Microsoft

Introduction to Azure SQL Database

Module 1

Learning Units covered in this Module

- Lesson 1: Basic concepts of Azure SQL Database

- Lesson 2: How to create Azure SQL Database

- Lesson 3: Introduction to Elastic Database Pools in Azure SQL Database

- Lesson 4: The difference between SQL Server IaaS and PaaS Solutions

Lesson 1: Basic concepts of Azure SQL Database

Objectives

After completing this learning, you will be able to:

· Describe the basic concept and architecture

· Describe the difference between the purchase models.

· Describe the service tiers compute and hardware generation of the Azure SQL Database.

What is Microsoft Azure?

Microsoft Azure is Microsoft's public cloud computing platform

Over 140 countries across 60 regions worldwide

Windows and Linux

Scale globally

- Reach more locations, faster, with the performance and reliability of a vast global infrastructure.

Safeguard data

- Rely on industry-leading data security in the region and across our network.

Promote sustainability

- Help build a clean-energy future and accelerate progress toward your sustainability goals.

What is Microsoft Azure?

https://azure.microsoft.com/en-us/global-infrastructure/regions/

Cloud Hosting Models

Managed by customer	Managed by Microsoft

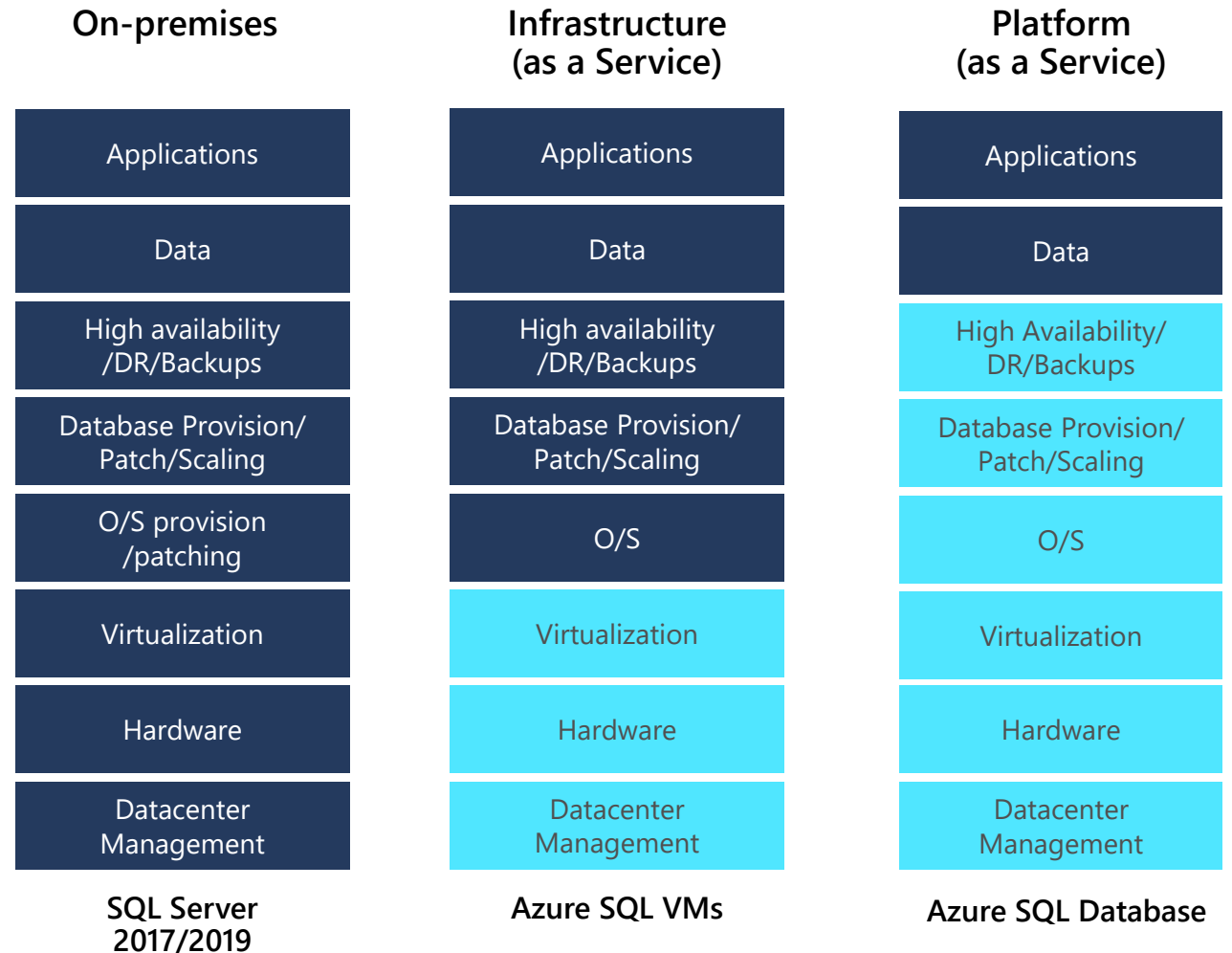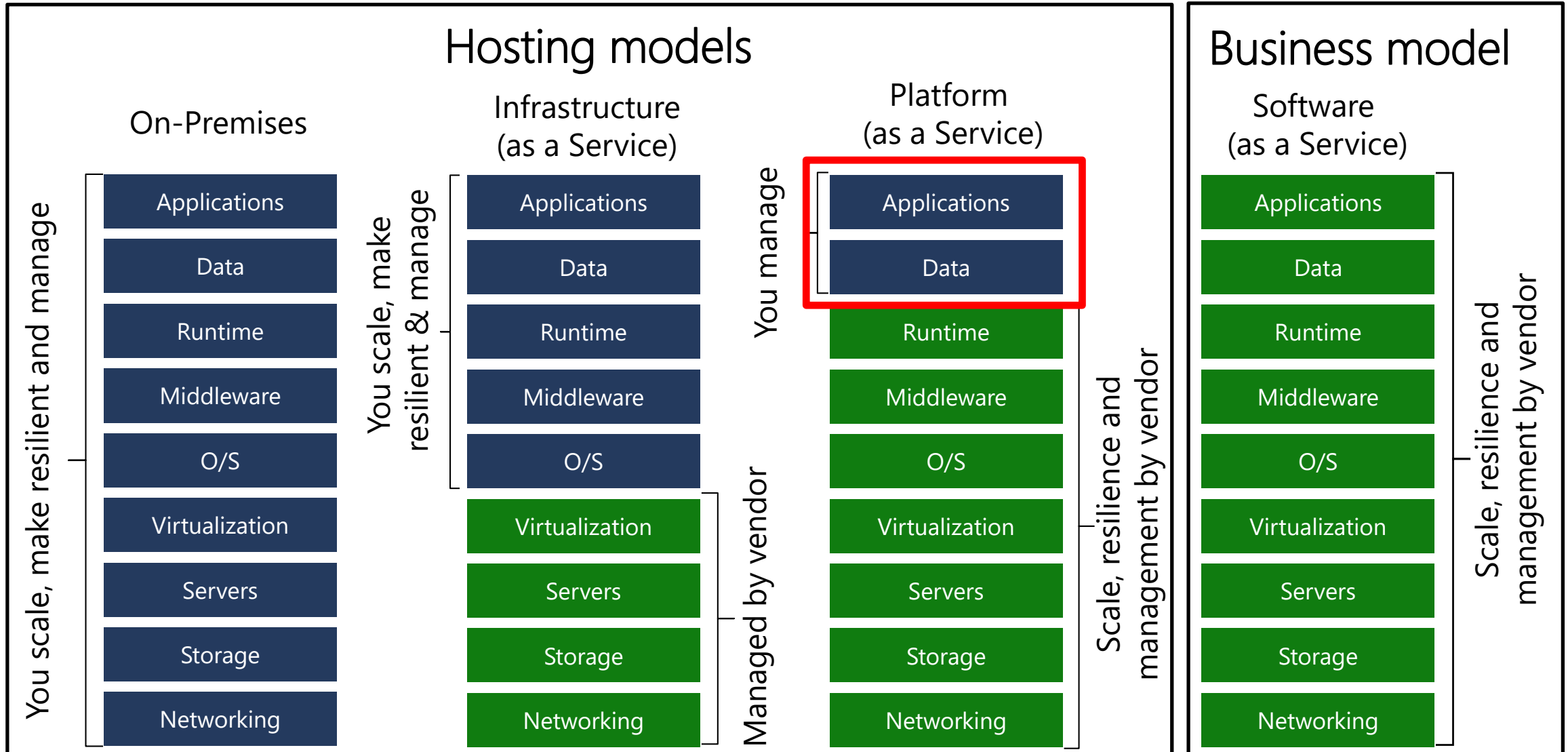**On-premises costs** tend to be driven by hardware and data center management costs

