Microsoft

Introduction to the Azure SQL Family

Today's Agenda

Azure SQL Overview

SQL Server on Azure VMs

Azure SQL Managed Instance

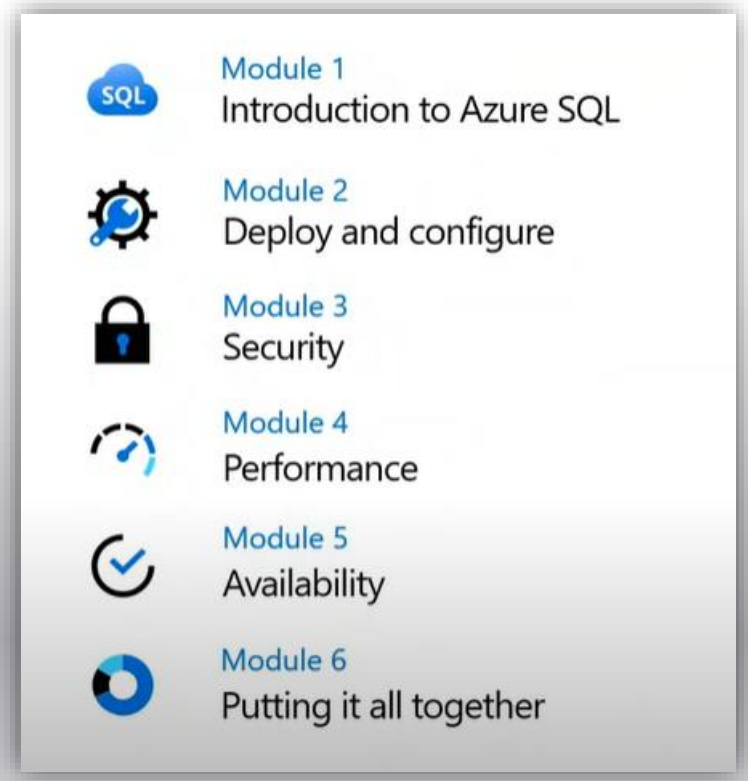
Azure SQL Database

Serverless and Elastic Pools

Comparison and summary

Azure SQL for Beginners

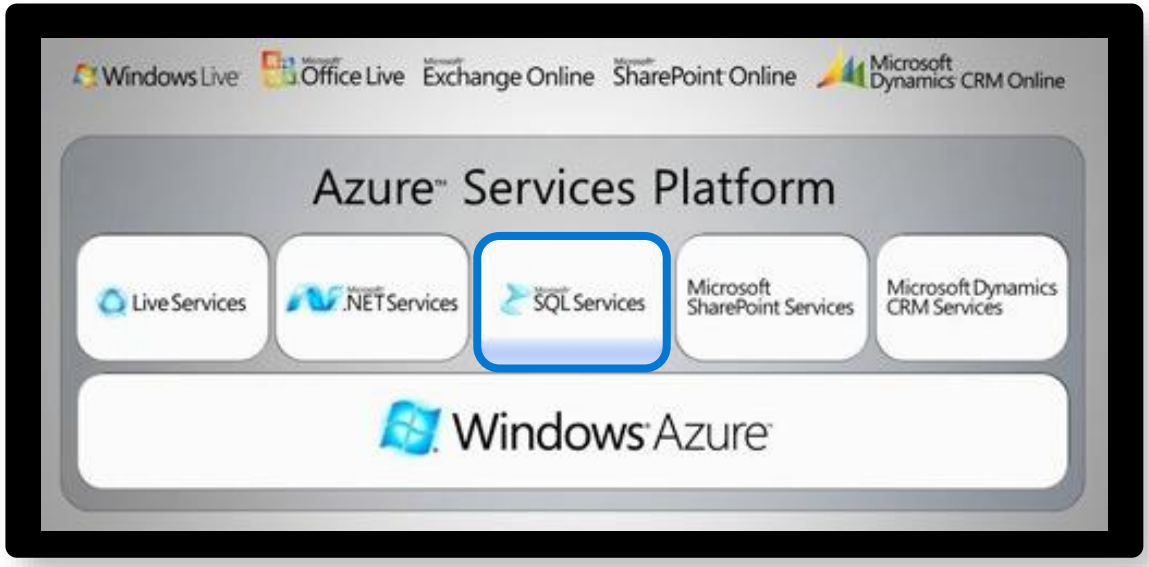
aka.ms/azureSQLfundamentals



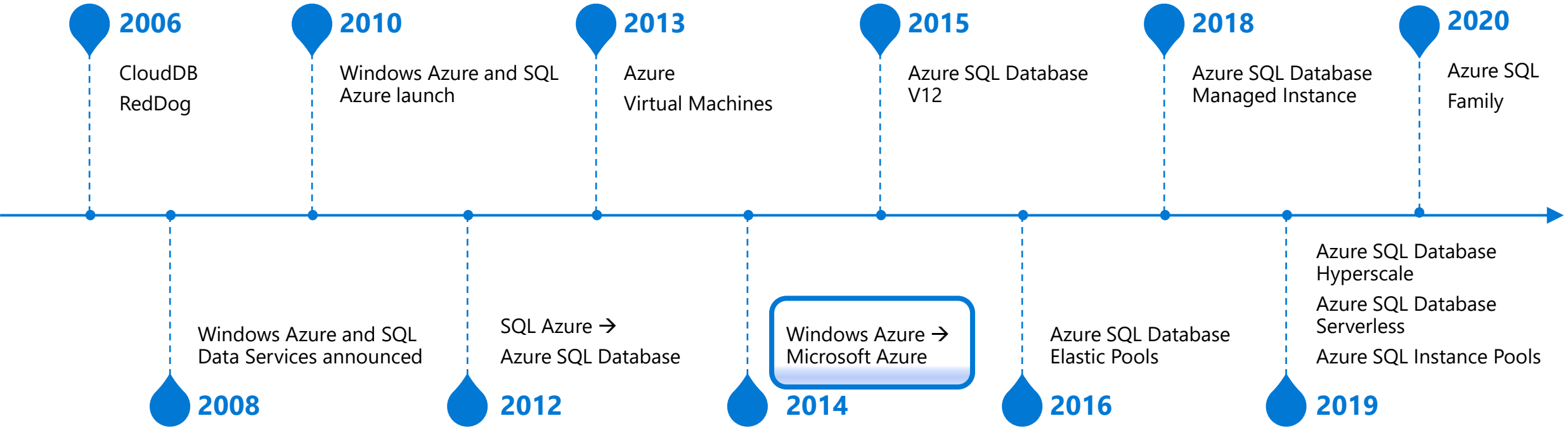
aka.ms/sqlWorkshops

History of Azure SQL

Ray Ozzie – Chief Software Architect (PDC 2008)



