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## Super Computer

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### ABSTRACT:

The invention of supercomputers is regarded as the marvellous innovation of creative minds. It is because of its enormous capability of working it has got its name as supercomputers. The normal computers that we use in our daily life are used to make our work easier and faster.

We take the help of computers in performing different calculations and tasks that are performed by us in our daily life. The working of supercomputers is totally different from the normal computers that we use in our daily life. Normal computers are capable of doing different tasks one by one but the same is not applicable to supercomputers.

Supercomputers have the capability of performing millions of calculations or tasks at one time. Normal computers work with the concept of serial processing that enables them to perform tasks one by one. On the other hand, supercomputers work with the concept of parallel processing that enables them to perform millions of tasks at one time. This makes supercomputers more efficient than the normal computers we use in our daily life.

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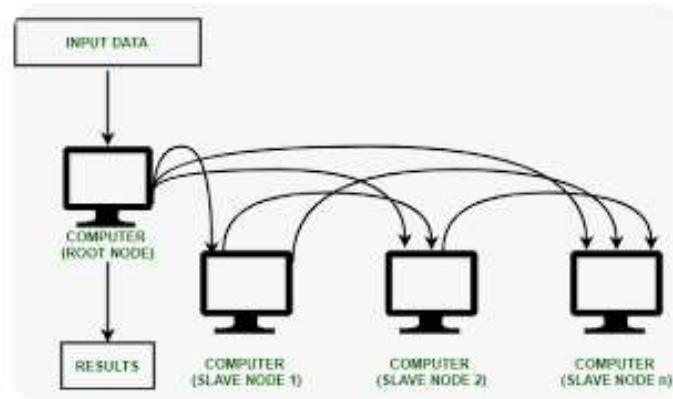
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### INTRODUCTION:

A supercomputer is a computer that performs at a higher level than a typical computer and is utilised by people who work in a variety of fields. Instead of million instructions per second (MIPS), a supercomputer's performance is measured in floating-point operations per second (FLOPS).

## Types of supercomputers

### *Tightly connected clusters:*



These are collections of linked computers working together to address a common problem. And Two-node clusters, multi-node clusters, director-based clusters, and massively parallel clusters are the four different types of clusters.

### *Supercomputers with vector processors:*

This happens when the CPU can handle all of the data items simultaneously rather than processing each one separately. This provides a form of parallelism where every element of the array is processed simultaneously. These supercomputer processors are arranged in arrays that can process a large volume of data at once.

### *Commodity supercomputers:*

- ❖ These are made up of typical (standard) personal computers connected by LANs with high bandwidth and quick speeds.
- ❖ Then these computers employ parallel computing to cooperate on a single job.

### *Virtual supercomputers:*

In essence, a virtual supercomputer operates and resides in the cloud.

By combining numerous virtual machines running on CPUs in a cloud data centre, it provides an extremely efficient computing platform.

### *Special-purpose computers:*

- ❖ These have a specific purpose and cannot be used for any other purpose.
- ❖ They are designed to deal with a specific issue.
- ❖ These systems focus all of their energy and resources on overcoming the particular problem.
- ❖ One example of a supercomputer created for a particular task is the IBM Deep Blue chess-playing supercomputer.

## FEATURES

Supercomputers are distinguished by a few characteristics.

- ❖ They typically include more than one CPU (central processing unit) which is unusual for ordinary computers and incorporates circuits for deciphering programme instructions and carrying out arithmetic and logic operations in the right order.
- ❖ The physical limitations of circuit technology force the employment of several CPUs to attain high computing rates.
- ❖ The speed of light, which is a fundamental speed restriction for both signal transmission and circuit switching, is the limit for electronic signals.

- ❖ Due to the miniaturisation of circuit components, drastically shorter wires connecting circuit boards, and advancements in cooling technologies (for example, in a variety of supercomputer systems, processor and memory circuits are immersed in a cryogenic fluid to achieve the low temperatures at which they operate fastest), this limit has almost been reached.
- ❖ The incredibly fast computational speed of CPUs requires quick retrieval of stored information and instructions.
- ❖ As a result, the majority of supercomputers have both a very huge storage capacity and extremely quick input/output speeds.

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***Characteristics of SUPERCOMPUTER:***

- ❖ These computers are capable of handling vast numbers of calculations as well as challenging ones.
- ❖ Multiple users can connect to the supercomputer simultaneously.
- ❖ Because it is more expensive, regular people cannot buy that computer.
- ❖ It has a large storage capacity.
- ❖ Used in specialised sectors where there are numerous and complex calculations.

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**DEPARTMENTS USING SUPERCOMPUTERS:*****Biology:***

Supercomputers are frequently used to diagnose a variety of illnesses and help with stroke, brain injury, and other blood flow-related problems in the body.

***Military and Defence:***

Supercomputers aids in the provision of virtual testing for nuclear explosion and weapon ballistics in military and defence missions.

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**CLIMATE CONDITION:**

Climate patterns can be studied and understood by supercomputer applications.

***Airlines Industry:***

A supercomputer was used to construct flight simulators for beginning pilots, and these simulators assisted in the training of new pilots.

***Weather Forecasting:***

The National Oceanic and Atmospheric Administration, better known as NOAA, uses supercomputers to gather data for weather forecasting. The NOAA system can carry out any kind of logical and straightforward command.

***Scientific Research Areas:***

Supercomputers are used in scientific and weather research to analyse data from satellites that orbit the globe, solar system explorers, and other fields including nuclear physics.

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**DATA MINING:**

For the purpose of obtaining meaningful information from data storage facilities or the cloud system, some large-scale businesses require the supercomputers, like insurance providers.

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**FINANCIAL DEPARTMENT:**

In the rapidly developing world of online currencies like bitcoin and the stock market, supercomputers are essential to true financial success.

***Simulated Environment in Automobiles:***

Supercomputers assist individuals in acquiring vehicles by enabling buyers to test drive vehicles in simulation environments before making a purchase.

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***Smog Control System:***

Scientists utilise supercomputers in their own lab to estimate the amounts of fog and other pollution in certain places, and then they take appropriate preventative measures.

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**DISADVANTAGES:**

Supercomputers are more expensive, require more setup space, are less useful for widespread applications, cannot replace physical testing, require highly trained staff, require more maintenance, require massive external storage for enormous amounts of data, have high power needs, and require water cooling in addition to air conditioning.

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**CONCLUSION:**

Supercomputers are ultimately all our technology needs. We have every reason to be proud of their amazing creation. Supercomputers are an indispensable component of technology, without which the world cannot continue to evolve.