Infrastructure-as-a-Service reduces cost categories related to data center and compute

Platform-as-a-Service off-loads customers' most administrative tasks to Azure, further improving efficiency with machine-learning capabilities for performance and security
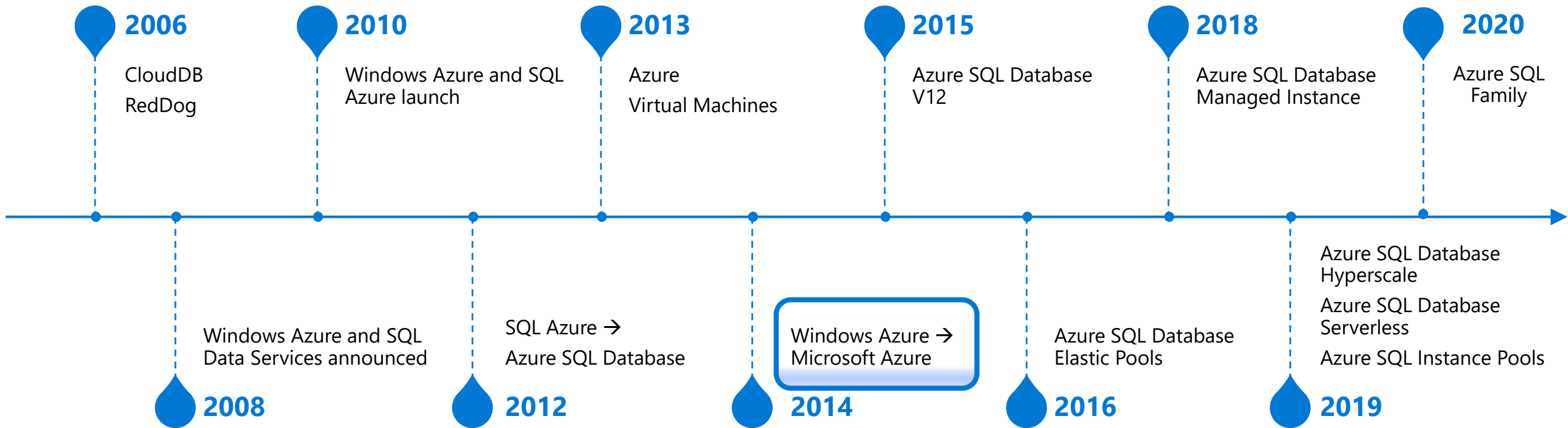
- **Managed Instance**: instance-level deployment for lift-shift existing apps to Azure, fully backward compatible

- **Single database**: database-level deployment for new apps

On-premises	Infrastructure (as a Service)	Platform (as a Service)
Applications	Applications	Applications
Data	Data	Data
High availability /DR/Backups	High availability /DR/Backups	High Availability/ DR/Backups
Database Provision/ Patch/Scaling	Database Provision/ Patch/Scaling	Database Provision/ Patch/Scaling
O/S provision /patching	O/S	O/S
Virtualization	Virtualization	Virtualization
Hardware	Hardware	Hardware
Datacenter Management	Datacenter Management	Datacenter Management
SQL Server 2017/2019	**Azure SQL VMs**	**Azure SQL Database**

Database as a Service

Hosting models

On-Premises

- Applications
- Data
- Runtime
- Middleware
- O/S
- Virtualization
- Servers
- Storage
- Networking

You scale, make resilient and manage

Infrastructure (as a Service)

- Applications
- Data
- Runtime
- Middleware
- O/S
- Virtualization
- Servers
- Storage
- Networking

You scale, make resilient & manage

Managed by vendor

Platform (as a Service)

- Applications
- Data
- Runtime
- Middleware
- O/S
- Virtualization
- Servers
- Storage
- Networking

You manage

Scale, resilience and management by vendor

Business model

Software (as a Service)

- Applications
- Data
- Runtime
- Middleware
- O/S
- Virtualization
- Servers
- Storage
- Networking

Scale, resilience and management by vendor

Azure SQL has come a long way

2006
CloudDB
RedDog

2008
Windows Azure and SQL
Data Services announced

2010
Windows Azure and SQL
Azure launch

2012
SQL Azure →
Azure SQL Database

2013
Azure
Virtual Machines

2014
Windows Azure →
Microsoft Azure

2015
Azure SQL Database
V12

2016
Azure SQL Database
Elastic Pools

2018
Azure SQL Database
Managed Instance

2019
Azure SQL Database
Hyperscale
Azure SQL Database
Serverless
Azure SQL Instance Pools

2020
Azure SQL
Family

Azure SQL Family

Explore Azure SQL database services

SQL Server on Azure Virtual Machines

Migrate your SQL workloads to Azure with ease while maintaining complete SQL Server compatibility and operating system-level access

Learn more >

Azure SQL Managed Instance

Modernize your existing SQL Server applications at scale with an intelligent, fully managed service

Learn more >

Azure SQL Database

Support modern cloud applications on an intelligent, fully managed service that includes serverless compute

Learn more >

What are my options?

IaaS

PaaS

I want a Virtual Machine

- Azure manages the hardware
- You own the OS and SQL Server
- You own monitoring and HADR

SQL Server in
Azure Virtual Machine

I want a SQL Server

- Azure manages the hardware and OS
- You get a SQL Server, but we help you manage it
- You need SQL Server feature compatibility and low friction move

Managed Instance
Single Instance Pool

I want a database

- Azure manages the hardware, OS, and SQL Server
- Azure gives you predicable performance
- Azure provides HADR, monitoring, and intelligence

Azure SQL Database
Single Elastic Pool

Which Azure SQL offering is right for you?

Control	Capabilities
	Managed SQL Server as a service Native restore and log shipping DTC and Linked Servers Service Broker and Event Notifications SQL Agent and Transactional Replication .NET CLR integration and ML Services
Microsoft Managed	
	↓ **No**
	Managed SQL database as a service A database scoped programming model
	↓ **No**
Customer Managed	**Full control of SQL Server instance** OS level access SQL Server versions 2008 - 2019 Ful control over upgrades and patching App and other services colocation

Yes → Azure SQL Managed Instance

Yes → Azure SQL Database

Yes → SQL Server on Azure VMs

Azure SQL PaaS deployment options

Azure SQL Database

Managed instances
Best for most lift-and-shift migrations to the cloud

Databases
Best for modern cloud applications. Hyperscale and serverless options are available

Single instance	Instance pool*
• SQL Server surface area (vast majority). • Native virtual network support. • Fully managed service.	• Resource sharing between multiple instances to price optimize. • Simplified performance management for multiple databases. • Fully managed service.

*Instance pool is currently in public preview, more details here

Single database	Elastic pool
• Hyperscale storage (up to 100TB). • Serverless compute. • Fully managed service.	• Resource sharing between multiple databases to price optimize. • Simplified performance management for multiple databases. • Fully managed service.

