DP 3015- Get Started With Azure Cosmos DB Nosql Development

Days: 1

Audience: Software engineers tasked with authoring cloud-native solutions that leverage Azure Cosmos DB for NoSQL and its various SDKs. They are familiar with C# programming. They also have experience writing code that interacts with a SQL or NoSQL database platform.

Prerequisites: Familiarity with C# programming. Experience writing code that interacts with a SQL or NoSQL database platform.

Description: This course teaches developers to utilize Azure Cosmos DB for NoSQL API and SDK. Students will learn query execution, resource configuration, SDK operations, and design strategies for non-relational data modeling and data partitioning.

OUTLINE:

LESSON 1 - INTRODUCTION TO AZURE COSMOS DB FOR NOSQL

- What is Azure Cosmos DB for NoSQL
- How does Azure Cosmos DB for NoSQL work
- When should you use Azure Cosmos DB for NoSQL

LESSON 2 - TRY AZURE COSMOS DB FOR NOSQL

- Explore resources
- Review basic operations

LESSON 3 - PLAN RESOURCE REQUIREMENTS

- Understand throughput
- Evaluate throughput requirements
- Evaluate data storage requirements
- Time-to-live (TTL)
- Plan for data retention with time-to-live (TTL)

LESSON 4 - CONFIGURE AZURE COSMOS DB FOR NOSQL

- Serverless
- Compare serverless vs. provisioned throughput
- Autoscale throughput
- Compare autoscale vs. standard (manual) throughput
- Migrate between standard (manual) and autoscale throughput

LESSON 5 - MOVE DATA INTO AND OUT OF AZURE COSMOS DB FOR NOSQL

- Move data by using Azure Data Factory
- Move data by using a Kafka connector
- Move data by using Stream Analytics
- Move data by using the Azure Cosmos DB Spark connector

LESSON 6 - USE THE AZURE COSMOS DB FOR NOSQL SDK

- Understand the SDK
- Import from package manager
- Connect to an online account
- Implement client singleton
- Configure connectivity mode

LESSON 7 - CONFIGURE THE AZURE COSMOS DB FOR NOSQL SDK

- Enable offline development
- Handle connection errors
- Implement threading and parallelism
- Configure logging

LESSON 8 - IMPLEMENT AZURE COSMOS DB FOR NOSQL POINT OPERATIONS

- Understand point operations
- Create documents
- Read a document
- Update documents

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- Configure time-to-live (TTL) value for a specific document
- Delete documents

LESSON 9 - PERFORM CROSS-DOCUMENT TRANSACTIONAL OPERATIONS WITH THE AZURE COSMOS DB FOR NOSQL

- Create a transactional batch with the SDK
- Review batch operation results with the SDK
- Implement optimistic concurrency control

LESSON 10 - PROCESS BULK DATA IN AZURE COSMOS DB FOR NOSQL

- Create bulk operations with the SDK
- Review bulk operation caveats
- Implement bulk best practices

LESSON 11 - QUERY THE AZURE COSMOS DB FOR NOSQL

- Understand NoSQL query language
- Create queries with NoSQL
- Project query results
- Implement type-checking in queries
- Use built-in functions
- Execute queries in the SDK

LESSON 12 - AUTHOR COMPLEX QUERIES WITH THE AZURE COSMOS DB FOR NOSQL

- Create cross-product queries
- Implement correlated subqueries
- Implement variables in queries
- Paginate query results

LESSON 13 - BUILD GENERATIVE AI APPLICATIONS WITH AZURE COSMOS DB

- Configure the Vector Search and storage feature of Azure Cosmos DB NoSQL
- Generate embeddings using Azure OpenAI Service
- Build Generative AI applications with Azure Cosmos DB NoSQL and Python
- Perform vector searches using Azure Cosmos DB for NoSQL from a Generative AI application
- Integrate LangChain orchestration to improve efficiency and code maintainability in a Python Generative AI application

LESSON 14 - DEFINE INDEXES IN AZURE COSMOS DB FOR NOSQL

- Understand indexes
- Understand indexing policies
- Review indexing policy strategies

LESSON 15 - CUSTOMIZE INDEXES IN AZURE COSMOS DB FOR NOSQL

- Customize the indexing policy
- Evaluate composite indexes

LESSON 16 - CONSUME AN AZURE COSMOS DB FOR NOSQL CHANGE FEED USING THE SDK

- Understand change feed features in the SDK
- Implement a delegate for the change feed processor
- Implement the change feed processor
- Implement the change feed estimator

