



# Azure SQL Database Administration

Module 2



## Learning Units covered in this Module

- Lesson 1: Various Tools to Manage Azure SQL Database
- Lesson 2: Scaling Azure SQL Databases Up and Down
- Lesson 3: Maintenance and Scheduling Jobs in Azure SQL Database
- Lesson 4: Azure SQL Database Read Scale-Out

# Lesson 1: Various Tools to Manage Azure SQL Database

# Objectives

After completing this learning, you will be able to:

- Know the different tools that you can use to manage your Azure SQL Database.

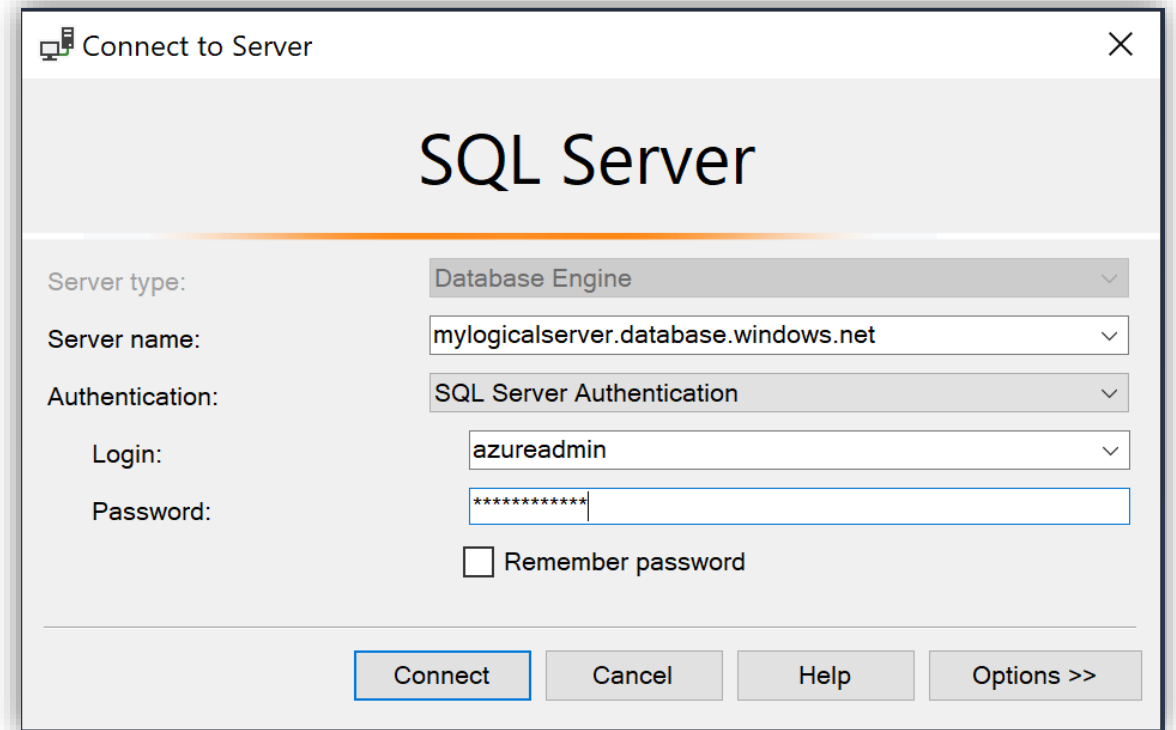


# SQL Server Management Studio

Download  
the latest  
version of  
SSMS.

Get the fully  
qualified  
domain  
name of  
your Azure  
SQL Server.

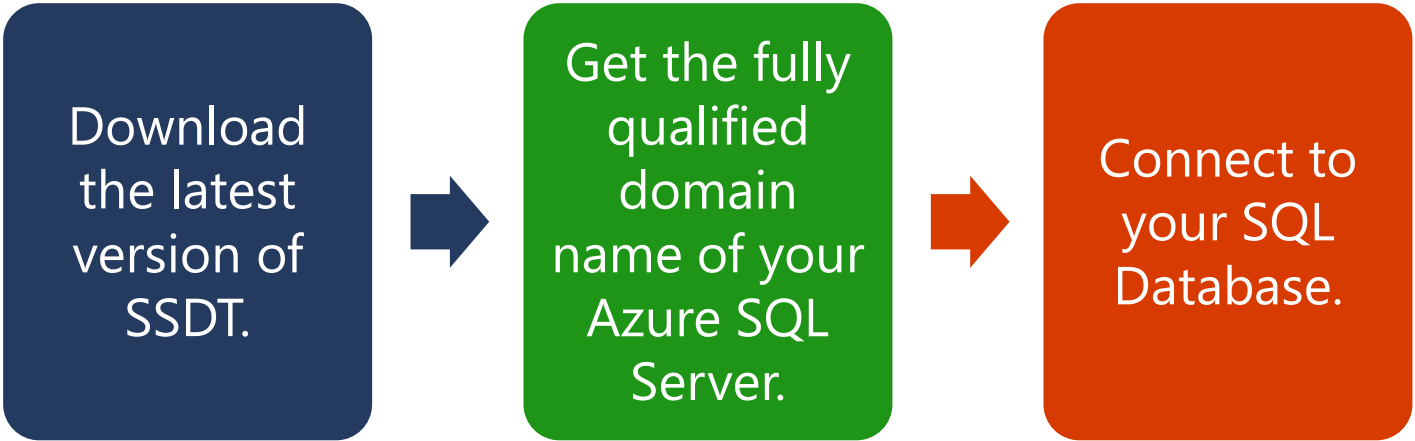
Connect to  
your SQL  
Database.