Azure SQL has come a long way



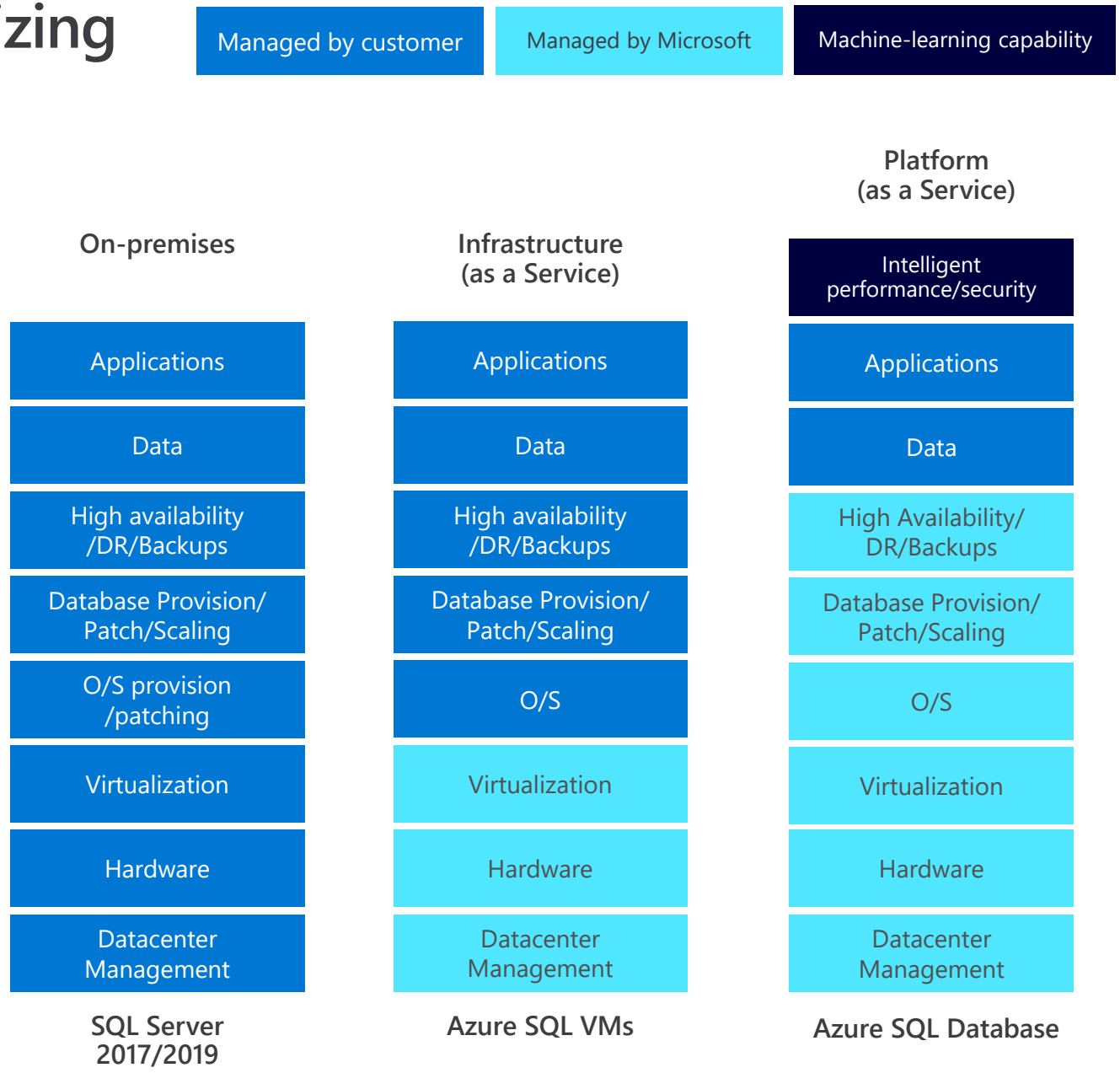
Savings opportunity for modernizing your data estate is significant

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



Azure SQL

A unified SQL portfolio built on the industry-leading SQL Server engine

SQL Server on Azure Virtual Machines

Best for re-hosting and apps requiring OS-level access and control

Automated manageability features and OS-level access

Azure SQL Managed Instance

Best for modernizing existing apps

Offers high compatibility with SQL Server and native VNET support

Azure SQL Database

Best for building new apps in the cloud

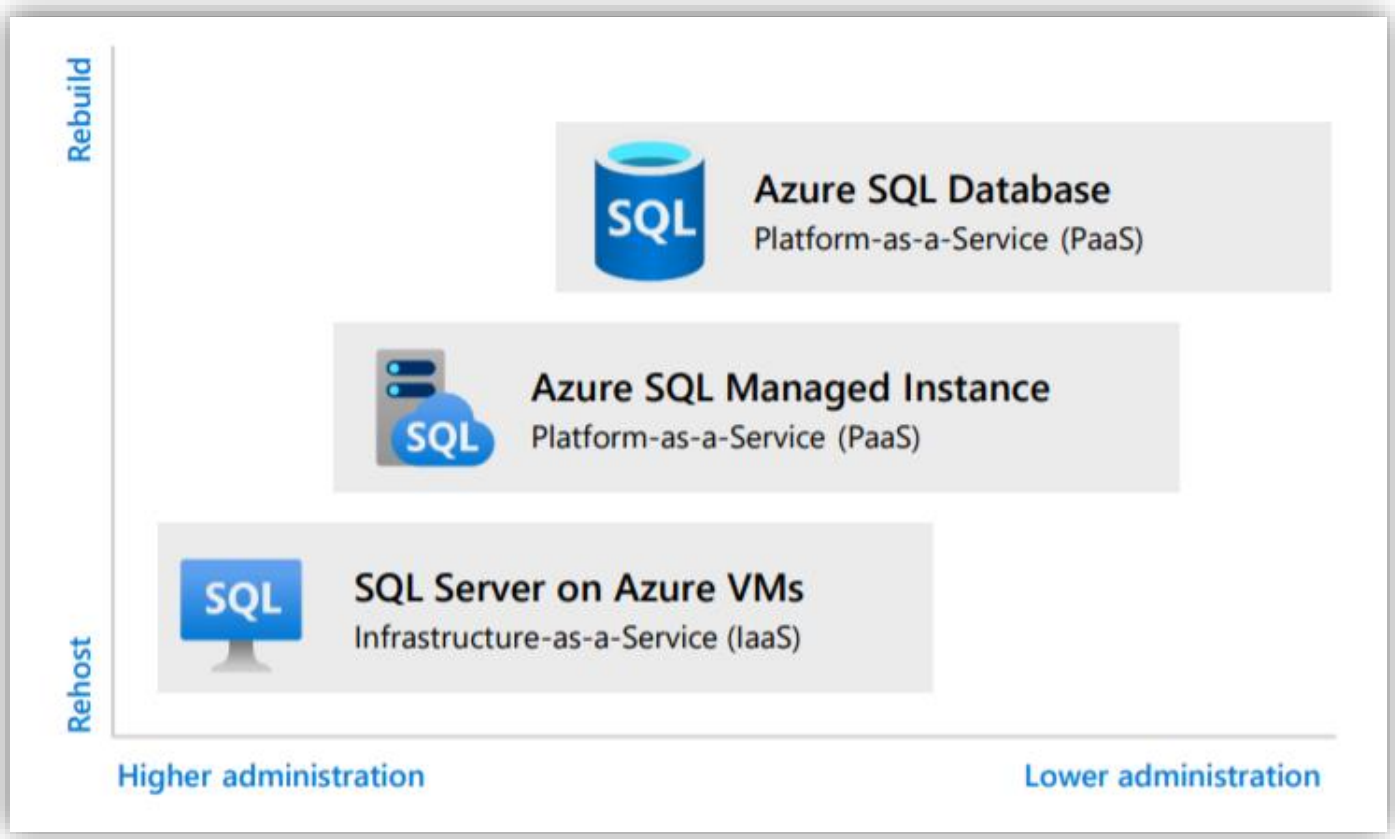
Pre-provisioned or serverless compute and Hyperscale storage to meet demanding workload requirements

