

Computer Fundamental

UNIT-1

Computer: A computer is a digital electronic machine that can be programmed to carry out sequences of arithmetic or logical operations (computation) automatically.

Characteristics of Computer:



1. Speed: – As you know computer can work very fast. It takes only few seconds for calculations that we take hours to complete. You will be surprised to know that computer can perform millions (1,000,000) of instructions and even more per second.

2. Accuracy: – The degree of accuracy of computer is very high and every calculation is performed with the same accuracy.

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

4. Versatility: – 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.

5. Power of Remembering: – Computer has the power of storing any amount of information or data. Any information can be stored and recalled as long as you require it, for any numbers of years. It depends entirely upon you how much data you want to store in a computer and when to lose or retrieve these data.

6. No IQ: – Computer is a dumb machine and it cannot do any work without instruction from the user. It performs the instructions at tremendous speed and with accuracy. It is you to decide what you want to do and in what sequence. So a computer cannot take its own decision as you can.

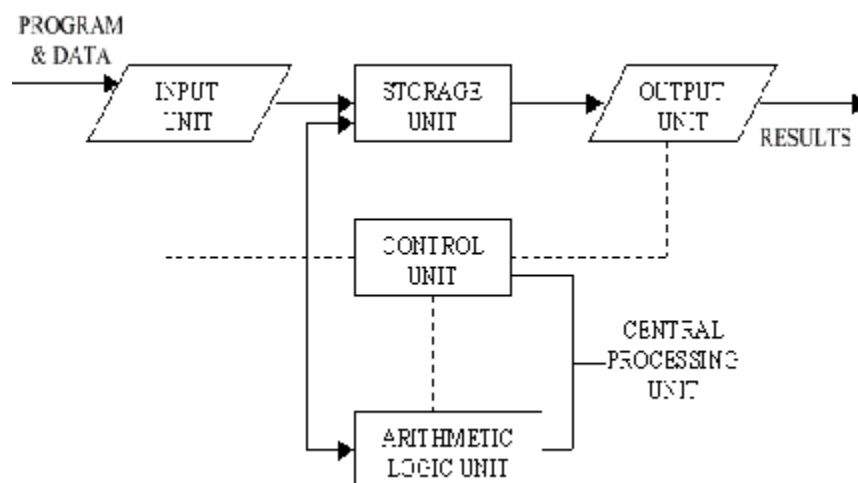
7. No Feeling: – It does not have feelings or emotion, taste, knowledge and experience. Thus it does not get tired even after long hours of work. It does not distinguish between users.

8. Storage: – The Computer has an in-built memory where it can store a large amount of data. You can also store data in secondary storage devices such as floppies, which can be kept outside your computer and can be carried to other computers.

Block Diagram of Computer

A computer can process data, pictures, sound and graphics. They can solve highly complicated problems quickly and accurately. A computer as shown in Fig. performs basically five major computer operations or functions irrespective of their size and make. These are

- 1) it accepts data or instructions by way of input,
- 2) it stores data,
- 3) it can process data as required by the user,
- 4) it gives results in the form of output, and
- 5) it controls all operations inside a computer.



1. Input: This is the process of entering data and programs in to the computer system. You should know that computer is an electronic machine like any other machine which takes as inputs raw data and performs some processing giving out

processed data. Therefore, the input unit takes data from us to the computer in an organized manner for processing.

2. Storage: The process of saving data and instructions permanently is known as storage. Data has to be fed into the system before the actual processing starts. It is because the processing speed of Central Processing Unit (CPU) is so fast that the data has to be provided to CPU with the same speed. Therefore the data is first stored in the storage unit for faster access and processing. This storage unit or the primary storage of the computer system is designed to do the above functionality. It provides space for storing data and instructions.

The storage unit performs the following major functions:

- All data and instructions are stored here before and after processing.
- Intermediate results of processing are also stored here.