The screenshot shows the 'Connect to Server' dialog box with the following fields and options:

- Server type:** Database Engine (dropdown)
- Server name:** mylogicalserver.database.windows.net (dropdown)
- Authentication:** SQL Server Authentication (dropdown)
- Login:** azureadmin (dropdown)
- Password:** [masked with asterisks]
- ☐ Remember password
- Buttons:** Connect, Cancel, Help, Options >>

# SQL Server Data Tools



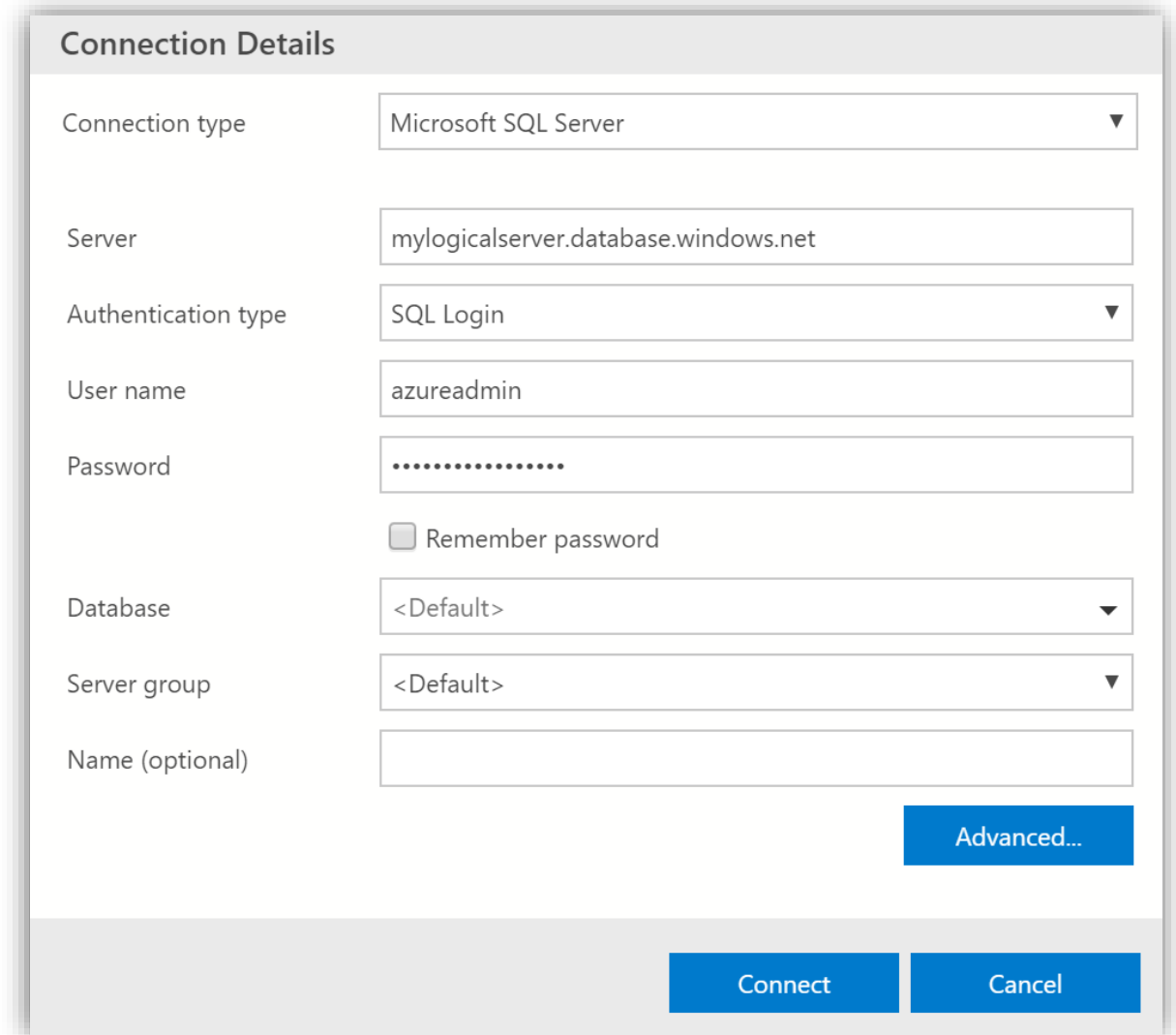
The screenshot shows the 'Connect' dialog box with the 'Browse' tab selected. The 'Server Name' field contains 'mylogicalserver.database.windows.net'. The 'Authentication' dropdown is set to 'SQL Server Authentication'. The 'User Name' field contains 'azureadmin'. The 'Password' field is masked with dots. The 'Database Name' dropdown is set to '<default>'. There is a 'Remember Password' checkbox which is unchecked. At the bottom right, there are 'Connect' and 'Cancel' buttons, and an 'Advanced...' link.

# Azure Data Studio

Download the latest version of Azure Data Studio.

Get the fully qualified domain name of your Azure SQL Server.

Connect to your SQL Database.



The screenshot shows the 'Connection Details' dialog box in Azure Data Studio. It contains the following fields and options:

- Connection type:** A dropdown menu set to 'Microsoft SQL Server'.
- Server:** A text box containing 'mylogicalserver.database.windows.net'.
- Authentication type:** A dropdown menu set to 'SQL Login'.
- User name:** A text box containing 'azureadmin'.
- Password:** A text box with masked characters (dots). Below it is a checkbox labeled 'Remember password' which is currently unchecked.
- Database:** A dropdown menu set to '<Default>'.
- Server group:** A dropdown menu set to '<Default>'.
- Name (optional):** An empty text box.

At the bottom right of the dialog, there are three buttons: 'Advanced...' (in a blue box), 'Connect' (in a blue box), and 'Cancel' (in a blue box).

# Management APIs

## PowerShell

- New-AzSqlDatabase
- Get-AzSqlDatabase
- Set-AzSqlDatabase
- Remove-AzSqlDatabase
- New-AzResourceGroup
- New-AzSqlServer
- Get-AzSqlServer
- Set-AzSqlServer
- Remove-AzSqlServer
- New-AzSqlServerFirewallRule
- Get-AzSqlServerFirewallRule
- Set-AzSqlServerFirewallRule
- Remove-AzSqlServerFirewallRule
- New-AzSqlServerVirtualNetworkRule

## Azure CLI

- az sql db create
- az sql db list
- az sql db list-editions
- az sql db list-usages
- az sql db show
- az sql db update
- az sql db delete
- az group create
- az sql server create
- az sql server list
- az sql server list-usages
- az sql server show
- az sql server update
- az sql server delete
- az sql server firewall-rule create
- az sql server firewall-rule list
- az sql server firewall-rule show
- az sql server firewall-rule update
- az sql server firewall-rule delete



