

Jes Schultz

Microsoft

Which Azure Database Option Should I Choose?



Jes Schultz (she/her)

- Product Manager @ Microsoft
- Based in Louisville, KY
- Runner
- Foodie



[@grrl_geek](https://twitter.com/grrl_geek)

[Jes Schultz](https://www.linkedin.com/in/jeschultz)

[grrlgeek](https://github.com/grrlgeek)



Sponsors

Gold

Special Thanks

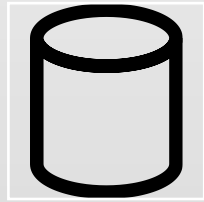
Gold



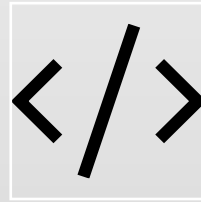
What you'll learn



IaaS vs. PaaS



Azure's PaaS database offerings



What makes each unique



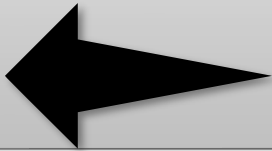
What's managed for you with each offering

First, let's talk IaaS vs PaaS

IaaS

- Infrastructure as a Service
- You “rent” infrastructure – VMs, compute, storage, networks, OSes
- You manage the VMs, OS, and any applications on them

PaaS



- Platform as a Service
- You rent access to a ready-to-use platform (in this case database)
- The provider manages the hardware, OS, upgrades, and many administrative tasks

Let's talk about types of data stores

Highly
structured data
with
primary/foreign
key
relationships
and constraints

Loosely
structured data
stored as a
document,
key/value pair,
or graph

Low-latency,
high-throughput
data storage

To store and
query large
amounts of data
for analysis

Relational

Non-relational

In-memory

Analytics

Azure Database Options

The screenshot displays the Microsoft Azure portal interface. At the top, a blue header bar contains the 'Microsoft Azure' logo, a search bar with the placeholder text 'Search resources, services, and docs (G+ /)', and several utility icons on the right. Below the header, the main content area is titled 'All services | Databases'. On the left side of this area is a navigation pane with a 'Categories' section. The 'Databases' category is currently selected and highlighted. The main pane shows a list of database services, organized into two columns. A search filter box labeled 'Filter services' is positioned at the top of the list. The services listed include Azure Cosmos DB, Azure SQL, Azure Database for MySQL servers, Azure Database for MariaDB servers, Dedicated SQL pools (formerly SQL DW), Azure Database Migration Services, SQL Server stretch databases, SQL elastic pools, Managed databases, and SQL managed instances. Each service entry is accompanied by its respective icon and a star icon for favoriting. Some services, like 'Elastic Job agents' and 'SQL virtual machines', are marked with a 'PREVIEW' label.

Microsoft Azure

Search resources, services, and docs (G+ /)

All services | Databases

Filter services

Azure Cosmos DB

Azure SQL

Azure Database for MySQL servers

Azure Database for MariaDB servers

Dedicated SQL pools (formerly SQL DW)

Azure Database Migration Services

SQL Server stretch databases

SQL elastic pools

Managed databases

SQL managed instances

Azure Cosmos DB for MongoDB (RU)

SQL databases

Azure Database for PostgreSQL servers

SQL servers

Azure Synapse Analytics

Azure Cache for Redis

Data factories

Virtual clusters

Elastic Job agents

SQL virtual machines

PREVIEW

Categories

- All
- Favorites
- Recents
- General
- Compute
- Networking
- Storage
- Web
- Mobile
- Containers
- Databases**
- Analytics
- AI + machine learning

These roughly fall into several categories

Relational	Non-relational	In-memory	<i>Analytics</i>	<i>Other</i>
<ul style="list-style-type: none">• Azure SQL, SQL databases, SQL servers, SQL elastic pools, SQL managed instances ★• Azure Database for MySQL servers• Azure Database for MariaDB servers• Azure Database for PostgreSQL servers ★• Azure Cosmos DB<ul style="list-style-type: none">• PostgreSQL (Citus)	<ul style="list-style-type: none">• Azure Cosmos DB<ul style="list-style-type: none">• NoSQL• MongoDB• Apache Cassandra• Apache Gremlin• Table	<ul style="list-style-type: none">• Azure Cache for Redis	<ul style="list-style-type: none">• <i>Azure Synapse Analytics</i>• <i>Dedicated SQL pool</i>• <i>Analysis Services</i>	<ul style="list-style-type: none">• <i>Azure Database Migration Services</i>• <i>SQL Server stretch databases</i>• <i>Managed databases</i>• <i>Data factories</i>• <i>Virtual clusters</i>• <i>Elastic Job agents</i>• <i>SQL virtual machines (IaaS)</i>

Choose your own adventure

Why choose Azure SQL?



- Microsoft's SQL Server database engine – now evergreen, no messy version upgrades required, ever
- Enterprise features, especially security ([Ledger](#), [Always Encrypted](#), [Auditing](#))
- Developers: less time managing performance
 - [Automatic tuning](#)
 - [Intelligent query processing](#)
 - [SQL DB Emulator](#) for local development
- Integrated with [Azure Functions](#)



Managed Instance

- One or more databases managed as an instance with shared resources
- Nearly 100% compatibility with SQL Server
- Best for: lift-and-shift from on-prem or IaaS



SQL Database

- One database with dedicated resources
- Provisioned and serverless options available
- Best for: cloud-native apps



Elastic Pools

- A pool of resources shared by many SQL Databases
- Manage databases that have varying, unpredictable usage
- Best for: SaaS apps, ISV apps, multi-tenant databases

Why choose Azure Database for MySQL servers?



