Which Azure SQL Database Options Should I Choose?

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What is Azure SQL?

- Not just SQL Server in the cloud!
- It's Microsoft's fully managed relational database solution that allows you to focus on development and performance, not management!
- Handles most of the database management functions such as upgrading, patching, backups, and monitoring without user involvement.
- Always running on the latest stable version of SQL Server Database Engine.
- Patched OS with 99.99% availability.

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Benefits of Azure SQL

- Cloud-first development pattern
  - New features come to Azure SQL before SQL Server
- Backups are performed automatically
- High availability is built in
- Disaster recovery is easy to set up and use
- Easily and quickly scale up or down
- Performance improvement tools
  - Query Performance Insight
  - Automatic plan correction
  - Automatic index tuning

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Glossary

- Deployment Option – the choice you make about how to structure the server and its databases.
- Purchase Model – within the deployment option, the choice you make about how to pay for the service.
- Service Tier – within the purchase model, the level of compute power you want.
- Compute Tier – within the service tier, the ability to have compute 24/7 or on demand.

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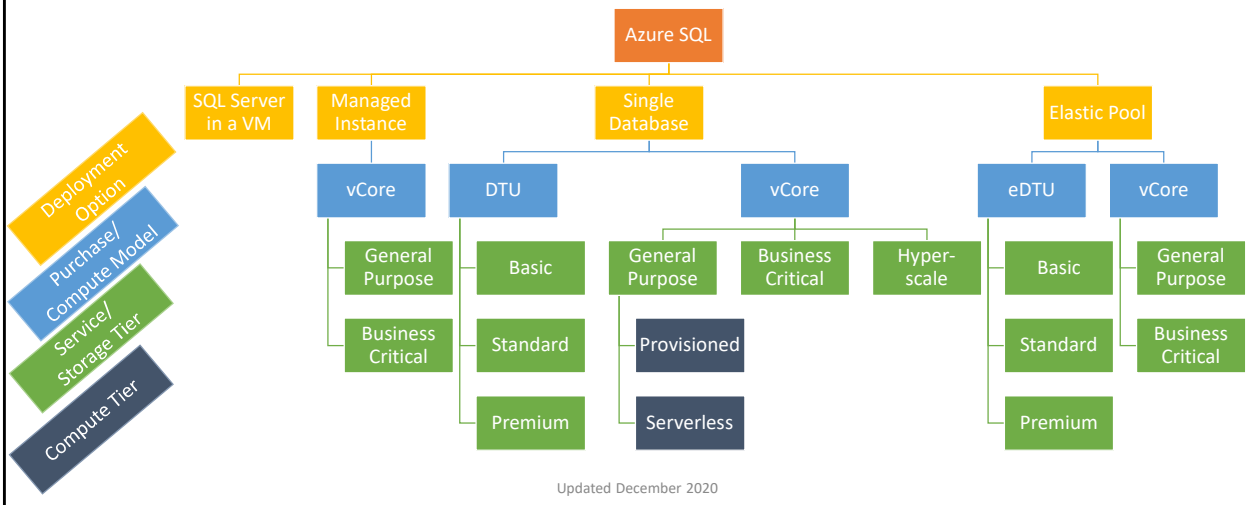
Offerings


Azure SQL
SQL Server in a VM
Managed Instance
Single Database
Elastic Pool
vCore
DTU
vCore
eDTU
vCore
General Purpose
Business Critical
Basic
Standard
Premium
General Purpose
Business Critical
Hyper-scale
Provisioned
Serverless
Basic
Standard
Premium
General Purpose
Business Critical
Deployment Option
Purchase/ Compute Model
Service/ Storage Tier
Compute Tier
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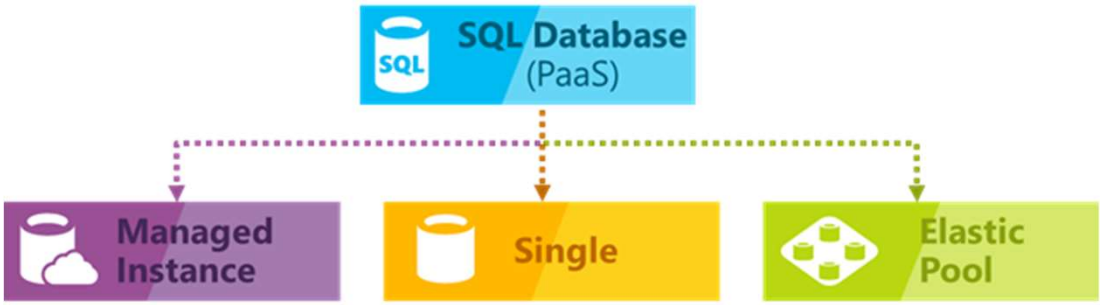
Deployment Options



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Deployment Option – the choice you make about how to structure the server and its databases.

Managed Instance

- A collection of system and user databases with a shared set of resources that is lift-and-shift ready.
- Great for moving existing on-premises SQL Server instances and databases to a PaaS offering in Azure with minimal code changes.
- Offers near-100% compatibility with on-premises SQL Server.