# Management APIs

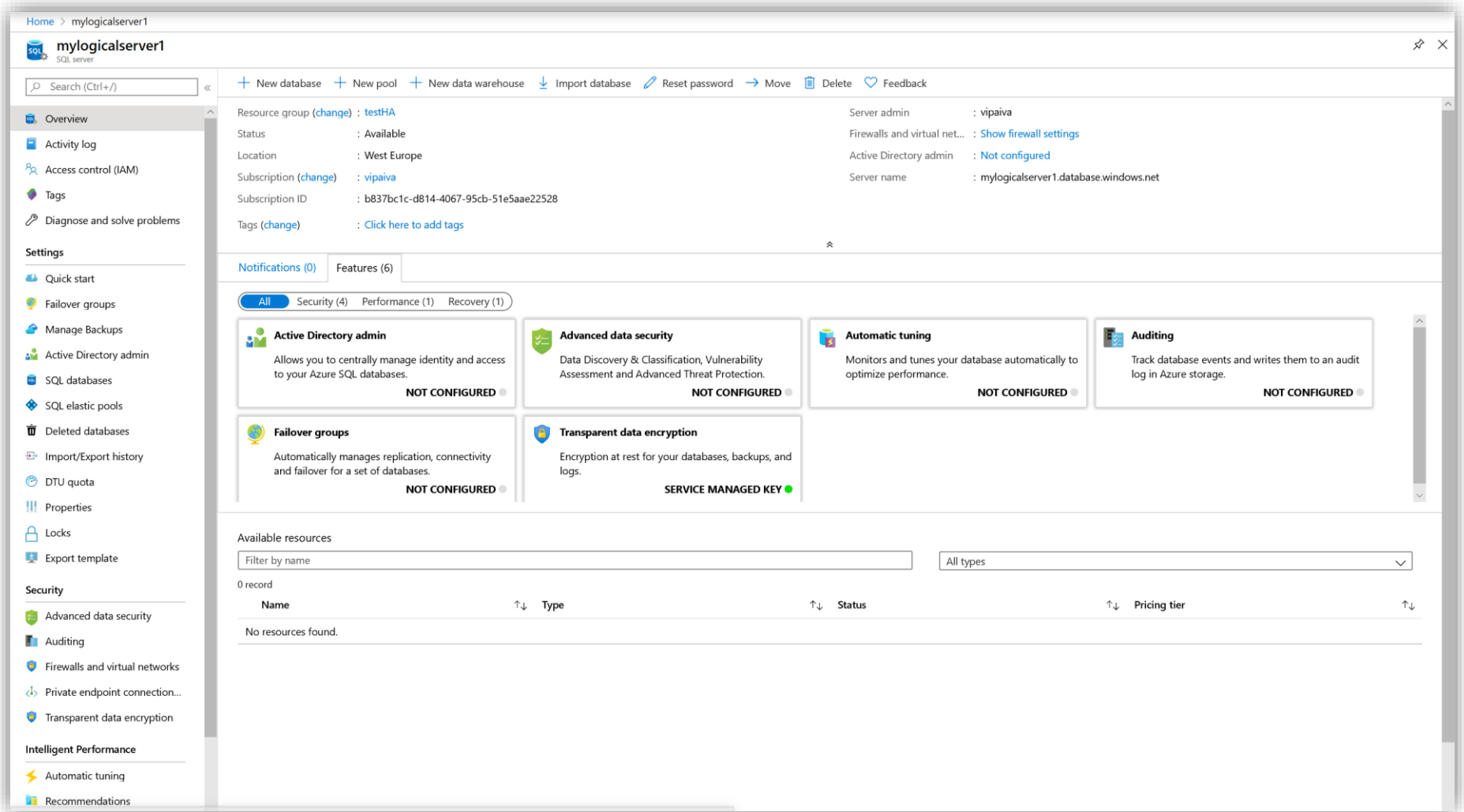
## Transact-SQL

- CREATE DATABASE
- ALTER DATABASE
- DROP DATABASE
- sys.database\_service\_objectives
- sys.dm\_db\_resource\_stats
- sys.resource\_stats
- sys.database\_connection\_stats
- sys.event\_log
- sp\_set\_firewall\_rule
- sys.firewall\_rules
- sp\_delete\_firewall\_rule
- sp\_set\_database\_firewall\_rule
- sys.database\_firewall\_rules
- sp\_delete\_database\_firewall\_rule

## REST API

- Servers - Create or update
- Servers - Delete
- Servers - Get
- Servers - List
- Servers - List by resource group
- Servers - Update
- Databases - Create or update
- Databases - Delete
- Databases - Get
- Databases - List by elastic pool
- Databases - List by server
- Databases - Update
- Firewall rules - Create or update
- Firewall rules - Delete
- Firewall rules - Get
- Firewall rules - List by server

# Azure Portal



# Demonstration

## Connect to your database with SSMS and Azure Portal

- Connect to your database with SSMS.
- Connect to the portal and explore the different options.



# Various Tools to Manage Azure SQL Database

- **Exercise 1:** Connect to your logical server with SQL Server Management Studio.
- **Exercise 2:** Connect to your logical server with SQL Server Data Tools.
- **Exercise 3:** Connect to your Azure SQL Database with Azure Portal.



Questions?



# Knowledge Check

What are the different tools that you can use to manage your Azure SQL Database?

What is the main recommendation to connect to Azure SQL databases regarding the version of the tools?

## Lesson 2: Scaling Azure SQL Databases Up and Down

# Objectives

After completing this learning, you will be able to:

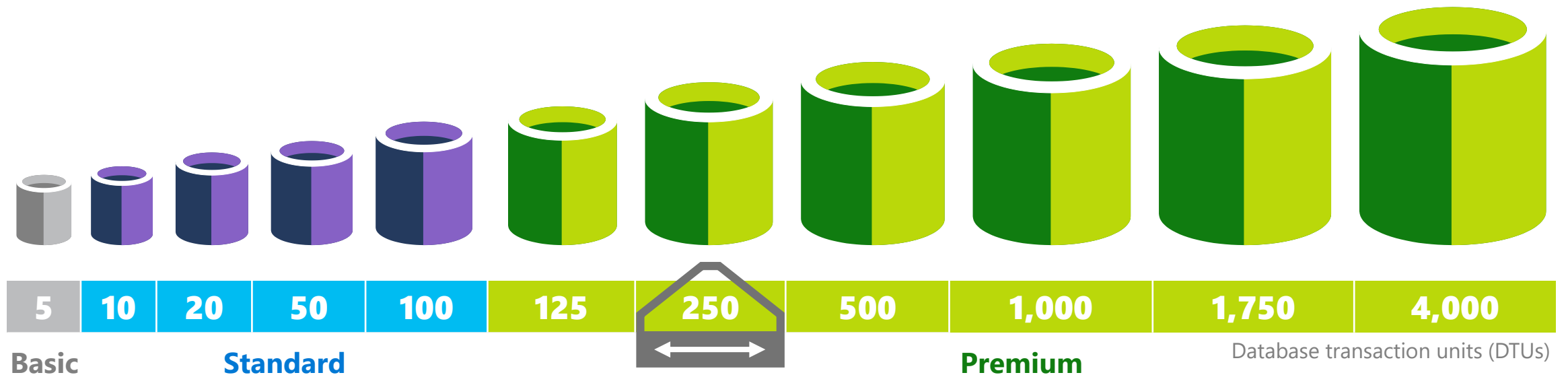
- Describe the vertical scaling options on Azure SQL DB





# Introduction – Scale up or down

- Scale up with one click.
- Accommodate growth and peak workloads.
- Pay for what you need, when you need it.



