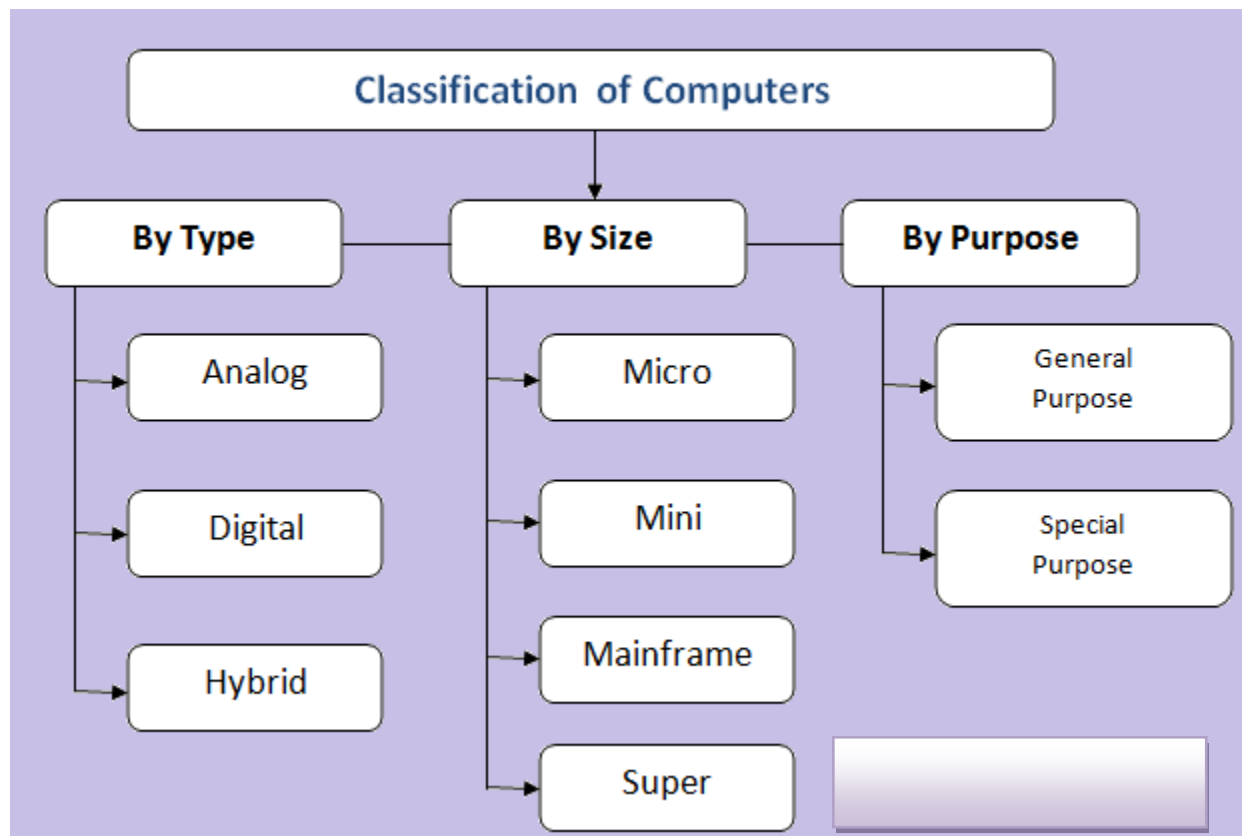




CLASSIFICATION OF COMPUTERS

Computers can be classified in the following ways:



Analogue computers

Analogue computers are designed to **process analogue data**. Analogue data is continuous data that changes continuously and cannot have discrete values. We can say that analogue computers are used where we don't need exact values always such as speed, temperature, pressure and current.

Analogue computers directly accept the data from the measuring device without first converting it into numbers and codes. They measure the continuous changes in physical quantity and generally render output as a reading on a dial or scale. **Speedometer** and **mercury thermometer** are examples of analogue computers.

Advantages of using analogue computers:

- It allows real-time operations and computation at the same time and continuous representation of all data within the range of the analogue machine.
- In some applications, it allows performing calculations without taking the help of transducers for converting the inputs or outputs to digital electronic form and vice versa.
- The programmer can scale the problem for the dynamic range of the analogue computer. It provides insight into the problem and helps understand the errors and their effects.

