
INTRODUCTION TO COMPUTER

COMPUTER AS A SYSTEM

- A system is a group of integrated parts having a common purpose of achieving some objectives.
- It has the following characteristics:
 1. A system has more than one element.
 2. All the elements of the system are related logically.
 3. All system elements are controlled in a proper manner to achieve the system goal.
- As a computer has more than one components (like input unit, output unit, storage unit and CPU), which work together to perform the steps called for in an executing program, it is a system.
- Input and output units cannot function until they accept signal from the Central Processing Unit (CPU). Similarly CPU or Storage unit has no use in alone.
- All the components of computer are controlled in a proper manner to achieve the goal. Consequently, we refer to a computer as a system.

Note: All of the components of a computer system can be summarized with the simple equations.

Computer System = Hardware Software+ User

- **Hardware** = Internal Devices + Peripheral Devices.
Hardware refers to the parts of a computer that you can see and touch, including the case and everything inside it.
- **Software** = Programs
- Software gives "intelligence" to the computer.
- Computer software, or just software, is a collection of computer programs and related data that provide the instructions for telling a computer what to do and how to do it.
- In other words, software is a conceptual entity which is a set of computer programs, procedures, and associated documentation concerned with the operation of a data processing system.
- **User** = Person, who operates computer.

NECESSITY AND USES OF COMPUTER

- Today, a computer is a necessary electronic device which helps us in different ways, like developing software, going on internet, E-learning, listening music, watching videos, designing, page-making, gaming, social-networking and much more.
- Computers have become indispensable in today's world. This revolutionary technology is indeed a benefit to the human race.

LET US TAKE A LOOK AT SOME OF USES OF COMPUTERS

1. Word Processing

2. Desktop Publishing
3. Animation
4. Watching Videos
5. Mathematical Calculations
6. Internet
7. E-Learning (Online Learning)
8. E Banking (Online banking)
9. E- Commerce (Online Business)
10. E-Shopping (Online Shopping)
11. Online Examinations and Results
12. Email
13. Banking Transactions
14. Booking all kind of tickets (e.g. Air, Railway, Bus, Taxi, Movie, Hotel, etc.)
15. Social networking
16. Diagnose Diseases
17. Telecommunications
18. Defense
19. Matrimony
20. News
21. Robotics
22. Electronic Gadgets
23. Planning and Scheduling
24. Gaming
25. Weather analysis

CHARACTERISTICS OF COMPUTER

AUTOMATIC (SPONTANEOUS)

- The computers are automatic. It may execute the process without any involvement of user once they are assigned to a work. Once the data or instruction are fetched from the secondary devices such as optical disks, hard disks etc. Immediately they get stored into RAM (primary memory) and then sequentially they get executed.

ACCURACY (AUTHENTICITY)

- The degree of accuracy of computer is very high and every calculation is performed with the same accuracy. The accuracy level is determined on the basis of design of computer.

SPEED (CELERITY)

- As you know computer can work very fast. It takes only few seconds for calculations that we take hours to complete. Computer can perform millions (1,000,000) of instructions and even more per second. The computer present in the modern world has the speed of Nano and Pico second.

NOTE:

1 milli second = 1×10^{-3} second

1 micro second = 1×10^{-6} second

1 nano second = 1×10^{-9} second

1 pico second = 1×10^{-12} second

DILIGENCE (ATTENTIVENESS)

- A computer is free from tiredness, lack of concentration, fatigue, etc. It can work for hours without creating any error. If millions of calculations formed, a computer will perform every with the same accuracy. Due to this capability it overpowers human being in routine type of work.

MEMORY (STOREHOUSE)

- A computer can store huge amount of data / information and retrieve any piece of this information whenever required. Secondary storage devices are the key for the data storage. They store the data for which the user wants to retrieve these data for future use. The examples for various secondary devices are Floppy disk, Optical disks (CD and DVD), Zip drives, Thumb drives etc. The data of smaller size can be easily fetched and they can be copied to the primary memory (RAM).

RELIABILITY (CONSISTENCY)

- A computer is reliable, dependent and can be run for many years without loss of data.

VERSATILITY (ADAPTABILITY)

- It means the capacity to perform completely different type of work. You may use your computer to prepare payroll slips. Next moment you may use it for inventory management or to prepare electric bills.

NO I.Q.

- A computer cannot take its own decisions, and has to be instructed what to do and in what sequence. It has no I.Q. For this reason, only a user determines what takes a computer will execute.

NO FEELINGS

- A computer cannot make judgments based on feelings and instincts, because it is a machine. It is devoid of emotions. A Computer has memory but no computer possesses the equivalent of a human heart and soul. It makes judgments based on the instructions given to them in the forof programs that are written by human being.