# Vertical Scaling



Upgrade to a Higher Service  
Tier



Downgrade to a Lower  
Service Tier



Change the Performance  
Level

# Changing Performance Levels (DTU)

## PowerShell

- Set-AzSqlDatabase

## REST

- Update database

## Azure CLI

- az sql db update

## T-SQL

- ALTER DATABASE ... MODIFY  
(EDITION = ...)

### Service and compute tier

Select from the available tiers based on the needs of your workload. The vCore model provides a wide range of configuration controls and offers Hyperscale and Serverless to automatically scale your database based on your workload needs. Alternately, the DTU model provides set price/performance packages to choose from for easy configuration. [Learn more](#)

Service tier

Basic (For less demanding workloads) ▼

DTUs [Compare DTU options](#)

**5 (Basic)**

Data max size (GB)

#### vCore-based purchasing model

General Purpose (Scalable compute and storage options)

Hyperscale (On-demand scalable storage)

Business Critical (High transaction rate and high resiliency)

#### DTU-based purchasing model

Basic (For less demanding workloads)

Standard (For workloads with typical performance requirements)

Premium (For IO-intensive workloads)

# Changing Performance Levels (vCore)

## PowerShell

- Set-AzSqlDatabase

## REST

- Update database

## Azure CLI

- az sql db update

## T-SQL

- ALTER DATABASE ... MODIFY (EDITION = ...)

### Service and compute tier

Select from the available tiers based on the needs of your workload. The vCore model provides a wide range of configuration controls and offers Hyperscale and Serverless to automatically scale your database based on your workload needs. Alternately, the DTU model provides set price/performance packages to choose from for easy configuration. [Learn more](#)

Service tier

General Purpose (Scalable compute and storage options) ▼

Compute tier

vCore-based purchasing model

General Purpose (Scalable compute and storage options)

Hyperscale (On-demand scalable storage)

Business Critical (High transaction rate and high resiliency)

DTU-based purchasing model

Basic (For less demanding workloads)

Standard (For workloads with typical performance requirements)

Premium (For IO-intensive workloads)

up to 80 vCores, up to 408 GB memory

[Change configuration](#)

Compute Hardware

Select the hardware configuration based on confidential computing hardware depends on

Hardware Configuration

### Save money

Already have a SQL Server License? Save with a license you already own with Azure Hybrid Benefit. Actual savings may vary based on region and performance tier. [Learn more](#)

☐ Yes ☒ No

vCores [Compare vCore options](#)



2

Data max size (GB) ⓘ



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# Changing Compute Tier and Hardware (vCore)

## Service and compute tier

Select from the available tiers based on the needs of your workload. The vCore model provides a wide range of configuration controls and offers Hyperscale and Serverless to automatically scale your database based on your workload needs. Alternately, the DTU model provides set price/performance packages to choose from for easy configuration. [Learn more](#)

Service tier

General Purpose (Scalable compute and storage options)



[Compare service tiers](#)

Compute tier

- ☒ **Provisioned** - Compute resources are pre-allocated. Billed per hour based on vCores configured.
- ☐ **Serverless** - Compute resources are auto-scaled. Billed per second based on vCores used.

## Compute Hardware

Select the hardware configuration based on your workload requirements. Availability of compute optimized, memory optimized, and confidential computing hardware depends on the region, service tier, and compute tier.