Digital Computer

Digital computer is designed to perform calculations and logical operations at high speed. It accepts the raw data as input in the form of digits or binary numbers (0 and 1) and processes it with programs stored in its memory to produce the output. All modern computers like laptops, desktops including smartphones that we use at home or office are digital computers.

Advantages of digital computers:

- It allows you to store a large amount of information and to retrieve it easily whenever you need it.
- You can easily add new features to digital systems more easily.
- Different applications can be used in digital systems just by changing the program without making any changes in hardware
- The cost of hardware is less due to the advancement in the IC technology.
- It offers high speed as the data is processed digitally.
- It is highly reliable as it uses error correction codes.
- Reproducibility of results is higher as the output is not affected by noise, temperature, humidity, and other properties of its components.

Hybrid Computer

Hybrid computer has features of both analogue and digital computer. It is ***fast like an analogue*** computer and has memory and ***accuracy like digital computers***. It can process both continuous and discrete data. It accepts analogue signals and converts them into digital form before processing. So, it is widely used in specialized applications where both analogue and digital data is processed. For example, a processor is used in petrol pumps that convert the measurements of fuel flow into quantity and price. Similarly, they are used in airplanes, hospitals, and scientific applications.

Advantages of using hybrid computers:

- Its computing speed is very high due to the all-parallel configuration of the analogue subsystem.
- It produces precise and quick results that are more accurate and useful.
- It has the ability to solve and manage big equation in real-time.
- It helps in the on-line data processing.

Supercomputer

Supercomputers are the ***biggest and fastest computers***. They are designed to process huge amount of data. A supercomputer can ***process trillions of instructions in a second***. It has thousands of interconnected processors.

Supercomputers are particularly used in ***scientific and engineering applications*** such as weather forecasting, scientific simulations and nuclear energy research. The first supercomputer was developed by ***Roger Cray in 1976***.

Characteristics or applications of supercomputers:

- It has the ability to decrypt your password to enhance protection for security reasons.
- It produces excellent results in animations.
- It is used for virtual testing of nuclear weapons and critical medical tests.
- It can study and understand climate patterns and forecast weather conditions. It can run in NOAA's system (National Oceanic and Atmospheric Administration) that can execute any type of simple and logical data.
- It helps in designing the flight simulators for pilots at the beginner level for their training.
- It helps in extracting useful information from data storage centres or cloud system. For example, in insurance companies.
- It has played a vital role in managing the online currency world such as stock market and bitcoin.
- It helps in the diagnosis of various critical diseases and in producing accurate results in brain injuries, strokes, etc.
- It helps in scientific research areas by accurately analysing data obtained from exploring the solar system, satellites, and movement of Earth.
- It also used in a smog control system where it predicts the level of fog and other pollutants in the atmosphere.

Mainframe computer

Mainframe computers are designed to support hundreds or thousands of users simultaneously. They can support multiple programs at the same time. It means they can execute different processes simultaneously. These features of mainframe computers make them ideal for big organizations like banking and telecom sectors, which need to manage and process high volume of data.

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Characteristics of Mainframe Computers:

- It can process huge amount of data, e.g. millions of transactions in a second in the banking sector.
- It has a very long life. It can run smoothly for up to 50 years after proper installation.
- It gives excellent performance with large scale memory management.

- It has the ability to share or distribute its workload among other processors and input/output terminals.
- There are fewer chances of error or bugs during processing in mainframe computers. If any error occurs it can fix it quickly without affecting the performance.
- It has the ability to protect the stored data and other ongoing exchange of information and data.

Applications of mainframe computers:

- In **health care**, it enabled hospitals to maintain a record of their millions of patients in order to contact them for treatment or related to their appointment, medicine updates or disease updates.
- In the **field of defense**, it allows the defense departments to share a large amount of sensitive information with other branches of defense.
- In the **field of education**, it helps big universities to store, manage and retrieve data related to their courses, admissions, students, teachers, employees and affiliated schools and colleges.
- In the **retail sector**, the retail companies that have a huge customer base and branches use mainframe computers to handle and execute information related to their inventory management, customer management, and huge transactions in a short duration.

Minicomputer

It is a **midsize multiprocessing computer**. It consists of two or more processors and can support **4 to 200 users at one time**. Minicomputers are used in institutes and departments for tasks such as billing, accounting and inventory management. A minicomputer **lies between the mainframe and microcomputer** as it is smaller than mainframe but larger than a microcomputer.