TYPES OF COMPUTER BASED ON ELECTRONIC SIGNAL

- Differences in certain computer characteristics have led to the development of major computer classifications based on the type of electronic signal and memory size. Computers, in general are of three types as per the electronic signal they transmit.
 1. Analog Computers
 2. Digital Computers
 3. Hybrid Computers

ANALOG COMPUTER

- Analog Computer is a computing device that works on continuous range of values.
- The results given by the analog computers will only be approximate since they deal with quantities that vary continuously.
- It generally deals with physical variables such as voltage, pressure, temperature, speed, etc. An analog computer operates on inputs continuously varying electrical voltages. A example of the use of an electronic an computer is that of controlling a flight simulator for training pilots. The computer responds to the cockpit simulator control movements made by the pilot and makes physical changes in the environment so that the pilot feels as if he is controlling an actual aeroplane.
- Analog computers are used mainly in scientific design and production environments. Each one has to be constructed to do a specific job and will respond very quickly to changes in the measurement of inputs.

DIGITAL COMPUTER

- On the other hand a digital computer operates on digital data such as numbers. It uses binary number system in which there are only two digits 0 and 1. Each one is called a bit.
- The digital computer is designed using digital circuits in which there are two levels for an input or output signal. These two levels are known as logic 0 and logic 1. Digital Computers can give more accurate and faster results.
- Digital computer is well suited for solving complex problems in engineering and technology. Hence digital computers have an increasing use in the field of design, research and data processing.

Based on the purpose, Digital computers can be further classified as,

1. General Purpose Computers General purpose computers are used for any type of applications. They can store different programs and do the jobs as per the instructions specified on those programs. Most of the computers that we see today are general purpose computers.
2. Special Purpose Computers- Special purpose computer is one that is built for a specific application.

HYBRID COMPUTERS

- Hybrid computers are computers that exhibit 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.

- It is mostly used for automatic operations of complicated physical processes and machines. Now-a-days analog-to-digital and digital-to- analog converters are used for transforming the data into suitable form for either type of computation.
- This type of computer operates by counting as well as by measuring. In other words, the output can be either in the form of numbers or required units of measurement, e.g., an analog device measures patient's heart beat (ECG). These measures will be converted into digital form and a digital device checks for any abnormality. Further, we can also input digital data like your marks and get digital results like the result of your class. Another example is a Modem. (Which converts the digital signals into analog, carry it along the line and at the receiving end again changes it back into digital signal).

TYPES OF COMPUTER BASED ON CONFIGURATION AND SIZE

- There are four different types of computers we classify them based on their performance, capacity and size.

These are,

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

- A supercomputer is focused on performing tasks involving intense numerical calculations such as weather forecasting, fluid dynamics, nuclear simulations, theoretical astrophysics and complex scientific computations.
- A supercomputer is a computer that is at the frontline of current processing capacity particularly speed of calculation.
- **Examples of Super Computer:** PARAM 8000, Cray-1, PARAM Yuva. EKA SAGA-220, IBM Roadrunner, Cray Jaguar, Tianhe-IA, Fujitsu K computer, IBM Sequoia.

SUPERCOMPUTERS OF INDIA (INDI'A RANK IN TOP500 IN WOLRD)

Rank	Site	Name
71	Indian Institute of Tropical Meteorology	PRITHVI(iDataPlex DX360M4)
131	Centre for Development of Advanced Computing	PARAM Yuva – II
149	Indian Institute of technology Kanpur	Cluster Platform SL230s Gen8
155	CSIR Centre for Mathematical Modelling and Computer Simulation	Cluster Platform 3000 BL460c Gen8
163	National Centre for Medium Range Weather Forecasting	iDataPlex DX360M4
167	IT Services Provider	Cluster Platform SL250s Gen8
206	Network Company	Cluster Platform 3000 BL460c

		Gen8
219	IT Services Provider	Cluster Platform SL210T
346	Vikram Sarabhai Space Centre, ISRO	SAGA – Z24XX/SL390s Cluster

- The India Government has proposed to commit 2.5 billion USD to supercomputing research during the 12th five-year plan period (2012-2017). The project will be handled by Indian Institute of Science (IISc), Bangalore.

