Microsoft

Azure SQL Database Administration

Module 2

Learning Units covered in this Module

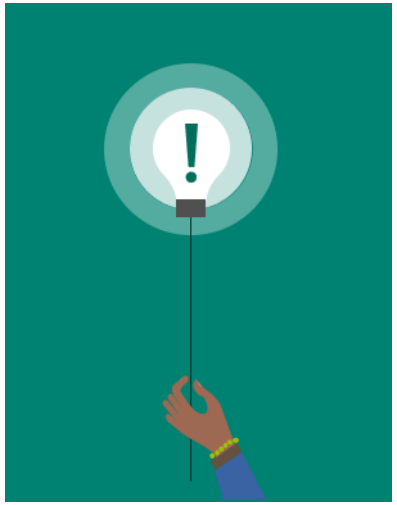
- Lesson 1: Various Tools to Manage Azure SQL Database
- Lesson 2: Scaling Azure SQL Databases Up and Down
- Lesson 3: Maintenance and Scheduling Jobs in Azure SQL Database
- Lesson 4: Azure SQL Database Read Scale-Out

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.

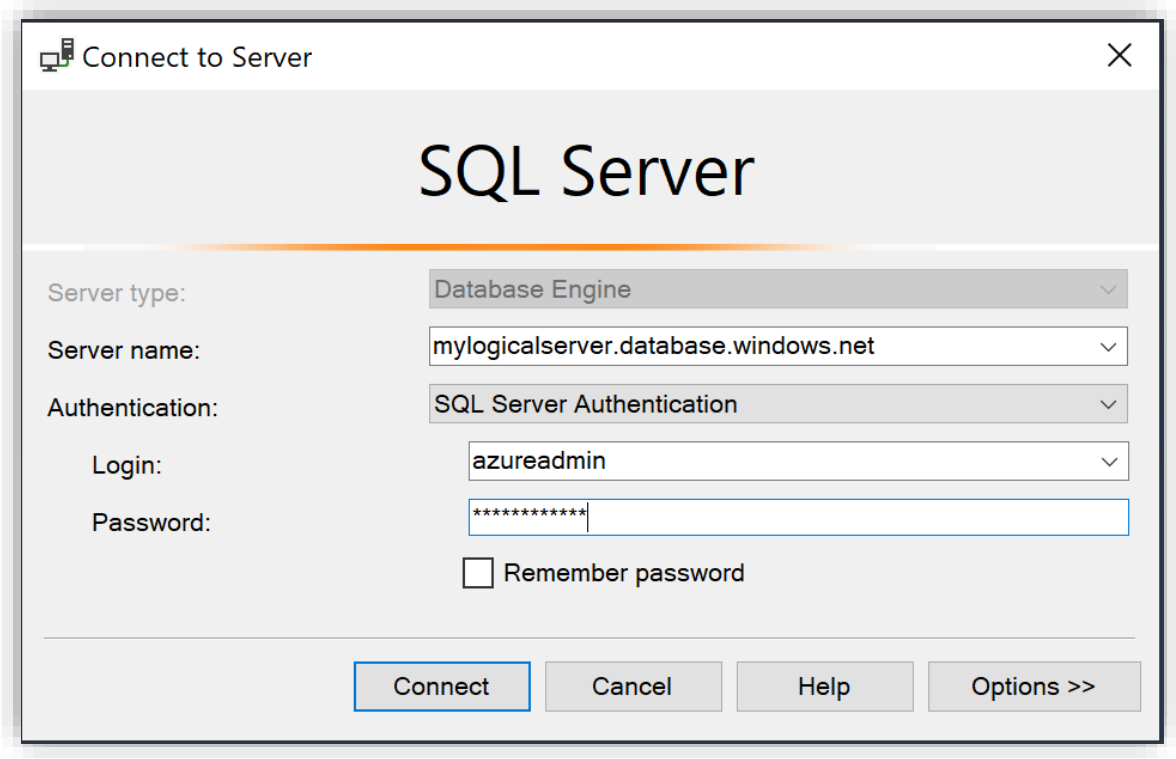


SQL Server Management Studio

Download the latest version of SSMS.

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

Connect to your SQL Database.

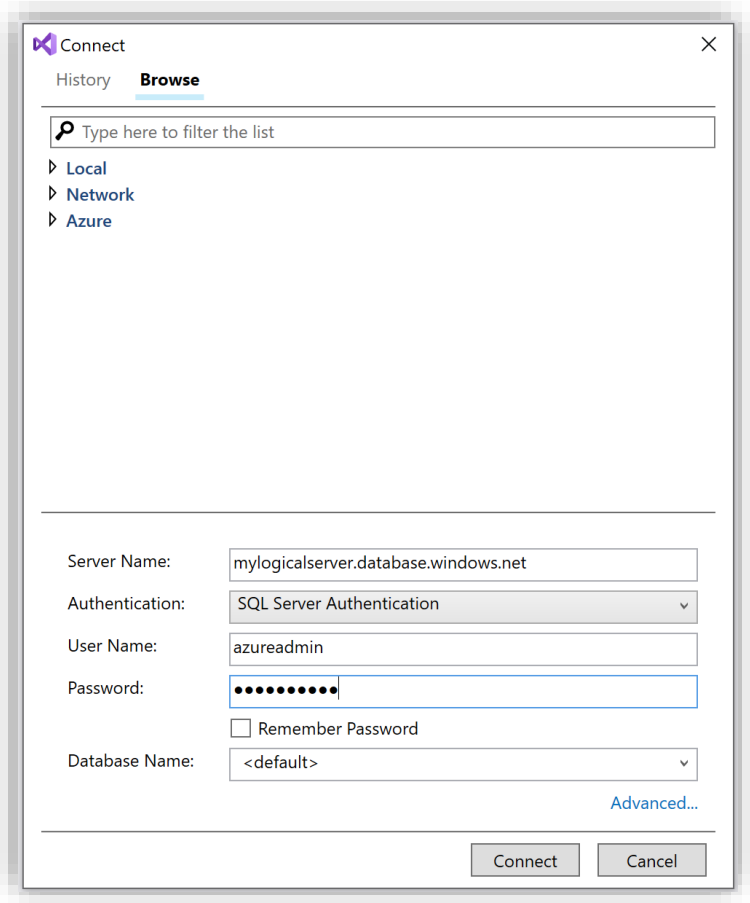


SQL Server Data Tools

Download the latest version of SSDT.

