Advantages and Disadvantages Of Distributed Systems

nikamjaydipashok11

A network of separate computers working together to complete a particular task is referred to as a distributed system. By sending messages or exchanging data through a network, these computers can connect with one another.

- A **distributed system's** objective is to boost a system's performance and dependability by making use of the resources of several computers. The system can scale to accommodate greater demands by splitting the job across numerous computers, and it can also keep running even if one or more of the computers malfunction.
- Online banking, social networks, search engines, and e-commerce websites are just a few examples of applications where distributed systems are used. In addition, they can be applied to data analysis, weather forecasting, and scientific research.
- The process of designing and creating distributed systems is difficult and fraught with difficulties, including managing concurrency and synchronization, coping with network latency and failures, and resolving security issues. To ensure effective operation, distributed systems need careful design and implementation as well as ongoing maintenance and monitoring.

Advantages of Distributed Systems:

- **Better Performance:** By using the resources of numerous computers to tackle the workload, distributed systems can perform at higher levels than centralized systems.
- **Cost Effectivity:** Although distributed systems consist of high implementation costs, they are relatively cost-effective in the long run. Compared to a mainframe computer, where a single system is composed of several processors, the distributed system is made up of several computers together. This type of infrastructure is far more cost-effective than a mainframe system.
- **Efficiency:** Distributed systems are made to be efficient in every aspect since they possess multiple computers. Each of these computers could work independently to solve problems. This is not only considered to be efficient, but also it significantly saves time for the user.
- **Scalability:** Distributed systems are made on default to be scalable. Whenever there is an

system. Moreover, no restrictions are placed on the number of machines. This means that these machines will be able to handle high-demand workloads easily.

- **Reliability:** Distributed systems are far more reliable than single systems in terms of failures. Even in the case of a single node malfunctioning, it does not pose problems to the remaining servers. Other nodes can continue to function fine.
- **Geographic Distribution:** Geographic distribution is a feature of distributed systems that enables them to offer services to users in various areas.
- **Reduced Cost:** Because distributed systems can make use of existing resources rather than needing to buy new gear, they can be less expensive than centralized systems.
- **Flexibility:** Distributed systems are adaptable and can be tailored to fit a variety of needs, making them suitable for a wide range of applications.
- **Fault Tolerance:** The ability to continue operating even when one or more nodes fail is known as fault tolerance, and distributed systems can be built to be fault-tolerant.
- **Reduced Latency:** Distributed systems result in low latency. If a particular node is located closer to the user, the distributed system makes sure that the system receives traffic from that node. Thus, the user could notice much less time it takes to serve them.
- **Security:** Data breaches and illegal access can be prevented by including security safeguards in distributed systems.
- **Innovation:** Data analytics, machine learning, and the Internet of Things are just a few of the areas where distributed systems are fostering innovation (IoT).

Disadvantages of Distributed Systems:

- **Compatibility:** In a distributed system, compatibility across multiple nodes and software systems can be a problem since they may employ various hardware, software, or protocols.
- **Startup Cost:** Compared to a single system, the implementation cost of a distributed system is significantly higher. The infrastructure used in a distributed system makes it expensive. In addition to that, the constant transmission of information and processing overhead further increases the cost.
- **Security:** Distributed systems always come with security risks since it contains open system characteristics. The data of the user is stored in different workstations. Thus, the user needs to make sure that their data is secured in each of these computers. Moreover, unlike in a centralized computing system, it is not an easy task to manage data access in a distributed system.
- **Overheads:** Overheating is a common problem faced by a distributed system. This happens when all the workstations try to operate at once. Even though this essentially brings desired results, eventually there will be an increase in computing time. This ultimately impacts the system's response time.
- **Testing and Debugging:** Because of the complexity of the system or the interactions between many nodes, testing and debugging distributed systems can be difficult.
- **Network Dependency:** Distributed systems are prone to network errors which result in communication breakdown. The information may fail to be delivered or not in the correct

sequence. And also, troubleshooting errors is a difficult task since the data is distributed across various nodes.

- **Consistency:** Data consistency can be difficult to ensure across several nodes and may call for the deployment of intricate algorithms and protocols.
- **Complexity:** The difficulty involved in implementation, maintenance, and troubleshooting makes the distributed system a complex strategy. Besides hardware complexity, distributed systems possess difficulty in software too. The software used in distributed systems needs to be well-attentive when handling communication and security.

Conclusion:

In a nutshell, we can say that distributed systems have a significant impact on our lives. But, there are some issues that occur while using them, mostly regarding security and complexity, which should be kept in mind while designing distributed systems.

Related Articles:

- What is a Distributed System?

Last Updated : 06 Apr, 2023

Similar Reads

1. Advantages and Disadvantages of Prototype model
2. Advantages and Disadvantages of Embedded System
3. Comparison - Centralized, Decentralized and Distributed Systems
4. Analysis of Monolithic and Distributed Systems - Learn System Design
5. How can Heartbeats Detection provide a solution to network failures in Distributed Systems
6. Hashing in Distributed Systems
7. Methodologies of Large Scale Distributed Systems
8. Language Synchronization Mechanism in Distributed Systems
9. Architecture Styles in Distributed Systems
10. Consistent Hashing In Distributed Systems

Related Tutorials

1. Spring MVC Tutorial
2. Spring Boot Tutorial
3. Java 8 Features - Complete Tutorial
4. Introduction to Heap - Data Structure and Algorithm Tutorials
5. Introduction to Segment Trees - Data Structure and Algorithm Tutorials

Previous Next

Article Contributed By :

nikamjaydipashok11

nikamjaydipashok11

Follow

Vote for difficulty

Easy | Normal | Medium | Hard | Expert

Article Tags : Picked, System Design

Practice Tags : System Design

Improve Article | Report Issue

GeeksforGeeks
A-143, 9th Floor, Sovereign Corporate Tower, Sector-136, Noida, Uttar Pradesh - 201305

feedback@geeksforgeeks.org