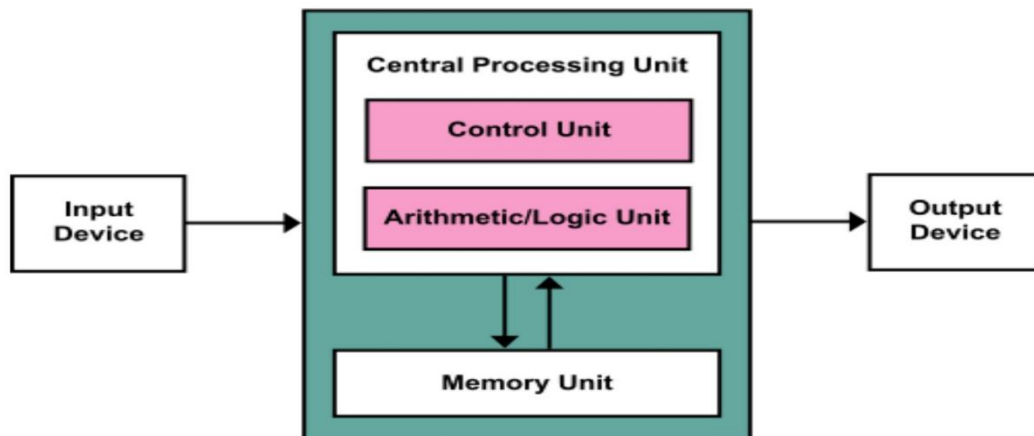
3. Processing: The task of performing operations like arithmetic and logical operations is called processing. The Central Processing Unit (CPU) takes data and instructions from the storage unit and makes all sorts of calculations based on the instructions given and the type of data provided. It is then sent back to the storage unit.

4. Output: This is the process of producing results from the data for getting useful information. Similarly the output produced by the computer after processing must also be kept somewhere inside the computer before being given to you in human readable form. Again the output is also stored inside the computer for further processing.

5. Control: The manner how instructions are executed and the above operations are performed. Controlling of all operations like input, processing and output are performed by control unit. It takes care of step by step processing of all operations inside the computer.

Functional Units

In order to carry out the operations mentioned in the previous section the computer allocates the task between its various functional units.



The computer system is divided into three separate units for its operation. They are

Arithmetic Logical Unit (ALU)

After you enter data through the input device it is stored in the primary storage unit. The actual processing of the data and instruction are performed by Arithmetic Logical Unit. The major operations performed by the ALU are addition, subtraction, multiplication, division, logic and comparison. Data is transferred to ALU from storage unit when required. After processing the output is returned back to storage unit for further processing or getting stored.

Control Unit (CU)

The next component of computer is the Control Unit, which acts like the supervisor seeing that things are done in proper fashion. Control Unit is responsible for coordinating various operations using time signal. The control unit determines the sequence in which computer programs and instructions are executed. Things like processing of programs stored in the main memory, interpretation of the instructions and issuing of signals for other units of the computer to execute them. It also acts

as a switch board operator when several users access the computer simultaneously. Thereby it coordinates the activities of computer's peripheral equipment as they perform the input and output.

Central Processing Unit (CPU)

The ALU and the CU of a computer system are jointly known as the central processing unit. You may call CPU as the **brain of any computer system**. It is just like brain that takes all major decisions, makes all sorts of calculations and directs different parts of the computer functions by activating and controlling the operations.

Applications Of Computer In Business

List of applications of computer in business,

- **Management**
- **Communication**
- **Meeting**
- **Logistic and Supply chain**
- **Marketing**
- **Sales**
- **Finance**
- **Documentation**
- **Storage**
- **Research**
- **Training**

Management:- computers help the organization to look after the organization management effectively and provide the report regarding the functioning of every management like Top Level Management, Middle-Level Management, and Lower Level Management. It provides the report to the board of directors to look at the efficiency of each level of management and make the changes accordingly which helps the organization to work smoothly.

Communication:- Computer used in managing communication in the organization, computer work in both external and internal communication in external communication computer used to communicate with the consumer and the supplier of raw material and in the internal communication computer used to communicate with employee and management of communication.

Meeting:- Computers are being used in arranging meetings nowadays in various organizations as the situation has been changed globally due to the Covid-19 Pandemic various organizations are using online platforms such as Zoom or Google Meet for meetings with suppliers and the employee of the organization.

Logistic and Supply Chain:- Computers are being used in managing the logistic and supply chain in the organization it keeps the record of inward and outward

logistic and that helps the organization to track the consignment/shipment all across the globe.

Marketing:- Computer help the organization to manage the marketing campaign it allows the organization to perform variety of task and help the marketer to design the market campaign as per the target consumer and create the website with various types of media for example images, text and video it helps the organization to sell the products/ service to target consumer with minimum marketing budget.

Computers help the Marketer to create various types of reports for the organization and present those reports to higher management for the new trend in market or new product developed or the reengineering of the existing products which helps the organization to take appropriate action and eventually it benefits the organization.

Sales:- Computers are being used in increasing sales and maximizing the profit of organizations. It helps the organization to create a sales campaign and used to create sales forecasts of product or service which help the organization to predict the organization growth. Computers are used to advertise the product to target consumers at various social and digital platforms which help the organization to increase profit.

