DISTRIBUTED DATABASE SYSTEM FOR A GLOBAL E-COMMERCE PLATFORM

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INTRODUCTION:

The system requirements for a Distributed Database System for a global e-commerce platform include both functional and non-functional needs. Functionally, it must handle high-volume transactions, support data partitioning across multiple regions, and enable real-time data synchronization to provide accurate inventory, pricing, and user information globally. Non-functional requirements emphasize scalability, ensuring the platform can expand seamlessly as the user base grows, and performance, where low-latency access and quick response times are essential. Security is paramount, requiring robust encryption, access control, and compliance with regulations like GDPR and CCPA. Additionally, high availability and fault tolerance are essential to minimize downtime, ensuring a consistent user experience worldwide.

SYSTEM REQUIREMENTS:

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ARCHITECTURE DESIGN

The architecture design for a Distributed Database System in a global e-commerce platform is centered around a robust, scalable, and fault-tolerant structure. This includes a system architecture overview that defines the distributed nature of the system, where databases are spread across multiple regions to ensure low latency and meet global demands. The architecture leverages distributed database models like sharding, replication, and partitioning to manage data effectively across locations, balancing load and reducing bottlenecks.

To further improve performance and reliability, data flow and network topology are designed to optimize data access routes, minimize delays, and handle regional traffic spikes. High availability and redundancy are achieved through failover mechanisms and data replication strategies, ensuring uninterrupted service during failures. This architecture aims to meet the platform's requirements for scalability, security, and real-time data processing, while allowing for easy expansion as demand grows.

DATA MODEL AND SCHEMA DESIGN

The Data Model and Schema Design for a Distributed Database System in a global e-commerce platform focuses on structuring data to support scalability, efficiency, and responsiveness. This begins with creating a detailed Entity-Relationship Diagram (ERD) that captures key entities like users, products, orders, inventory, and transactions, defining their attributes and relationships to represent the business logic comprehensively.

The table structures and relationships are designed to support rapid querying and updates, with key data organized in a way that supports easy partitioning for distribution across regions. To accommodate the high volume and complexity of e-commerce data,

the schema includes a blend of normalization and denormalization, balancing data integrity with performance. Primary and foreign

Data modeling stages

Conceptual

Logical

Physical