LESSON 17 - HANDLE EVENTS WITH AZURE FUNCTIONS AND AZURE COSMOS DB FOR NOSQL CHANGE FEED

- Understand Azure Function bindings for Azure Cosmos DB for NoSQL
- Configure function bindings
- Develop function

LESSON 18 - SEARCH AZURE COSMOS DB FOR NOSQL DATA WITH AZURE COGNITIVE SEARCH

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- Create an indexer for data in Azure Cosmos DB for NoSQL
- Implement a change detection policy
- Manage a data deletion detection policy

LESSON 19 - IMPLEMENT A NON-RELATIONAL DATA MODEL

- What's the difference between NoSQL and relational databases?
- Identify access patterns for your app
- When to embed or reference data
- Choose a partition key
- Model small lookup entities

LESSON 20 - DESIGN A DATA PARTITIONING STRATEGY

- Denormalize data in your model
- Manage referential integrity by using change feed
- Combine multiple entities in the same container
- Denormalize aggregates in the same container
- Finalize the data model

LESSON 21 - CONFIGURE REPLICATION AND MANAGE FAILOVERS IN AZURE COSMOS DB

- Understand replication
- Distribute data across regions
- Evaluate the cost of distributing data globally
- Define automatic failover policies
- Perform manual failovers
- Configure SDK region

LESSON 22 - USE CONSISTENCY MODELS IN AZURE COSMOS DB FOR NOSQL

- Understand consistency models
- Configure default consistency model in the portal
- Change consistency model with the SDK
- Use session tokens

LESSON 23 - CONFIGURE MULTI-REGION WRITE IN AZURE COSMOS DB FOR NOSQL

- Understand multi-region write
- Configure multi-region support in the SDK
- Understand conflict resolution policies
- Create custom conflict resolution policy

LESSON 24 - CUSTOMIZE AN INDEXING POLICY IN AZURE COSMOS DB FOR NOSQL

- Index usage
- Review read-heavy index patterns
- Review write-heavy index patterns
- Module assessment

LESSON 25 - MEASURE INDEX PERFORMANCE IN AZURE COSMOS DB FOR NOSQL

- Enable indexing metrics
- Analyze indexing metrics results
- Measure query cost
- Measure point operation cost

LESSON 26 - IMPLEMENT INTEGRATED CACHE IN AZURE COSMOS DB FOR NOSQL

- Review workloads that benefit from the cache
- Enable integrated cache
- Configure cache staleness

LESSON 27 - MEASURE PERFORMANCE IN AZURE COSMOS DB FOR NOSQL

- Understand Azure Monitor
- Measure throughput
- Observe rate-limiting events
- Query logs

LESSON 28 - MONITOR RESPONSES AND EVENTS IN AZURE COSMOS DB FOR NOSQL

- Review common response codes
- Understand transient errors
- Review rate-limiting errors
- Configure Alerts

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- Audit security
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LESSON 29 - IMPLEMENT BACKUP AND RESTORE FOR AZURE COSMOS DB FOR NOSQL

- Evaluate periodic backup
- Configure continuous backup and recovery
- Perform a point-in-time recovery
- Module assessment

LESSON 30 - IMPLEMENT SECURITY IN AZURE COSMOS DB FOR NOSQL

- Implement network-level access control
- Review data encryption options
- Use role-based access control (RBAC)
- Access account resources using Microsoft Entra ID
- Understand Always Encrypted

LESSON 31 - WRITE MANAGEMENT SCRIPTS FOR AZURE COSMOS DB FOR NOSQL

- Create resources
- Manage index policies
- Configure database or container-provisioned throughput
- Migrate between standard and autoscale throughput
- Change region failover priority
- Initiate failovers
- Module assessment

LESSON 32 - CREATE RESOURCE TEMPLATE FOR AZURE COSMOS DB FOR NOSQL

- Understand Azure Resource Manager resources
- Author Azure Resource Manager templates
- Configure database or container resources
- Configure throughput with an Azure Resource Manager template
- Manage index policies through Azure Resource Manager templates

LESSON 33 - BUILD MULTI-ITEM TRANSACTIONS WITH THE AZURE COSMOS DB FOR NOSQL

- Understand transactions in the context of JavaScript SDK
- Author Stored procedures
- Rollback transactions
- Create stored procedures with the JavaScript SDK

LESSON 34 - EXPAND QUERY AND TRANSACTION FUNCTIONALITY IN AZURE COSMOS DB FOR NOSQL

- Create user-defined functions
- Create user-defined functions with the SDK
- Add triggers to an operation
- Create and use triggers with the SDK