Computer : An electronic device that can accept data from the user process it and gives the desired result according to the instruction given by the user

The characteristic of computers:

Speed: Computer can manipulate a large amount of data in fractions of a second. The speed of a computer is much faster than a person handling that operation. The speed of a computer is closely related to the amount of data it must process.

Storage capacity: Computer systems can have unlimited capacity to store the data and also instant recall of stored data.

Accuracy: The computer processes the data accurately as well as quickly. Computers rarely make mistakes and can perform all kinds of complex computation accurately.

Reliability: Computer systems are particularly adept at repetitive tasks as they do not take break or any complaints. They are capable of operating under the worst conditions for extended period of time.

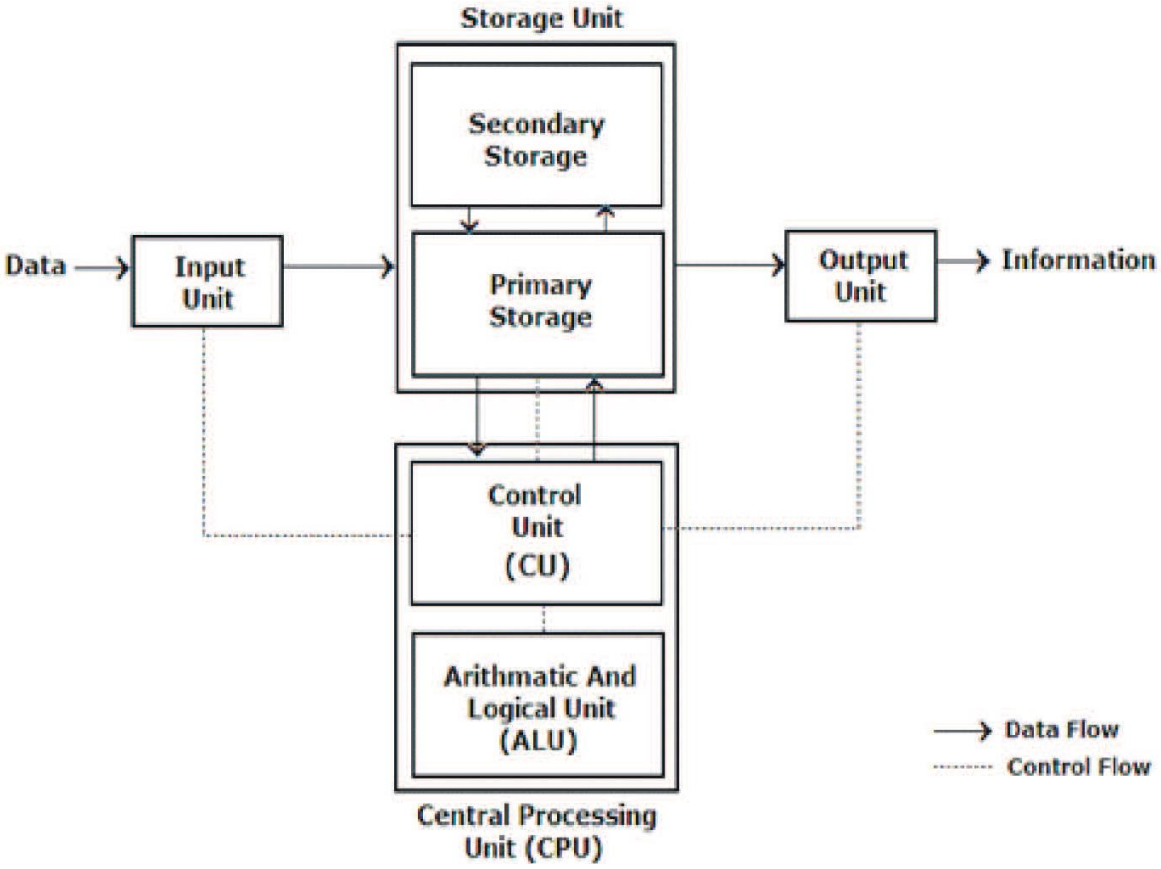
Intangible benefits: There are many companies that utilize the systems for flexibility, ability to growth and give the competitive edge for attracting customers.

Reduced cost: Compared to olden days the cost of computer system reduced a lot.