TOP 10 SUPER COMPUTER OF WORLD AS ON 2015

Rank	System	Manufactured Company	Country	Year	Memory	Cores	Speed
1	Tianhe-2	Sun Yat-sen University	China	2013	1,024,000 GB	3,120,000	33.86
2	Titan	Oak Ridge National Laboratory(Cray)	USA	2012	710,144 GB	560,640	17.59
3	Sequoia	IBM	USA	2012	1,572,864 GB	1,572,864	16.32
4	K computer	Fujiter	Japan	2011	1,410,048 GB	705,024	10.51
5	Mira	IBM	USA	2010	-	786,432	8.59
6	Piz Daint	Cray Inc.	Switzerland	2009	-	115,984	6.2
7	Stampede	Dell	USA	2008	192,192 GB	462,462	5.2
8	JUQUEEN	IBM	Germany	2007	458,752 GB	458,752	5
9	Vulcan	IBM	USA	2005	393,216 GB	393,216	4.3
10	Cray XC30#	Cray Inc	USA	2014	-	225,984	3.1

- In this Table 'year' represents the manufacturing year of that super computer.
- All the above Super computers have Linux Operating system.
- The above star mark(*) represents speed RMAX in petaFLOPS. (1 petaFLOPS = 10¹⁵ FLOPS)
- # refers to Cray XC30, Intel Xeon E5-2697V2 12C 2.7GHZ, Aries Interconnect

MAINFRAME COMPUTERS

- Mainframe computers (referred to as "big iron") are powerful computers used primarily by corporate and governmental organizations for critical applications, bulk data processing such as census, industry and consumer statistics, enterprise resource planning, and transaction processing.
- A mainframe computer is a large, powerful computer that handles the processing for many users simultaneously (up to several hundred users).
- **Examples of Mainframe Computer** : IBM 360 370, IBM zSeries, System z9 and System z10, Unisys Dorado, Unisys Libra.

MINI COMPUTERS

- The word "minicomputer (referred to as "mini") is a term for a class of smaller computers that evolved in the mid-1960s.
- Mini computers are lower to mainframe computers in terms of speed and storage capacity. They are also less expensive than mainframe computers. Some of the features of mainframes will not be available in mini computers. Hence, their performance also will be less than that of mainframes.
- **Examples of Mini Computers:** Control Data's CDC 160A and CDC 1700, Hewlett-Packard -HP 3000 series, HP 2100 series, HP1000 series, IBM midrange computers, Prime Computer Prime 50 series, SDS SDS-92, SEL, one of the first 32-bit real-time computer system manufacturers, K-202, first Polish minicomputer and probably first personal computer

MICRO COMPUTERS

- A microcomputer is a computer that has a microprocessor chip as its CPU.
- The term "microcomputer" was introduced with the advent of single chip microprocessors. The term "microcomputer" itself is now practically an anachronism.
- They are often called personal computers because they are designed to be used by one person at a time. Personal computers are the most common type of computers used at home, at school, or at workplace.
- Popular uses for microcomputers include word processing, surfing the web, sending and receiving e-mail, spreadsheet calculations, database management, editing photographs, creating graphics, and playing music or games.
- Examples of Micro Computer Desktop Computer, Laptop, Notebook, Tablet computer Smartphone, Palmtop, Handheld Computer PDA (Personal Digital Assistant)

Type	Description
Server	Server usually refers to a computer that is dedicated to providing a service. For example, a computer dedicated to a database may be called a "database server" "File servers" manage a large collection of computer files. "Web servers" process web pages and web applications. Many smaller servers are actually personal computers that have been dedicated to providing services for other computers
Workstations	Workstations are computers that are intended to serve one user and may contain special hardware enhancements not found on a personal computer

Information appliances	Information appliances are computers specially designed to perform a specific user-friendly function-such as playing music, photography, or editing text. The term is most commonly applied to mobile devices though there are also portable and desktop devices of this class.
Embedded computers	Embedded computers are computers that are a part of a machine or device. Embedded computers generally execute a program that is stored in non-volatile memory and is only intended to operate a specific machine or device. Embedded computers are very common.

PERSONAL COMPUTER

- A personal computer (PC) is any general-purpose computer whose size, capabilities, and original sales price make it useful for individuals.
- It can be defined as a small, relatively inexpensive computer designed for an individual user.
- Software applications for personal computers include, but are not limited to, word processing, spreadsheets, databases, Web browsers and e-mail clients, digital media playback, games, and countless personal productivity and special-purpose software applications.
- Modern personal computers often have connections to the Internet, allowing access to the World Wide Web and a wide range of other resources. Personal computers may be connected to a local area network (LAN), either by a cable or a wireless connection.
- A personal computer may be a desktop computer or a laptop, tablet, or a handheld PC.

TYPES OF PERSONAL COMPUTERS

- Computers range in size and capability. At one end of the scale are supercomputers very large computers with thousands of linked microprocessors that perform extremely complex calculations. At the other end are tiny computers embedded in cars, TVs, stereo systems, calculators, and appliances. These computers are built to perform a limited number of tasks.
- The personal computer, or PC, is designed to be used by one person at a time. This section describes the various kinds of personal computers: Desktop, Laptop, Notebook, Ultrabook, Handheld Computer, Smartphone and Tablet PCs.