Azure SQL Database Purchasing models and resources

Database Transaction Unit (DTU) model

- Pre-packaged, bundled unit that represents the database power.
- Designed for **predictable performance**, but somewhat inflexible and limited in options.
- DTU sizing offers simplicity of choice.
- Blended measure of CPU, memory, and read-write rates.
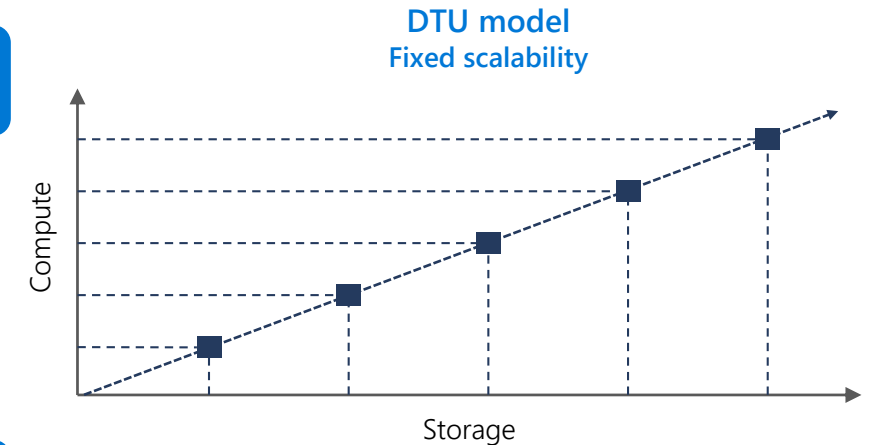
vCore model

- À La carte approach deconstructs the DTU model into separate parts.
- Customers can select compute and storage independently.
- Allows customers to right-size their compute requirements in the cloud.
- vCore sizing offers flexibility of choice.
- Provides a choice between a **provisioned compute tier** and a **serverless compute tier**.

DTU model
Fixed scalability

Compute

Storage

New vCore model
Independent scalability

Compute

Storage
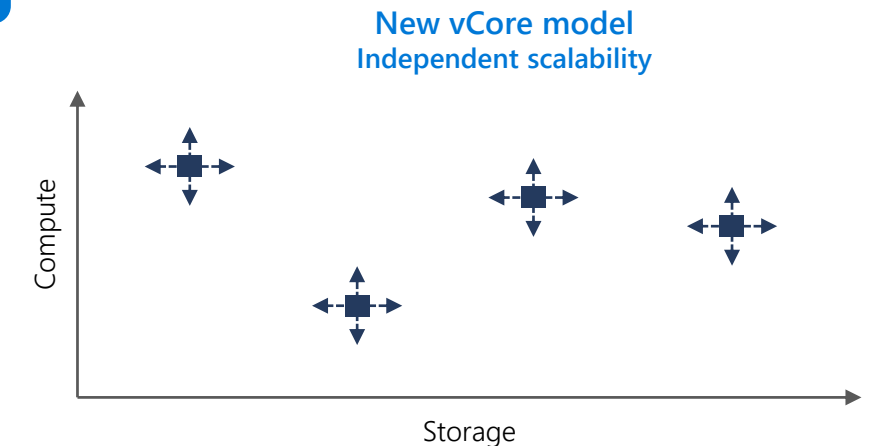
Purchasing models available for Azure SQL Database deployment:

Purchasing model/ Deployment model	DTU based	vCore based
Single Database	✔️	✔️
Elastic Pool	✔️	✔️
Managed Instance	✖️	✔️
Hyperscale service tier (single databases)	✖️	✔️

Overview Service Tiers

DTU based → Basic → Standard → Premium

vCore based → General purpose. → Business critical → Hyperscale
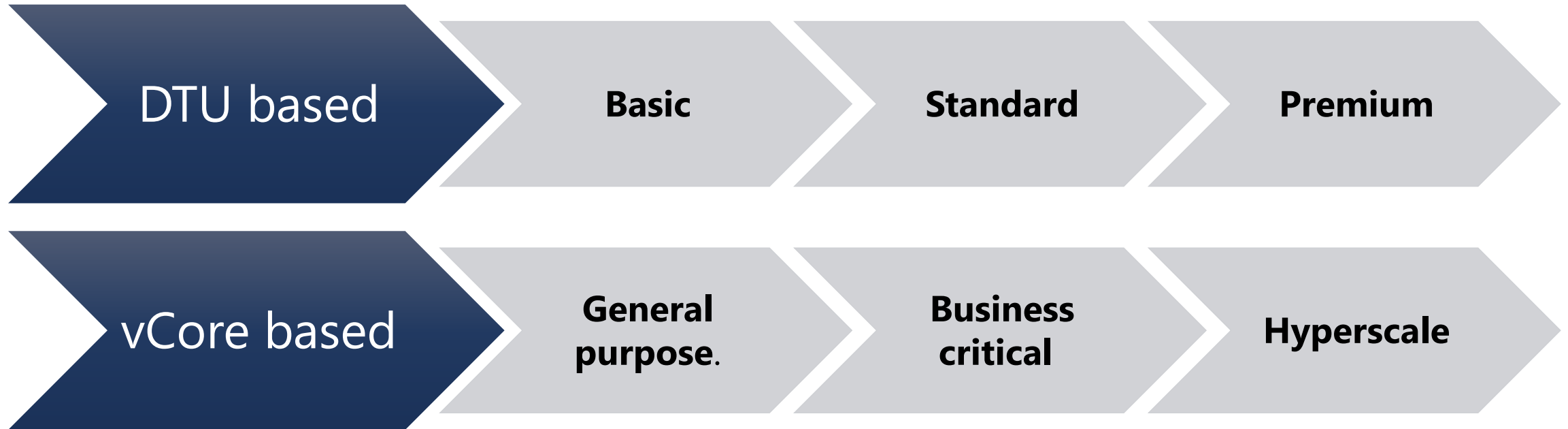
Standard 100DTUs = 1vCore
Premium 125DTUs = 1vCore

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 workloac. 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

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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) ⌄

vCore-based purchasing model

Compute tier   General Purpose (Scalable compute and storage options)

Hyperscale (On-demand scalable storage)

Business Critical (High transaction rate and high resiliency)

DTU-based purchasing model

Compute Hardware

Select the hardware configuration based on Basic (For less demanding workloads)
confidential computing hardware depends

Standard (For workloads with typical performance requirements)

Hardware Configuration

Premium (For IO-intensive workloads)

up to 80 vCores, up to 408 GB memory
Change 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) ⓘ

○————————————————————————   32

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

Demonstration

Overview of Service Tiers available for Azure SQL Database

- Review the different Service Tiers, Compute and Hardware options available while creating an Azure SQL Database.

