DP-3015: Getting Started with Cosmos DB NoSQL Development

Course Duration: 8 Hours **Course code: DP-3015**

1. Course Overview

This foundational course introduces you to Azure Cosmos DB, Microsoft's globally distributed, multi-model NoSQL database service. You'll explore the architecture, capabilities, and best practices to build highly available, scalable, and responsive applications. Through practical, hands-on labs, you'll learn how to design, implement, query, and optimize NoSQL solutions using Cosmos DB's APIs and tools.

2. What you'll learn?

- By the end of this course, you will be able to:
- Understand Cosmos DB fundamentals, including capacity models, partitioning, consistency levels, and global distribution
- Design container schemas and partition key strategies for scalable data storage
- Use key Cosmos DB APIs (SQL/Core, MongoDB, Cassandra, Gremlin, Table) for CRUD and query operations
- Write efficient, cost-effective queries leveraging indexing policies and query metrics
- Implement transactional operations using stored procedures, triggers, and bulk executor
- Monitor, troubleshoot, and optimize Cosmos DB performance using metrics and diagnostics
- Integrate Cosmos DB with applications using SDKs for .NET, Java, Python, and JavaScript

- Apply best practices for security, reliability, and cost-management in production environments

3. Target Audience

This course is ideal for:

- Developers looking to build scalable, high-performance applications using NoSQL patterns
- Database professionals transitioning to cloud-native, globally distributed databases
- Data architects designing multi-region, low-latency data solutions
- Solution engineers and technical leads evaluating Cosmos DB for enterprise scenarios

4. Pre-Requisites

- Basic knowledge of NoSQL concepts and data modeling
- Familiarity with at least one programming language (such as C#, Java, JavaScript, or Python)
- Prior exposure to Azure fundamentals—understanding of services like Resource Groups, Storage, and Azure Portal navigation
- (Optional but beneficial) Experience with other database systems such as relational databases or MongoDB

5. Course content

Module 1: Introduction to Azure Cosmos DB

- Overview of Cosmos DB and its capabilities
- Key use cases and advantages of a globally distributed NoSQL database
- Service tiers and cost models

Module 2: Data Modeling and Partitioning

- Designing containers and partition keys for performance
- Logical vs. physical partitions
- Throughput allocation and scaling

Module 3: Working with APIs and SDKs

- SQL (Core) API fundamentals
- Overview of other APIs (MongoDB, Cassandra, Gremlin, Table)
- Using SDKs with .NET, Java, Python, and JavaScript

Module 4: CRUD Operations and Querying Data

- Creating, reading, updating, and deleting items
- Writing SQL queries for JSON data
- Using query metrics for optimization

Module 5: Indexing and Performance Optimization

- Built-in indexing and custom indexing policies
- RU (Request Unit) cost optimization strategies
- Query tuning techniques

Module 6: Transactional Processing

- Implementing stored procedures and triggers
- Creating user-defined functions (UDFs)
- Bulk execution and batch operations

Module 7: Global Distribution and Consistency Models

- Multi-region replication setup

- Exploring consistency levels: Strong, Bounded Staleness, Session, Consistent Prefix, Eventual
- Trade-offs between latency, availability, and consistency

Module 8: Monitoring, Troubleshooting, and Scaling

- Using Azure Monitor and diagnostic logs
- Setting up alerts and performance tracking
- Auto-scale and manual scaling options

Module 9: Security and Best Practices

- Role-based access control and keys
- Network isolation and encryption
- Cost optimization and SLA considerations

Module 10: Hands-On Lab / Final Project

- Building an end-to-end application with Cosmos DB
- Applying design, performance, and security best practices
- Testing, deployment, and final presentation