***Introduction to Computers***

**What is Computer:**

Computer is an electronic machine. “Computer” is derived from the **Latin “compute”**. Which signifies, “A Machine that can make Calculation” signifies a machine that can do any kind of computation. Under the immediate words, the Computer is made out of “Compute” which signifies, “Calculate”. Thusly, Computers are a computing machine.

 **OR**

A computer is an electronic device, operating under the control of instructions stored in its own memory that can accept data (input), process the data according to specified rules, produce information (output), and store the information for future use.

 **OR**

An electronic device that stores, retrieves, and processes data, and can be programmed with instructions. A computer is composed of hardware and software, and can exist in a variety of sizes and configurations.

Computer **hardware** is the collection of physical elements that constitutes a computer system. Computer hardware refers to the physical parts or components of a computer such as the monitor, mouse, keyboard, computer data storage, hard drive disk (HDD), system unit (graphic cards, sound cards, memory, motherboard and chips), etc. all of which are physical objects that can be touched.

The **software** is the instructions that makes the computer work. Software, also called a program, consists of a series of related instructions, organized for a common purpose, that tells the computer what tasks to perform and how to perform them. Software can be divided into two categories: system software and application software.

**Data, Information and Knowledge:**

**Data:** Facts and figures which relay something specific, but which are not organized in any way and which provide no further information regarding patterns, context, etc. So data means "unstructured facts and figures."

**Information:** For data to become information, it must be contextualized, categorized, calculated and condensed. Information thus paints a bigger picture; it is data with relevance and purpose. Essentially information is found "in answers to questions that begin with such words as who, what, where, when, and how many".

**Knowledge:** Knowledge is closely linked to doing and implies know-how and understanding. The knowledge possessed by each individual is a product of his experience, and encompasses the norms by which he evaluates new inputs from his surroundings.

**Characteristics of Computers:**

Speed, accuracy, diligence, storage capability and versatility are some of the key characteristics of a computer. A brief overview of these characteristics are

• **Speed:** The computer can process data very fast, at the rate of millions of instructions per second. Some calculations that would have taken hours and days to complete otherwise, can be completed in a few seconds using the computer. For example, calculation and generation of salary slips of thousands of employees of an organization, weather forecasting that requires analysis of a large amount of data related to temperature, pressure and humidity of various places, etc.

• **Accuracy:** Computer provides a high degree of accuracy. For example, the computer can accurately give the result of division of any two numbers up to 10 decimal places.

 • **Diligence:** When used for a longer period of time, the computer does not get tired or fatigued. It can perform long and complex calculations with the same speed and accuracy from the start till the end.

• **Storage Capability:** Large volumes of data and information can be stored in the computer and also retrieved whenever required. A limited amount of data can be stored, temporarily, in the primary memory. Secondary storage devices like floppy disks, compact disks and hard disks can store a large amount of data permanently.

 • **Versatility:** Computer is versatile in nature. It can perform different types of tasks with the same ease. At one moment you can use the computer to prepare a letter document and in the next moment you may play music or print a document.

**Advantages of Computers:**

**Speed:** When data, instructions, and information flow along electronic circuits in a computer, they travel at incredibly fast speeds. Many computers process billions or trillions of operations in a single second. Processing involves computing (e.g., adding, subtracting), sorting, organizing, displaying images, recording audio, playing music, and showing a movie or video.

**Reliability:** The electronic components in modern computers are dependable and reliable because they rarely break or fail.

**Consistency**: Given the same input and processes, a computer will produce the same results — consistently. For example, if you do not use the flash on a digital camera when indoors, the resulting pictures that are displayed on the computer screen may be unusable because they are too dark.

**Storage:** A computer can transfer data quickly from storage to memory, process it, and then store it again for future use. Many computers store huge amounts of data and make this data available for processing anytime it is needed.

**Communications:** Most computers today can communicate with other computers, often wirelessly. Computers with this capability can share any of the four information processing cycle operations — input, process, output, and storage — with another computer or a user.

**Uses of Computers:**

**Online Trading:** People tend to use computer and internet while purchasing and selling their goods, according to a recent survey more than 50% of people across the world will use computers for their online trading.
Online trading has been made such an easy and time saving, you have a variety of products with best prices, many websites offer their users heavy discount. People found to be keen on using a computer for their online trading.

**Online Education or Distance Learning:** This is one of the biggest use of computers as students, professionals can get a quality education at their fingertips. People use many video sharing websites for learning, go to any video sharing website such as youtube.com and search for your favorite topic you will find lots of videos made by users for educational purpose and also you can find the videos in your own languages.

**Forecasting Weather:** Super computers are used in weather forecasting, predicting earthquakes, volcano eruptions, the scientist predict the time and hence they can save people from these natural disasters.

