Client-Centric Consistency Models in Distributed Systems

Introduction to Consistency in Distributed Systems

- Data is replicated across multiple servers or nodes in distributed systems. Consistency ensures data synchronization across all nodes so that users see the same data.

Client-Centric Consistency Models

- These models focus on individual clients' data consistency, ensuring they see a consistent view based on their own actions.

- - More relaxed compared to strict consistency models.
- - Prioritizes performance in large distributed systems.

Monotonic Read Consistency

- Definition: If a client has seen a data value at a certain time, they will never see an older version of the same data later on.

- Example: Reading a blog post from different devices, but always seeing the latest version.

Monotonic Write Consistency

- Definition: Once a client issues a write, all future writes are guaranteed to be applied in the order the client made them.

- Example: Updating a social media status from different devices in the correct order.

Read Your Writes Consistency

- Definition: After a client writes data, they will immediately see the updated data in any subsequent read operation.

- Example: Uploading a photo and immediately seeing it in your account.

Writes Follow Reads Consistency

- Definition: If a client reads data and then writes a new value based on it, the write is correctly ordered and linked to the read.

- Example: Replying to an email in a thread; your response follows the correct message.

When to Use Client-Centric Models?

- Real-world use cases:
- - Social media platforms
- - Online shopping carts

- Trade-offs:
- - Performance improves due to relaxed consistency
- - Focuses on individual client consistency over system-wide strict consistency

Summary of Client-Centric Consistency Models

- - Monotonic Reads: Never see an older version after seeing a new one.
- - Monotonic Writes: Writes are applied in the order they are made.
- - Read Your Writes: See changes you made immediately after writing.
- - Writes Follow Reads: Writes based on a read are correctly ordered.