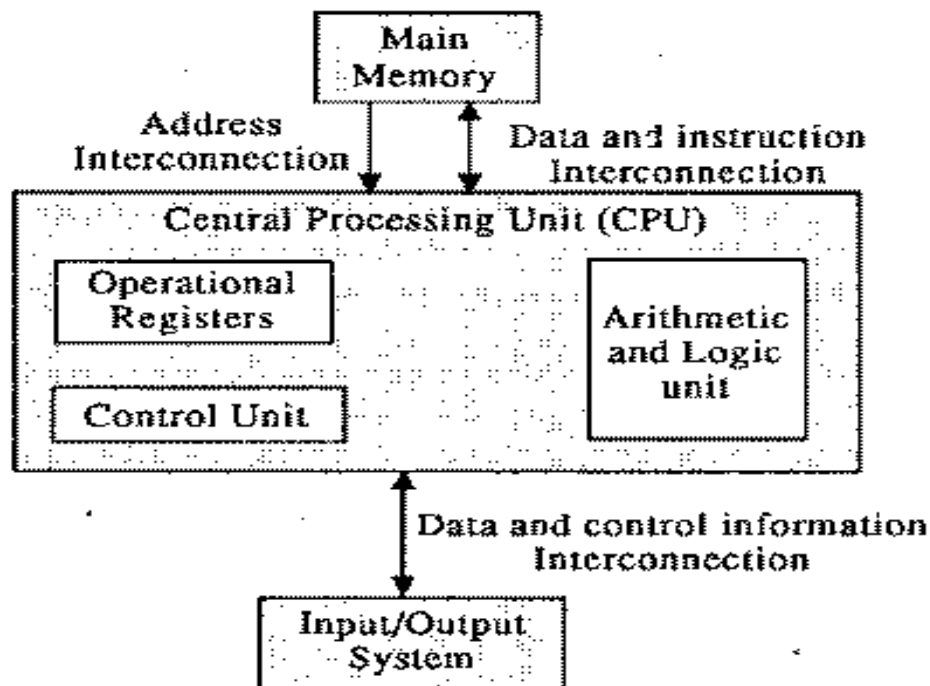
Characteristics:

- i. Consist of extremely large scale integration.
- ii. Parallel processing
- iii. Possession of high speed logic and memory chip.
- iv. High performance, micro-miniaturization.
- v. Ability of computers to mimic human intelligence, e.g. voice recognition, facial face detector, thumb print.
- vi. Satellite links, virtual reality.
- vii. They have billions of circuits per cubic.

Examples:

- i. Super computers
- ii. Robots
- iii. Facial face detector and iv. Thumb print.

Block Diagram of a Computer:



Functions of a Computer:

Computers contains four types of functions,

- Accept input
- Process information
- Produce output
- Store information

Characteristics of a Computer:

Computers contain *SEVEN* types of characteristics:

- ❖ **SPEED:** In general, no human being can compete to solving the complex computation, faster than computer.
- ❖ **ACCURACY:** Since Computer is programmed, so whatever input we give it gives result with accurately.
- ❖ **STORAGE:** Computer can store mass storage of data with appropriate format.
- ❖ **DILIGENCE:** Computer can work for hours without any break and creating error.
- ❖ **VERSATILITY:** We can use computer to perform completely different type of work at the same time.
- ❖ **POWER OF REMEMBERING:** It can remember data for us.
- ❖ **NO IQ:** Computer does not work without instruction.
- ❖ **NO FEELING:** Computer does not have emotions, knowledge, experience, and feeling.

Different Components of a Computer:

There are four types of physical components in a computer,

- i) Inner Components.
- ii) Back side of the Cabinet.
- iii) Outer Components.
- iv) Front side of the Cabinet.

i) Inside components:

The list of an inside components are as follows

- Mother Board
- CPU
- RAM
- ROM
- BIOS
- Expansion Slots
- Bus
- Hard disk
- SMPS
- CARDS
- Modem
- Web camera
- Speakers

Mother Board:

The main board in the computer also called the system board. The CPU, ROM chips, DIMMs, RIMMs, and interface cards are plugged into the motherboard.

