



# Administering Microsoft Azure SQL Solutions

## Course DP-300T00: 4 days; Instructor-Led

### 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

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.

**Job role:** Database Administrator

**Preparation for exam:** [DP-300](#)

### Prerequisites

Successful Azure Database Administrators start this role with professional experience in database management and technical knowledge of cloud technologies.

Specifically:

- Working with, maintaining, and developing with SQL Server
- Experience with Azure, such as deploying and managing resources

At a minimum, you should know the information in the following online training before attending the course:

- [AZ-900 Azure Fundamentals](#)
- [DP-900 Azure Data Fundamentals](#)

### Course Outline

#### 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.

In this module, you 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.

#### 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

#### 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.

In this module, you 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

#### 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

### 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.

In this module, you 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

#### 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
- Describe SQL Edge
- Exercise: Deploy an Azure SQL Database

### Module 4: Evaluate strategies for migrating to Azure SQL

Describe database migration options and tools on Azure. Understand how compatibility level affects database behavior. Describe Azure private and public preview options.

In this module, you will:

- Evaluate different Azure migration options when moving your SQL environment to the cloud.
- Understand how SQL Server compatibility level affects database behavior.
- Understand the differences between private and public preview options.

#### Lessons

- Introduction
- Understand compatibility level
- Understand Azure preview features
- Describe Azure database migration options

### Module 5: Migrate SQL workloads to Azure SQL databases

In this module, you will learn to demonstrate the benefits and processes for moving a SQL Server database to Azure SQL Database.

In this module, you will:

- Describe the considerations for a SQL Server to Azure SQL Database migration.
- Describe the methods and steps to perform an offline migration to Azure SQL Database.

- Describe the methods and steps to perform an online migration to Azure SQL Database.
- Explore the post migration steps required to ensure service continuity of your database in backup, high availability, disaster recovery, and scalability.

### Lessons

- Introduction
- Choose the right SQL Server Instance option in Azure
- Migrate SQL Server to Azure SQL Database offline
- Migrate SQL Server to Azure SQL Database online
- Load and move data to Azure SQL Database

### Module 6: Migrate SQL workloads to Azure Managed Instance

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

In this module, you 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.

### 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 7: Configure database authentication and authorization

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

In this module, you will:

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

### Lessons

- Introduction
- Describe Active Directory and Azure Active Directory
- 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 Azure Active Directory

### Module 8: 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.

In this module, you 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

### 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 9: 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.

In this module, you will:

- 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 Azure SQL Database Ledger works

### Lessons

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

### Module 10: 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.

In this module, you will:

- 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.

### 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

**Module 11: 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.

In this module, you will:

- 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

**Lessons**

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

**Module 12: 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.

In this module, you will:

- Understand the use cases and configuration of Resource Governor in SQL Server
- 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

**Lessons**

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

**Module 13: Explore query performance op**

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.

In this module, you will:

- 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

**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

**Module 14: Evaluate performance improvements**

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

In this module, you will:

- 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

**Lessons**

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

**Module 15: Explore performance-based design**

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

In this module, you will:

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

**Lessons**

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

**Module 16: Automate deployment of database resources**

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.

In this module, you will:

- 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

**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

**Module 17: Create and manage SQL Agent jobs**

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

In this module, you will:

- 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.

### Lessons

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

### Module 18: 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.

In this module, you will:

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

### 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

### Module 19: 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.

In this module, you will:

- 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

### 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

### Module 20: 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.

In this module, you will:

- Explore options for deploying a WSFC in Azure
- Explore options for deploying an AG in Azure
- Implement Temporal Tables
- Plan active geo-replication and auto-failover groups

### Lessons

- Introduction
- 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
- Exercise: Configure geo replication for Azure SQL Database

### **Module 21: 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.

In this module, you will:

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

### **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