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https://docs.microsoft.com/en-us/azure/azure-sql/database/features-comparison
Not supported:
DB Mirroring
DB Snapshots
MS DTC
Event Notifications
Extended Stored procecures.
Filestream.
Linked Servers from files
Bulk import (minimal logging)
Windows Auth (Azure AD Auth is)
WSFC

Use cases for managed instance

Lift and shift existing on-premises SQL Server instance or databases.

Use features of SQL Server that aren't available in Single Database or Elastic Pool such as cross-database queries, SQL Server Agent jobs, Change Data Capture, Resource Governor, or Service Broker.

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Single Database

- A single database given its own set of resources.
- Managed via a logical “SQL server”.
- Optimized for development of new, cloud-native applications.

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https://docs.microsoft.com/en-us/azure/azure-sql/database/features-comparison
Not supported:
CDC
Collation
CLR
Cross-database queries or transactions
Database mail
DB mirroring
DB snapshots
MS DTC
Notifications
Filestream
Linked servers
Resource governor
Service Broker
SQL Server Agent
Time zone choice
Trace Flags
Windows Auth

Use cases for single database

Simple database that can be migrated from an on-premises SQL Server or other relational databases (MySQL, PostgreSQL)

New database used in a cloud application

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Elastic pool

- A collection of databases with a shared set of resources.
- Managed via a logical “SQL server”.
- Optimized for a multi-tenant SaaS application pattern.

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Use cases for elastic pool

Multi-tenant SaaS application – many databases with the same schema that have varying usage patterns.

Databases that require cross-database communication – can use Elastic Tools features.

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Purchase model

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Purchase Model

DTU

- A blended measurement of CPU, memory, and I/O.
- Fixed amount of storage (maximum 4 TB).
- Compute and storage scale together.

vCore

- Compute and storage are paid for and scale separately.
- You specify vCores desired; memory amount is tied to that choice.
- You choose storage – General Purpose or Business Critical.

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Service tier

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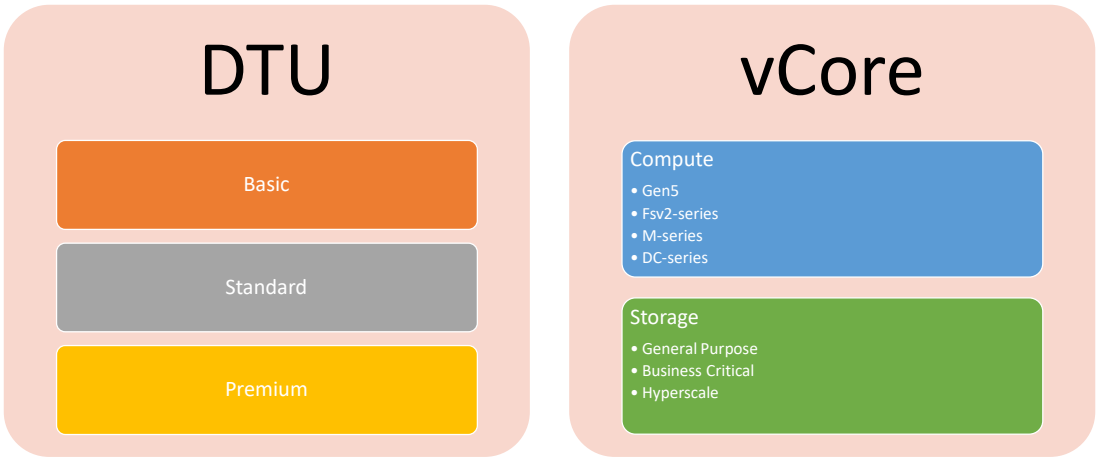
Available service tiers



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DTUs

Basic	Standard	Premium
• 5 DTUs • Max 2 GB • 1-4 IOPS per DTU • Latency - 5 ms (read), 10 ms (write)	• 10 – 3,000 DTUs • Max 1 TB • 1-4 IOPS per DTU • Latency - 5 ms (read), 10 ms (write)	• 125 – 4,000 DTUs • Max 4 TB • 25 IOPS per DTU • Latency - 2 ms (read/write)

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[Service tiers - DTU-based purchase model - Azure SQL Database | Microsoft Docs]
[DTU resource limits single databases - Azure SQL Database | Microsoft Docs]
[DTU resource limits elastic pools - Azure SQL Database | Microsoft Docs]

vCore

Gen 5
- 2 vCore/10.5 GB memory – 80 vCore/396 GB memory

Fsv2-series
- CPU-optimized
- 8 vCore/15.1 GB memory – 72 vCore/136 GB memory

M-series
- Memory-optimized
- 8 vCore/235 GB RAM – 128 vCore/3767 GB memory

DC-series
- Designed for workloads that process sensitive data and confidential query processing (Always Encrypted)