Data: Data is basic element of computer system and it can be defined as **collection of facts, figures or statistics which can be processed to produce useful information. Ex. 1245**
The term **information** means identifying the data so it can be defined **as processed data with some definite meaning**. It represents facts, figures or statistics which have proper meaning. Ex Roll Num=1245
Hardware : The physical parts of a computer that can see and touch

Software
Software, simply are the computer programs. The instructions given to the computer in the form of a program is called Software. Software is the set of programs, which are used for different purposes. All the programs used in computer to perform specific task is called Software.
Types of software
1. **System software:**
a) Operating System Software
DOS, Windows XP, Windows Vista, Unix/Linux, MAC/OS X etc.
b) Utility Software
Windows Explorer (File/Folder Management), Compression Tool, Anti-Virus Utilities, Disk Defragmentation, Disk Clean, BackUp, WinZip, WinRAR etc…
c) Language Processors
Compiler, Interpreter and Assembler
2. **Application software:**
a) Package Software
Ms. Office 2003, Ms. Office 2007, Macromedia (Dreamweaver, Flash, Freehand), Adobe (PageMaker, PhotoShop)
b) Tailored or Custom Software
School Management system, Inventory Management System, Payroll system, financial system

etc.
Functional components of a computer



A computer is designed using 4 basic units. They are

1) Input unit
2) Central processing Unit (CPU)
   a) Control Unit b) Arithmetic Unit c) Registers
3) Memory Unit
4) Output Unit

1) Input unit: This is used to feed data & information into the computer. It is connected to the system unit. The input unit may consist of one or more input device. The keyboard and mouse of a computer is the commonly used input device. Other input devices are light pen, Joystick, touch panel, digital camera etc.

2) CPU: The CPU stands for central processing unit. It is the heart and brain of the computer system. The data and instructions feed by the user are processed in this unit. The CPU consists three major units i.e., control unit, arithmetic logic unit and registers.

The control unit is an important unit in a computer. It controls and co-ordinate all the activities of the computer system. It carries out four basic operations.

a) Fetches an instruction.
b) Decodes the instructions.
c) Execute the instructions.
d) Stores the data.

It sends the control and timing signals to various units of a computer to co-ordinate for a specific operation.

The arithmetic and logic unit performs all arithmetic operations such as addition, subtraction, multiplication division & modules operation. It also performs logical operations such as AND, OR & NOT and relation operations like < >, <=,>= are being carried out in this unit.

The CPU consists of a numbers of temporary storage units, which are used t store instructions and intermediate data, which may be generated during processing these units are called as registers.

3) Memory Unit: It is used to store the data & instructions fed by the user. The computer memory is measured in terms of bytes & words. A bit is a binary digit. A byte is a basic unit of memory and defined as sequence of 8 bits. A word can be defined as sequence of 16 bits or 2 bytes.

The computer memory is classified into

i) Main memory (RAM)
ii) Secondary memory (ROM)
iii) Cache memory

Main memory is a primary memory which holds data & instructions supplied by the user. This memory is a temporary memory that holds data instruction till the power supply lost.

Secondary memory is permanent memory which holds data and instructions as long as the user wants.

Cache memory is a high speed memory that comes in b/w the CPU & main memory. Unlike the main & secondary memory the user cannot access the cache memory.

4) Output Unit: It is used to print & display the results which are stored in the main memory unit. Monitor is the commonly used output device. Other output devices are printers, plotters, speakers etc.

Evolution of computers

Abacus is a first tool used for calculation which gave the motivation to develop a machine to perform calculations. This device allows the users to make computations using a system of sliding beads arranged on a rack.

Napier's bones: It was invented by John Napier as a aid to multiplication . A set of bones consisted of nine rods one for each digit 1 through 9 and constant rod for digit 0

William Oughtred in 1625invented a slide rule based on Napier's ideas about logarithms to do multiplication quickly and easily

Pascaline is the first mechanical adding machine invented by Blaise Pascal in 1642. This device used a base of ten to perform calculations.

In 1694, a German mathematician and philosopher, Gottfried Wilhem Von Leibniz, improved the Pascaline by creating a machine that could also multiply. It is worked by a system of gears and dials.

An English Mathematician professor, Charles Babbage designed a machine to perform differential equations which is called Difference Engine. It is very large in size and powered by steam. It could perform calculations and print the results automatically.