Infrastructure as a Service

Platform as a Service

Cloud migration effort and administration

Azure SQL gives you cloud database options that meet your needs



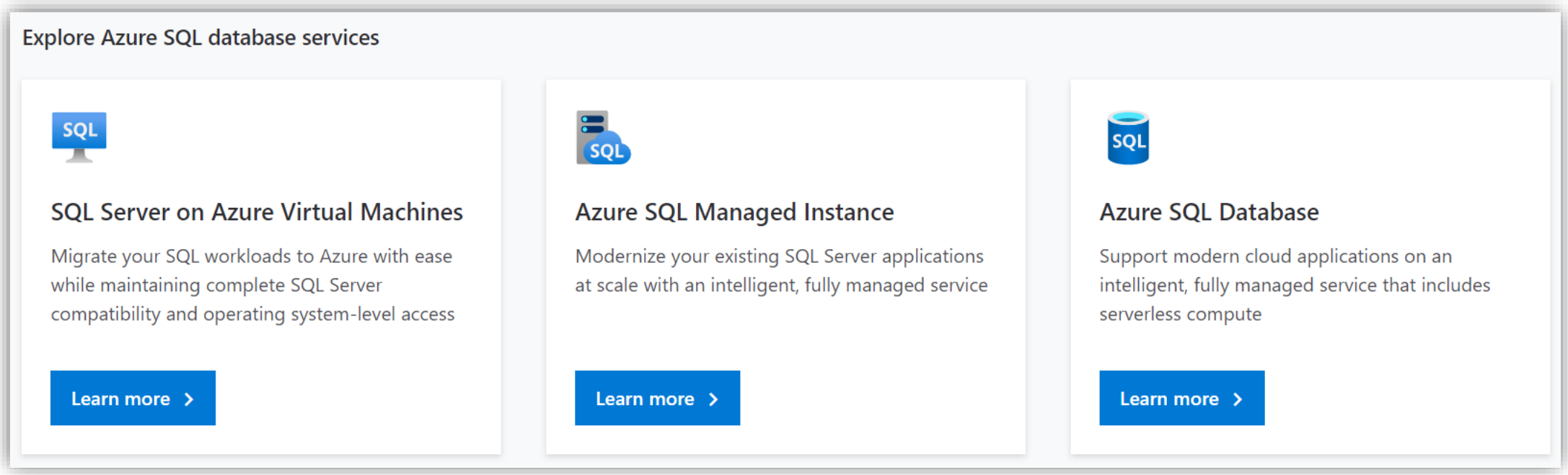
Build modern cloud applications on intelligent, managed Azure SQL Database that includes serverless compute.

Modernize your existing SQL Server applications at scale on a fully managed Azure SQL Managed Instance.

Lift-and-shift your SQL workloads to SQL Server on Azure VMs with ease and maintain them with 100% SQL Server compatibility and operating system level access.

Azure SQL Family

Azure SQL Family is a consistent, unified experience across your entire SQL portfolio



https://aka.ms/AzureSQLfamily

Azure SQL Family

SQL Server on Azure Virtual Machines

SQL Server on Azure VMs provides the promise of the cloud while maintaining OS control

Customer challenge

I want to migrate to the cloud as fast as possible but maintain operating system control and complete SQL Server functionality

Solution

Get the combined performance, security, and analytics of SQL Server, backed by the flexibility, security, and hybrid connectivity of Azure

Key features

SQL Server and OS server access

Expansive SQL and OS versions

Windows, Linux, Containers

File stream, DTC, and Simple Recovery model

SSAS, SSRS, and SSIS

Azure differentiators

Free Extended Security Updates for SQL Server 2008/R2

Automated Backups and Security Updates

Point in Time Restore with Azure Backup

Accelerated storage performance with Azure Blob Caching

435 percent overall return on an Azure IaaS investment over five years[1]

Allscripts®

Healthcare software manufacturer saves costs when reusing licenses while moving 600 on-premises VMs to Azure

1. Forrester Consulting. The Total Economic Impact™ of Microsoft Azure SQL Database Managed Instance.

SQL Server on Azure Virtual Machines

Deployment Choices

Marketplace pre-installed SQL Server on Windows or Linux
Install your own SQL Server
Lift and Shift with Azure Migrate (Azure Site Recovery)

Resource Provider

Unlock Licensing and Edition Flexibility
Automated Backups and Security Updates
Manage VMs through Azure SQL in portal

Sizes and Storage Performance

Memory or Storage optimized sizes for best performance
Data and log on Premium Storage Managed Disks
Azure Blob Read Caching for data disks

Tempdb on local SSD
Ultra disks for extremely low latency needs

Networking and Security

Virtual Networks to integrate with on-premises
Advanced Data Security services (Preview)

HADR

Azure VM built-in HA
Azure Storage built-in DR
Azure Backup and Automated backups to Azure Blob Storage
File-Snapshot Backups

Failover Cluster Instance with Azure Premium File Share
Always On Availability Groups with Cloud Witness
Hybrid Availability Group Secondary replicas
HADR on RedHat Linux with Pacemaker and fencing

Azure SQL Family

Azure SQL Managed Instance

Azure SQL managed instance eases cloud migration

Customer challenge

I want to migrate to the cloud, remove management overhead, but I need instance-scoped features (Service Broker, SQL Server Agent, CLR…)

Solution

Managed instance combines leading security features with SQL Server compatibility and business model designed for on-premises customers

Key features

- Single instance or instance pool
- SQL Server surface area (vast majority)
- Native virtual network support
- Fully managed service
- On-premise identities enabled with Azure AD and AD Connect

