MS-DP300T00: ADMINISTERING MICROSOFT AZURE SQL SOLUTIONS

DURATION	LEVEL	TECHNOLOGY	DELIVERY METHOD	TRAINING CREDITS
4 Days	Intermediate	Azure	Instructor-led	NA

INTRODUCTION

This course provides students with the knowledge and skills to administer a SQL Server database infrastructure for cloud, on-premises and hybrid relational databases and who work with the Microsoft PaaS relational database offerings. Additionally, it will be of use to individuals who develop applications that deliver content from SQL-based relational databases.

AUDIENCE PROFILE

The audience for this course is data professionals managing data and databases who want to learn about administering the data platform technologies that are available on Microsoft Azure. This course is also valuable for data architects and application developers who need to understand what technologies are available for the data platform with Azure and how to work with those technologies through applications.

PREREQUISITES

In addition to their professional experience, students who take this training should have technical knowledge equivalent to the following:

- Azure Fundamentals
- Azure Data Fundamentals
- Ability to navigate the Azure the portal.
- Understanding of the traditional Database Administration role.
- Experience with T-SQL programming language at a basic level.
- Experience creating and configuring resources using the Azure portal.
- Ability to create an on-premises SQL Server database.
- Ability to write SQL statements at a beginner level.

COURSE OBJECTIVES

After completing this course, students will be able to:

- Plan, deploy and configure Azure SQL offerings
- Monitor database performance and tune a database and queries for optimum performance
- Plan and configure a High Availability Solution

COURSE CONTENT

Module 1: Prepare to maintain SQL databases on Azure

Explore the role of a database administrator on Azure. Describe SQL Server-based offerings on Azure.

Lessons

- Introduction.
- Describe Microsoft Intelligent Data Platform roles.
- Understand SQL Server in an Azure virtual machine.
- Design Azure SQL Database for cloud-native applications.
- Explore Azure SQL Database Managed Instance.
- Summary.

After completing this module, students will:

- Understand the role of Azure Database Administrator as it fits in with other data platform roles.
- Describe the key differences between the SQL Server-based database options in Azure.
- Describe other features for Azure SQL platforms available.

Module 2: Deploy IaaS solutions with Azure SQL

Configure virtual machine sizing, storage, and networking options to ensure adequate performance for your database workloads. Choose and configure appropriate high availability options.

Lessons

- Introduction
- Explain IaaS options to deploy SQL server in Azure
- Understand hybrid scenarios.
- Explore performance and security.
- Explain high availability and disaster recovery options.
- Exercise: Provision a SQL Server on an Azure Virtual Machine.
- Summary.

After completing this module, students will:

- Explore the basics of SQL Server in an Infrastructure as a Service (IaaS) offering.
- Learn the available options for provisioning and deployment.

- Deploy SQL Server into an Azure Virtual Machine.

Module 3: Deploy PaaS solutions with Azure SQL

Provision and deploy Azure SQL Database and Azure SQL managed instance. Select the appropriate options when performing a migration to the SQL PaaS platform.

Lessons

- Introduction.
- Explain PaaS options for deploying SQL Server in Azure.
- Explore single SQL database.
- Deploy SQL database elastic pool.
- Understand SQL database hyperscale.
- Examine SQL managed instance.
- Exercise: Deploy an Azure SQL Database.
- Summary.

After completing this module, students will:

- Gain an understanding SQL Server in a Platform as a Service (PaaS) offering.
- Understand PaaS provisioning and deployment options.
- Understand elastic pools.
- Examine Azure SQL Managed Instances.
- Explore Azure SQL Edge.
- Configure a template for PaaS deployment.

Module 4: Migrate SQL Server workloads to Azure SQL Database

You will explore different migration tools and migrate SQL Server databases to Azure SQL Database.