He worked on difference engine for 10 years and developed the first general purpose computer which he called the Analytical Engine. Babbage's analytical engine has a great significance in the history of computers because it had in its design all the fundamental concepts of the model digital computers. Due to this reason **Charles Babbage is known as the father of computers. Ada Lovelace** worked on Babbage's analytical engine and she developed a algorithm so she is known a **first programmer**

In early 19th century a French man Joseph Marie Jacquard invented a loom that used punched cards. These cards are used to transmit information to and from computers. The **punched card** considered as **first read only memory.**

Herman Hollerith, an American inventor also applied the Jacquard loom concept to computing. Hollerith's method used cards to store data and information, which he fed into a machine that compiled the results automatically. He started a company called Tabulating Machine Company in 1896 and later in 1924 it become IBM

During the early 20th century IBM (International Business Machine) and other manufacturers produce a variety of computing devices for business use. The best of these devices was all electronic calculator by 1944 named as Mark I by Howard H Aiken. This computer is used for the purpose of creating charts for U.S.Navy.

Generation of computer: The generation means a step of advancement. We have total 5 different generation

First generation of computer (1940-1956)

The important features are,

1) **Vacuum tubes** were used for internal operations.

2) Magnetic drums were used for memory.

3) Punched cards were used for input and output.

4) Low level languages were used for programming.

5) Processing speed was very slow.

6) It was very expensive.

7) The system was not very powerful.

8) The system was huge and non portable.

9) It did not have much memory.

The some important computers of this generation: Howard Aiken's Mark I gave the idea of modern computers in the first generation computers.

Another computer development was Electronic Numerical Integrator and Computer (ENIAC) produced by U.S. Govt and the University of Pennsylvania. ENIAC was developed by John Presper Eckert and John W Mauchly which was faster than Mark I. ENIAC was general purpose computer. It is the first electronic computer. It consisted 18,000 vaccum tubes, 70,000 resistors and 5 million soldered joints.

John Von Neumann designed Electronic Discrete Variable Automatic Computer (EDVAC).

In 1951 UNIVAC (UNIVersal Automatic Computer) built by Ramington Rand, became one of the first commercially available computers.

Second generation computers(1956-1963)

The Characteristic features of second generation computers are,

1) **Transistors** were used for internal operations.

2) Magnetic core was used as main memory.

3) Magnetic tapes and disks were used for secondary memory.

4) High level languages were used for developing programs.

5) The systems were faster, more powerful, more reliable, cheaper, smaller in overall size and had memory.
During this generation development of COBOL (Common Business Oriented Language) and FORTRAN (Formula Translator) is took place

Third generation computers(1964-1971)

The important features of third generation computers are,

1) **Integrated circuits** were used for internal operations.

2) Minicomputers were introduced.

3) Development was seen in software.

4) The computers were able to reduce computational time from milli seconds to micro seconds.

5) Maintenance cost was low.

6) Systems were totally general purpose and used for many applications.

7) The systems were faster, more powerful, more reliable, cheaper, smaller in overall size and had more memory.
The IC(integrated circuits) are developed by Jack Kilby

Fourth generation computers(1971 to present)

The important characteristic features of fourth generation computers are,

1) More circuits on chips LSI, VLSI.

2) **Introduction of microprocessors**.

3) Personal computers and microcomputers which were affordable was available to the common man

4) Use of chips for memory.

5) The cost of assembling reduced to great extent.

6) Easily portable because of their small size.

7) Hardware failures were negligible.

8) The systems were faster, more powerful, more reliable, cheaper, smaller in overall size and had more memory.

6) Training programs in business and various organization use computer based training to train the people on procedures and techniques they need to know.

Fifth Generation (present and beyond)
These computers works based on artificial intelligence. This generation still in development stage
Characteristics

1. Development of storage technology
2. Advancement in network technolog
3. Computers are more intelligent
4. Concept of parallel computation
5. Concept of VVLSI is developed
6. Systems are faster , reliable

Classification of computer
We classify the computers in to different type based on

1) Size & capabilities :- Micro , Mini , Mainframe , Super
2) Construction and working principle :- Analog , Digital , Hybrid
3) Usage : special Purpose , general Purpose
4) Number of micro processors :- Sequential , Parallel

A. On the basis of working principle

a) Analog Computer

An analog computer is a form of computer that uses *continuous* physical phenomena such as electrical, mechanical, or hydraulic quantities to model the problem being solved.