Azure differentiators

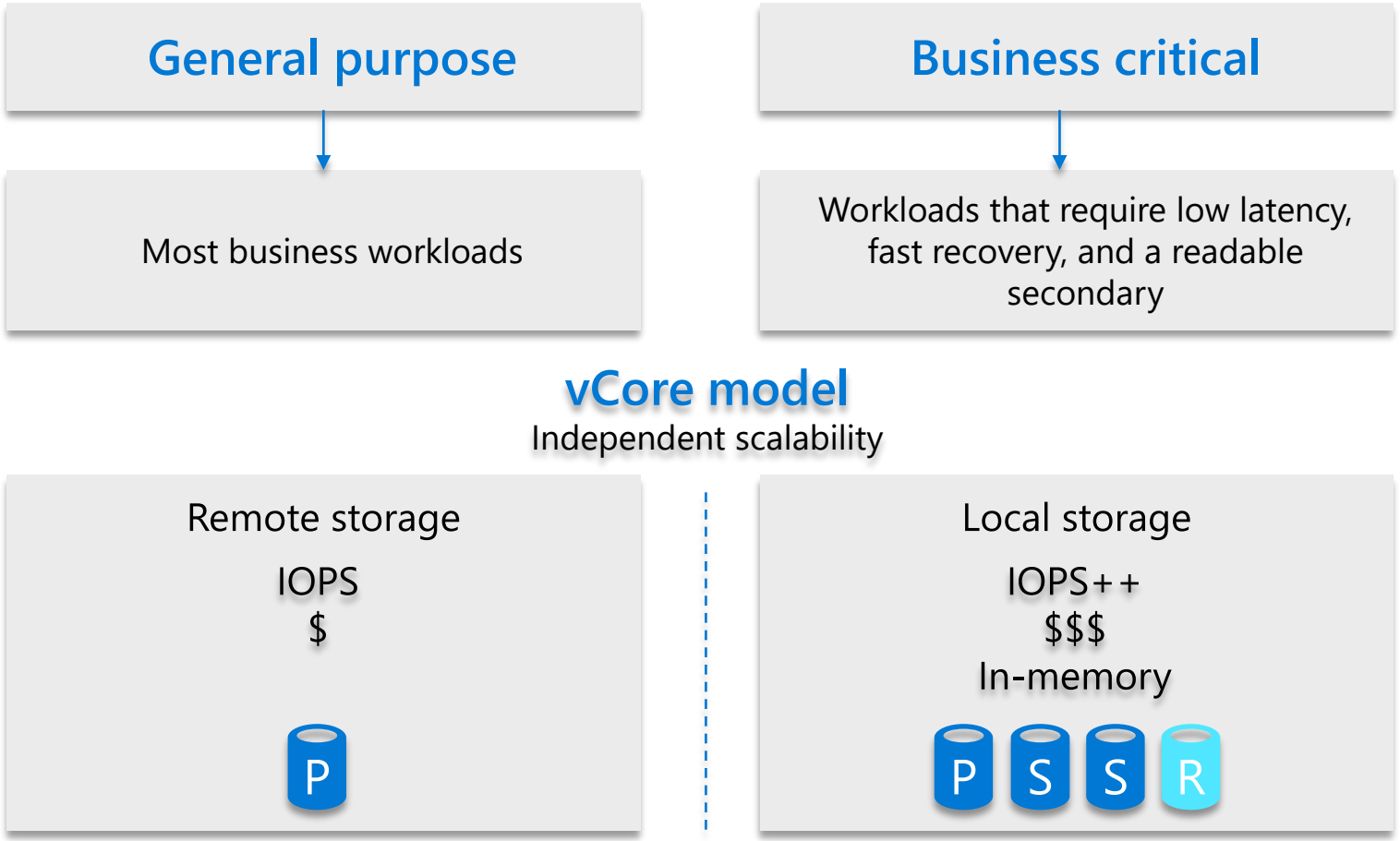
- Near zero downtime migration using log shipping
- Fully managed business continuity with failover groups
- Projected return on investment of 212 percent over three years[1]
- The best of SQL Server with the benefits of a managed service

KOMATSU

Komatsu easily migrated 1.5 TBs of data thanks to near complete compatibility with SQL Server, plus 49% cost reduction and 25-30% performance gains.

1. Forrester Consulting. The Total Economic Impact™ of Microsoft Azure SQL Database Managed Instance.

Service tiers – Managed Instance



Azure SQL Family

Azure SQL Database

Azure SQL Database is built for modern cloud apps

Customer challenge

I want to build modern apps, potentially multi-tenanted, with the highest uptime and predictable performance

Solution

Azure SQL Database is a highly scalable cloud database service with built-in high availability and machine learning

Key features

Single database or elastic pool

Hyperscale storage (100TB+)

Serverless compute

Fully managed service

Private link support

High availability with AZ isolation

Azure differentiators

Industry highest availability SLA of 99.995%

Industry only business continuity SLA with 5 second RPO and 30 second RTO

Price-performance leader for mission-critical workloads while costing up to 86 percent less than AWS RDS (GigaOm)

AccuWeather uses Azure SQL Database to provide an automated, scalable weather prediction service

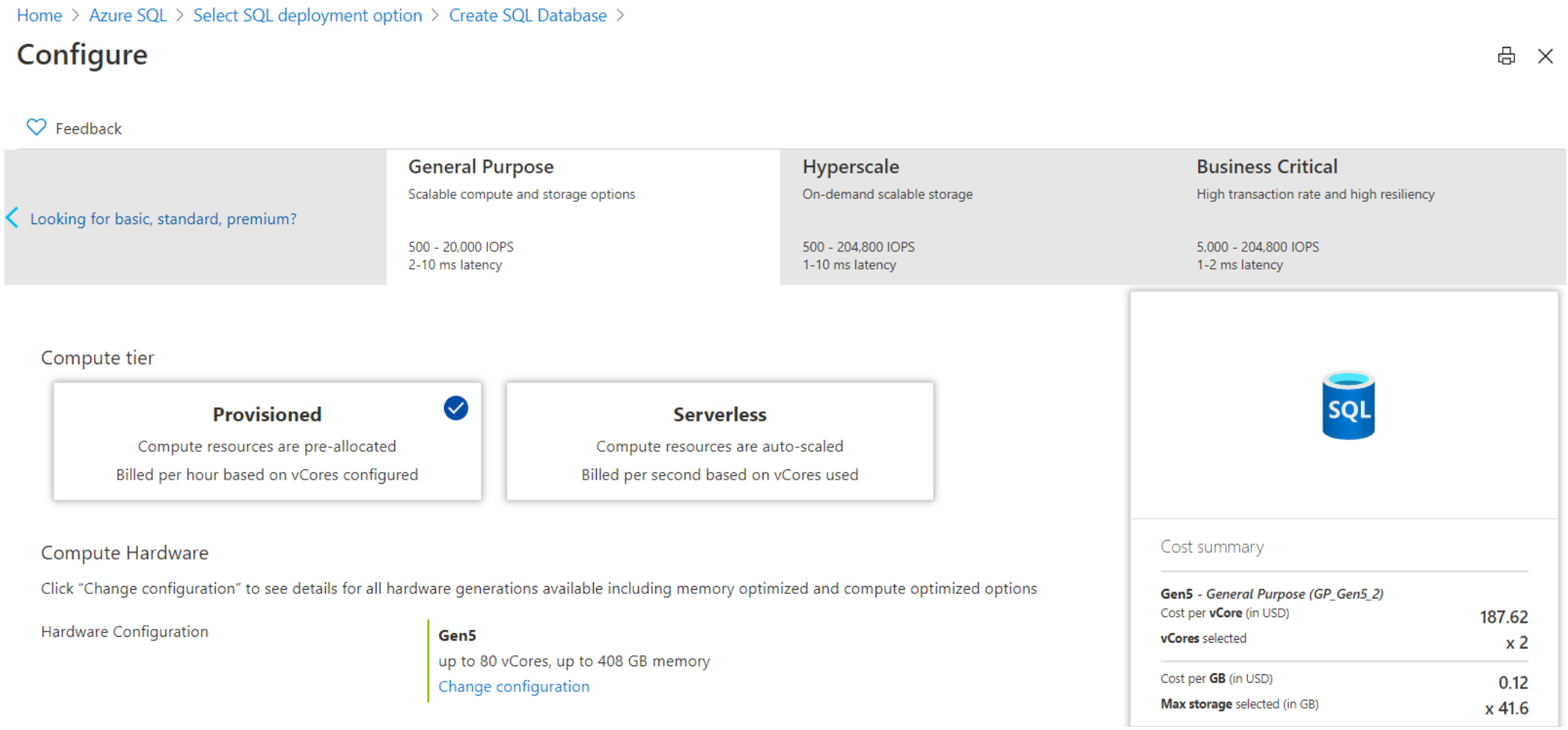
1. Forrester Consulting. The Total Economic Impact™ of Microsoft Azure SQL Database Managed Instance.