Lessons

- Introduction
- Choose the right Azure SQL Database feature
- Use Azure SQL migration extension to migrate to Azure SQL Database
- Explore Data Migration Assistant to migrate to Azure SQL Database
- Migrate to Azure SQL Database using BACPAC
- Use an online method to migrate to Azure SQL Database
- Move data to Azure SQL Database
- Exercise - Migrate a SQL Server database to Azure SQL Database
- Module assessment
- Summary

After completing this module, students will:

- Explore the advantages, capabilities, and migration possibilities offered by Azure SQL Database.
- Migrate databases using Azure SQL Migration extension for Azure Data Studio and tracking database migration activities.
- Use transactional replication as an online method to migrate to Azure SQL Database.
- Explore several other methods for migrating SQL Server databases to Azure SQL Database.

Module 5: Migrate SQL Server workloads to Azure SQL Managed Instance

You'll explore different migration tools and migrate SQL Server databases to Azure SQL Managed Instance.

Lessons

- Introduction
- Evaluate migration scenarios
- Use Log Replay Service (LRS) to migrate
- Migrate using Managed Instance link
- Move data to SQL Managed Instance
- Exercise - Migrate a SQL Server database to Azure SQL Managed Instance
- Module assessment
- Summary

After completing this module, students will:

- Explore the advantages, capabilities, and migration possibilities offered by Azure SQL Managed Instance.
- Learn how Log Replay Service works to migrate to Azure SQL Managed Instance.
- Understand how Managed Instance link feature works in a migration scenario.
- Load and move data to and from Azure SQL Managed Instance.
- Explore several other methods for migrating SQL Server databases to Azure SQL Database.

Module 6: Configure database authentication and authorization

Contrast authentication using Microsoft Entra ID, Windows Active Directory, and SQL Server authentication. Implement various security principals and configure permissions.

Lessons

- Introduction
- Describe authentication and identities.
- Describe Security Principals.
- Describe database and object permissions.
- Identify authentication and authorization failures.
- Exercise: Authorize Access to Azure SQL Database with Microsoft Entra ID.
- Module assessment.
- Summary.

After completing this module, students will:

- Learn about authentication options for Azure SQL
- Create various security principals
- Configure permissions within a SQL database
- Identify authentication and authorization failures

Module 7: Protect data in-transit and at rest

Explore encryption options available within Azure SQL, including firewall rules, Always Encrypted, and Transport Layer Security. Understand how SQL Injection works.

Lessons

- Introduction
- Explore Transparent Data Encryption
- Configure server and database firewall rules
- Explain object encryption and secure enclaves
- Enable encrypted connections
- Describe SQL injection
- Understand Azure Key Vault
- Exercise: Configure a server-based firewall rule using the Azure portal
- Module assessment
- Summary

After completing this module, students will:

- Understand the data encryption options available in the various platforms.
- Implement object level encryption.
- Understand the difference between database and server firewall rules for Azure SQL Database.
- Explore Always Encrypted with secure enclaves.

Module 8: Implement compliance controls for sensitive data

Explore data classification capabilities and degrees of confidentiality. Implement security options to maintain private data safe, including Azure SQL auditing, Microsoft Defender for SQL, row-level security, Dynamic Data Masking and Azure SQL Database Ledger.

Lessons

- Explore data classification.

- Explore server and database audit.
- Implement Dynamic Data Masking.
- Implement Row Level security.
- Understand Microsoft Defender for SQL.
- Explore Ledger.
- Implement Azure Purview.
- Exercise: Enable Microsoft Defender for SQL and Data Classification.
- Summary.

After completing this module, students will understand:

- Plan and implement data classification in Azure SQL Database.
- Understand and configure row-level security and dynamic data masking.
- Understand the usage of Microsoft Defender for SQL.
- Explore how Ledger works.

Module 9: Describe performance monitoring

Compare Azure, and on-premises tools for monitoring and measuring performance. Determine critical metrics. Understand the purpose of a baseline for comparative analysis. Configure extended event sessions for tracing activities.