**Produce Employment:** Computer produces great amount of jobs per year, people don’t want to work manually anymore as this is tedious, time-consuming, and inaccurate whereas the computer works with unbelievably accuracy and speed and are reliable. From last few years, the need of computer professionals has reached to a different level, every organization, every business needs computer experts, professionals in their unit.

**Internet:** The internet has been the most valuable invention of all time. Evolution of internet has changed the entire human civilization with the connectivity internet has provided you can reach to every place in the world, you can have a video chat with your friends, family and loved ones living abroad using the internet.

**Business:** People use computer in business because of its features of storing volumes of data, multitasking, doing complex calculation, working more efficiently than humans. The computer has become a huge contributor in business.

**Medical:** Uses of the computer in the hospital provide many benefits for doctors and patients. Hospitals can create a database of a patient with their treatment records, medical records. Doctors are using a computer to diagnose the diseases of patients faster. They are taking the help of various medical applications of computer and hardware devices. The use of computer and its application in hospitals are such as to do the research on diseases, blood test, brain testing, and body scanning, etc.

**Government offices:** The government works or official works take more time to complete in the past. There was lots of staff required in the past to manage citizen’s works. But today citizens, consumers are getting a solution with high speed and accuracy. Because of the use of computers in official works. There are so many applications that speed the process and quality of official works. Such as Microsoft Office package, email, video conferencing tools are few applications that speed the work of government offices with accuracy.

**Types of computers:**

There are three basic types of computers. This is based on the hardware structure and the way physical quantities are represented in a computer. The following are the three types.

[**Analog Computers**](https://byte-notes.com/analog-digital-hybrid-computers/#simple-table-of-contents-1)**:** Analog computers are used to process analog data. Analog data is of continuous nature and which is not discrete or separate. Such type of data includes temperature, pressure, speed weight, voltage, depth etc. These quantities are continuous and having an infinite variety of values.

It measures continuous changes in some physical quantity e.g. The Speedometer of a car measures speed, the change of temperature is measured by a Thermometer, the weight is measured by Weights machine. These computers are ideal in situations where data can be accepted directly from measuring instrument without having to convert it into numbers or codes.

[**Digital Computers**](https://byte-notes.com/analog-digital-hybrid-computers/#simple-table-of-contents-2)**:** A Digital Computer, works with digits to represent numerals, letters or other special symbols. Digital Computers operate on inputs which are ON-OFF type. Normally, an ON is represented by a 1 and an OFF is represented by a 0. So we can say that digital computers process information which is based on the presence or the absence of an electrical charge or we prefer to say a binary 1 or 0.

A digital computer can be used to process numeric as well as non-numeric data. It can perform arithmetic operations like addition, subtraction, multiplication and division and also logical operations. Most of the computers available today are digital computers. The most common examples of digital computers are accounting machines and calculators.

[**Hybrid Computers**](https://byte-notes.com/analog-digital-hybrid-computers/#simple-table-of-contents-3)**:** A hybrid is a combination of digital and analog computers. It combines the best features of both types of computers, It has the speed of analog computer and the memory and accuracy of digital computer. Hybrid computers are used mainly in specialized applications where both kinds of data need to be processed. Therefore, they help the user, to process both continuous and discrete data. For example a petrol pump contains a processor that converts fuel flow measurements into quantity and price values. In hospital Intensive Care Unit (ICU), an analog device is used which measures patient’s blood pressure and temperature etc, which are then converted and displayed in the form of digits. Hybrid computers for example are used for scientific calculations, in defense and radar systems.

**Classification of Computers:**

Since the Computer has been created, from that point there have been a few changes to the Computer. These changes are according to the **size, application or purpose**. A Computer can be broadly classified by size, speed, processing power, and price.

**Microcomputers (Personal Computer)**

 A microcomputer is the smallest general purpose processing system. The older pc started 8 bit processor with speed of 3.7MB and current pc 64 bit processor with speed of 4.66 GB.

Examples: -     IBM PCs, APPLE computers

Microcomputer can be classified into 2 types:

1.       Desktops

2.       Portables

The difference is portables can be used while travelling whereas desktops computers cannot be carried around.

The different portable computers are: -

1)         Laptop

2)         Notebooks

3)         Palmtop (hand held)

4)         Wearable computers

**Laptop:** this computer is similar to a desktop computers but the size is smaller. They are expensive than desktop. The weight of laptop is around 3 to 5 kg.

**Notebook:** These computers are as powerful as desktop but size of these computers are comparatively smaller than laptop and desktop. They weigh 2 to 3 kg. They are more costly than laptop.

**Palmtop (Hand held):** They are also called as personal Digital Assistant (PDA). These computers are small in size. They can be held in hands. It is capable of doing word processing, spreadsheets and hand writing recognition, game playing, faxing and paging. These computers are not as powerful as desktop computers. Ex: - 3com palmV.