Service tiers – Azure SQL Database

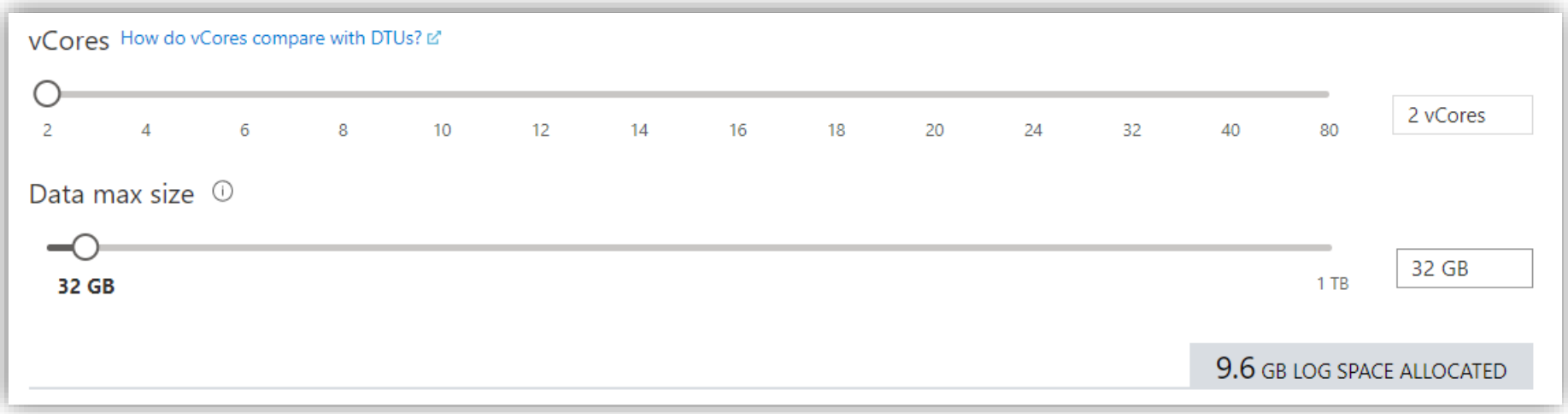
General purpose	Business critical	Hyperscale*
Most business workloads	Workloads that require low latency, fast recovery, and a readable secondary	Most business workloads with highly scalable storage and read-scale requirements
Remote storage IOPS $ Serverless Option* 	Local storage IOPS++ $$$ In-memory 	Local + remote storage IOPS+ $ Unlimited storage 

*Not currently in managed instance

Configuration Options- Azure SQL Database



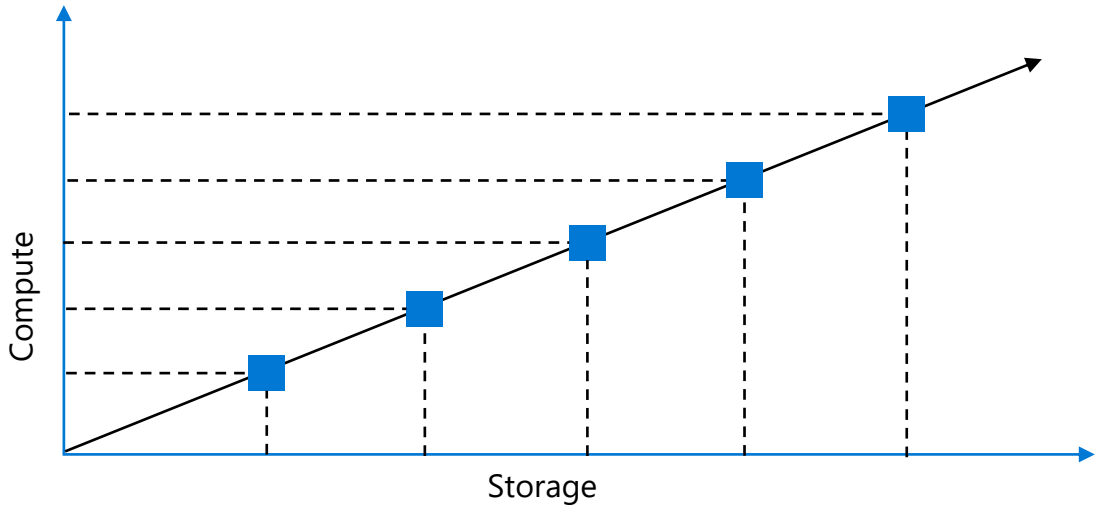
vCore Purchasing Model



Purchasing models - Azure SQL Database

DTU model

Simple, preconfigured



Pre-packaged, bundled unit that represents the database power

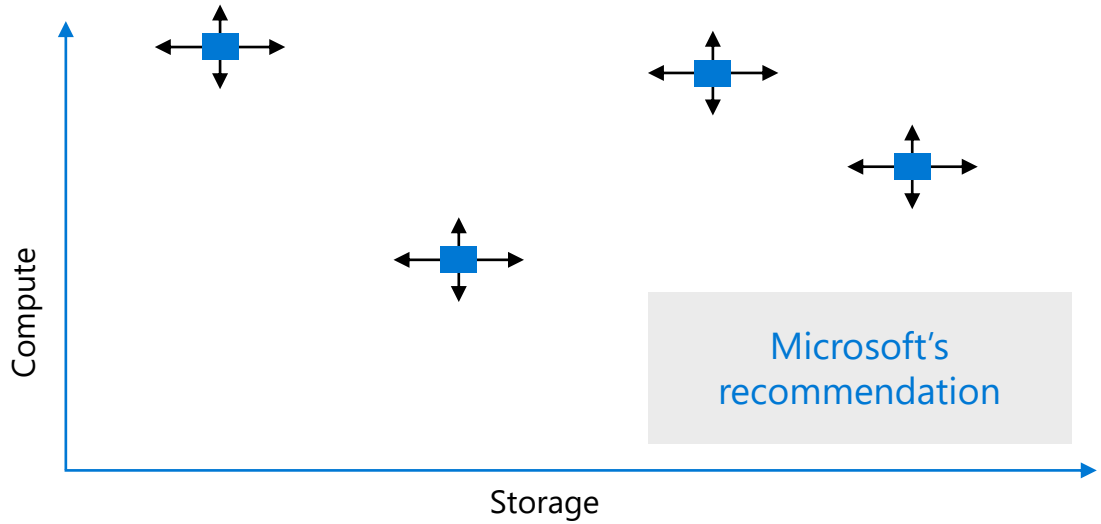
Designed for predictable performance, but somewhat inflexible and limited in options

DTU sizing offers simplicity of choice

Not

vCore model

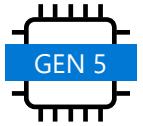
Independent scalability



This model allows you to independently choose compute and storage resources. It also allows you to use Azure Hybrid Benefit for SQL Server to gain cost savings.