Lessons

- Introduction
- Describe performance monitoring tools
- Describe critical performance metrics
- Establish baseline metrics
- Explore extended events
- Describe Azure SQL Insights
- Explore Query Performance Insight
- Exercise: Isolate problems with monitoring
- Knowledge check
- Summary

After completing this module, you will be able to:

- Review potential performance issues.
- Identify critical Azure metrics.
- Learn how to collect metrics for an established baseline.
- Use extended events for performance analysis.
- Understand Azure SQL Database Intelligent Insights.

Module 10: Configure SQL Server resources for optimal performance

Choose the appropriate size and storage options for your Azure SQL databases. Configure server resources such as tempdb. Understand the usage of Resource Governor.

Lessons

- Introduction.
- Explain how to optimize Azure storage for SQL Server virtual machines.
- Describe virtual machine resizing.
- Optimize database storage.
- Control SQL Server resources.
- Knowledge check.

After completing this module, you will be able to:

- Understand your options for configuration of Azure storage.
- Learn how to configure TempDB data files in SQL Server.
- Learn how to choose the right type of VM for SQL Server workloads.
- Understand the use cases and configuration of Resource Governor in SQL Server.

Module 11: Configure databases for optimal performance

Implement tasks for both IaaS and PaaS to maintain indexes, and statistics. Explore the automatic tuning features of Azure SQL Database. Control database-level configuration options. Explore Intelligent Query Processing.

Lessons

- Introduction
- Understand database scoped configuration options.
- Explore database maintenance checks.
- Describe database scoped configuration options.
- Describe automatic tuning.
- Describe intelligent query processing.
- Exercise: Detect and correct fragmentation issues.
- Knowledge check.
- Summary.

After completing this module, students will understand:

- Understand database scoped configuration options.
- Understand maintenance tasks related to indexing and statistics.
- Understand the features of Intelligent Query Processing (IQP).
- Explore the automatic tuning feature in Azure.

Module 12: Explore query performance optimization

Read and understand various forms of execution plans. Compare estimated vs actual plans. Learn how and why plans are generated. Understand the purpose and benefits of the Query Store.

Lessons

- Introduction
- Understand query plans.
- Explain estimated and actual query plans.
- Describe dynamic management views and functions.
- Explore Query Store.
- Identify problematic query plans.
- Describe blocking and locking.
- Exercise: Identify and resolve blocking issues.
- Knowledge check.
- Summary.

After completing this module, students will understand:

- Generate and save execution plans
- Compare the different types of execution plans
- Understand how and why query plans are generated
- Explain the purpose and benefits of the Query Store
- Investigate the available reports and data in the Query Store

Module 13: Explore performance-based design

Explore normalization for relational databases. Investigate the impact of proper datatype usage. Compare types of indexes.

Lessons

- Introduction
- Describe normalization.
- Choose appropriate data types.
- Design indexes.
- Exercise: Identify database design issues.
- Knowledge check.
- Summary.

After completing this module, students will understand:

- Explore normal forms and how they affect database design.
- Choose appropriate datatypes for your data.
- Evaluate appropriate index types.

Module 14: Evaluate performance improvements

Evaluate possible changes to indexes. Determine the impact of changes to queries and indexes. Explore Query Store hints.

Lessons

- Introduction
- Describe wait statistics.
- Tune and maintain indexes.
- Understand query hints.
- Exercise: Isolate problem areas in poorly performing queries.
- Knowledge check.
- Summary.

After completing this module, students will understand:

- Determine when changing indexes or defining new ones can affect performance.
- Evaluate wait statistics as an aid in finding areas for performance improvement.
- Understand how query hints work, and when to use them.

Module 15: Automate database deployment

Explore multiple deployment models available on Azure. Use Azure Resource Manager (ARM) templates and Bicep files for deploying Azure SQL resources. Understand how to use PowerShell and Azure CLI for automation purposes.