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

Connect to your SQL Database.

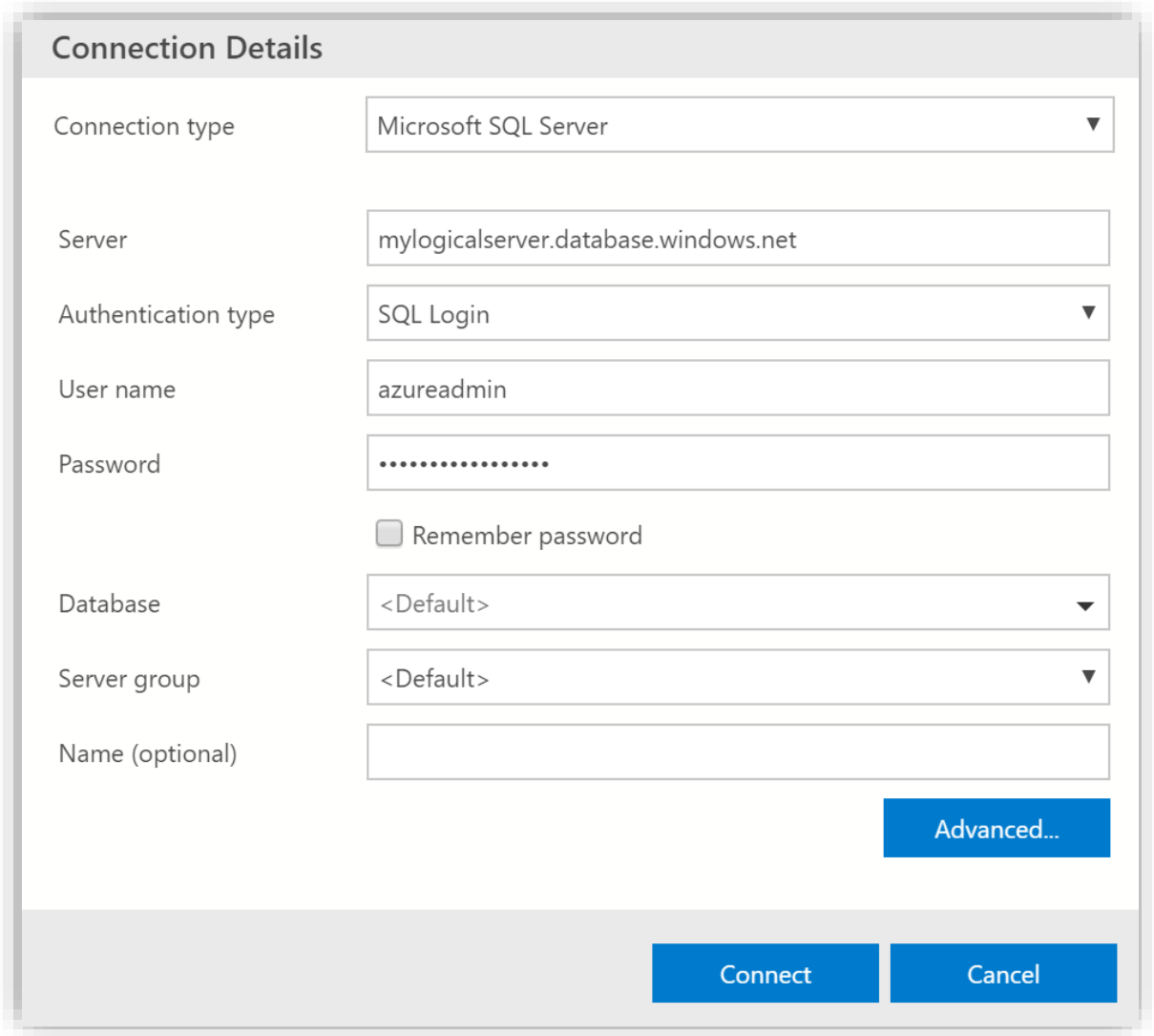


Azure Data Studio

Download the latest version of Azure Data Studio.

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

Connect to your SQL Database.