Characteristics of minicomputer:

- It is light weight that makes it easy to carry and fit anywhere.
- It is less expensive than mainframe computers.
- It is very fast compared to its size.
- It remains charged for a long time.
- It does not require a controlled operational environment.

Applications of minicomputers:

A minicomputer is mainly used to perform three primary functions, which are as follows:

- **Process control:** It was used for process control in manufacturing. It mainly performs two primary functions that are collecting data and feedback. If any abnormality occurs in the process, it is detected by the minicomputer and necessary adjustments are made accordingly.
- **Data management:** It is an excellent device for small organizations to collect, store and share data. Local hospitals and hotels can use it to maintain the records of their patients and customers respectively.
- **Communications Portal:** It can also play the role of a communication device in larger systems by serving as a portal between a human operator and a central processor or computer.

PALMTOP:

A small computer, that literally fits in your palm. Compared to full-size computers, palmtops are severely limited, but they are practical for certain functions such as phone books and calendars. Palmtops that use a pen rather than a keyboard for input are often called *hand-held computers* or *PDA*s.

Because of their small size, most palmtop computers do not include disk drives. However, many contain PCMCIA slots in which you can insert disk drives, modems, memory, and other devices. Palmtops are also called PDAs, hand-held computers and *pocket computers*.

DESKTOP :

A computer designed to fit comfortably on top of a desk, typically with the monitor sitting on top of the computer. Desktop model computers are broad and low, whereas *tower model* computers are narrow and tall. Because of their shape, desktop model computers are generally limited to three internal mass storage devices. Desktop models designed to be very small are sometimes referred to as *slimline models*.

Workstation

Workstation is a **single user computer** that is designed for **technical or scientific applications**. It has a faster microprocessor, a large amount of RAM and high speed graphic adapters. It generally **performs a specific job with great expertise**; accordingly, they are of different types such as graphics workstation, music workstation and engineering design workstation.

Characteristics of workstation computer:

- It is a high-performance computer system designed for a single user for business or professional use.
- It has larger storage capacity, better graphics, and more powerful CPU than a personal computer.
- It can handle animation, data analysis, CAD, audio and video creation and editing.

Microcomputer

Microcomputer is also known as a personal computer. It is a general-purpose computer that is designed for individual use. It has a microprocessor as a central processing unit, memory, storage area, input unit and output unit. Laptops and desktop computers are examples of microcomputers. They are suitable for personal work that may be making an assignment, watching a movie, or at office for office work.

Characteristics of a microcomputer:

- It is the smallest in size among all types of computers.
- A limited number of software can be used.
- It is designed for personal work and applications. Only one user can work at a time.
- It is less expensive and easy to use.
- It does not require the user to have special skills or training to use it.
- Generally, comes with single semiconductor chip.
- It is capable of multitasking such as printing, scanning, browsing, watching videos, etc.

TABLET PC:

A tablet is a type of notebook computer that has an LCD screen on which the user can write using finger and swipe actions or by using a special-purpose pen, or *stylus*. All user input is directly via the LCD screen and not a keyboard or mouse. On a tablet computer, handwriting is digitized and can be converted to standard text through handwriting recognition, or it can remain as handwritten text. The stylus also can be used to type on a pen-based key layout where the lettered keys are arranged differently than a QWERTY keyboard. Tablet PCs can be equipped with a keyboard and/or a mouse for input.

The tablet PC relies on digital ink technology, where a digitizer is laid under or over an LCD screen to create an electromagnetic field that can capture the movement of the special-purpose pen and record the movement on the LCD screen. The effect is like writing on paper with liquid ink.

Servers

These are types of computers used to provide resources, services, and functionality to client computers in a server-client network model. Resources provided are based on the functions of a particular server, which may fall under these categories:

- a. File server
 - b. Database server
 - c. Print server
 - d. FTP servers
 - e. Application server
 - f. Web server
- Their sizes will depend on purpose and tasks in the network. Of course bigger and more multitasking installations will require multiple system and storage installation.
 - A common errant is that desktop systems can be used as servers. Far from it, true server systems are specialized computers with abilities far beyond what personal computers can deliver.
 - Servers are optimized to run 24 hours and are capable of hot swapping of storage and other hardware without having to shut down the system.