Best for customers who value flexibility, control and transparency

Hardware

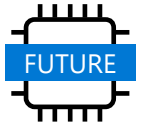


Gen5

80 vCore limit

Up to 4 TB of local storage

Accelerated Networking is guaranteed



Future

Future hardware generations

M-series (memory optimized)

- 128 vCores (hyperthreaded)
- 3.8 TB memory
- Business critical (preview)

Fsv2-series (compute optimized)

- 72 vCores (hyperthreaded)
- 3.4 GHz sustained turbo clock speed
- General purpose (preview)

Azure SQL Family

Serverless for Azure SQL Databases

Provisioned compute cannot solve some problems

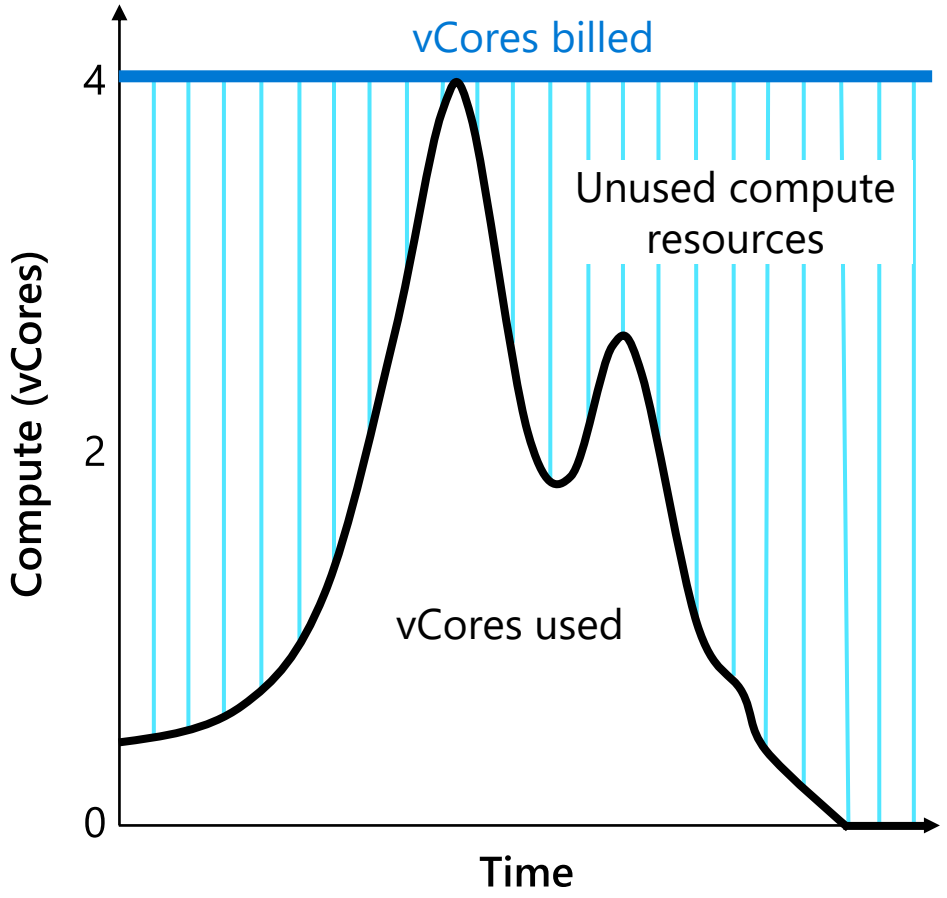
Provisioned compute databases are designed for predictable patterns and higher compute utilization

They struggle to meet high peaks in demand

They contribute to over-allocation of resources and costs during periods of inactivity or low usage

Lead to precious resources spent managing, not building

Provisioned compute with unpredictable and intermittent workloads



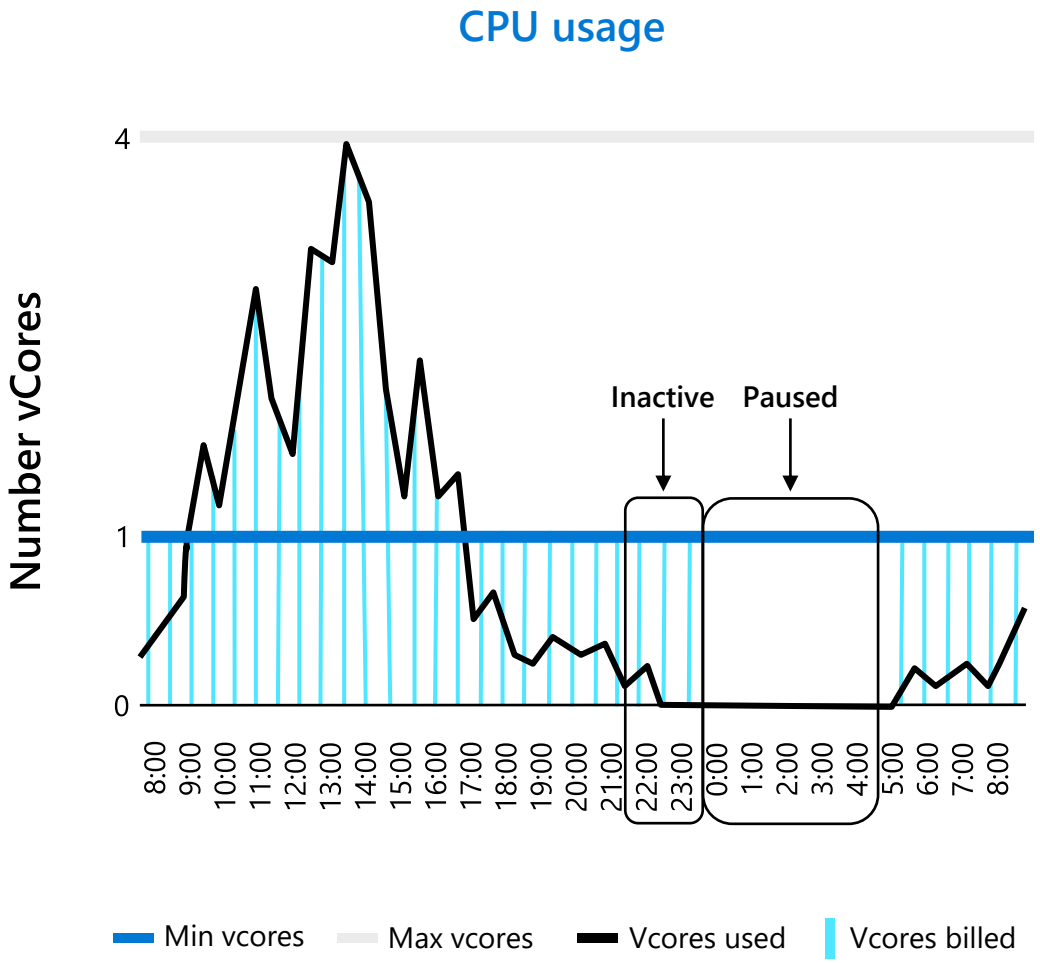
Optimize price to performance with per-second billing