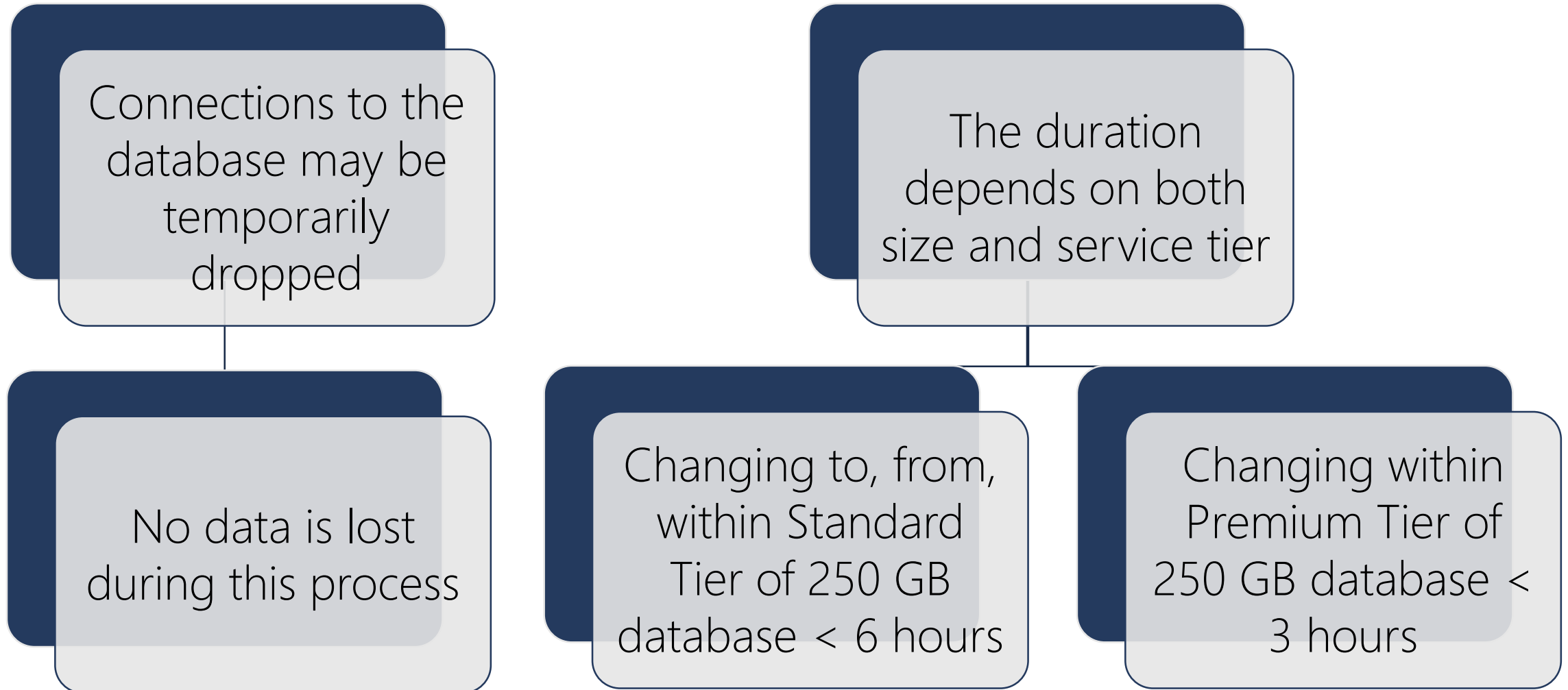
Hardware Configuration

**Gen5**

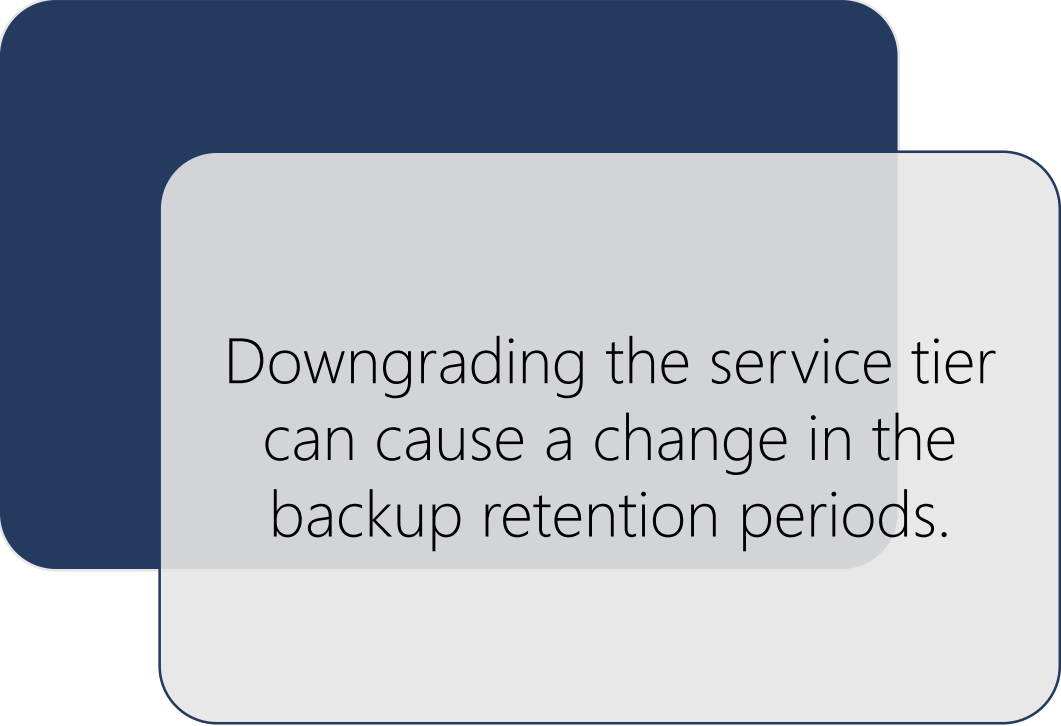
up to 80 vCores, up to 408 GB memory

[Change configuration](#)

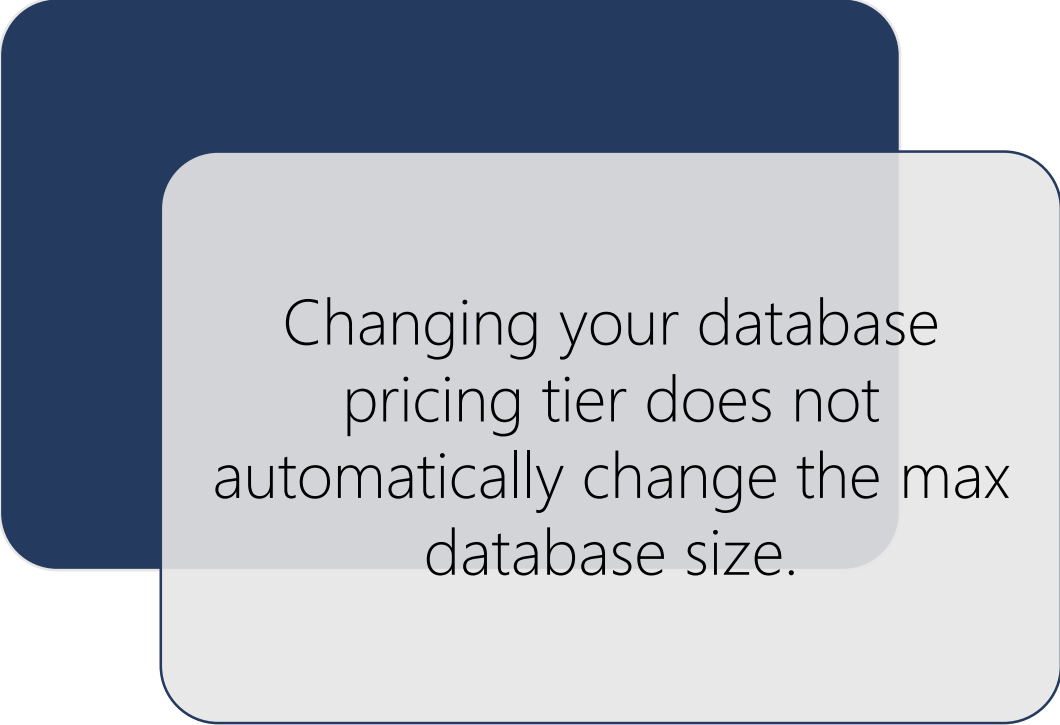
# Impact of Database Changes



# Impact of Database Changes (continued)



Downgrading the service tier can cause a change in the backup retention periods.



Changing your database pricing tier does not automatically change the max database size.

# Demonstration

## Scale up an Azure SQL Database

- Scale up an Azure SQL Database and verify that the database has moved to the selected pricing tier.





# Scale up or down an Azure SQL Database

- **Exercise 1:** Scale up\down an Azure SQL Database.
- **Exercise 2:** Verify the database is at the selected pricing tier.



