# DP-300T00: Administering Microsoft Azure SQL Solutions

Course Code: DP-300T00
Duration: 4 days
Instructor-led Training (ILT) | Virtual Instructor-led Training (VILT)

## OVERVIEW

***Level up with Microsoft Certified: Azure Database Administrator Associate.***

This ***DP-300T00: Administering Relational Databases on Microsoft Azure*** 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.

## SKILLS COVERED

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

## WHO SHOULD ATTEND?

- 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

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 training before attending the course:

- Introduction to Azure SQL
- DP-900T00: Microsoft Azure Data Fundamentals
- AZ-900T00: Microsoft Azure Fundamentals

## MODULES

### 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.

**Learning objectives**

At the end of this module, you will be able to:

- 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.

**Prerequisites**

- Ability to navigate the Azure the portal.
- Understanding of the traditional Database Administration role.
- Experience with T-SQL programing language at a basic level.

**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.

**Learning objectives**

After completing this module, you will be able to:

- 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

**Prerequisites**

- Familiarity with on-premises virtualization technologies, including: VMs, virtual networking, and virtual hard disks.
- Familiarity with network configuration, including TCP/IP, Domain Name System (DNS), virtual private networks (VPNs), firewalls, and encryption technologies.
- Ability to create a on-premises SQL Server database, including the configuration of data files and log files.
- Experience creating and configuring resources using the Azure portal.

**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.

**Learning objectives**

After completing this module, you will be able to:

- 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

**Prerequisites**

- Ability to create an on-premises SQL Server database, including the configuration of data files and log files.
- Experience creating and configuring resources using the Azure portal.

**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.

**Learning objectives**

After completing this module, you will be able to:

- 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.

**Prerequisites**

- 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.

**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.

**Learning objectives**

By the end of this module, you'll be able to:

- 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.

**Prerequisites**

The following prerequisites should be completed:

- Understand SQL Server Database file administration
- Successfully log in to the Azure portal
- Understand the Azure storage options
- Understand the Azure compute options

**Module 6: Migrate SQL workloads to Azure Managed Instances**

Learners will be able to demonstrate the benefits and processes for moving a SQL Server database to an Azure SQL Database Managed Instance.

**Learning objectives**

By the end of this module, you'll be able to:

- Evaluate migration scenarios to Azure SQL Database Managed Instance
- Migrate to Azure SQL Database Managed Instance
- Load and move data to Azure SQL Database Managed Instance

**Prerequisites**

The following prerequisites should be completed:

- Understand SQL Server Database file administration
- Successfully log in to the Azure portal
- Understand the Azure storage options
- Understand the Azure compute options

**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.

**Learning objectives**

After completing this module, you will be able to:

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

**Prerequisites**

- Ability to use tools for running queries against a Microsoft SQL database, either on-premises or cloud-based
- Understanding of why security is a crucial part of database system planning
- Ability to write code in the SQL language, particularly the Microsoft T-SQL dialect, at a basic level
- Experience creating and configuring resources using the Azure portal

**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.

**Learning objectives**

After completing this module, you will be able to:

- 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

**Prerequisites**

- Ability to use tools for running queries against a Microsoft SQL database, either on-premises or cloud-based
- Understanding of why security is a crucial part of database system planning
- Ability to write code in the SQL language, particularly the Microsoft T-SQL dialect, at a basic level.
- Experience creating and configuring resources 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.

**Learning objectives**

After completing this module, you will be able to:

- 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

**Prerequisites**

- Ability to write code in the SQL language, particular the Microsoft T-SQL dialect, at a basic level.
- Experience creating and configuring resources using the Azure portal.

**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.

**Learning objectives**

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.

**Prerequisites**

- Experience creating and configuring resources using the Azure portal.
- Ability to use Windows Performance Monitor to monitor system components such as CPU, I/O, network traffic.

**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.

**Learning objectives**

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

**Prerequisites**

- Ability to write code in the SQL language, particularly the Microsoft T-SQL dialect, at a basic level.
- Experience creating and configuring resources using the Azure portal.
- Knowledge of purpose of SQL Server system databases: master, tempdb, msdb
- Basic understanding of SQL Server file storage.

**Module12: 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.

**Learning objectives**

After completing this module, you will be able to:

- 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

**Prerequisites**

- Ability to write code in the SQL language, particularly the Microsoft T-SQL dialect, at a basic level.
- Experience creating and configuring resources using the Azure portal.
- Basic understanding of structure and usage of SQL Server indexes.

**Module 13: 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.

**Learning objectives**

After completing this module, you will be able to:

- 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

**Prerequisites**

- Ability to use tools for running queries against a Microsoft SQL database, either on-premises on cloud-based.
- Ability to write code in the SQL language, particularly the Microsoft T-SQL dialect, at a basic level.
- Basic understanding of structure and usage of SQL Server indexes.
- Basic understanding of relational database concepts.

**Module 14: Evaluate performance improvements**

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

**Learning objectives**

After completing this module, you will be able to:

- 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

**Prerequisites**

- Ability to use tools for running queries against a Microsoft SQL database, either on-premises on cloud-based.
- Ability to write code in the SQL language, particularly the Microsoft T-SQL dialect, at a basic level.
- Basic understanding of structure and usage of SQL Server indexes.
- Basic understanding of relational database concepts.

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

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

**Learning objectives**

After completing this module, you will be able to:

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

**Prerequisites**

- Ability to use tools for running queries against a Microsoft SQL database, either on-premises on cloud-based.
- Ability to write code in the SQL language, particularly the Microsoft T-SQL dialect, at a basic level.
- Basic understanding of structure and usage of SQL Server indexes.
- Basic understanding of relational database concepts.

**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.

**Learning objectives**

After completing this module, you will be able to:

- 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

**Prerequisites**

- Ability to use tools for running queries against a Microsoft SQL database, either on-premises on cloud-based.
- Ability to write code in the SQL language, particularly the Microsoft T-SQL dialect, at a basic level.
- Experience creating and configuring resources using the Azure portal.

**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.

**Learning objectives**

After completing this module, you will be able to:

- 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.

**Prerequisites**

- Ability to use tools for running queries against a Microsoft SQL Server database, either on-premises or on cloud.
- Ability to write code in the SQL language, particularly the Microsoft T-SQL dialect, at a basic level.
- Experience creating, and configuring resources using the Azure portal.

**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.

**Learning objectives**

After completing this module, you will be able to:

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

**Prerequisites**

- Ability to use tools for running queries against a Microsoft SQL database, either on-premises on cloud-based.
- Ability to write code in the SQL language, particularly the Microsoft T-SQL dialect, at a basic level.
- Experience creating and configuring resources using the Azure portal.
- Familiarly with Open Source database systems on Azure.

**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.

**Learning objectives**

After completing this module, you will be able to:

- 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

**Prerequisites**

- Experience creating and configuring resources using the Azure portal.
- Basic understanding of SQL Server file storage.

**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.

**Learning objectives**

After completing this module, you will be able to:

- 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

**Prerequisites**

- Experience creating and configuring resources using the Azure portal.
- Basic understanding of SQL Server file storage.

**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.

**Learning objectives**

In this module, you will:

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

**Prerequisites**

- Experience creating and configuring resources using the Azure portal.
- Basic understanding of SQL Server file storage.
- Familiarity with SQL Server database files for data and log.
- Familiarity with purpose and management of SQL Server transaction log.

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