(OR)

A mother board is a big green board which consist circuits and slots for inserting components.

The motherboard contains the controllers for all standard devices such as display screen, keyboard, and disk drive as well as for additional devices.

a) CPU:

CPU stands for “Central Processing Unit “and it consists two components such as control unit, arithmetic unit and logic unit. This component can do logical operations and also mathematical manipulations. The speed of the CPU is measured by (MHz).

b) RAM:

RAM stands Random Access Memory. This is a volatile memory (temporary). It is a Memory module on the motherboard containing microchips used to temporarily hold data and programs while the CPU processes both. Information in RAM is lost when the PC is turned off.

The data which is stored in the RAM will be removed time to time. The size of the RAM is measured by “Bytes”.

There are 2 types of RAM's. They are “SRAM”, “DRAM”.

Static RAM (SRAM): SRAM is costly when compared with Dynamic RAM (DRAM). The SRAM is not required refresh, to remove the data because by itself it can remove the data from it.

OR

SRAM chips can retain information without the need for refreshing, as long as the computer's power is on. They are more expensive than traditional DRAM.

Dynamic RAM (DRAM): The most common type of system memory, it requires refreshing every few Milliseconds. But its cost is low than the SRAM.

c) ROM:

ROM stands for Read Only Memory. The information is permanent in the ROM. It contains instruction (booting information) to start up the computer.

In another words ROM is a Chip that contain programming code and cannot be erased.

d) BIOS:

BIOS stand for “Basic Input and Output System”. BIOS is a software provided by the manufacturer (hardware). This software provides inter communication between devices such as keyboard to monitor and monitor to disk drives etc.

e) Expansion Slots:

A Personal computer has Expansion Slots of different shapes and sizes to support various types of expansion cards. Expansion Slots is used for to add new hardware components.

Some popular Expansion Slots are as follows:

- a. AGP(Accelerated Graphic Port)
- b. PCI (Peripheral Component Interconnect)
- c. CNR (Communication and Network Raiser)

f) BUS:

A BUS is a bunch of wires and is used to transmit the data from one device to another device .This bus is also known as PC-BUS.

g) Hard disk:

Hard disk is the secondary storage device, where we can store large volume of data permanently. The hard disk size is greater than the RAM. The hard disk consists components for reading and writing the data.

The inner components of a hard disk are as follows

- Plotters
- Spindle and spindle motor
- Read-write head

Plotters:

Generally any hard disk consists of two plotters and each plotter consists two sides. i.e. top and bottom. So the data will be stored in four sides.

o Spindle and Spindle Motor:

Spindle and Spindle Motor is used for rotating the hard disk for storing the data.

o Read-write head:

Read-write head is used for to read the data from the disk & to write the data into the disk.

h) SMPS:

SMPS stands for Switch Mode Power Supply. This takes the power from outside socket and provides the power supply to the all components in the system.

The primary function of SMPS is to convert AC to DC & to supply the DC to various parts of computer like mother board, HDD, CDROM, Floppy Drive etc.

i) Cards:

Cards are printed circuit boards and they will be inserted in expansion slots. The cards may be Printer adaptor card, LAN card etc.

Adapter boards or interface cards placed into expansion slots to expand the functions of a computer, allowing it to communicate with external devices such as monitors or speakers.

j) Modem:

Modem consists of two words. They are Modulator and Demodulator. Modulator accepts analogue signals from telephone lines and converts into digital signals. Similarly the demodulator converts digital signals to analogue signals.

k) Web Camera:

Web Camera is used to make the video and sends to destination using internet.

l) Speakers(Built In)

Every Computer system comes with a built in speaker. This speaker is used by the bios to generate the beep sounds.

ii) Out Side Components:

The following components are connected to the outside of the system.

- Monitor
- Keyboard
- Mouse
- Scanner
- Printer
- Speakers(External)

a) Monitor:

The most commonly used output device for displaying text and graphics on a computer. There are types of Monitors. They are, 1) CRT 2) LCD

CRT Monitor: In the CRT monitor (Cathode Ray Tube) the characters and graphics will be displayed using pixels. A pixel is a point on the screen. They will generate lots of heat.