Questions?



# Knowledge Check

True or false: Database will remain offline and unavailable during the scale up\down operation.

What are the various methods to change the performance levels and edit?

# Lesson 3: Maintenance and Scheduling Jobs in Azure SQL Database

# Objectives

After completing this learning, you will be able to:

- Understand how to perform maintenance and job scheduling in Azure SQL Database



# Maintenance Tasks



Index maintenance as is on premises.



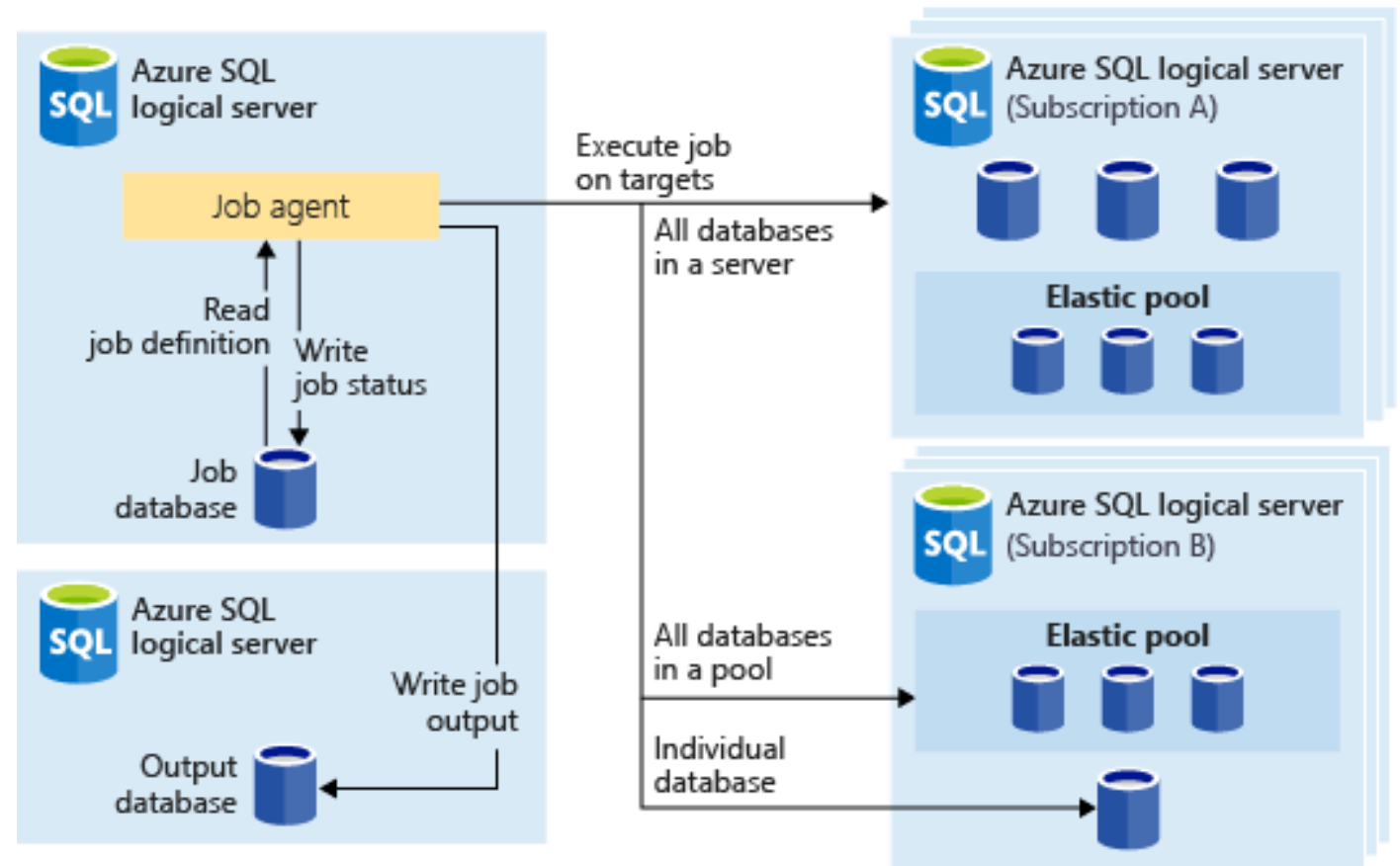
Update statistics as is on premises.



Support for running DBCC CHECKDB.

# What are Elastic Database Jobs?

Elastic Database Jobs provide the ability to run one or more T-SQL scripts in parallel, across a large number of databases, on a schedule or on-demand.



# Why use Elastic Jobs?

## Manage many databases

- Easily do schema changes, credentials management, reference data updates, performance data collection or tenant (customer) telemetry collection.
- Schedule administrative tasks for example: Index Maintenance.

## Collect data for reporting

- Aggregate data from a collection of Azure SQL Databases into a single destination table.

## Reduce Overhead

- No need to connect to each DB separately.
- Scripts are executed against a group of databases.

## Flexibility

- Define custom groups of Azure SQL Databases, and define schedules for running a job.