DESKTOP COMPUTER

- Desktop computers are designed for use at the top of a desk or table.
- They are typically larger and more powerful than other types of personal computers.
- Desktop computers are made up of separate components. The main component, called the system unit, is usually a rectangular case that sits on or underneath a desk. Other components, such as the monitor, mouse, and keyboard, connect to the system unit.

LAPTOP, NOTEBOOK & ULTRABOOK

DIFFERENCE BETWEEN LAPTOP AND NOTEBOOK

Laptop	Notebook
<ul style="list-style-type: none">Laptop computers are larger than Notebook computers.	<ul style="list-style-type: none">Notebook computers are smaller than Laptop computers.
<ul style="list-style-type: none">It has optical drives, USB ports.	<ul style="list-style-type: none">It does not have optical drives, but instead provides communication ports (like USB ports) so that an external drive can be connected
<ul style="list-style-type: none">It is thicker than notebook	<ul style="list-style-type: none">It is thinner than laptop
<ul style="list-style-type: none">It is expensive than notebook	<ul style="list-style-type: none">It is cheaper than laptop.

- Laptop computers are lightweight mobile PCs with a thin screen. Laptops can operate on batteries, so you can take them anywhere. Unlike desktops, laptops combine the CPU, screen, and keyboard in a single case. The screen folds down onto the keyboard when not in use.
- An Ultrabook is a computer in a category of higher-end thin and lightweight ultraportable laptops, defined by a specification from Intel. The name Ultrabook is an Intel trademark. Because of their minimal size, the ability to have many ports (USB, HDMI, VGA, Ethernet, etc.) is limited.
- Small notebooks PCs are small, affordable laptops that are designed to perform a limited number of tasks. They're usually less powerful than a laptop so they're used mainly to browse the web and check e-mail.

HANDHELD PC / PALMTOP / PDAS (PERSONAL DIGITAL ASSISTANTS)

PALMTOP - A SMALL COMPUTER THAT LITERALLY FITS IN YOUR PALM

- Handheld computers, also called personal digital assistants (PDAs), are battery-powered computers small enough to carry almost anywhere. Although not as powerful as desktops or laptops, handheld computers are useful for scheduling appointments storing addresses and phone numbers, and Handheld computer (Left), Stylus (Right) playing games. Some have more advanced capabilities, such as making telephone calls or accessing the Internet. Instead of keyboard handheld computers have touch screen that you use with your finger or a stylus (a pen shaped pointing tool).

SMARTPHONE

- Smartphones are mobile phones that have some of the same capabilities as a computer, You can use a Smartphone to make telephone calls, access the Internet, organize contact information, send a mail and text messages, play games and take pictures. Smartphones usually have a keyboard and a large screen.

TABLET PCS

- A tablet computer, or a tablet, is a mobile computer, larger than a mobile phone or personal digital assistant, integrated into a flat touch screen and primarily operated by touching the screen rather than using a physical keyboard. It often uses an onscreen virtual keyboard, a passive stylus pen, or a digital pen. Some Tablet PCs are "convertibles" with a screen that swivels and unfolds to reveal a keyboard underneath.

COMPONENTS OF DESKTOP COMPUTER

- **Monitor** - A monitor displays information in visual form, using text and graphics
- **Keyboard** - A keyboard is used mainly for typing text into your computer
- **Mouse** A mouse is a small device used to point to and select items on your computer screen.
- **System Unit** -A system unit is the enclosure that contains the main components of a computer

SYSTEM UNIT-COMPONENTS

- **Motherboard**- The motherboard, also referred to as system-board or main-board, is the primary circuit board within a personal computer.
- **CPU** The Central Processing Unit (CPU) is that part of a computer which executes software program instructions. CPU is known as the Brain of the Computer. All the computations are really performed by Central Processing Unit (CPU).
- **RAM (Random Access Memory)** - RAM is known as Primary Storage/Memory. Random access memory (RAM) is a form of computer data storage
DRAM (Dynamic RAM)- (e.g., DDR SDRAM) SRAM (Static RAM)
- **ROM (Read only memory)** -Read-only memory (ROM) is a class of storage medium used in computers and other electronic devices. ROM chips contain data, instructions or information that is recorded permanently. ROM contains the basic input/output system, which is a structure of instructions the computer follows to load the operating system and other files when you first turn on the computer.
PROM Programmable read-only memory
EPROM - Erasable programmable read-only memory
EEPROM -Electrically erasable programmable read-only memory
- **Hard-disk** Mass storage devices store programs and data even when the power is off they do require power to perform read and write functions during usage
- Floppy disk drive, CD and DVD ROM drive
- SMPS - Switched- mode Power supply