Compute resources scale dynamically up or down based on workload requirements

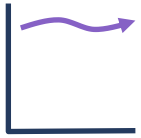
Configure minimum and maximum vCores to define the range of available compute capacity

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

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



Choosing provisioned or serverless compute



Characteristics for provisioned compute

- More uniform resource utilization
- Need for higher compute responsiveness
- Scenarios where hourly billing granularity is ideal
- Desire to maintain resource allocation
- Interested in reserved capacity, Azure Hybrid Benefit, or elastic pools

Characteristics for serverless compute

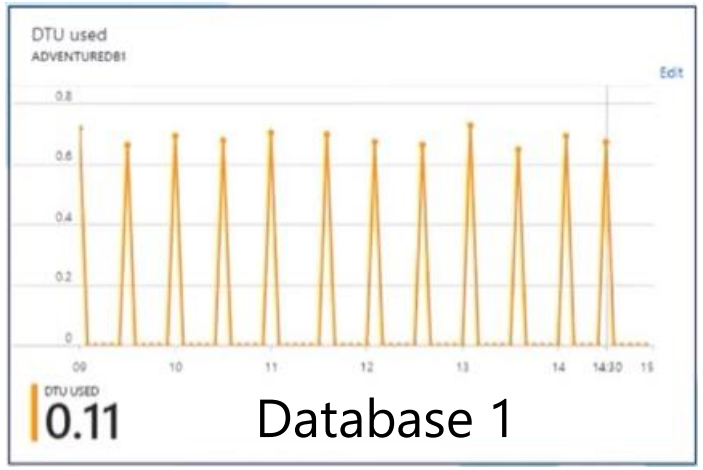
- Large shifts in usage and periods of inactivity
- Comfort with resume delay and memory reclamation
- Scenarios where per second billing granularity is ideal
- Desire to delegate resource allocation
- Currently using single databases on General Purpose service tier

Price optimization will help drive the decision between provisioned and serverless compute

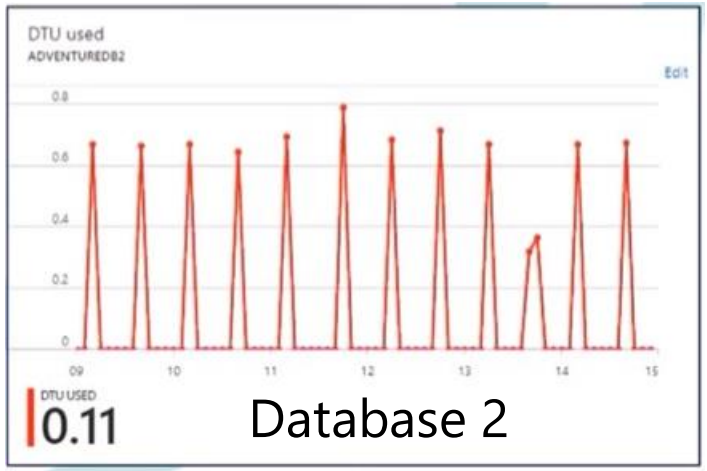
Azure SQL Family
Elastic Pools

Three Singleton Databases

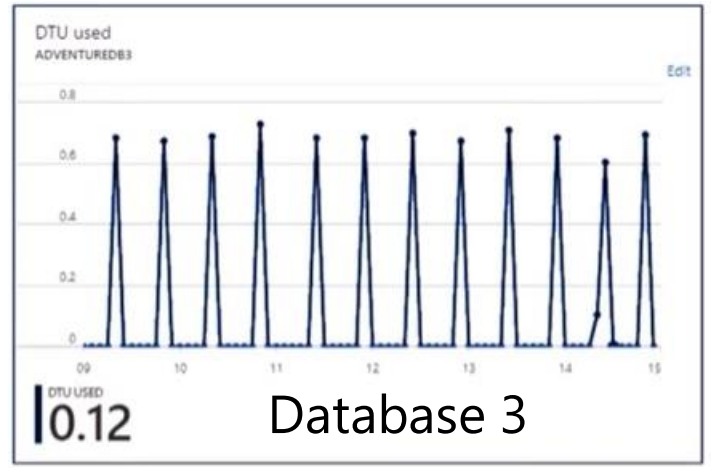
Singleton databases with unpredictable and intermittent usage patterns can be consolidated into a single server using elastic pools for better optimization.