# Elastic Job Components

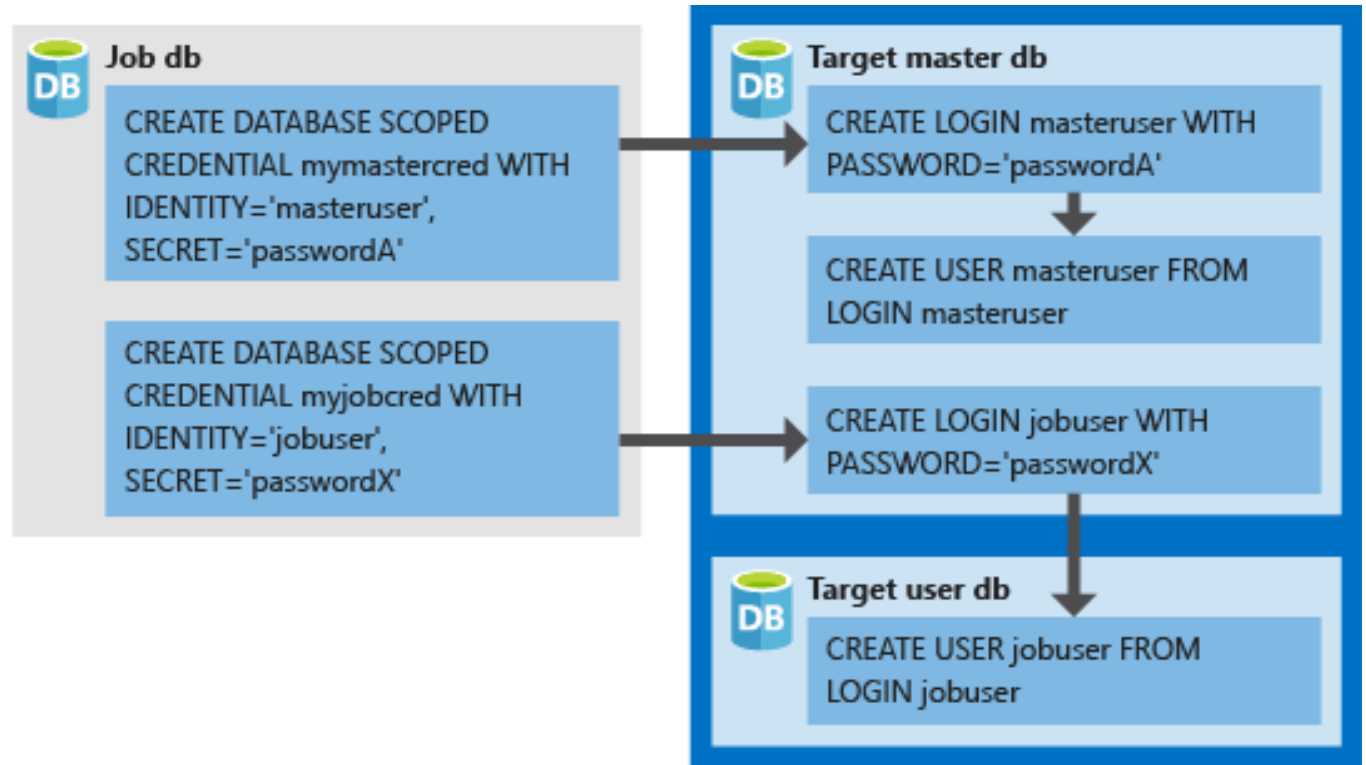
Component	Description
Elastic Job Agent	The Azure resource you create to run and manage Jobs.
Job Database	An Azure SQL database the job agent uses to store job related data, job definitions, etc.
Target Group	The set of servers, pools, databases, and shard maps to run a job against.
Job	A job is a unit of work that is comprised of one or more job steps. Job steps specify the T-SQL script to run, as well as other details required to execute the script.

# Credentials for running jobs

Database Scoped  
Credentials

Used to connect to  
master database

Create a user in every  
database.



# Elastic Database Jobs

Create and manage an elastic database job.



# Scheduling Jobs



Microsoft Azure SQL Database does not support SQL Server Agent.



Instead, use Azure Automation or Elastic jobs or use SQL Server Agent from a Linked server.

# Using SQL Server Agent



Create a linked server to the Azure Database.

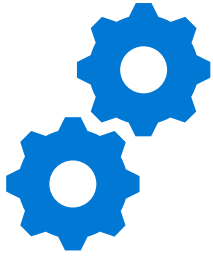


Schedule the job from your on-premises or Azure VM SQL Server by using the linked server.

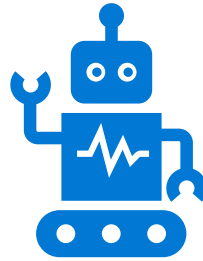
# Azure Automation

Microsoft Azure Automation provides a way for users to automate the manual, long-running, error-prone, and frequently repeated tasks that are commonly performed in a cloud and enterprise environment.

# Azure Automation - Runbook



Automating processes with runbooks.



Runbook is a set of tasks that perform some automated process in Azure Automation.



Based on Windows PowerShell/  
Windows PowerShell Workflow.

# Azure Automation vs. SQL Server Agent Job

Azure Automation	SQL Server Agent Job
Create an Azure Automation Account	Create an SQL Server Agent Job
Create a runbook	Create a Job Step
Test the runbook	Start Job at Step
Publish the runbook	Save the job
Schedule the runbook	Schedule the SQL Server Agent Job
View jobs of the runbook	View History



# Demonstration

Scheduling jobs using Azure Automation



Questions?



# Knowledge Check

True or False; Index maintenance still needs to be done by the DBA?

True or False; SQL Server Jobs are scheduled as in on premises using SQL Server Agent for Azure SQL database?

Why should you use Elastic Jobs. Give some examples?