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

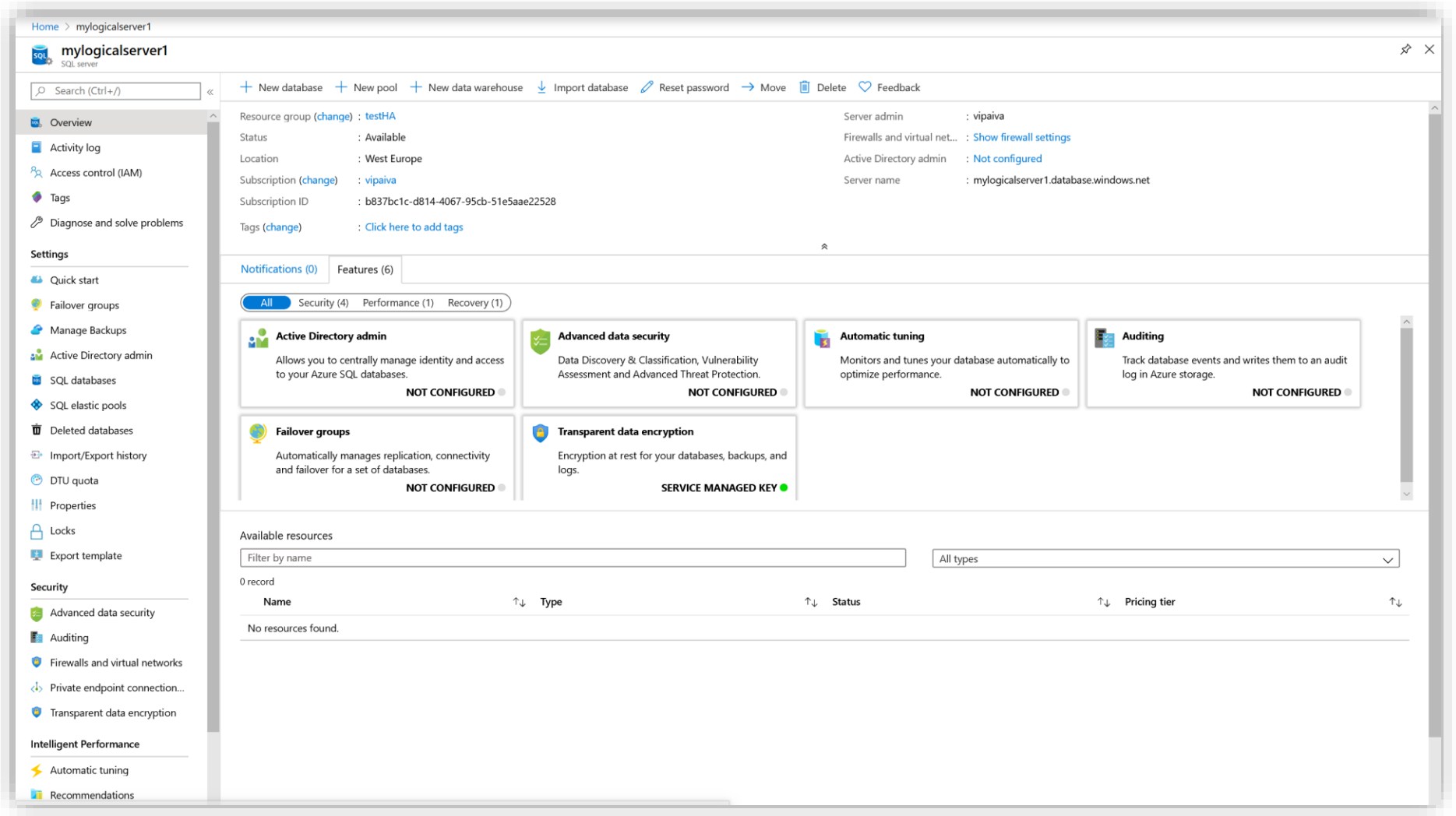
Transact-SQL

- 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.

LAB

Questions?

Knowledge Check

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

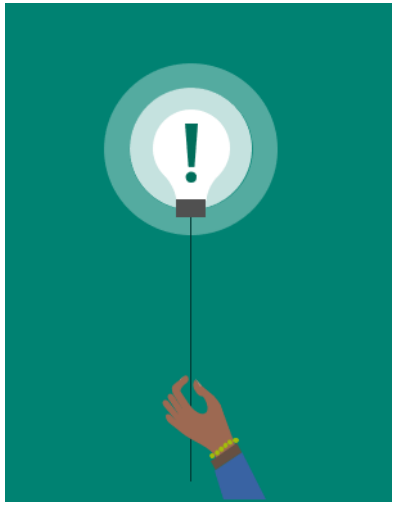
What is the main recommendation to connect to Azure SQL databases regarding the version of the tools?

Lesson 2: Scaling Azure SQL Databases Up and Down

Objectives

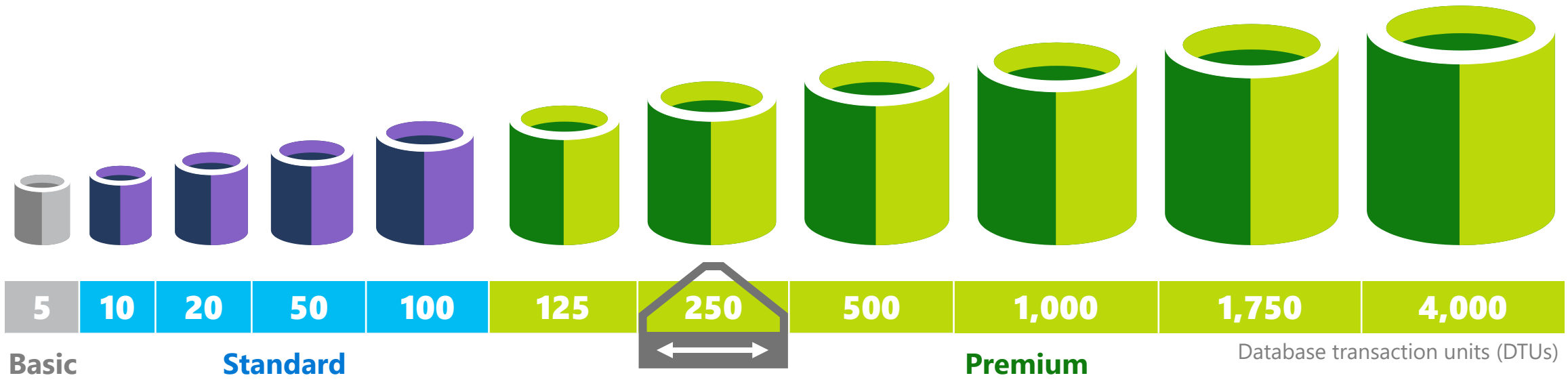
After completing this learning, you will be able to:

- 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

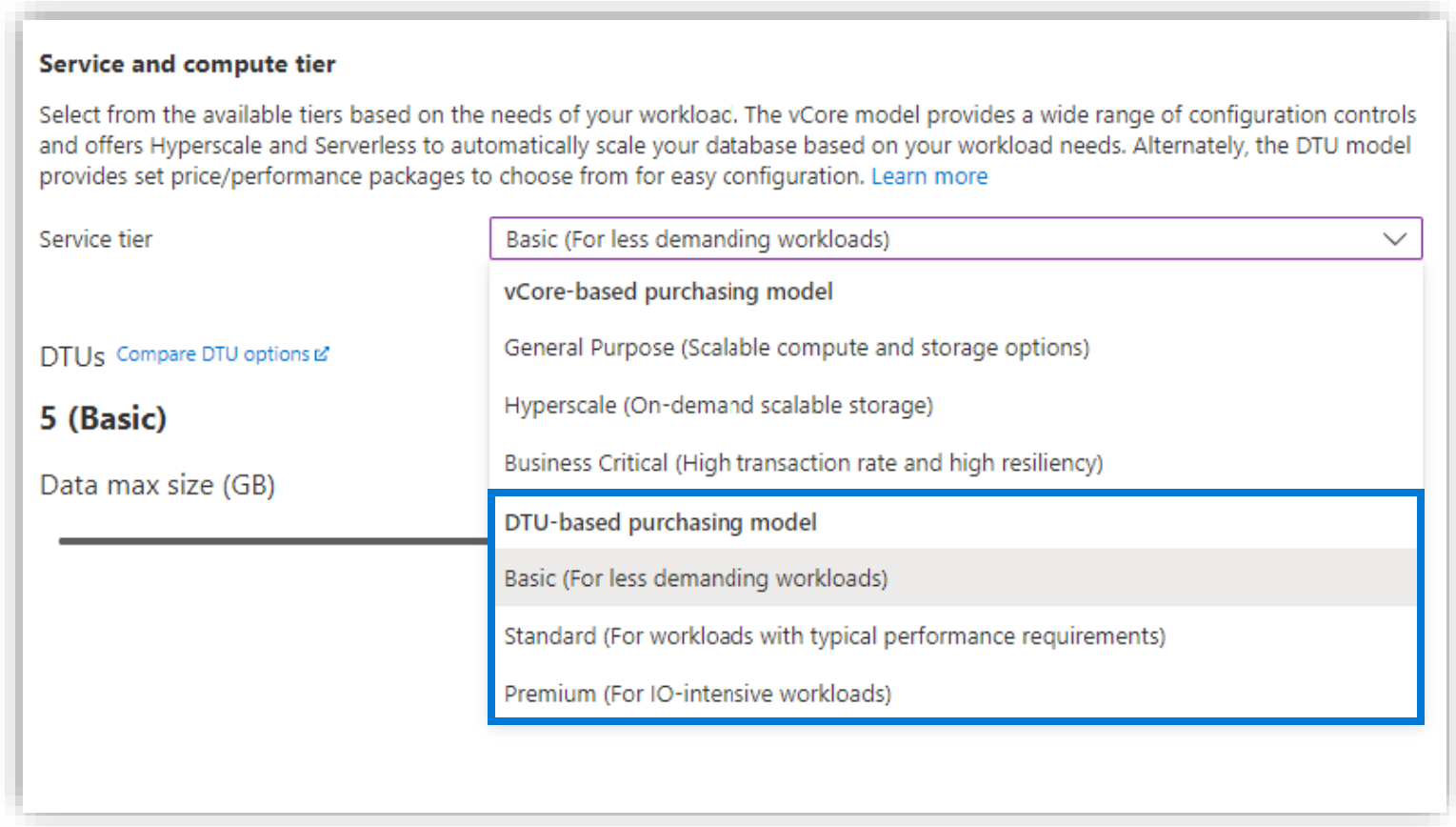
- Update database

Azure CLI

- az sql db update

T-SQL

- ALTER DATABASE … MODIFY (EDITION = …)



Changing Performance Levels (vCore)

