ONE PAGE SUMMARY

IT & Software › System Design › Consistency

Introduction to Consistency

Understanding consistency is key to reliable system design.

DEFINITION

> Consistency in system design ensures that all users see the same data at the same time. It is crucial for maintaining trust and reliability in distributed systems.

KEY CONCEPTS

Strong Consistency

All operations appear to happen in a single, atomic step, ensuring immediate visibility of changes.

Eventual Consistency

Updates to the system will eventually propagate, but may not be immediately visible to all users.

Consistency Models

Different models define how and when data updates are visible, impacting system behavior.

CAP Theorem

States that a distributed system can only guarantee two out of three properties: Consistency, Availability, and Partition Tolerance.

Distributed Systems

Systems spread across multiple locations that must coordinate to maintain consistency.

EXAMPLES

→ Bank transactions must reflect the same balance across all branches immediately.

→ Social media posts should show the same number of likes to all users at once.

→ E-commerce inventory needs to be updated in real-time to avoid overselling.

MEMORY TIPS

★ Think 'C' for Consistency in CAP: Choose two from Consistency, Availability, Partition.

★ Use 'S' for Strong and 'E' for Eventual to remember the types of consistency.

★ Visualize a library where every book must be in the same place for all readers.

COMMON MISTAKES

✗ Confusing strong consistency with eventual consistency.

✗ Overlooking the impact of network partitions on system behavior.

✗ Neglecting to consider user experience when designing for consistency.

QUICK RECAP

Consistency is vital for ensuring all users see the same data in a system. Understanding different consistency models helps in designing reliable distributed systems.