Database Transaction Units (DTUs)
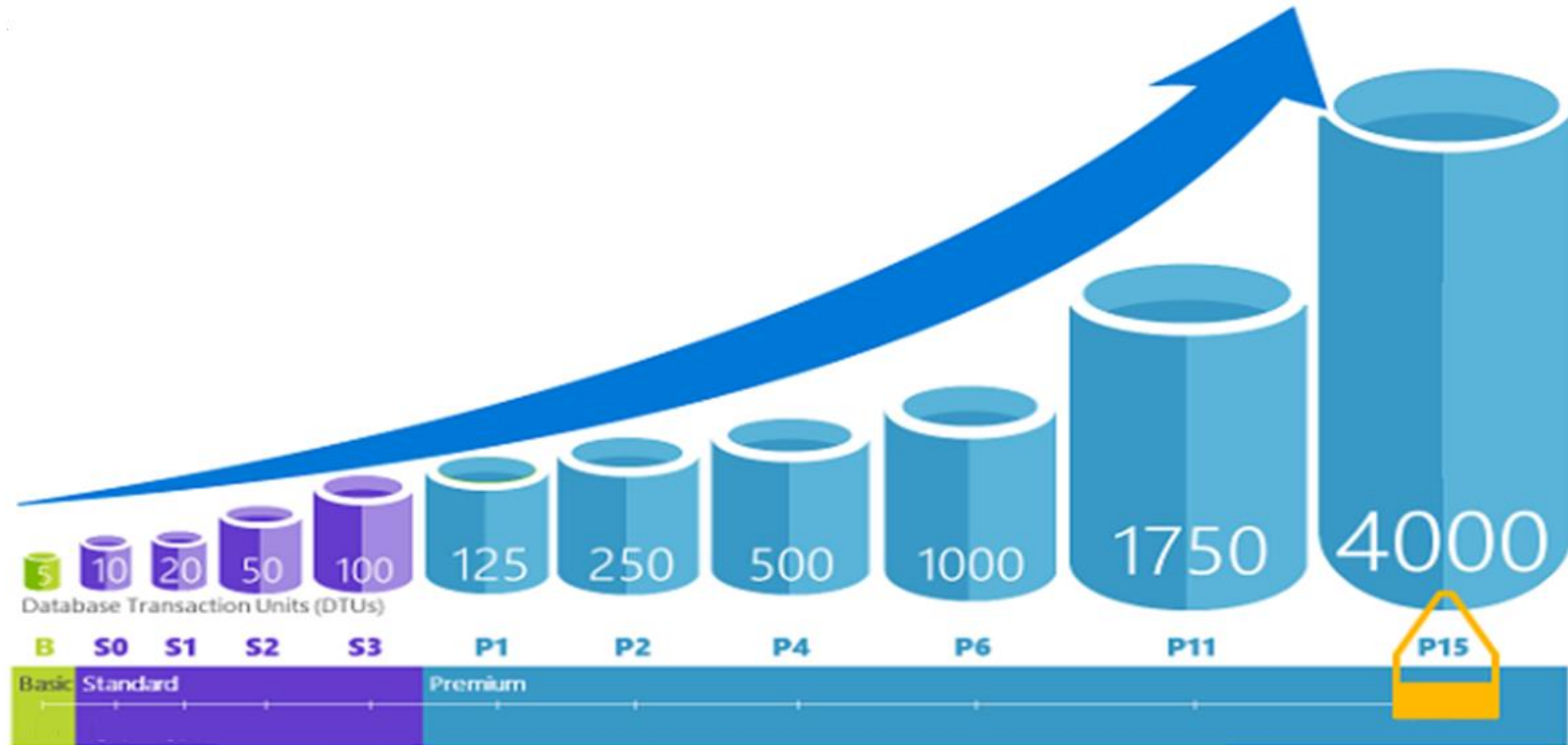
DTU-based model: Service Tiers

	Basic	Standard									Premium					
		S0	**S1**	**S2**	**S3**	**S4**	**S6**	**S7**	**S9**	**S12**	**P1**	**P2**	**P4**	**P6**	**P11**	**P15**
Built for	Light transactional workloads	Medium transactional workloads									Heavy transactional workloads					
Available SLA	99.99%															
Database max. size	2 GB	250 GB		1 TB											4 TB	
Point-in-time restore ("oops" recovery)	Any point within 7 days	7-35 days (7 days by default)														
Business continuity	Active geo-replication, up to four readable secondary backups															
Security	Auditing, row-level security, dynamic data masking, Advanced Threat Protection															
Performance objectives	Transactions per hour	Transactions per minute									Transactions per second					
Database transaction units (DTUs)	5	10	20	50	100	200	400	800	1,600	3,000	125	250	500	1,000	1,750	4,000

$ ←——————————————————→ $$$

Resource limits for single databases using the DTU-based purchasing model

vCore-based purchasing model: Provisioned compute tier

Simplicity:

- We remain committed to the DTU-based model and the simplicity it offers customers who want a pre-configured solution.

Flexibility:

- The vCore-based model reflects our commitment to customer choice and to simplify the hybrid benefit for customers migrating from on-premises.

Customers pay for:

- Service tier + number of vCores.
- Type and amount of data storage.
- Number of IO.
- Backup storage (RA-GRS).

vCore-based purchasing model: Provisioned compute tier

Service tier	General purpose		Business critical		Hyperscale
Best for	Most budget-oriented workloads		Critical business applications with high IO requirements.		VLDB OLTP and HTAP workloads with highly scalable storage and read-scale requirements.
Deployment option	Single / Elastic Pools	Managed Instance	Single / Elastic Pools	Managed Instance	Single
Compute tiers	Gen5: 2 to 80 vCore Fsv2-series*: 72 vCore Serverless: 0.5 to 16 vCore	Gen5: 4 to 80 vCore	Gen5: 2 to 80 vCore M-series*: 128 vCore	Gen5: 4 to 80 vCore	Gen5: 2 to 80 vCore
Storage	Premium remote		Local SSD		Local SSD Cache
	5GB – 4TB per instance	32GB – 16TB per instance	5GB – 4TB per instance	32GB – 16TB per instance	Scale from 5GB to 100TB of storage in 1GB increments
In-Memory	Not supported		Supported		Not supported
Read-write IO	~2ms for all data access		<0.5ms for all data access		<0.5ms for hot data access ~2ms otherwise
Availability	1 replica, no read-scale replicas		3 read replicas, zone-redundant HA	3 replicas, 1 read-scale replica, zone-redundant HA	Primary read/write replica + up to 4 read replicas
Backups	RA-GRS, 7-35 days (7 days by default)		RA-GRS, 7-35 days (7 days by default)		LRS, ZRS, RA-GRS, 7-35 days (7 days by default)

For latest information reference: https://azure.microsoft.com/en-us/pricing/details/sql-database/

* Fsv2-series and M-series are currently in preview.
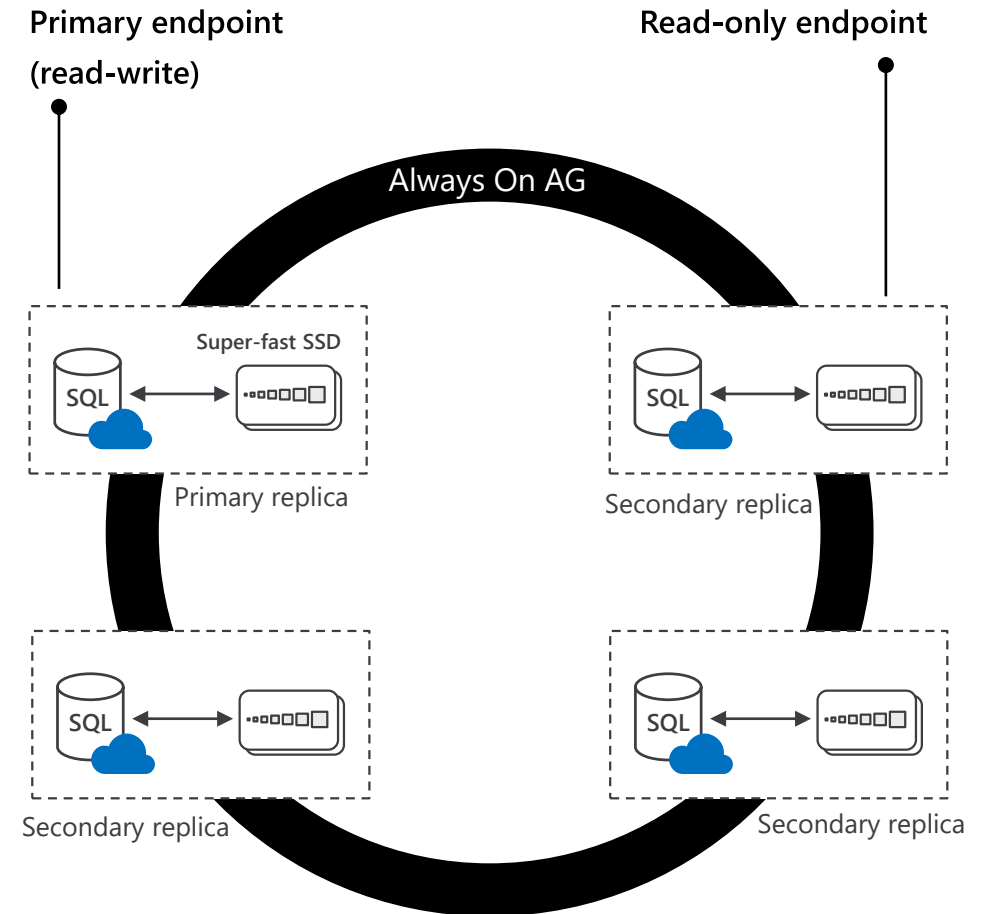
🛢 General Purpose

| Feature	Description
Number of vCores	8, 16, 24 (Gen 4) 8, 16, 24, 32, 40, 64, 80 (Gen 5) 72 (Fsv2-series)
SQL Server version / build	SQL Server (latest available)
Min storage size	32 GB
Max storage size	8 TB
Max storage per database	Determined by the max storage size per instance
Expected storage IOPS	500-7500 IOPS per data file (depends on data file). See Premium Storage
Number of data files (ROWS) per the database	Multiple
Number of log files (LOG) per database	1
Managed automated backups	Yes
HA	Based on remote storage and Azure Service Fabric
Built-in instance and database monitoring and metrics	Yes
Automatic software patching	Yes
VNet - Azure Resource Manager deployment	Yes
VNet - Classic deployment model	No
Portal support	Yes