PowerShell

- Set-AzSqlDatabase

REST

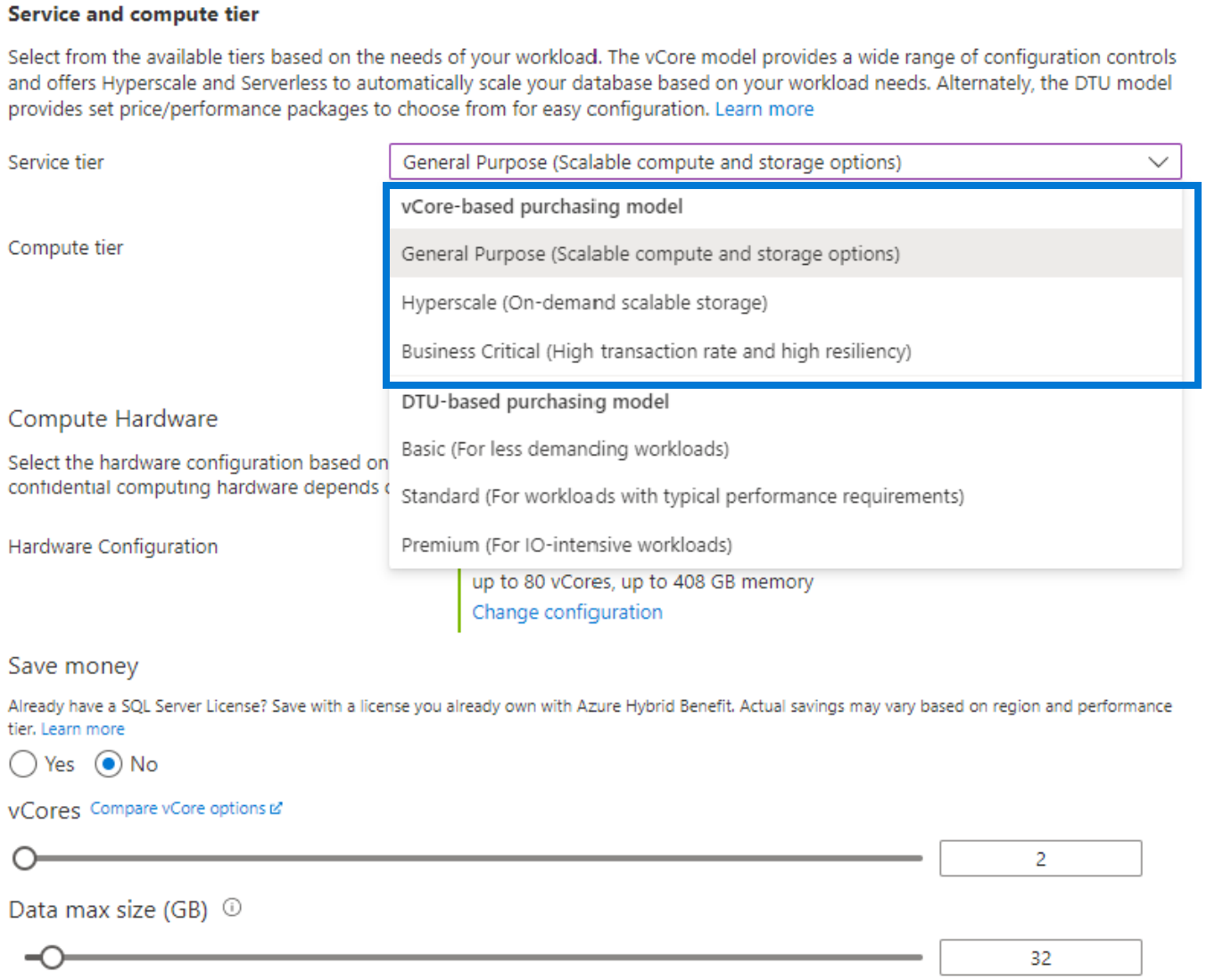
- Update database

Azure CLI

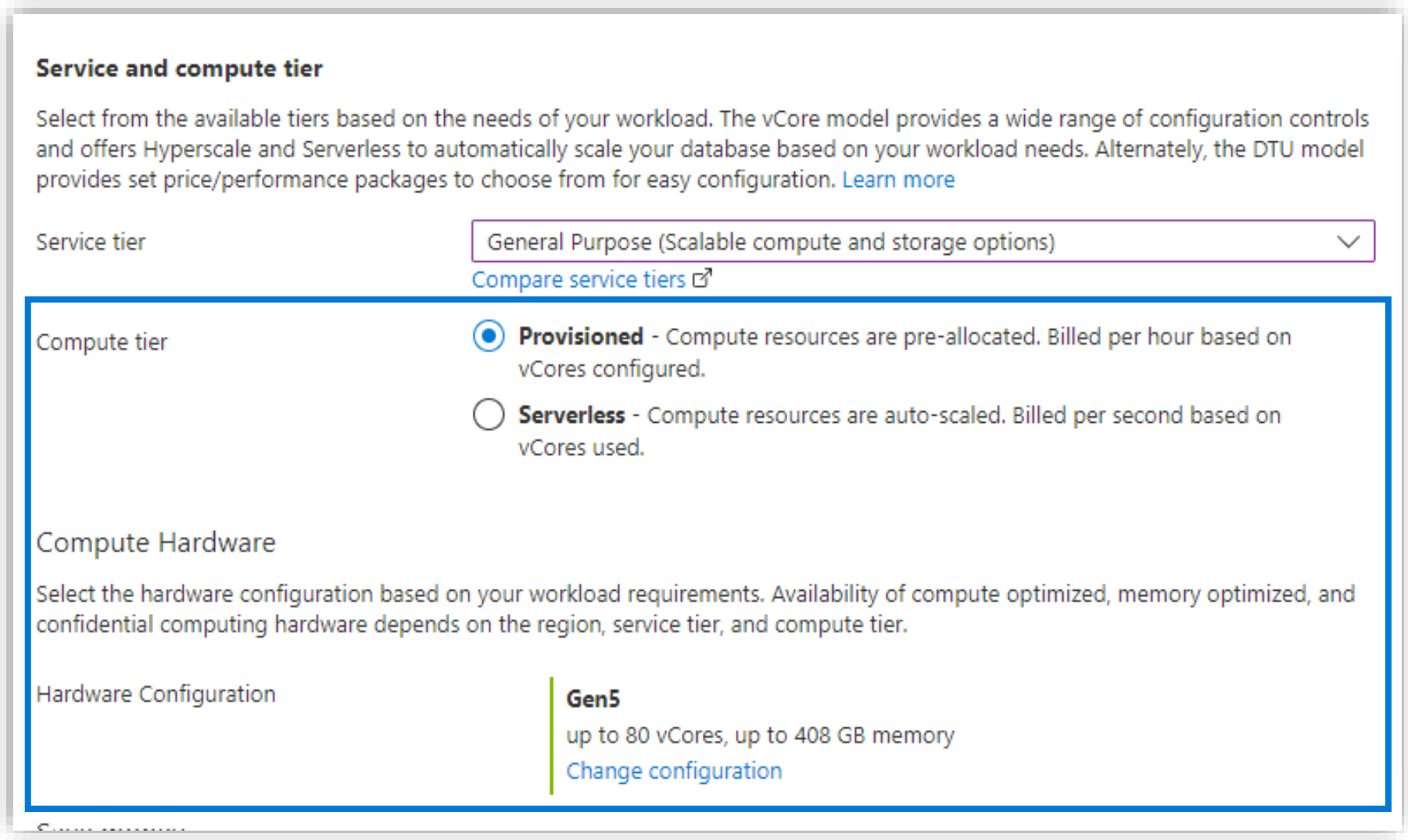
- az sql db update

T-SQL

- ALTER DATABASE … MODIFY (EDITION = …)