Answer the following questions:

1. Differentiate between workstation and server.

Ans:

Server	Workstation
The device which responds the services for the client's request is called server.	Perform dedicated task with having enhanced features.
In server, Operations are internet based.	In workstation, Operations are in forms of Business, engineering etc.
The example of server are: FTP server, web servers etc.	The example of workstation are: Video workstations, audio workstations etc.
Operating system used in server are: Linux, Solaris server and windows.	Operating system used in workstation are: Unix, Linux or Windows NT.
In server, Graphics User Interface (GUI) is optional.	In workstation, Graphics User Interface (GUI) is installed.

2. List few characteristics of mini computers.

Ans:

- It is light weight that makes it easy to carry and fit anywhere.
- It is less expensive than mainframe computers.
- It is very fast compared to its size.
- It remains charged for a long time.

3. Write a short on hybrid computers.

Ans: A computer that processes both analog and digital data, Hybrid computer is a digital computer that accepts analog signals, converts them to digital and processes them in digital form.

4. Differentiate between mainframe and minicomputer.

Ans:

Mainframe	Minicomputer
In mainframe computer, large size of disk is used.	While in minicomputer, small size of disk is used.
Mainframe computers have large memory storage.	While minicomputers have small or less memory storage than mainframe computer.
The processing speed of mainframe computer is faster than minicomputer.	While the processing speed of minicomputer is slower than mainframe computer.
Mainframe computer is costlier than minicomputers.	Whereas minicomputers's cost is less or it is inexpensive.
The first microcomputer was invented by the team leader Bill Pentz .	The first successful mainframe computer is invented by IBM.
Mainframe computers support thousand or millions of users simultaneously.	Whereas minicomputers support hundreds of users at a time.

5. Differentiate between supercomputer and minicomputer.

Ans:

Minicomputer	Supercomputer
Minicomputers are standalone mid-sized machines that fall somewhere between smaller mainframe and powerful microcomputers.	Supercomputers are most powerful computing machines on the planet and the ultimate engine of the digital age.
They have speed in the range of 10-30 MIPS.	The speed of supercomputer is in the range of 100-900 MIPS.
They are functional intermediate between a microcomputer and a mainframe computer.	They are able to process trillions of instructions per second.
The main purpose of the mini computer is to fulfill the computing needs for several people from small to medium-sized business environment.	They are primarily used for scientific research and forecasting along with scientific simulations, fluid dynamics calculation, nuclear energy research etc.

6. Write a short note on digital computers.

Ans: A computer that performs calculations and logical operations with quantities represented as digits, usually in the binary number system of "0" and "1", "Computer capable of solving problems by processing information expressed in discrete form, manipulation of the combinations of the binary digits, it can perform mathematical calculations, organize and analyze data, control industrial and other processes, and simulate dynamic systems such as global weather patterns.

7. Mention few applications of supercomputers.

Ans:

- a) It helps in designing the flight simulators for pilots at the beginner level for their training.
- b) It helps in extracting useful information from data storage centres or cloud system. For example, in insurance companies.
- c) It has played a vital role in managing the online currency world such as stock market and bitcoin.
- d) It helps in the diagnosis of various critical diseases and in producing accurate results in brain injuries, strokes, etc.
- e) It helps in scientific research areas by accurately analysing data obtained from exploring the solar system, satellites, and movement of Earth.

8. List few characteristics of microcomputers.

Ans:

- a) It is the smallest in size among all types of computers.
- b) A limited number of software can be used.
- c) It is designed for personal work and applications. Only one user can work at a time.
- d) It is less expensive and easy to use.

9. Write a short note on palmtop.

Ans: A small computer that literally fits in your palm. Compared to full-size computers, palmtops are severely limited, but they are practical for certain functions such as phone books and calendars. Palmtops that use a pen rather than a keyboard for input are often called *hand-held computers* or *PDA*s.

Because of their small size, most palmtop computers do not include disk drives. However, many contain PCMCIA slots in which you can insert disk drives, modems, memory, and other devices. Palmtops are also called PDAs, hand-held computers and *pocket computers*.

10. Provide suitable examples of mainframe, supercomputers, and microcomputers.

Ans: Mainframe - IBM z Series, System z9 and System z10 servers.

Supercomputers - PARAM, jaguar, roadrunner.

Microcomputers - Tablets, Smartwatches.

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