LCD monitors (Liquid Crystal Display): Characters and graphics will be displayed using liquid technology. LCD's will generate low heat when compared to CRT monitors.

b) Keyboard:

It is a common input device through which data and instructions may be typed into computer memory.

A keyboard is a type writer like device which contains keys to enter the information to the system. Generally key boards are available in two models.

The standard model key board consists of 83 to 84 keys but the enhanced keyboard consists of 104 keys.

The keyboard consists of different types of keys such as type writer keys, numeric keys, functional keys, cursor control keys, caps lock key, shift key, back space key and alt keys, enter key, space bar key, page up key, page down key, home key and end key.

c) Mouse:

A mouse is a pointing and input device that allows the user to move a cursor around the screen and select items with the click button.

It is mainly of 2 types. They are Mechanical Mouse (Ball Mouse) & Optical Mouse.

A mouse which consists of a rubber ball is known as ball mouse. This ball is moving the pointer on the screen.

Optical Mice make use of one or more light-emitting diodes to detect movement relative to the underlying surface.

Now Wireless (Cordless) mice are also available, these mice are not connected physically to the computer. These will be worked using radio (including Bluetooth) signals.

d) Scanner:

A scanner is an input device which can scan images, printed text, handwriting or an object and converts it into digital images and sends it to the computer.

e) Printer:

A printer is an output device which prints any type of data on the paper. There are three types of printers,

- Dot Matrix printer
- Ink jet printer
- Laser printer

- **Dot matrix printer:**

This type of printer uses pins to print on the paper using ribbon cartridge.

- **Ink jet printer:**

This printer sprays ink on a sheet of paper. Ink jet printers produce high quality text and graphics. This printer can print 4 to 6 copies in a minute.

- **Laser printer:**

This type of printer uses fine powder called toner. This printer also produces high quality text and graphics on the paper.

f) Speakers (External):

These are used for listening lessons (or) music some systems are also consisting built-in speakers but the external speakers produce high sound.

System Unit:

A system unit is the most important part of a personal computer. A computer system unit is the case (Cabinet) with the mother board and all the parts.

The key board, mouse, monitors etc., are linked with the system unit through the cables at backside. System unit consists of three types of ways to connect the components. They are,

- i. Front side of the system unit
- ii. Back side of the system unit
- iii. Inside the system unit

i. Front Side of the System Unit:

The following components will come at the front side at the system unit.

a) Power Switch:

This is used to turn on (or) turn off the power to the PC

b) Reset button:

This button is used to restart the computer.

c) **Light:**

There are different lights will be displayed on the front panel of the system unit. If the system is on the light is also on. Like the system light, the remaining drives such as floppy disk drive and DVD drive are also consists light.

d) **Floppy disk drive:**

This drive is used for to read the data from floppy disk and write the data into the floppy disk.

e) **CD-ROM Drive:**

This is used for to read the data from CD and also to write the data on the CD. Similarly the current computer systems consists DVD drives for reading and writing the data on the DVD.

Back side of the System Unit:

The following components can be linked to the back side of the system unit.

- **Keyboard:** The key board consists round shape connector. The male connector key board has 8 pins and it is connected to female connector on the backside of the system unit.
- **Mouse:** The mouse connector shape is in D-shape. The male mouse connector has 9 pins and is connected to female connector on the backside of the system unit.
- **Monitor:** The monitor has D shape connectors, the male connector of the monitor ahs 15 pins and is connected to the female connector on the backside of the system unit.
- **Printer:** The printer can be connected at front side (or) backside. Generally the printer ports consists 25 pins. The male connector of the printer is connected to female connector of the system unit at backside. Now the printer connecting ports are also coming with USB ports. So the printer port can be connected at front side USB port (or) backside USB port.
- **Audio (or) Speakers:** The audio/speakers can also be connected at back port of the system unit.
- **Video:** In current days computers are also coming with video connectors. So we can attach audio (or) video devices like DVD player to the computer.
- **Modem:** The male modem connector has no pins. But it has plastic head in rectangle shape and is connected to the system.
- **Ethernet/Networking:** The Ethernet connection is used when two (or) more connections are needed to be linked on the network as LAN.
- **USB:** This stands of Universal Serial Bus which is latest and popular connector. We can insert the any type of devices to the computer using USB ports.