Changing Compute Tier and Hardware (vCore)



Impact of Database Changes

Connections to the database may be temporarily dropped

No data is lost during this process

The duration depends on both size and service tier

Changing to, from, within Standard Tier of 250 GB database < 6 hours

Changing within Premium Tier of 250 GB database < 3 hours

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.

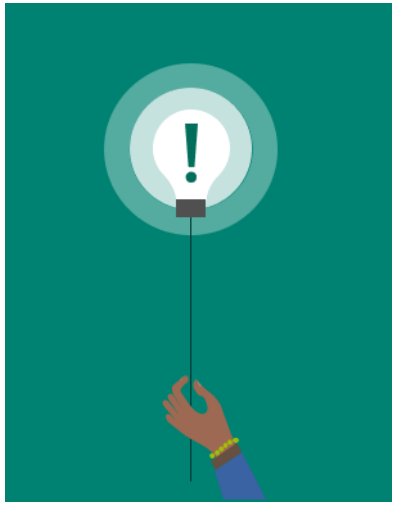
What are the various methods to change the performance levels and edit?

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

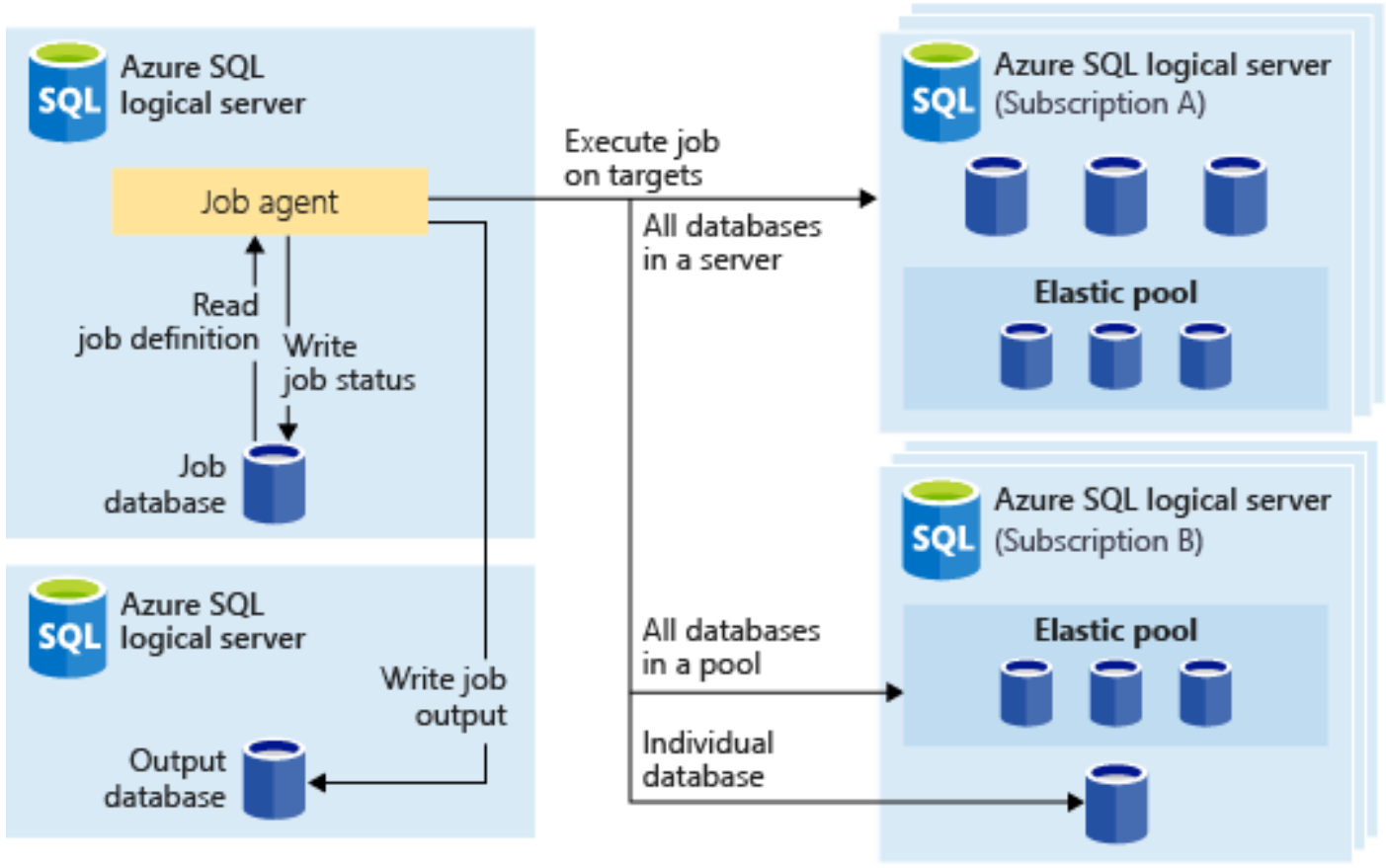
Index maintenance as is on premises.