Database 1

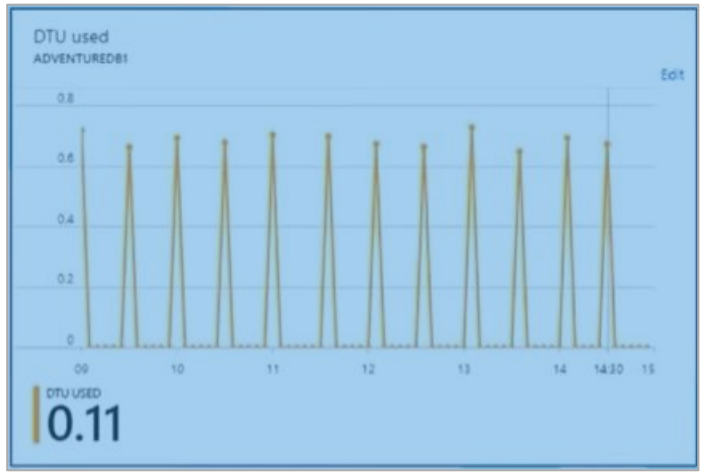


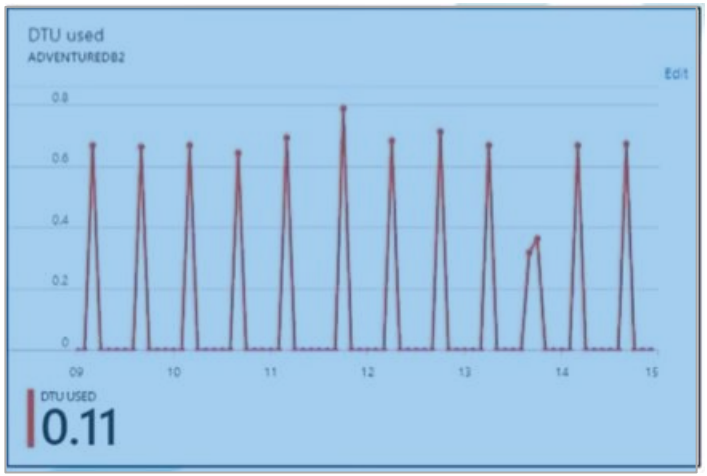
Database 2

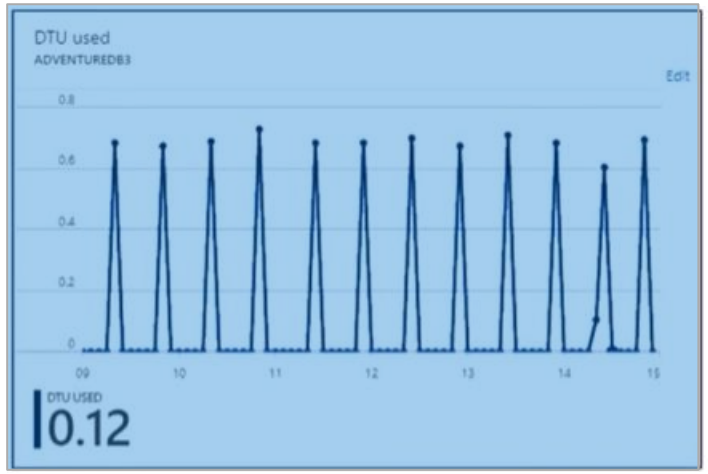


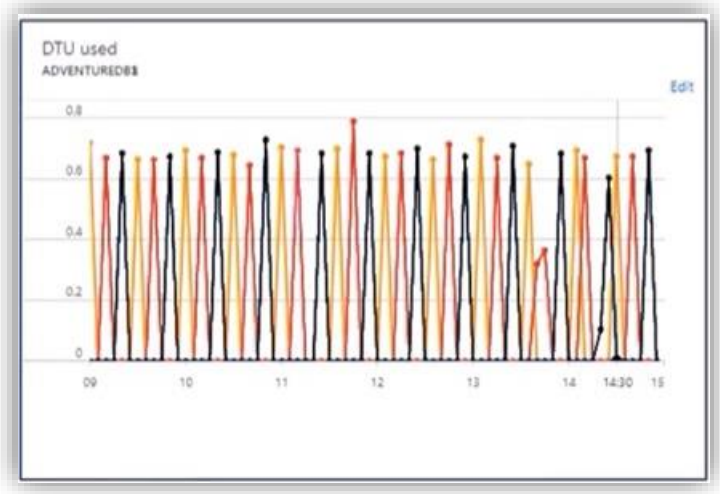
Database 3

Elastic Pools









Resources combined into a single elastic pool.

Azure SQL Family
Summary

Azure SQL Managed Instance or Azure SQL Database?

Azure SQL managed instance

Single instance

SQL Server surface area (vast majority of workloads)

Native virtual network support

Fully managed service

Instance pool

Pre-provision compute resources for migration

Enables cost-efficient migration.

Ability to host smaller instances (2Vcore)

Currently in public preview

Azure SQL Database

Single database

Hyperscale storage (up to 100TB)

Serverless compute

Fully managed service

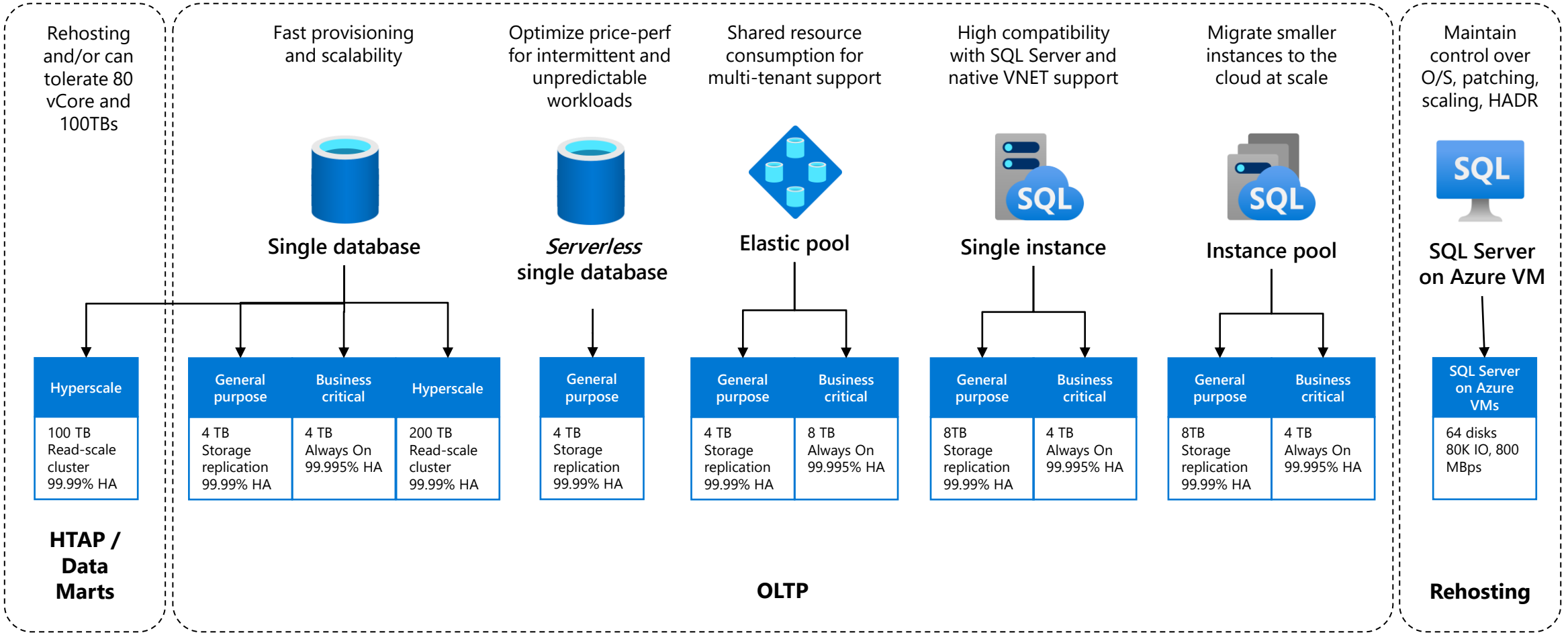
Elastic pool

Resource sharing between multiple databases to price optimize

Simplified performance management for multiple databases

Fully managed service

How to pick Azure SQL models and service tiers



Resources

Azure SQL documentation

- aka.ms/azuresqldocs

Try the Azure SQL Workshop

- aka.ms/sqlworkshops

Azure SQL for Beginners

- aka.ms/AzureSQL4Beginners

Choosing the Correct Tools

- aka.ms/ChooseAzureSQL

Data Exposed with Anna Hoffman

- aka.ms/dataexposed

Additional Resources

Best Options for Database Migration into Azure:
https://techcommunity.microsoft.com/t5/azure-migration/sql-server-best-options-for-database-migration-into-azure/ba-p/1497339

What is Azure SQL Database Hyperscale?:
https://www.youtube.com/watch?v=Z9AFnKI7sfI

Azure SQL Elastic Pools: https://www.youtube.com/watch?v=v1Yvvo9e1gQ

Introducing Azure SQL Database Managed Instance:
https://www.youtube.com/watch?v=W8feSZXm2Ec

Optimize Pricing with Azure SQL Database Serverless:
https://www.youtube.com/watch?v=E23D9iXSCJQ

Summary

- Azure SQL has evolved into **the world's database**
- **Azure SQL includes** Virtual machine, Managed Instance, and Database
- **SQL Server on Azure Virtual Machines** is best for 100% lift and shift
- **Azure SQL Managed Instances:** Database engine instance + power of PaaS
- **Azure SQL Database** for modern cloud apps providing you the most PaaS capabilities