Eg: Thermometer, Speedometer, Petrol pump indicator, Multimeter

b) Digital Computer

A computer that performs calculations and logical operations with quantities represented as digits, usually in the binary number system (0 and 1).They gives the result accurate and faster

c) Hybrid Computer (Analog + Digital)

A combination of computers those are capable of inputting and outputting in both digital and analog signals. A hybrid computer system setup offers a cost effective method of performing complex simulations. The instruments used in medical science lies in this category. Ex. BP monitoring unit , ECG

B. On the basis of Size

a) Super Computer

The fastest type of computer, introduced in 1980. Supercomputers are very expensive and are employed for specialized applications that require immense amounts of mathematical calculations. These computers are large in size

Uses of super computer

weather forecasting requires a supercomputer. Other uses of supercomputers include animated graphics, fluid dynamic calculations, nuclear energy research, and petroleum exploration.

Ex. Tata's Eka in Pune's Computational Research Laboratories (CRL)

Param

b) Mainframe Computer

A very large and expensive computer capable of supporting hundreds, or even thousands, of users simultaneously. This computer is introduced in 1975 In the hierarchy that starts with a simple microprocessor (in watches, for example) at the bottom and moves to supercomputers at the top, mainframes are just below supercomputers. In some ways, mainframes are more powerful than supercomputers because they support more simultaneous programs. But supercomputers can execute a single program faster than a mainframe..

Use of Mainframe :

In Airline for ticket reservation system

c) Mini Computer

A midsized computer introduced in 1960. In size and power, minicomputers lie between *workstations* and *main frames*. In general, a minicomputer is a multiprocessing system capable of supporting from 4 to about 200 users simultaneously. Generally, servers are comes in this category.

d) Micro Computer

This is also called as personnel computer, is introduced in 1970. It contain one or two processor . It can be categorized as

i. **Desktop Computer:** a personal or micro computer sufficient to fit on a desk, or table

ii. **Laptop Computer:** a portable computer complete with an integrated screen and keyboard. It is generally smaller in size than a desktop computer and larger than a notebook computer.

iii. **Palmtop Computer/Digital Diary /Notebook /PDAs:** a hand-sized computer. Palmtops have no keyboard but the screen serves both as an input and output device.

Applications of computer

A) Education

1) Computers are used as teaching tool for the students.

2) Computer is treated as a subject for the learners.

3) Internet helped the students as information bank to understand the concept or research their assignment.

4) Using internet and telecommunication, students can avail the facility of distance education and complete their degrees or courses of far universities sitting at home.

5) Computers are used as special device for the special learners, so that they also can experience learning capability.

B) industry

1) Computers are used in all industries where products are designed and manufactured.

2) Computer Aided Design (CAD) is used to develop products, computer aided manufacturing is used to produce them (CAM).

3) Almost all companies and factories are populated by computers used for many applications including inventory control, planning and process control etc.

4) Computers are also used to run robots that create, finish, assemble and test products their components.

5) Computers are used to visualize what a building's design will really look like.

6) Training programs in business and various organization use computer based training to train the people on procedures and techniques they need to know.

C) science and engineering.

1) Powerful computers are used to simulate dynamic processes in the practice of science and engineering.

2) Super computers have numerous applications in Chemistry, Physics and structured programming and weather forecasting.

3) Physician use computers to understand the human body and to diagnose disorders.

4) Used in satellite launching and adjust the relay signals from one point to another

5) Used in Astronomy.

6) Used in virtual reality concept.

7) Simulation of dangerous experiments.

8) Robots were developed to assist human beings to perform many experiments.

D) Business

1) Online shopping (E Commerce)

2) Trading the stock and shares sitting in the home

3) Online banking

4) Desk Top Publication (DTP)

E) Communication

1) In teleconferencing to discuss on line

2) E Mail facility allow people come together globally

3) Used as switching element in telephone exchange

4) Used in satellite communication

5) Voice mail service

F) Entertainment and multimedia

1) To play games

2) To create special effect in movie

3) Develop cartoon network

4) Edit the photo

5) Record and edit music

G) Hospital

1) To maintain patients detail

2) To diagnose the problem

H) Travel

1) To navigate the path

2) To reserve car lodge

I) Government

1) All the transaction and detail of the government is updated in net for quick communication and to provide e-government

J) Bank

1) To do the transaction

2) ATM (Automatic Teller Machine)

3) Online fund transfer