General Purpose
- Premium blob storage
- Gen 5 or Fsv2-series

Business Critical
- Local SSD storage
- Gen 5 or M-series

Hyperscale
- Combines SSD and Azure Storage
- Rapid, dynamic storage scaling up to 100 TB
- Gen 5

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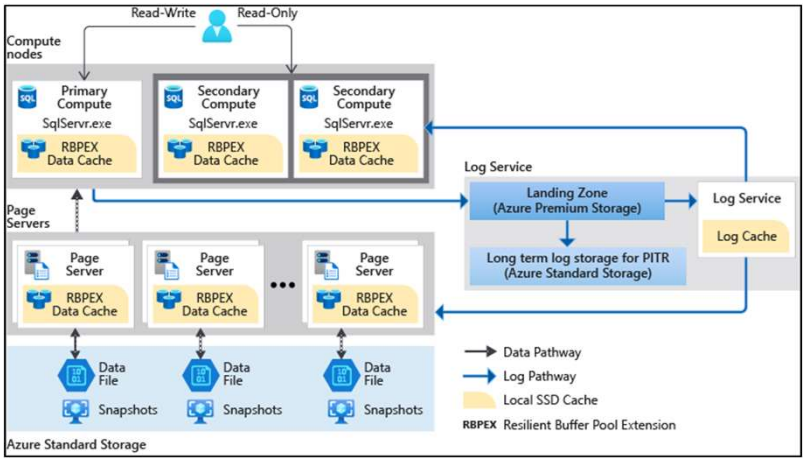
[Single database vCore resource limits - Azure SQL Database | Microsoft Docs]
[Elastic pool vCore resource limits - Azure SQL Database | Microsoft Docs]

Hyperscale



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Leverages Azure architecture to scale out storage and compute resources.
Distributed functions architecture.

Compute – where the relational engine lives.

Page servers – each is responsible for a subset of the data pages. Servers pages to compute node on demand. Kept up to date by the log service.

Log service – accepts log records from primary compute replica, persists in a durable cache, forwards records to the compute replicas and page servers, then pushes to long-term Azure Storage.

Azure storage – holds all the data files in the database.

Supports up to 100 TB databases.
Backups are based on file snapshots so they are nearly instantaneous and have no I/O impact on compute resources.
Fast restores because file snapshots.
Higher log throughput.

Compute tier

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Available compute tiers

Provisioned

- A fixed amount of compute resource for a fixed price billed **hourly**.
- Use cases – databases that are needed daily and hourly; predictable consistent usage.

Serverless

- Optimizes price-performance and simplifies performance management for single databases with intermittent, unpredictable usage by auto-scaling compute and billing for compute used **per second**.
- Use cases – databases that are used for a period of time then go inactive; only pay for storage when compute is not needed.

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Demo

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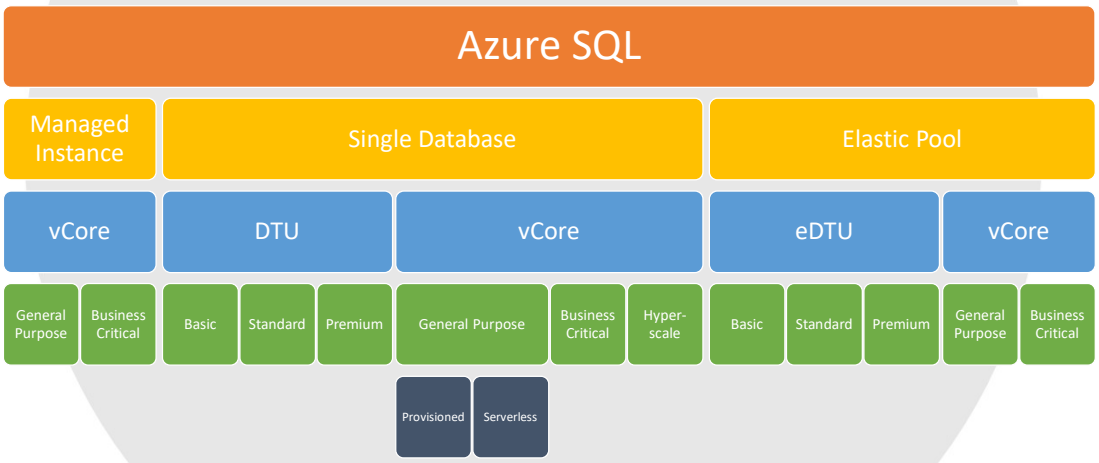
- Create Single DB > vCore > Gen Purpose > Provisioned
    - New-AzSqlDatabase.ps1
- Create Elastic Pool > eDTU > Standard
    - New-AzSqlElasticPool
- Create Managed Instance > vCore > General Purpose
    - New-AzSqlInstance

Putting it all together



Summary

- Azure SQL is Microsoft's PaaS relational SQL Server database.
- It's designed to minimize management and optimize performance.
- Multiple deployment options and service tiers are offered to give you the right blend of management, features, compute, and storage.

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Questions?

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