Finance:- Computers are being used in the finance department of the organization. It helps the organization to predict the growth of the organization and manage the cash flow in the organization. It helps the organization in accounting with the software like quick book and Tally ERP9. It provides the report to shareholders about the financial situation of the company and helps the organization to borrow the fund from the market for the organization,s expansion.

Documentation:- Computers are being used in creating documentation in the organization with help of software it can create various documentation like purchase orders, sales reports, dossier, presentation, and various other documentation which helps the organization to function smoothly.

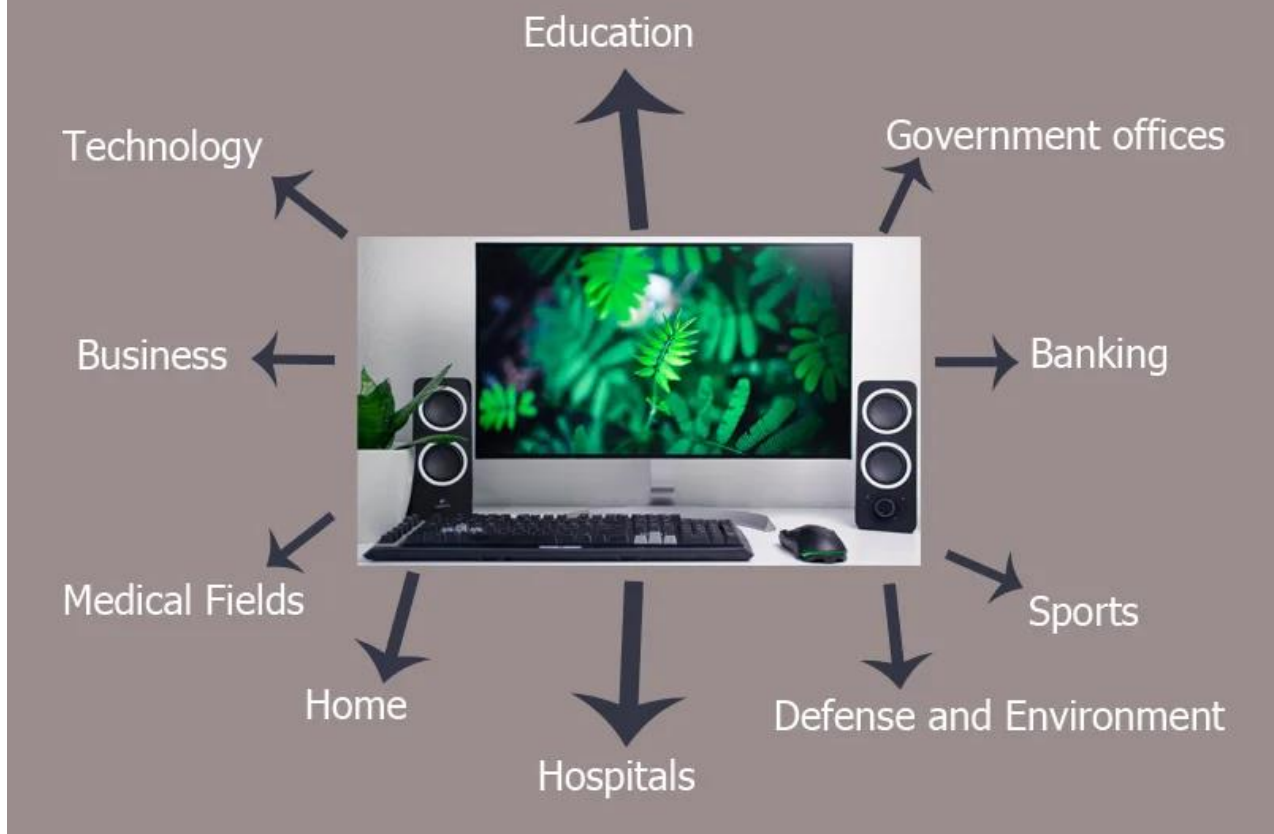
Storage:- Computers are being used as storage to collect and store the documentation and report of the organization at the specified place. Which helps the organization to reduce the manual storage system and decrease the burden of maintaining physical files. It helps the organization to store data in various different ways. There are various cloud storage service providers such as Google and Microsoft which help the organization to save the documents and files on the cloud.

