DD QUS ANS (magic 1)

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CSE 52

Question 01: Define distributed system. Mention a few real-time examples of distributed systems.

🖥️ What is a Distributed System?

A distributed system is a group of computers that work together over a network to perform tasks. To users, it appears as a single system, but behind the scenes, multiple machines share the workload. This setup enhances speed, reliability, and scalability.

🌐 Real-World Examples

1. **Cloud Platforms (e.g., AWS, Google Cloud):* These services use many servers worldwide to store data and run applications, ensuring fast and reliable acces.
2. **Online Banking:* Banks use distributed systems to manage accounts and transactions across various branches and online services, providing real-time access to customer.
3. **Social Media (e.g., Facebook, Twitter):* These platforms handle vast amounts of data and user interactions by distributing the workload across multiple server.
4. **E-commerce (e.g., Amazon):* Online stores manage product listings, user accounts, and orders using distributed systems to ensure smooth shopping experience.
5. **Telecommunication Networks:* Phone and internet services rely on distributed systems to route calls and data efficiently across the glob.

Question 02: What design principles are considered useful for better performance in a distributed system?

Key design principles that enhance the performance of distributed systems include:

- Modularity: Dividing the system into distinct components that can be developed, tested, and deployed independently. citeturn0search13
- Fault Tolerance: Designing the system to continue operation despite failures in some of its components.

- **Scalability: Ensuring the system can handle increased load by adding resources without significant changes to its architecture.**
- **Consistency Models: Defining rules for how updates to data are propagated and become visible across the system.**
- **Load Balancing: Distributing workloads evenly across all system components to prevent any single component from becoming a bottleneck.**

Question 03: Mention the advantages of a distributed computing environment over standalone applications. What are the disadvantages of distributed systems?

Advantages:

- **Resource Sharing: Efficient utilization of resources across multiple systems.**
- **Scalability: Ability to handle increased load by adding more machines.**
- **Reliability and Availability: System continues to function even if some components fail.**
- **Flexibility: Components can be located in different geographical locations.**

Disadvantages:

- **Complexity: More challenging to design, develop, and manage.**
- **Security: Increased risk due to multiple points of access.**
- **Latency: Potential delays in communication between components.**
- **Data Consistency: Ensuring all components have the latest data can be difficult.**

Question 04: Define scalability. What are the challenges involved in designing a scalable distributed system?

Scalability refers to a system's ability to handle increased workload by adding resources such as servers or storage. A scalable system maintains or improves its performance as the workload grows.

Challenges in designing scalable distributed systems include:

- **Load Distribution: Ensuring even distribution of tasks to prevent bottlenecks.**
- **Data Consistency: Maintaining uniform data across all components.**
- **Fault Tolerance: Designing systems that continue to operate despite failures.**

- **Network Latency: Minimizing delays in data transmission between components.**
- **Resource Management: Efficiently allocating resources to meet demand.**