Redundant nodes

Azure storage accounts

Active compute nodes

🛢️ Business Critical

Feature	Description
Number of vCores	8, 16, 24, 32 (Gen 4) 8, 16, 24, 32, 40, 64, 80 (Gen 5) 128 (M-series)
SQL Server version / build	SQL Server (latest available)
Additional features	In-Memory OLTP 1 additional read-only replica (Read Scale-Out)
Min storage size	32 GB
Max storage size	Gen 4: 1 TB (all vCore sizes Gen 5:1 TB for 8, 16 vCores 2 TB for 24 vCores 4 TB for 32, 40, 64, 80 vCores
Max storage per database	Determined by the max storage size per instance
Number of data files (ROWS) per the database	Multiple
Number of log files (LOG) per database	1
Managed automated backups	Yes
HA	Based on Always On Availability Groups and Azure Service Fabric
Built-in instance and database monitoring and metrics	Yes
Automatic software patching	Yes
VNet - Azure Resource Manager deployment	Yes
VNet - Classic deployment model	No
Portal support	Yes

Primary endpoint
(read-write)

Read-only endpoint

Always On AG

Super-fast SSD

SQL

SQL

Primary replica

Secondary replica

SQL

SQL

Secondary replica

Secondary replica

Business Critical service tier: collocated compute and storage

Hyperscale

Feature	Description
Number of vCores	Gen4: 1 to 24 vCore Gen5: 2 to 80 vCore
SQL Server version/build	SQL Server (latest available)
Additional features	4 read-scale replicas 100TB Data Support Constant Time Operations
Min storage size	4 GB
Max storage size	100TB Grows as customer data grows
Max storage per database	Determined by the max storage size per instance
Number of data files (ROWS) per the database	Multiple
Number of log files (LOG) per database	1
Managed automated backups	Yes
HA	High Availability is ensured on the storage layer
Built-in instance and database monitoring and metrics	Yes
Automatic software patching	Yes
VNet - Azure Resource Manager deployment	Yes
VNet - Classic deployment model	No
Portal support	Yes
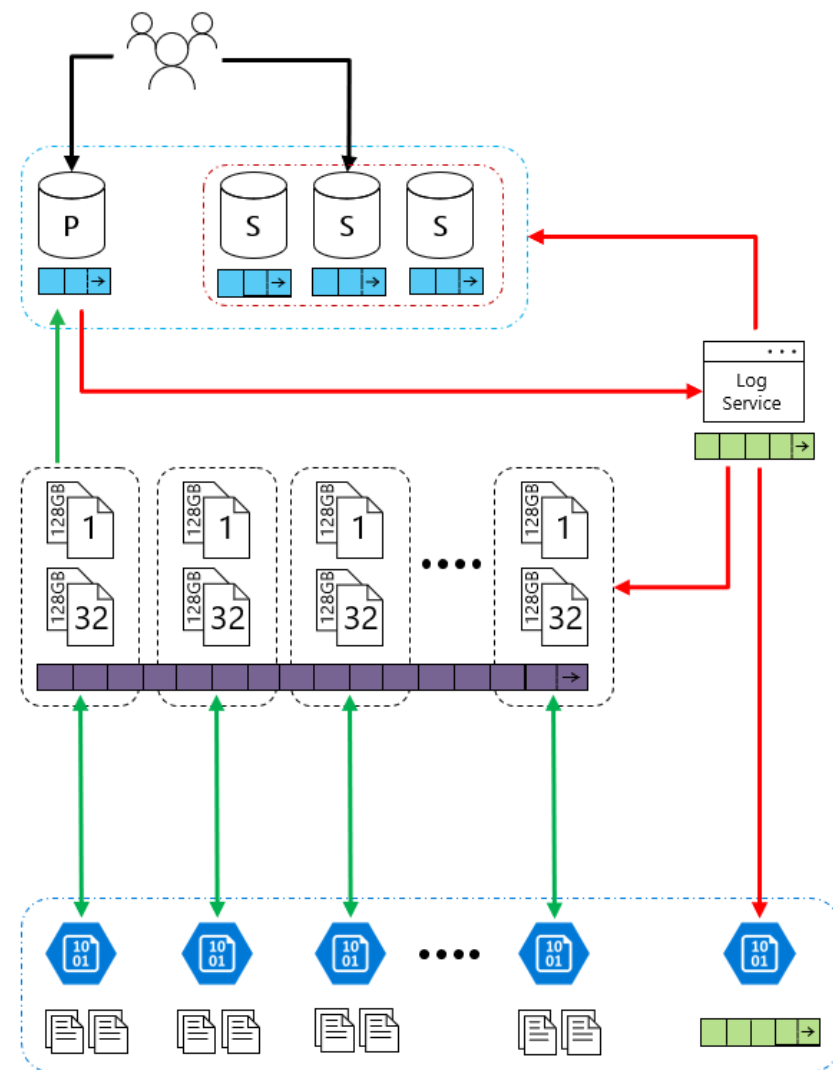
Hyperscale Service Tier – Availability of Storage

Choose from hardware generations

	Gen 5	Fsv2-series	M-series	DC-Series
Hardware	Intel E5-2673 v4 (Broadwell) 2.3 GHz processors, fast eNVM SSD vCore=1 LP (hyper-thread)	Intel Xeon Platinum 8168 (SkyLake) processors	Intel Xeon E7-8890 v3 2.5 GHz processors	Intel® XEON E-2288G processors. Featuring Intel Software Guard Extension (Intel SGX))
Performance levels	1 to 80 vCores	72 vCores (1 vCore = 1 hyper-thread)	128 vCores (1 vCore = 1 hyper-thread)	Provision up to 8 vCores (physical)
Memory	5.1 GB per vCore for provisioned compute Up to 24 GB per vCore for serverless compute	1.9 GB per vCore	29 GB per vCore	4.5 GB per vCore
Storage	Up to 4TB remote SSD storage Up to 4TB local SSD storage	Up to 4TB remote SSD storage	Up to 4TB local SSD storage	Up to 4TB remote SSD storage

- Balance performance requirements and price with two hardware generations
- Match your on-premises application behavior
- Fsv2, M, and DC series are Generally available but in limited regions

vCore-based purchasing model: Serverless compute tier

On-demand flexible scale
Operate at the true rhythm of your business.

Adapts compute resources to the workload without sacrificing performance.

Automatically pauses and resumes.

Cost-effective
Pay for performance. Period.

Pay only for compute resources you consume, on a per-second basis.

Further optimize costs with configurable compute thresholds.

Fully managed & intelligent
Focus on your applications, not your infrastructure

Fully-managed and intelligent database service.

Built-in 99.99% availability.

Best for unpredictable and intermittent workloads on **single databases, such as:**

Dev/test

Line of Business

E-commerce

Provisioned compute and serverless meet different needs

Optimize compute provisioning and billing for your workload

Databases with provisioned compute...

Provision compute resources upfront.

Bill on an hourly basis.

Common scenarios

Workloads with regular and substantial compute utilization.

Multiple databases with bursty usage patterns that can be consolidated into a single server and use *elastic pools* for better price optimization.

Serverless databases...

Scale up or down to meet workload requirements, instead of pre-provisioning.

Bill on a per-second basis.