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

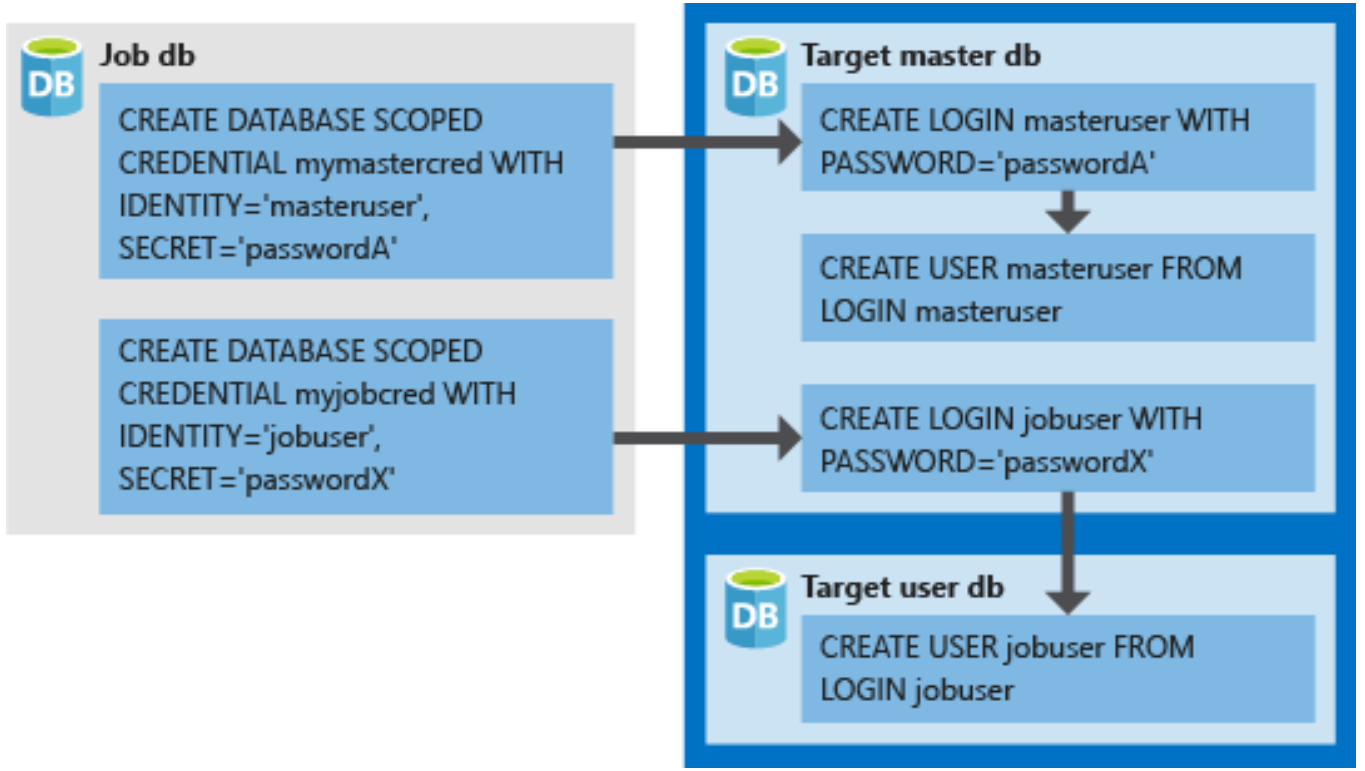
Component	Description
Elastic Job Agent	The Azure resource you create to run and manage Jobs.
Job Database	An Azure SQL database the job agent uses to store job related data, job definitions, etc.
Target Group	The set of servers, pools, databases, and shard maps to run a job against.
Job	A job is a unit 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

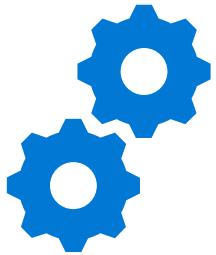
Create a linked server to the Azure Database.

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

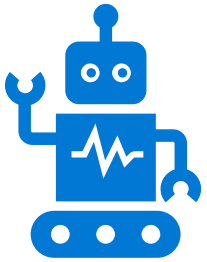
Azure Automation

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?

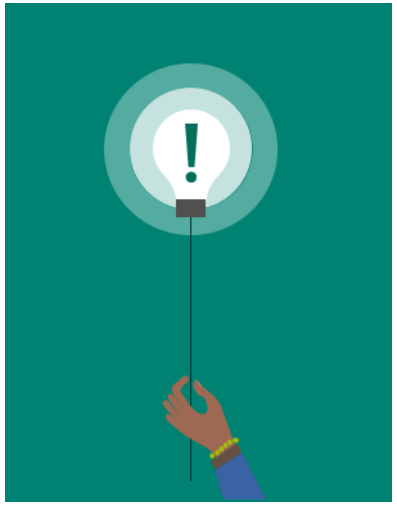
Why should you use Elastic Jobs. Give some examples?

