DP-3020: Develop data-driven applications with Azure SQL Database

Course Duration: 8 Hours **Course code: DP-3020**

1. Course Overview

DP-3020: Develop Data-Driven Applications with Azure SQL Database is a comprehensive, hands-on professional course designed for developers and data professionals. It equips you with practical skills to design, implement, and optimize applications using Azure SQL Database as the backend. This course focuses on building highly scalable, secure, and performant data-driven applications in the Azure ecosystem, leveraging modern best practices, rich functionality, and Azure-native features.

2. What you'll learn?

By the end of this course, you will be able to:

- Architect and design robust data solutions using Azure SQL Database.
- Create, configure, and manage Azure SQL databases to support application workloads.
- Implement efficient connectivity and routing strategies for client apps (e.g., connection strings, firewall rules, and Elastic Pools).
- Develop secure applications using Azure SQL's built-in authentication and authorization mechanisms (including Azure AD integration).
- Model data and design schemas for performance and scalability.
- Implement T-SQL for querying, manipulating, and managing data (CRUD operations, stored procedures, and functions).
- Optimize database performance (indexing, partitioning, query tuning, monitoring).

- Enable high availability and resilience with features like automated backups, geo-replication, failover groups, and autoscaling.
- Integrate applications with Azure APIs and tooling (Azure CLI, PowerShell, ARM templates, .NET SDK, REST APIs).
- Monitor and troubleshoot database and application performance with Azure Monitor, Query Performance Insight, and built-in diagnostic logs.
- Apply best practices for security, auditing, compliance, and cost optimization.

3. Target Audience

This course is ideal for:

- Software Developers: Building web, mobile, or cloud applications that interact with a relational database.
- Data Practitioners / Database Developers: Designing and optimizing data access and modeling within Azure.
- DevOps Engineers: Deploying, managing, and monitoring Azure SQL environments as part of CI/CD pipelines.
- Data Architects: Designing cloud-native data platforms and ensuring scalability, reliability, and security.
- Technical Leads / Solution Architects: Evaluating Azure SQL Database as a backend for enterprise-grade applications.

4. Pre-Requisites

- Familiarity with relational databases: Basic knowledge of SQL and how relational data is structured.
- Programming experience: Comfortable with at least one development language—such as C#, Java, Python, JavaScript—especially with database connectivity (ODBC/JDBC, or a language-specific ORM).
- Basic Azure exposure: Understanding of Azure fundamentals, navigating the Azure Portal, or using the Azure CLI.
- Optional but helpful:

- Previous experience with T-SQL, stored procedures, functions.
- Experience with version control (Git) or CI/CD pipelines (GitHub Actions, Azure DevOps, etc.).

5. Course content

Module 1: Introduction to Azure SQL Database

- Overview of Azure SQL Database service and its deployment models.
- Key benefits, architecture considerations, and common use cases.

Module 2: Provisioning and Configuring Azure SQL Database

- Creating databases using Azure Portal, CLI, and PowerShell.
- Adjusting compute and storage tiers, and scaling resources effectively.

Module 3: Securing Azure SQL Database

- Configuring firewalls, virtual network integration, and private endpoints.
- Implementing SQL Authentication and Azure Active Directory integration.
- Data encryption, auditing, threat protection, and compliance features.

Module 4: Data Modeling and Development with T-SQL

- Designing efficient database schemas.
- Creating tables, views, indexes, stored procedures, and triggers.
- Writing and optimizing T-SQL queries for CRUD operations and reporting.

Module 5: Performance Optimization

- Analyzing execution plans and improving query performance.
- Using indexes, statistics, and partitioning for speed and efficiency.

- Leveraging Query Store, Intelligent Insights, and performance monitoring tools.

Module 6: High Availability and Disaster Recovery

- Configuring automated backups and point-in-time restore.
- Setting up geo-replication and auto-failover groups.
- Building robust disaster recovery and business continuity plans.

Module 7: Monitoring and Troubleshooting

- Using Azure Monitor, metrics, and alerts to track database health.
- Troubleshooting connectivity, performance, and resource bottlenecks.
- Applying Extended Events and Query Performance Insight.

Module 8: Integration and Automation

- Integrating Azure SQL Database with web, mobile, and cloud apps.
- Using ARM templates, Bicep, and Terraform for deployment.
- Implementing CI/CD pipelines with Azure DevOps and GitHub Actions.

Module 9: Best Practices and Cost Optimization

- Applying governance, security, and compliance best practices.
- Cost-saving strategies including auto-pause and reserved capacity.
- Ongoing database maintenance and optimization tips.

Module 10: Capstone Project

- Building a secure, optimized, and fully functional data-driven application.
- Applying security, performance tuning, automation, and monitoring skills in a real-world scenario.