Lessons

- Introduction
- Describe deployment models in Azure.
- Automate deployment by using Azure Resource Manager templates and Bicep.
- Automate deployment by using PowerShell.
- Automate deployment by using Azure CLI.
- Exercise: Deploy an Azure SQL Database using an Azure Resource Manager template.
- Knowledge check.
- Summary.

After completing this module, students will understand:

- Describe the deployment models available on Azure.
- Deploy database resources using PowerShell and Azure CLI.
- Deploy an Azure Resource Manager template and Bicep.
- Understand the difference between multiple command-line options.

Module 16: Create and manage SQL Agent jobs

Explore SQL automation for scheduled tasks, and automatic alerts for SQL Server and Azure SQL Managed Instance.

Lessons

- Introduction
- Create a SQL Server maintenance plan
- Describe task status notifications
- Knowledge check
- Exercise: Create a CPU status alert for a SQL Server
- Summary

After completing this module, students will understand:

- Schedule necessary maintenance activities for your databases.
- Configure notifications and alerts on SQL Server Agent jobs, and SQL Server.
- Configure alerts based on performance monitor values.

Module 17: Manage Azure PaaS tasks using automation

Explore automation for Azure SQL platform. Configure elastic jobs, explore Azure Automation, and evaluate different strategies for monitoring automation tasks.

Lessons

- Introduction
- Explore Elastic jobs
- Understand Azure Automation
- Build an automation runbook
- Automate database workflows by using Logic Apps
- Monitor automated tasks
- Exercise: Deploy an automation runbook to automatically rebuild indexes
- Knowledge check
- Summary.

After completing this module, students will understand:

- Understand the benefits of Azure policy.
- Explore the capabilities of Azure Automation.
- Configure elastic jobs.
- Use Logic Apps for database workflow.

Module 18: Describe high availability and disaster recovery strategies

Plan an appropriate high availability and disaster recovery strategy based on recovery time objective and recovery point objective. Choose the best solution for IaaS or PaaS deployments or hybrid workloads.

Lessons

- Introduction
- Describe recovery time objective and recovery point objective.
- Explore high availability and disaster recovery options.
- Describe Azure high availability and disaster recovery features for Azure Virtual Machines.
- Describe high availability and disaster recovery options for PaaS deployments.
- Explore an IaaS high availability and disaster recovery solution.
- Describe hybrid solutions.
- Knowledge check.
- Summary.

After completing this module, students will understand:

- Define recovery time objective and recovery point objective.
- Explore the available high availability and disaster recovery options for both IaaS and PaaS.
- Devise an appropriate high availability and disaster recovery strategy.

Module 19: Explore IaaS and PaaS solutions for high availability and disaster recovery

Deploy Windows Server Failover Cluster and availability groups in Azure and hybrid environments. Configure temporal tables, geo-replication, and auto-failover groups.

Lessons

- Describe failover clusters in Windows Server.
- Configure Always-on availability groups.
- Describe temporal tables in Azure SQL Database.
- Describe active geo-replication for Azure SQL Database.
- Explore auto-failover groups for Azure SQL Database and Azure SQL Managed Instance.
- Monitor availability.
- Exercise: Configure geo replication for Azure SQL Database.
- Summary.

After completing this module, students will understand:

- Explore options for deploying a WSFC in Azure.
- Explore options for deploying an AG in Azure.
- Monitor high availability.
- Plan active geo-replication and auto-failover groups.

Module 20: Back-up and restore databases

Plan and implement policy for recovering data if user errors occur or the technology fails. Explore various options for how and where to back up and restore databases.

Lessons

- Introduction
- Back-up and restore SQL Server running on Azure virtual machines.
- Back-up a SQL Server virtual machine.
- Back-up and restore a database using Azure SQL Database.
- Exercise: Backup to URL.
- Knowledge check.
- Summary.

After completing this module, students will understand:

- Explore backup and restore options for IaaS
- Implement backup and restore for PaaS

ASSOCIATED CERTIFICATIONS & EXAM

This course will prepare delegates to write the Microsoft DP-300: Administering Relational Databases on Microsoft Azure exam.