Classification of Computers:

Classification of Computers Based on type of Data:

- **Analog Computer**

“A computer that operates with numbers represented by directly measurable quantities (as voltages or rotations) .”

- **Digital Computer**

“A Computer works with numbers that are represented by the digits 0 and 1.”

- **Hybrid Computer**

“Hybrid Computers are computers that show features of analog computers and digital computers.”

The digital component normally serves as the controller and provides logical operations, while the analog component normally serves as a solver of differential equations.

Classification of Computers based on *Size & Processing Speed*:

- **Microcomputer**

“A microcomputer is a complete computer on a smaller scale and is generally a synonym for the more common term, personal computer (PC), a computer designed for an individual.”

A microcomputer contains a microprocessor (a central processing unit on a microchip), memory in the form of read-only memory and random access memory , I/O ports and a bus or system of interconnecting wires, housed in a unit that is usually called a motherboard .

- **Mini Computer**

“A mini computer is an intermediate between a microcomputer and a mainframe in size, speed, and capacity that can support time-sharing and that is often dedicated to a single application.”

- **Mainframe Computer**

“A Mainframe Computer is a data processing system working mainly in large organizations for various applications, including bulk data processing, process control, industry and consumer statistics, enterprise resource planning, and financial transaction processing.”

- **Super Computer**

“A supercomputer is a computer that performs at or near the currently highest operational rate for computers.” A supercomputer is typically used for scientific and engineering applications that must handle very large databases or do a great amount of computation (or both).

Classification of computer based on *Applications*:

- **General Purpose Computers**

“A computer is a general purpose device that can be programmed to carry out a set of arithmetic or logical operations.” General-purpose computers are designed to solve a large variety of problems. General-purpose computers can store large amount of data and the programmes necessary to process them.

- **Special Purpose Computers**

“Special purpose computers are designed to solve a specific problems; the computer programme for solving the problem is built right into the computer. “ Special purpose computers have many features of general-purpose computers but are designed to handle specific problems and

are not applied to other computerized activities. For example, special purpose computers may be designed to process only numeric data or to completely control automated manufacturing processes.

Peripheral Devices:

A **peripheral** is a device that is connected to a host computer, but not part of it. It expands the host's capabilities but does not form part of the core computer architecture. There are three different types of peripherals:

- ❖ **Input**, used to interact with, or send data to the computer (mouse, keyboards, etc.)
- ❖ **Output**, which provides output to the user from the computer (monitors, printers, etc.)
- ❖ **Storage**, which stores data processed by the computer (hard drives, flash drives, etc.)

Hardware:

The physical components of the computer are known as Hardware. For example, Motherboard, CPU, RAM, Hard Disk, Keyboard, Monitor etc.,

Software:

Software is a general term for the various kinds of programs used to operate computers and related devices. Software is classified into two types. They are

- System Software
- Application Software

System Software:

System software (or systems software) is computer software designed to operate and control the computer hardware and to provide a platform for running application software. System software includes the following:

- The operating system (prominent examples being z/OS, Microsoft Windows, Mac OS X and Linux), allows the parts of a computer to work together by performing tasks like transferring data between memory and disks or rendering output onto a display device. It also provides a platform to run high-level system software and application software.
- Utility software helps to analyze, configure, optimize and maintain the computer.
- Device drivers such as computer BIOS and device firmware provide basic functionality to operate and control the hardware connected to or built into the computer.
- A user interface "allows users to interact with a computer." Since the 1980s the graphical user interface (GUI) has been perhaps the most common user interface technology. The command-line interface is still a commonly used alternative.

Application Software:

Application software is all the computer software that causes a computer to perform useful tasks beyond the running of the computer itself. A specific instance of such software is called a software

application, program, application or app. Examples include accounting software, enterprise software, graphics software, media players, and office suites.