Common scenarios

Workloads with unpredictable and intermittent usage patterns or performance requirements .

Workloads where the requirements are unknown, and you can delegate compute sizing to the service.

Serverless price to performance with per-second billing

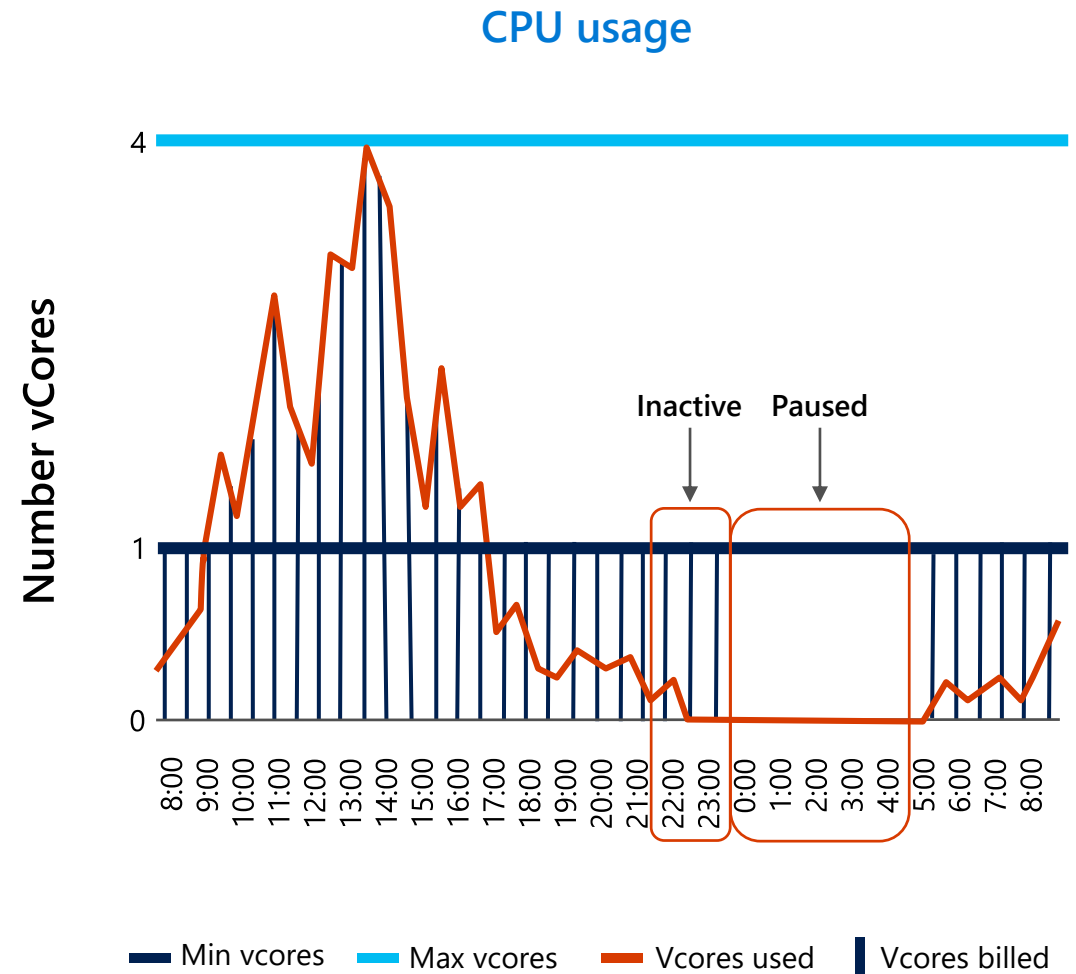Compute resources scale dynamically up or down based on workload requirements.

Configure minimum and maximum vCores to define the range of available compute capacity.

Use auto-pause delay to define the time period the dataset must be inactive before pausing.

The database is automatically resumed when the next login or other activity occurs.

Pay for compute based on the vCores and memory used per second, with lowest billing based on configured vCore minimum.

When the database is paused, the compute cost is zero and only storage costs are incurred.

CPU usage

Number vCores

Inactive   Paused

— Min vcores   — Max vcores   — Vcores used | Vcores billed

Pay only for what you need

DTUs			vCores		
Basic	**Standard**	**Premium**	**General Purpose**	**Business Critical**	**Hyperscale**
Small databases particularly those in development phases.	General purpose databases with moderate performance requirements.	Mission-critical databases with high performance and high-availability requirements.	Data applications with basic IO and basic availability requirements.	Business critical data applications with fast IO and high availability requirements.	VLDB OLTP and HTAP workloads with highly scalable storage and read-scale requirements.

Elastic scale and performance: Three service tiers within DTU-based model, and two tiers within vCore-based model let you scale up and down based on throughput needs and offer better resource isolation and an improved billing experience.

Business continuity and data protection: A spectrum of business-continuity features across tiers lets you dial up control over data recovery and failover.

Familiar and fully-managed: Near-complete SQL Server compatibility and unprecedented efficiencies as your applications scale with a near-zero maintenance service and a variety of familiar management tools and programmatic APIs.

Identify the right Azure SQL Database/MI SKU for your on-premises database (I/II)

Database Migration Assistant (DMA)

- Single database
- Elastic pools
- Managed instance

Azure SQL DB SKU Recommendations

We have analyzed 3 databases. For each database, we have identified the minimum recommended Azure SQL DB SKU based off of the performance counters collected from your instances. For more detailed information about the predictions, please refer to one of the text-based output formats.

The sliders below can be used to adjust the compute level and the maximum data size for each database. After configuring the databases and entering the subscription information, click "Generate Provisioning Script" to generate a powershell script that can be used to provision the databases.

Subscription information

| Subscription Id: | | Resource Group: | | Server Admin Username: | |

| Region: | West US▾ | Server Name: | | Server Admin Password: | |

Configure Databases

Provision	Database Name	Pricing Tier	Compute Level		Max Data Size		Est. Cost Per Month
☑	edw_3g	Premium▾	P1 (125 DTU)	\<cost\>	Max Data Size: 40 Gb	\<cost\>	\<cost\>
☑	mydb	Premium▾	P1 (125 DTU)	\<cost\>	Max Data Size: 5 Gb	\<cost\>	\<cost\>
☑	tpcds1g	Premium▾	P1 (125 DTU)	\<cost\>	Max Data Size: 5 Gb	\<cost\>	\<cost\>
						Total Estimated Monthly Cost	\<cost\>

NOTE: Price refresh failed for region West US. Prices shown are approximate. For the latest price, please consult the Azure Portal or retry with the proper authentication options enabled at a later time.

☐ I already have a SQL Server License (up to 55% savings).

Reset All to Recommended   Generate Provisioning Script

Questions?

Knowledge Check

What are the differences between IaaS, PaaS, SaaS and where should you position Azure SQL Database?

What are the two purchasing models available?

What are the three vCore-based purchasing models that Azure SQL Database offers?

What are the differences between a provisioned compute tier and a serverless compute tier?

Which are the two deployment options that can use DTU-based or the vCore-based purchasing model?