**Mini Computer:**

 A minicomputer is a medium-sized computer. That is more powerful than a microcomputer. These computers are usually designed to serve multiple users simultaneously (Parallel Processing). They are more expensive than microcomputers.

            Examples:        Digital Alpha, Sun Ultra.

**Mainframe Computers:**

A mainframe is a large, expensive, powerful computer that can handle hundreds or thousands of connected users simultaneously. Mainframes store tremendous amounts of data, instructions, and information. Most major corporations use mainframes for business activities. With mainframes, enterprises are able to bill millions of customers, prepare payroll for thousands of employees, and manage thousands of items in inventory. Mainframes also can act as servers in a network environment. Servers and other mainframes can access data and information from a mainframe. People also can access programs on the mainframe using terminals or personal computers            Examples: -     **IBM 370, S/390.**

**Super Computers**

A supercomputer is the fastest, most powerful computer — and the most expensive. The fastest supercomputers are capable of processing more than one quadrillion instructions in a single second. With weights that exceed 100 tons, these computers can store more than 20,000 times the data and information of an average desktop computer. Applications requiring complex, sophisticated mathematical calculations use supercomputers. Large-scale simulations and applications in medicine, aerospace, automotive design, online banking, weather forecasting, nuclear energy research, and petroleum exploration use a supercomputer.

**Computers in near Future**:

Modern computers are found everywhere: homes, offices, businesses, hospitals, and schools. Today's computers are smaller, faster, and cheaper than their predecessors. Some computers are the size of a deck of cards. Hand-held Personal Data Assistants and notebook computers make users portable and give them the opportunity to work in a variety of places. These systems provide a wide range of connectivity and access to information on local, wide, and wireless networks. This gives users more convenience and more control over their time.

Future computers promise to be even faster than today's computers and smaller than a deck of cards. Perhaps they will become the size of coins and offer "smart" or [artificial intelligence](https://www.encyclopedia.com/science-and-technology/computers-and-electrical-engineering/computers-and-computing/artificial) features like expert intelligence, [neural network](https://www.encyclopedia.com/science-and-technology/computers-and-electrical-engineering/computers-and-computing/neural-network) pattern recognition features, or natural language capabilities. These capabilities will allow users to more conveniently interact with systems and efficiently process large amount of information from a variety of sources: fax, e-mail, [Internet](https://www.encyclopedia.com/science-and-technology/computers-and-electrical-engineering/computers-and-computing/internet), and telephone.

A **wearable computer** is defined as a handless system with a data processor supported by a user's body rather than an external surface. The unit may have several components (camera, touch panel, screen, wrist-mounted keyboard, head-worn display, and so forth) that work together to bring technology to situational and environmental problems.

A **DNA-based computer** would be radically different from a conventional computer. Instead of storing data on silicon chips, converting data to binary notation (0s and 1s), and performing computations on the binary digits, DNA computing would rely on data found in patterns of molecules in a synthetic DNA strand. Each strand represents one possible answer to the problem. A set of strands is manufactured so that all conceivable answers are included. To winnow out a solution, the DNA computer subjects all the strands simultaneously to a series of chemical reactions that imitate mathematical computations.

**Virtual reality:** Virtual Reality (VR) is the use of computer technology to create a simulated environment. Unlike traditional user interfaces, VR places the user inside an experience. Instead of viewing a screen in front of them, users are immersed and able to interact with 3D worlds. By simulating as many senses as possible, such as vision, hearing, touch, even smell, the computer is transformed into a gatekeeper to this artificial world. The only limits to near-real VR experiences are the availability of content and cheap computing power.

**Augmented reality: A***ugmented***R***eality* is a type of [virtual reality](https://www.webopedia.com/TERM/V/virtual_reality.html) that aims to duplicate the world's environment in a [computer](https://www.webopedia.com/TERM/C/computer.html). An augmented reality system generates a composite view for the user that is the combination of the real scene viewed by the user and a virtual scene generated by the computer that augments the scene with additional information. The virtual scene generated by the computer is designed to enhance the user's sensory perception of the virtual world they are seeing or interacting with. The goal of Augmented Reality is to create a system in which the user cannot tell the difference between the real world and the virtual augmentation of it. Augmented Reality will be used in entertainment, military training, engineering design, robotics, manufacturing and other industries.

**Perceptual computing**: Perceptual computing is a latest term in IT. The common definition of perceptual computing is a general advancement in technology where computers are better able to sense or analyze the environment around them and respond accordingly. Perceptual computing has a lot of potential to change the end-user interfaces through which humans interact with computers.  For example, experts believe that perceptual computing will soon change the workstations and peripherals that we use, the mouse, keyboard and a laptop screen, replacing them with workstations where people can talk, make gestures and input commands to the computer in a natural, sensory way, rather than through the manipulation of a mouse or keys.