Research:- Computers are being used in research in the organization. It helps the organization to research the market trend, new product development, consumer interest, target consumer demographic, age segment, and various other things. In the 21st century, computers are being used in the digital research of consumers with the help of various software. it helps the organization to understand the consumer.

Training:- Computers are being used in training in the organization it helps the organization to train its manpower and making them understand the computer and it's function. Training helps the employee to work in a more efficient way.

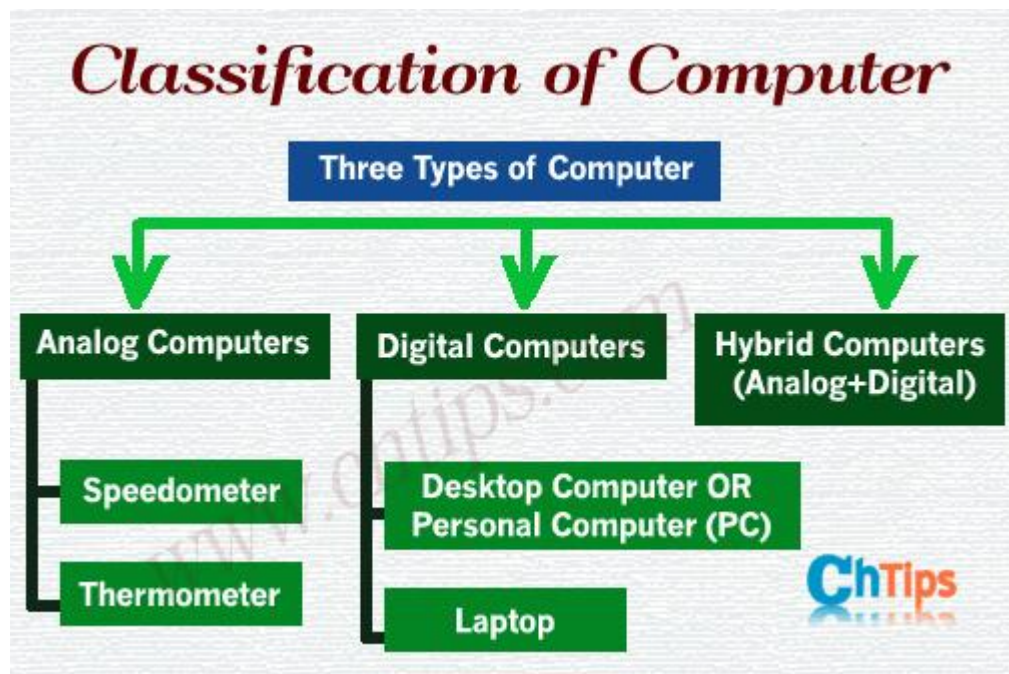
Various fields of Computer

10 Uses of Computer in Different Fields



Classifications of Computers System:-

1. On the Basis of **Size** and **Capacity**, [Supercomputer, Mainframe, Mini, and Micro Computer].
2. On the Basis of **Purposes**, [General and Special Purpose].
3. On the Basis of **Hardware Design** and **Type** [Analog, Digital, and Hybrid Computer].



Computers on the Basis of Size and Capacity

1. SuperComputer

A Supercomputer is the very **fastest** and **powerful**, and **expensive** type of computer for processing data. Supercomputers' size and storage capacity are also huge (can occupy huge premises) designed to process vast amounts of data in a short time with high productivity.

These are specially made to perform **multi-specific tasks**. Therefore, many CPUs work in parallel order on these supercomputers. This function of a Supercomputer is called Multiprocessing or Parallel Processing.

A supercomputer's design is complicated, like it can be heterogeneous, combining computers of different architectures, is significantly surpassed most existing personal computers. This made this machine an **ultra-high-performance** supercomputer.

Each part of a supercomputer is responsible for its own specific task, such as structuring and solving the most complex problems requiring an incredible amount of calculations.



Applications: The uses of supercomputers are dedicated to –

- In research and study of energy and nuclear weapons and designing the aircraft, airplanes, and flight simulators.
- Climate research and Weather Forecasting and Prediction of Natural Disasters.
- Spaceship and Satellite Launching.
- Used in scientific research laboratories.
- Used in Chemical and Biological research and for highly calculation complex tasks.

Examples: IBM Roadburner, *IBM Blue Gene*, *Intel ASI Red*. PARAM-1000, and CRAY-XMP-14.

2. Mainframe Computer

Mainframe computers are **multi-programming, high-performance** computers, and multi-user, which means they can handle the workload of more than 100 users at a time on the computer.