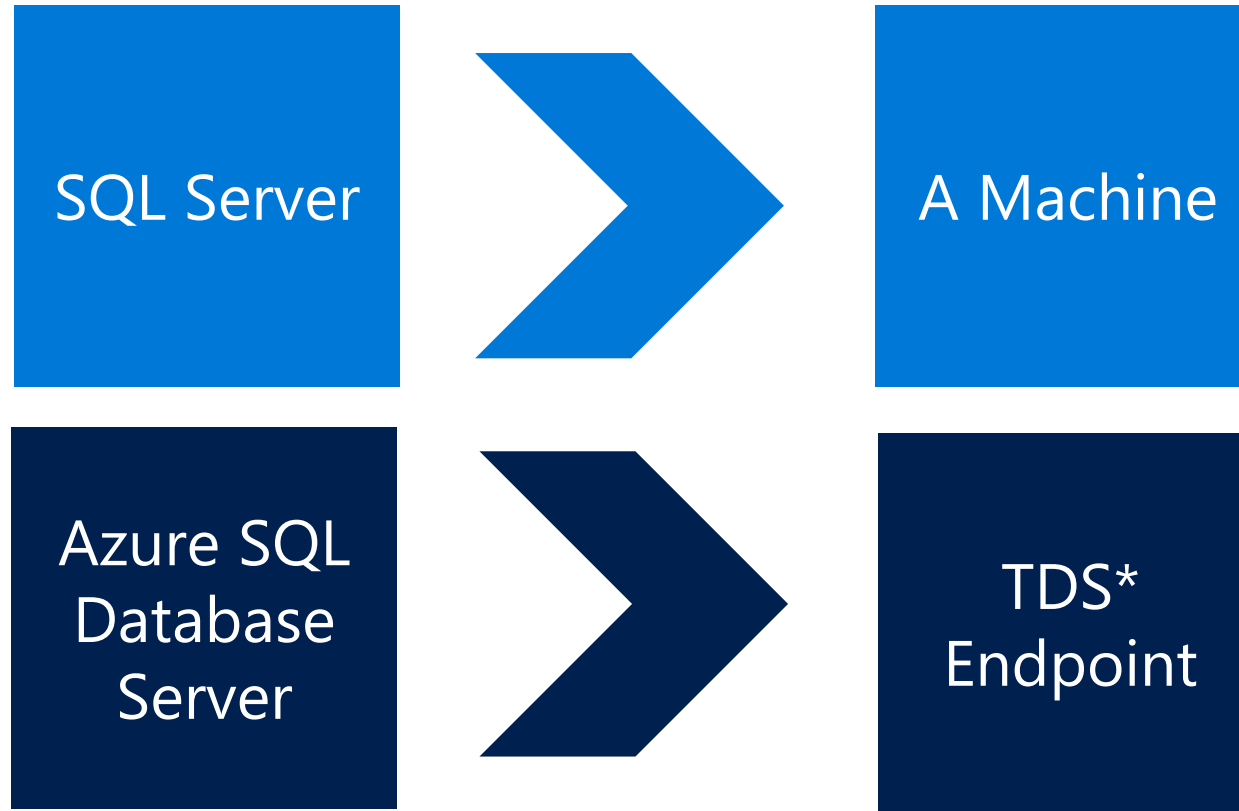# Lesson 2: How to create Azure SQL Database

Objectives

After completing this learning, you will be able to:

· Know which prerequisites are needed before you can create an Azure SQL Database.

· Create your first Azure SQL Database.

Azure SQL Database Server is not a machine...

| SQL Server | > | A Machine |

| Azure SQL Database Server | > | TDS* Endpoint |

*TDS = Tabular Data Stream

Server Provisioning

Service head that contains databases

Connect via Fully Qualified Domain Name

Initially contains only a **master** database

Create SQL Database Server
Microsoft

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ   [PFE Subscription   ⌄]

    Resource group * ⓘ   [(New) AzureSQLDatabaseRG   ⌄]
                  Create new

Server details

Enter required settings for this server, including providing a name and location.

Server name *   [dbsqlessentials   ✓]
                                       .database.windows.net

Location *   [(US) East US   ⌄]

Authentication

Select your preferred authentication methods for accessing this server. Create a server admin login and password to access your server with SQL authentication, select only Azure AD authentication Learn more ↗ using an existing Azure AD user, group, or application as Azure AD admin Learn more ↗ , or select both SQL and Azure AD authentication.

Authentication method   ⦿ Use SQL authentication
                             ◯ Use only Azure Active Directory (Azure AD) authentication
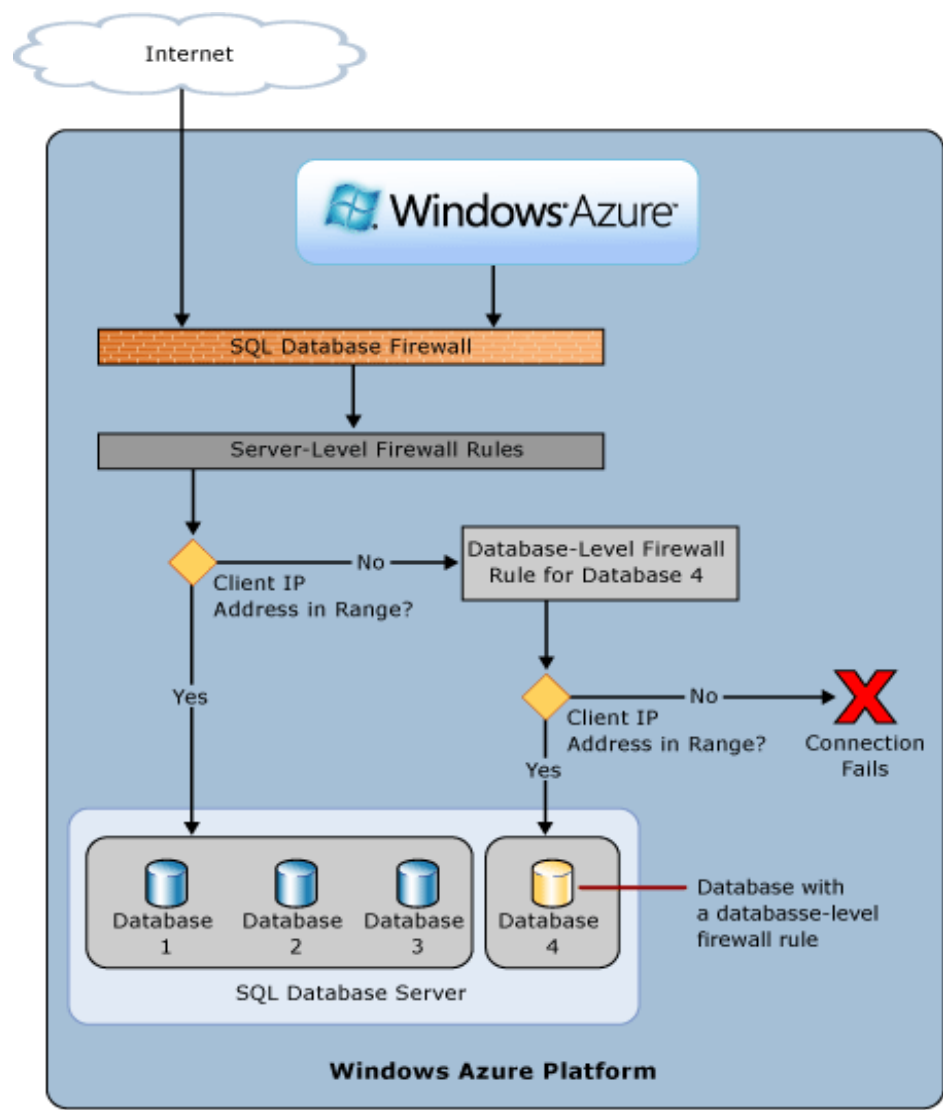   ◯ Use both SQL and Azure AD authentication

Server admin login *   [sqlserveradmin   ✓]

Password *   [●●●●●●●●●●●●●●●●   ✓]

Confirm password *   [●●●●●●●●●●●●●●●●   ✓]

[Review + create]   [Next : Networking >]