Lesson 4: Azure SQL Database Read Scale-Out

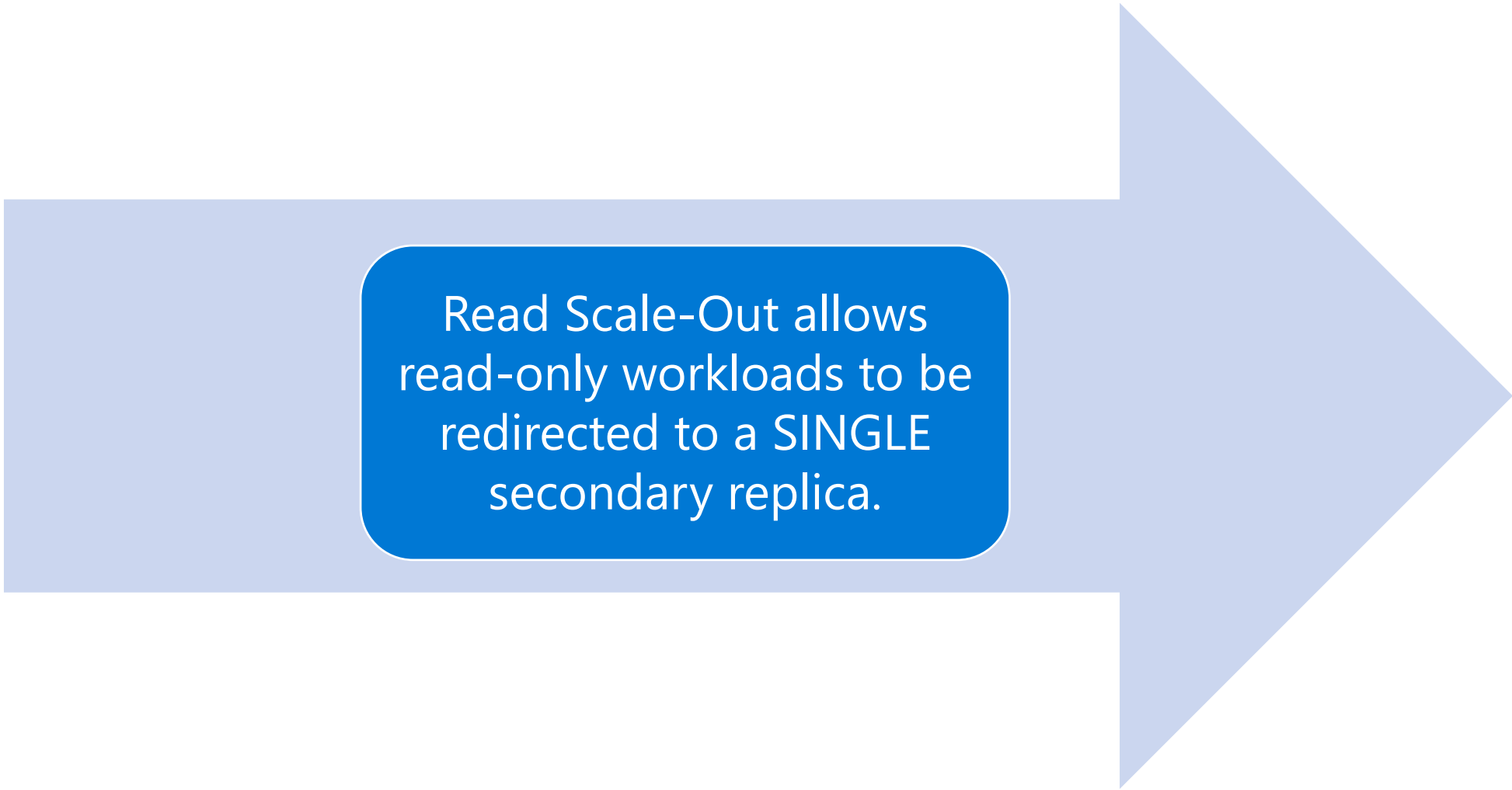
Objectives

After completing this learning, you will be able to:

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



Introduction – Read Scale-Out



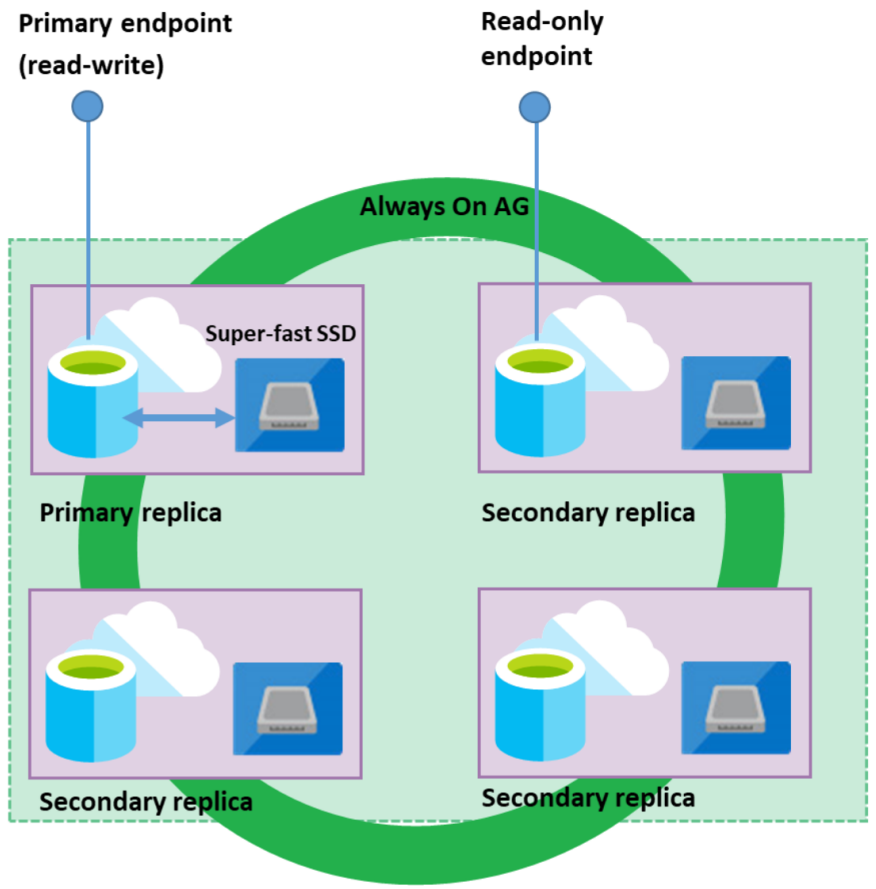
Read Scale-Out

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