The storage capacity of the mainframe is enormous, with a high-speed data process as well. As well as handling hundreds of input and output devices at a time.

The mainframe is a highly efficient computer capable of **simultaneously solving complex calculations and continuously for a long time**. These computers have several microprocessors that have the ability to function the data at too high performance and speed.

The mainframe is ahead of our conventional modern Personal computers in almost every metric. The possibility of their “hot” replacement in the mainframe computer ensures continuity of operation. And the standard amount of processor utilization effortlessly exceeds 85% of the total power.

Somehow mainframes can be more powerful than supercomputers because the mainframe supports many processes simultaneously. On the other hand, supercomputers can run a single program but faster than a mainframe. In the past, *Mainframes requires entire rooms or even floors of whole buildings for set up.*

In today, IBM company is leading the production of mainframe computers. Mainframe **reliability is increased** with development in the past 60 years. These computers can fix most of the hardware



and software bugs.

Applications: Uses of Mainframe Computer –

Mainframe computers are mainly used by departmental and commercial organizations like Banks, Companies, Scientific research centers, and governmental

departments like railways. These computers can work for 24 hours. Hundreds of users can work on these computations simultaneously.

Using the mainframe completes the tasks, Such as keeping details of payments, research centres, advertising, sending bills and notices, paying employees, ticket booking, maintaining details of purchases by users, keeping detailed tax details, etc.

Examples: IBM Es000 series, ICL39 Series, and CDC 6600.

3. Mini Computer

Minicomputer is a **digital and multi-user** computer system with the connection of more than one CPU. Thus, many people can work on these computers simultaneously instead of a single person. Also, it can process with other accessories like a printer, plotter, etc.

Minicomputers are the medium type of computers that have more functionality power and are expensive than microcomputers. On the other hand, the size, storage, and speed of minicomputers are **large but less than** the mainframe and supercomputers.

Minicomputers are made for performing multiple computing tasks at a single point of time, instead of assigning many microcomputers for a single task, which will be time-consuming and expensive.

In general, a minicomputer is a multi-threaded system (several processes at a time) capable of supporting from one to up to 200 users simultaneously: these computers are currently used to *store large databases, multi-user applications, and the automation industry.*

Applications: The uses of Minicomputers –

The minicomputers are used as real-time applications in Industries, bookings, and Research Centres. Banks also use minicomputers for preparing payroll for employees' salaries, records, tracking of financial accounts, etc. As well as in the field of Higher Education and Engineering.

Examples: PDP 11 and IBM (8000 Series).

4. Micro Computer

Today we are using many computers at home is also the most common microcomputer. With this invention of the microprocessors in the year 1970, it became possible to use computers for people personally at a low cost and reasonable price known as Digital **Personal Computer**.

The design of microcomputers is minimal in size and storage capacity. These computers consist of many parts like *Input and Output devices, Software, operating systems, networks, and Servers* all these need to connect to form a complete Personal Digital Computer.

There is not only a PC or laptop are examples of microcomputers. Other examples of the microcomputer are smartphone, Tablet, PDA, server, palmtop, and workstation.

This can be installed in any work area or even at home for personal use.

The primary purpose of microcomputers is to keep and process the everyday tasks and needs of the people. Only one person can work on a single PC at a time, but its operating system is **multitasking**. The PC can be connected to the Internet to take benefits and enhance the user experience.

The development of multimedia, small equipment, optimized energy consumption, and the LAN made the microcomputers increase in demand for every field.

The increase in the demand and need for microcomputers between the people leads to the **tremendous development** of each part related to the microcomputers.

Applications: **The uses of MicroComputer –**

PC is being widely used in many fields like home, office, data collection, business, education, entertainment, publishing, etc.

It keeps the details and prepares letters for correspondence in small businesses, creating bills, accounting, word processing, and operation of the filing systems in a large company.

Some of the major PC manufacturers are IBM, Lenovo, Apple, HCL, HP, etc.

Examples: Desktops, tablets, smartphones, and Laptops.

The fast development of microcomputers with technology. As a result, today, microcomputers coming in the form of a book, a phone, and even a clock in the name of a digital clock.

Computers on the Basis Purpose

1. General Purpose

General computers can do various **everyday tasks** such as writing a word processing letter, Document preparation, recording, financial analysis, Printing documents, creating databases, and calculations with accuracy and consistency.

The size, storage capacity, and cost of such computers are mainly less. The ability of these computers is limited in performing specialized tasks. Still, it has **versatility and useful** for serving people's basic needs at home or in the workplace in the environment.