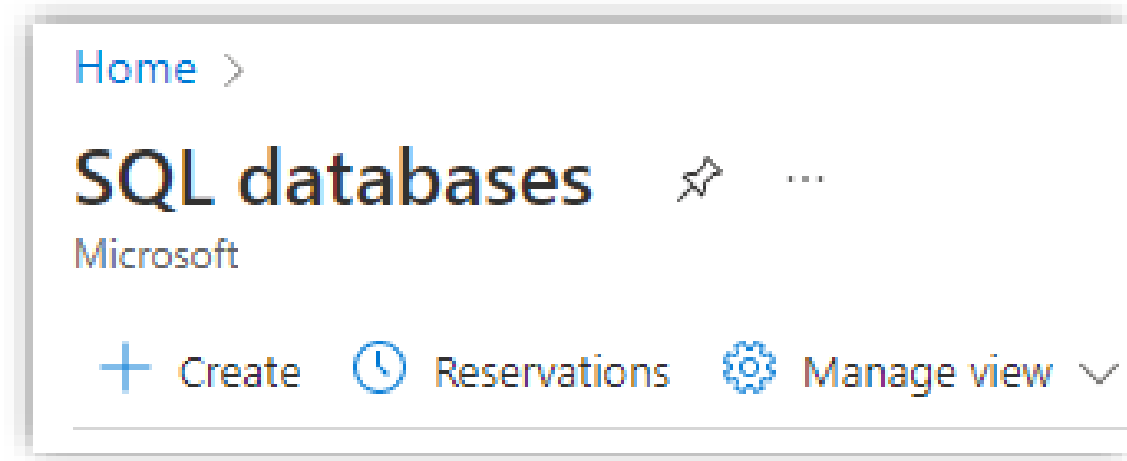# Azure SQL Database Firewall

IP Address-based access control for SQL Database

Rules at the server and/or database level

No IP authorized by default, not even Azure itself

Create the database

PowerShell:
```
New-AzSqlDatabase -ResourceGroupName "reurcegroupsqlgsps"
-ServerName "server1" -DatabaseName "database1"
-Edition "Standard" -RequestedServiceObjectiveName "S1"
```

Transact-SQL:
```
CREATE DATABASE MyFirstAzureSQLDatabase
(MAXSIZE = 500 MB, EDITION = 'standard', SERVICE_OBJECTIVE = 'S1');
```

Demonstration

Create your first Azure SQL Database

- Create a new server, configure the firewall rules and create an Azure SQL Database (DTU based).

Create an Azure SQL Database

- Exercise 1: Create a new SQL Server (logical server).

- Exercise 2: Create firewall rules.

- Exercise 3: Create an Azure SQL. Database (DTU Based).

LAB

Questions?

Knowledge Check

Why do you need to configure the Azure SQL Database Firewall and why is it important?

What options do you need to specify to create an Azure SQL Database?

What is a SQL server (logical server)?

Lesson 3: Introduction to Elastic Database Pools in Azure SQL Database

Objectives

After completing this learning, you will be able to:

· Describe the Azure Elastic Database Pool

What is an Azure SQL elastic pool?

Managing and scaling multiple databases that have varying and unpredictable usage demands.

A pool is shared by multiple databases to accommodate unpredictable periods of usage by individual databases.

Provisioning resources for the entire pool. It is a cost-effective solution for running multiple data bases with a fixed Budget.

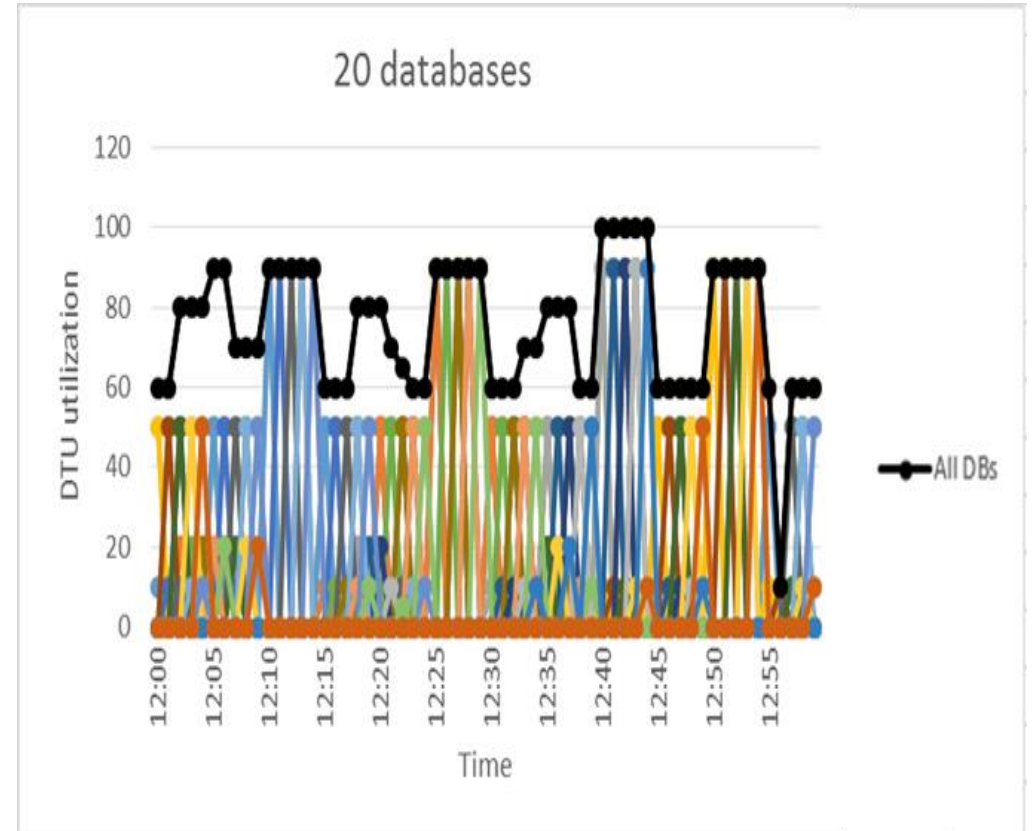Simply add and remove databases with downtime.

When to consider a pool?

Assessing database utilization patterns.

There are large differences between peak utilization and average utilization per database.

The peak utilization for each database occurs at different points in time.

eDTUs are shared between many databases.

DTU-based Elastic Pool service tiers

	Basic	Standard	Premium
Built for	Light transactional workloads	Medium transactional workloads	Heavy transactional workloads
Available SLA	99.99%		
eDTUs per pool	50-1,600	50-3,000	125-4,000
Max number of databases per pool	100-500	100-500	50-100
Max eDTUS choices per data bases	5	10-3000	25-4,000
Max storage per pool	5-156 GB	4 TB	4 TB
Max storage per database	2 GB	500 GB -1 TB	1 TB
Point-in-time restore ("oops" recovery)	Any point within 7 days	7-35 days (7 days by default)	
Business continuity	Active geo-replication, up to four readable secondary backups		
Security	Auditing, row-level security, dynamic data masking		
Performance objectives	Transactions per hour	Transactions per minute	Transactions per second

Elastic pool: Storage sizes and compute sizes

vCore-based Elastic Pool service tiers - General Purpose

	Gen5	Fsv2-series
vCores	2 - 80	72
Memory (GB)	10.2 - 408	136
Max number of DBs per pool	100 - 500	500
Storage type	Premium (remote) storage	Premium (remote) storage
Max data size	512 GB – 4 TB	4 TB
Max log size	154 GB – 1229 GB	1 TB
Max tempdb size	64 GB - 384 GB	333 GB
Number of replicas	1	1

Resource limits for elastic pools using the vCore-based purchasing model limits

vCore-based Elastic Pool service tiers - Business Critical

	Gen5	M-series
vCores	4 - 80	128
Memory (GB)	20.4 - 408	3767
Max number of DBs per pool	100	100
Storage type	Local SSD	Local SSD
Max data size	1 TB – 4 TB	4 TB
Max log size	307 GB – 1229 GB	2 TB
Max tempdb size	128 GB - 384 GB	4 TB
Number of replicas	4	4

Resource limits for elastic pools using the vCore-based purchasing model limits

Impact of changing service tier or rescaling compute size

Create new compute instance for the elastic pool

- A new compute instance for the elastic pool is created with the requested service tier and compute size.
- Regardless, the databases remain online during this step, and connections continue to be directed to the databases in the original compute instance.

Switch routing of connections to new compute instance

- Existing connections to the databases in the original compute instance are dropped.
- Any new connections are established with the databases in the new compute instance. Accelerated Database Recovery can reduce the impact from aborting long running transactions.

No data is lost during any step in the workflow

Demonstration

Create an Elastic Pool

- Create an Elastic pool using the Azure portal

Questions?

Knowledge Check

What is a SQL Elastic Pool?

When should you consider an elastic pool instead of a single database?

Which tools can help you to size your elastic pool?