- Open source - based on MySQL **Community** edition
- Configurable [server parameters](#)
- [Data-in](#) and [data-out](#) replication supported from/to on-prem servers, Azure VMs, other Azure MySQL DBs, other cloud MySQL DBs
- Up to [10 read replicas](#) for scale-out
- [Storage engines](#) available:
 - InnoDB (most similar to SQL Server's engine)
 - MEMORY

Why choose Azure Database for MariaDB servers?



- Open source – based on MariaDB **community** edition (which is a fork of MySQL)
- Configurable [server parameters](#)
- [Data-in](#) replication supported from on-prem servers, Azure VMs, other Azure MariaDBs, other cloud MariaDBs
- Up to [5 read replicas](#) for scale-out
- [Storage engines](#) available:
 - InnoDB
 - MEMORY

Why choose Azure Database for PostgreSQL servers?



- Open source - based on PostgreSQL **community** edition
 - Microsoft has a team of committers and contributors who work full time on the open-source Postgres project
 - Versions 11, 12, 13, 14
- Configurable [server parameters](#)
- Lots of supported [extensions](#) (vary by engine version)
 - Version 14 includes, but is not limited to, timescaledb, postgis, pgaudit, and pg_cron
- [Built-in PgBouncer](#) for connection pooling – public or private access
- Up to [5 read replicas](#) for scale-out
- [Query Store](#) for performance troubleshooting
 - Runtime stats – how many times was a query run, average execution time, longest-running queries
 - Wait stats – what queries are waiting on what resource, what resource is a long-running query waiting on

Why choose Azure Cosmos DB?



- Globally distributed*
 - Read anywhere, write anywhere
- Flexible consistency levels*



- Integrated with Azure Functions, IoT Hub, AKS, App Service

* PostgreSQL (Citus) has slightly different options

Cosmos DB APIs

NoSQL

- Document storage (JSON)
- Use SQL to query
- [Automatic indexing](#)
- Offline emulator
- Great for IoT, retail, gaming

MongoDB

- Document storage (BSON)
- Compatible with MongoDB wire protocol
- [Single and compound indexes](#)
- Use familiar tools to query (Mongo Shell, etc)

Apache Cassandra

- Wide-column data store
- Compatible with existing Cassandra SDKs and tools
- Great for apps where writes exceed reads – logging, package tracking, IoT

Table

- Key/value storage
- Azure Table Storage on steroids
- Great for app caching, gaming scores, shopping carts

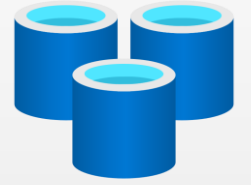
Apache Gremlin

- Graph data storage - think vertices and edges
- [Automatic indexing](#)
- Great for relationships – recommendation engines, social networks, logistics

PostgreSQL

- Community Postgres engine with the Citus extension
- Most recent engine versions (14, 15)
- Distributed data – coordinator and worker nodes
- Great for high-throughput transactional apps and SaaS

Why choose Azure Cache for Redis?



- Open-source Redis
 - Basic, Standard, Premium tiers
- Or Redis Enterprise
 - Enterprise, Enterprise Flash tiers
 - Modules supported
 - Redisearch, Redisbloom, Redistimeseries, Redisjson
- Data or content caching, session store, job or messaging queue
- Redis persistence supported (Premium, in preview for Enterprise)
 - RDB (Redis database) – snapshots saved in Azure Storage account
 - AOF (Append only file) – write log stored in Azure Storage account

What's “managed” for these databases?

	Backups	Restores	High Availability (same region)	Disaster Recovery (different region)	Version upgrades
Azure SQL	Automatic	Point-in-time, geo-restore	Automatic	Geo-replicated backups, Geo-replication	Evergreen engine – no concept of versions. Incremental updates are automatic.
MySQL	Automatic	Point-in-time, geo-restore	Available	Geo-replicated backups, Read replicas	Patch updates – automatic. Major versions – dump and create new or perform manually through portal.
MariaDB	Automatic	Point-in-time, geo-restore	Automatic	Geo-replicated backups, Read replicas	Patch updates – automatic. Minor versions - dump and create new. Major versions - dump and create new.
PostgreSQL	Automatic	Point-in-time, geo-restore	Available	Geo-replicated backups, Read replicas	Patch and minor versions – automatic. Major versions – dump and create new.
Cosmos DB	Automatic	Point-in-time	Automatic	Scale out	Evergreen engine – no concept of versions. Incremental updates are automatic.
Redis	Set up data persistence	Load saved data	Available	Zone redundancy	Manual through portal, Azure CLI, or PowerShell.

Cool, how do I build my app using one of these PaaS databases?

- Sign up for a free trial!
 - [Create Your Azure Free Account Today | Microsoft Azure](#)
 - \$200 credit for 30 days (Pro tip: provision serverless or burstable to get the most out of that)
 - After that, move to pay-as-you-go and get this every month for 12 months:
 - [Azure Cosmos DB](#) 1,000 RUs, 25 GB storage
 - [Azure SQL Database](#) 10 DTUs, 250 GB storage
 - [Azure Database for MySQL](#) – 750 hours of burstable compute/32 GB storage
 - [Azure Database for PostgreSQL](#) – 750 hours of burstable compute/32 GB storage
 - Cosmos DB has its own totally-free, no-credit-card-involved 30-day trial - [Try Azure Cosmos DB free | Microsoft Learn](#)
- Find sample code @ [github.com/azure-samples](https://github.com/Azure-Samples)
- Check documentation of each service for Quick Starts, Templates, and Samples

Jes Schultz (she/her)

- Product Manager @ Microsoft
- Based in Louisville, KY
- Runner
- Foodie



[@grrl_geek](https://twitter.com/grrl_geek)

[Jes Schultz](https://www.linkedin.com/in/jeschultz)

[grrlgeek](https://github.com/grrlgeek)