Examples:

Desktops, laptops, smartphones, and tablets are used on daily basis for general purposes.

2. Special Purpose

These computers are designed to perform a particular or specialized task. The size, storage capacity, and cost of such computers mainly depend on the nature and size of the work. The function of these computers is consistent with any particular task.

The special computer **needs specific and input and devices** as well as a compatible motherboard with the processor to conduct work efficiently.

These computers are used for special purposes in *weather forecasting, space research, agriculture, engineering, meteorology, satellite operation, traffic control, and research in chemical sciences.*

Examples:

- Automatic teller machines (ATM),
- Washing machines,
- Surveillance equipment,
- Weather-forecasting simulators,
- Traffic-control computers,
- Defense-oriented applications,
- Oil-exploration systems,
- Military planes controlling computers.

Computers on the Basis of Hardware Design and Data Handling.

1. Analog Computer

An analog computer performs tasks using continuous data (*the physical amount that changes continuously*). Analog computers are used primarily to measure physical units like the voltage, pressure, electric current, temperature, and convert them into digits.

It is also used to measure and perform arithmetic calculations of numbers, the length of an object, or the amount of voltage that passes through a point in an electrical circuit. Analog computers obtain all their data from some measurement way.

Analog computers are mainly used in the fields of science and engineering. Analog computers are slow and equipped to measure things rather than countable or check.

The efficiency of this computer increases when we get the result of the data in graphs, etc. Analog Computers **cannot** store statistics.

They are used in the fields of **technology, science, research, engineering**, etc. Because quantities like **voltage, pressure, electric current, temperature** are used more in these areas, these types of computers give only approximate estimates.

Examples:

An analog computer installed on a petrol pump measures the amount of petrol coming out of the pump and appears in liters. And calculates its value. These quantities vary continuously while measuring the amount, such as the temperature of a human body changes consistently.

A simple clock, the **vehicle's speedometer, Voltmeter**, etc. are examples of analog computing.

2. Digital Computer

As its name suggests, a digital computer represents the digital computer's letters, numerical values, or any other special symbols. This computer is the computer that calculates the number for processing the data.

They run on electronic signs, and the binary numeral method Binary System 0 or 1 is used for calculation. Their speed is fast.

It can perform arithmetic operations such as **addition, occurrence, subtraction, multiplication, or division and all types of logical(mathematical) operations.** Today, most of the computers available in the market are digital computers.

Digital computers are built to bring the solution of equations to an almost unlimited precision, but in a bit slow manner compared to analog computers. To some extent, they all have similar components for receiving, processing, sorting, and transmitting data and use a relatively small number of essential functions to perform their tasks.

Digital computers use discrete electrical signals for operation rather than continuous electrical signals as analog computers have, making them the most common form of computers today because of their **versatility, speed, and power.**

Other Examples of Digital Computers

- Personal Desktop Computers,
- Calculators,
- Laptops, Smartphones, and Tablets,
- Chromebooks,
- Digital watch,
- Accounting machines,
- Workstations,
- Digital clock, etc.

3. Hybrid Computer

A hybrid computer is a combined complex computer unit built using both ***analog and digital*** properties and united by a single control system. The purpose of designing hybrid computers is to provide functions and features that can be found on both analog and digital devices.

The aim behind creating a hybrid computer is to create a kind of work unit that offers the best of both types of computers. **Hybrid computers are extremely fast** when driving equations, even when those calculations are incredibly complex.

As both the properties of a computer consist in the form of a single hybrid computer made possible ***to solve too complex calculations or problems,*** at the same time, these devices are not only too expensive but also able to solve complex issues a bit fastly.

Incorporating the properties of both(analog and digital) computers into hybrid computers makes it possible to resolve more difficult equations immediately.

The analog computer systems solve the equation process immediately. But it is not necessary that those solutions would be completely accurate.

Here, the digital computer system gives 100 % correct solutions, but it takes a bit of time in the calculation. Therefore, Hybrid computers are made to overcome the flaws of both these analog and digital systems.

Applications of hybrid Computer:

Hybrid computers are most commonly used in vast industries, research centres, organizations, and manufacturing firms (where many equations need to be solved).

Also, the solutions and uses of hybrid computers have proved to be much more detailed, accurate, and useful. Hybrid computers are used in scientific calculations, for nations' defence and radar systems as well.

Examples:

Auto Gasoline pump is the example of a hybrid computer, this device is installed on a petrol pump do not only to measure the amount of petrol but also to calculates its value, in this way It is capable of both functions i.e **hybrid function**.