# Lesson 4: Azure SQL Database Read Scale-Out

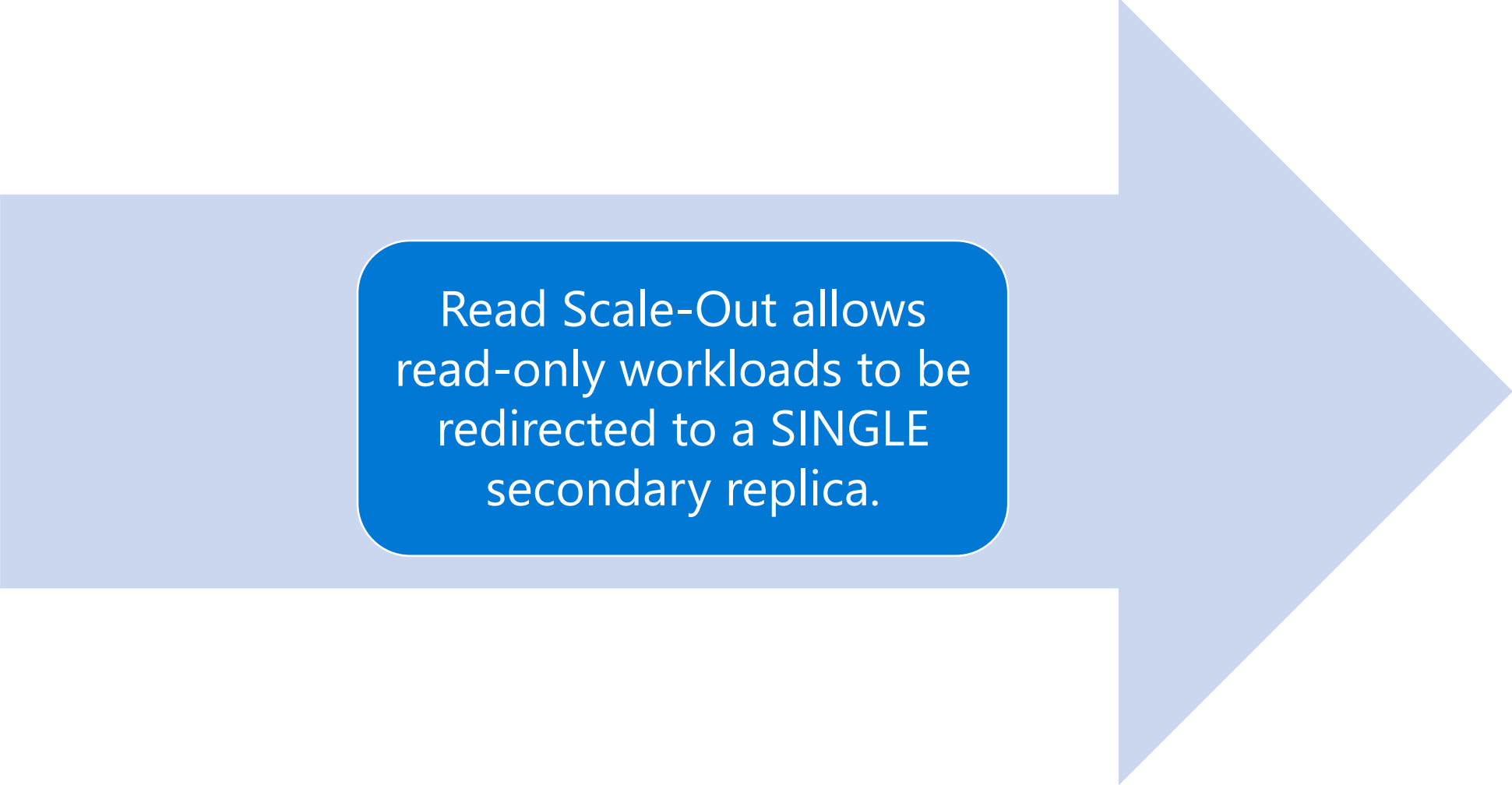
# Objectives

After completing this learning, you will be able to:

- Use read-only replicas to load balance read-only query workloads



# Introduction – Read Scale-Out



Read Scale-Out allows read-only workloads to be redirected to a SINGLE secondary replica.

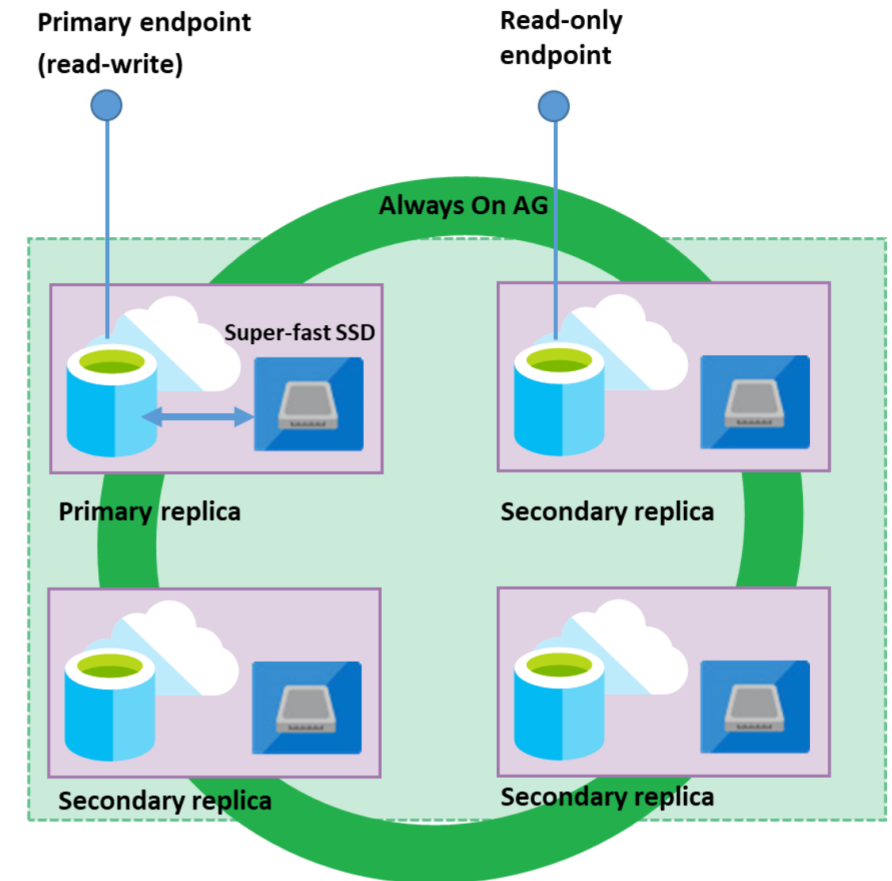
# Read Scale-Out

Each database in the Premium and Business Critical service tiers is automatically provisioned with several AlwaysON replicas to support the availability SLA. These replicas are provisioned with the same compute size as the read-write.

Read Scale-Out redirects the read-only client connections to one of the ready-only replicas available instead of sharing the read-write replica.

Effectively isolate the read-only workload from the main read-write workload and doubles the compute capacity of the database or elastic pool at no additional charge.

This is ideal to scale-out for complex analytical workloads without affecting the primary OLTP workload.



# How to use Read Scale-Out?

If your database is geo-replicated, be sure the read scale-out is enabled on both primary and geo-replicated secondary databases.

## Default Configuration

- **Enabled** in **Managed Instance** Business Critical tier.
- **Disabled** in **database** placed on **SQL Database server** Premium and Business Critical tiers.

## Setup Methods

- **Azure Portal**
  - Settings > Configure > Premium/Business Critical tier > Read scale-out.
- **PowerShell**
  - Set-AzSqlDatabase or
  - New-AzSqlDatabase cmdlets.
- **Azure Resource Manager REST API**
  - Create or
  - Update method

## Connection

- Applications will be directed to either the read-write replica or to a read-only replica according to the **ApplicationIntent** property configured in the application's **connection string**.
- Use **ApplicationIntent=ReadOnly;** to connect to the read-only replica.



# Demonstration

## Enable and disable Read Scale-Out

- Enabling a database with read scale-out.
- Connecting to a Read Scale-Out replica.
- Disabling read scale-out.



Questions?



# Knowledge Check

Read Scale-Out feature is available in which Service Tiers?

How many replicas are enabled to load balance read-only query workloads?

How do you connect to a read-only replica?

# Module Summary