Number Systems (Binary, Octal, Hexadecimal):

1. Decimal number system: This is a base 10 number system having 10 digits from 0 to 9. This means that any numerical quantity can be represented using these 10 digits. Decimal number system is also a positional value system. This means that the value of digits will depend on its position.

For example, let three numbers, 734, 971 and 207. The value of 7 in all three numbers is different.

- In 734, value of 7 is 7 hundreds or 700 or 7×100 or 7×10^2
- In 971, value of 7 is 7 tens or 70 or 7×10 or 7×10^1
- In 207, value of 7 is 7 units or 7 or 7×1 or 7×10^0

The weightage of each position can be represented as follows:

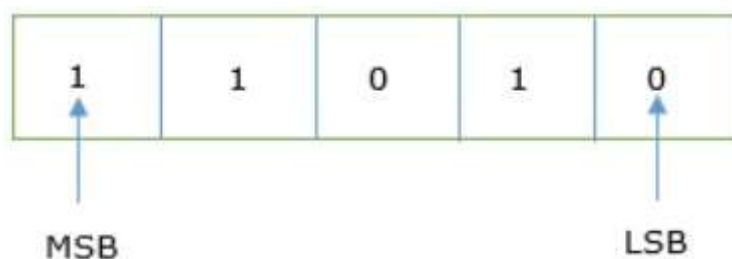
10^5	10^4	10^3	10^2	10^1	10^0
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2. Binary Number System: The easiest way to vary instructions through electric signals is two-state system: on and off. On is represented as 1 and off as 0, though 0 is not actually no signal but signal at a lower voltage. The number system having just these two digits – 0 and 1 – is called binary number system.

Each binary digit is also called a bit. Binary number system is also positional value system, where each digit has a value expressed in powers of 2, as displayed here.

2^5	2^4	2^3	2^2	2^1	2^0
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In any binary number, the rightmost digit is called **least significant bit (LSB)** and leftmost digit is called **most significant bit (MSB)**.



And decimal equivalent of this number is sum of product of each digit with its positional value.

$$\begin{aligned} 11010_2 &= 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 \\ &= 16 + 8 + 0 + 2 + 0 \\ &= 26_{10} \end{aligned}$$

Computer memory is measured in terms of how many bits it can store. Here is a chart for memory capacity conversion.

- 1 byte (B) = 8 bits
- 1 Kilobytes (KB) = 1024 bytes
- 1 Megabyte (MB) = 1024 KB
- 1 Gigabyte (GB) = 1024 MB
- 1 Terabyte (TB) = 1024 GB
- 1 Petabyte (PB) = 1024 TB
- 1 Exabyte (EB) = 1024 PB
- 1 Zettabyte = 1024 EB
- 1 Yottabyte (YB) = 1024 ZB
- 1 Geopbyte (GeB) = 1024 YB

3. Octal Number System:

Octal number system has eight digits – 0, 1, 2, 3, 4, 5, 6 and 7. Octal number system is also a positional value system with where each digit has its value expressed in powers of 8, as shown here:

8^5	8^4	8^3	8^2	8^1	8^0
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Decimal equivalent of any octal number is sum of product of each digit with its positional value.

$$\begin{aligned}726_8 &= 7 \times 8^2 + 2 \times 8^1 + 6 \times 8^0 \\&= 448 + 16 + 6 \\&= 470_{10}\end{aligned}$$

4. Hexadecimal Number System:

Hexadecimal number system has 16 symbols – 0 to 9 and A to F where A is equal to 10, B is equal to 11 and so on till F. Hexadecimal number system is also a positional value system with where each digit has its value expressed in powers of 16, as shown here:

16^5	16^4	16^3	16^2	16^1	16^0
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Decimal equivalent of any hexadecimal number is sum of product of each digit with its positional value.

$$\begin{aligned}27FB_{16} &= 2 \times 16^3 + 7 \times 16^2 + 15 \times 16^1 + 10 \times 16^0 \\&= 8192 + 1792 + 240 + 10 \\&= 10234_{10}\end{aligned}$$
