



# *Imagine Cloud Conference*

EINSTIEG IN AZURE SQL DATABASES UND POWERSHELL AUTOMATION

# About Me

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# Agenda

Azure SQL Database - General

Features

Performance-Levels / Costs

Legal / Availabilities

Backup / Restore

Tuning

Particularities

Q & A



# First Steps



# What was up to now...

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2009 – Microsoft announced „Azure SQL Database“

2010 – „Azure SQL Database“ went live

2014 – New version announced

2015 – Elastic Pools announced

SQL Server 2012 / 2014 only „Backup-to-Azure“

SQL 2016 – „Backup-to-Azure“

- Stretched Database



# What is in it?

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## From a business view

- Availability
- Scalability

## From a development view

- Always Encrypted
- Sort aka Collate
- Change-Data-Capture
- Column-Store-Indexes
- Cursor / Stored Procedures
- Compression / Spatial
- Graph
- Row based Security

# Not supported Features

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All Hardware related settings/statements: Syntax related to hardware-related server settings: such as memory, worker threads, CPU affinity, trace flags. Use service levels instead.

Also File placement, High availability, Log reader

sp\_configure options and RECONFIGURE - some options are available using ALTER DATABASE SCOPED CONFIGURATION.

sp\_helpuser

Functions: fn\_get\_sql, fn\_virtualfilestats, fn\_virtualservernodes

OPENQUERY, OPENROWSET, OPENDATASOURCE and four-part names

.NET Framework: CLR-Integration in SQL Server

Transact-SQL-Debugging

USE-Statement

# Azure SQL Database Development

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ADO.NET

Java

PHP (Windows only)

Node.js

Python

Ruby



# What makes life easier

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BUILTIN SLA / Availability

BUILTIN Backup

BUILTIN Point-in-Time-Restore

BUILTIN Scalability

BUILTIN Firewall

BUILTIN Geo-Redundance

BUILTIN Load-Balancing aka Elastic Pools



# Power ?

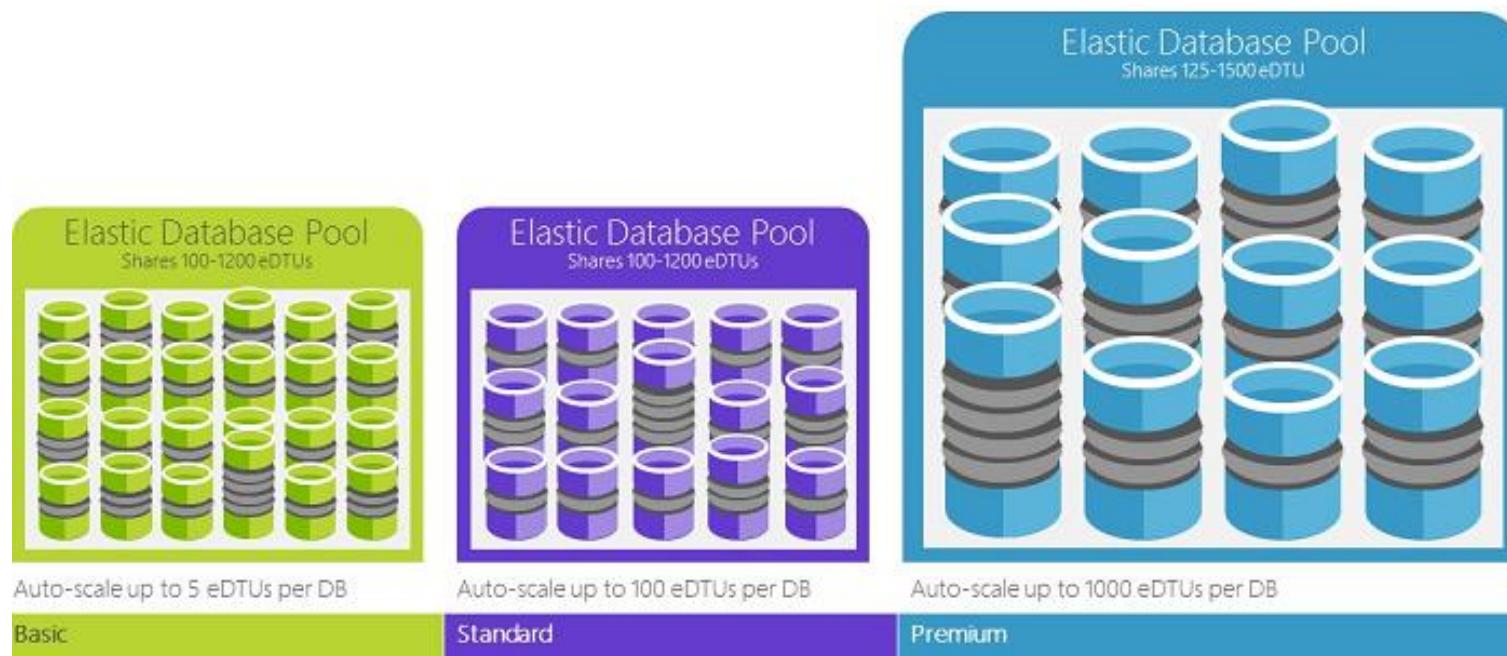
# Which PerformanceLevel 1/2

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# Which PerformanceLevel 2/2

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# Choosing a service tier

	<b>Basic</b>	<b>Standard</b>	<b>Premium</b>	<b>Premium RS</b>
Target workload	Development and production	Development and production	Development and production	Workload that can tolerate data loss up to 5-minutes due to service failures
Uptime SLA	99.99%	99.99%	99.99%	N/A while in preview
Backup retention	7 days	35 days	35 days	35 days
CPU	Low	Low, Medium, High	Medium, High 	Medium
IO throughput	Low	Medium	Order of magnitude higher than Standard	Same as Premium
IO latency	Higher than Premium	Higher than Premium	Lower than Basic and Standard	Same as Premium
Columnstore indexing and in-memory OLTP	N/A	N/A	Supported	Supported

# Performance level and storage size limits

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## Single databases

	<b>Basic</b>	<b>Standard</b>	<b>Premium</b>	<b>Premium RS</b>
Maximum storage size*	2 GB	1 TB	4 TB	1 TB
Maximum DTUs	5	3000	4000	1000

# Performance level and storage size limits

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## Elastic pools

	Basic	Standard	Premium	Premium RS
Maximum storage size per database*	2 GB	1 TB	1 TB	1 TB
Maximum storage size per pool*	156 GB	4 TB	4 TB	1 TB
Maximum eDTUs per database	5	3000	4000	1000
Maximum eDTUs per pool	1600	3000	4000	1000
Maximum number of databases per pool	500	500	100	100

# Standard service tier 1/2

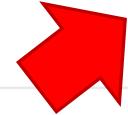
Performance level	S0	S1	S2	S3
Max DTUs**	10	20	50	100
Included storage (GB)	250	250	250	250
Max storage choices (GB)*	250	250	250	250, 500, 750, 1024
Max in-memory OLTP storage (GB)	N/A	N/A	N/A	N/A
Max concurrent workers (requests)	60	90	120	200
Max concurrent logins	60	90	120	200
Max concurrent sessions	600	900	1200	2400

# Standard service tier 2/2

Performance level	S4	S6	S7	S9	S12
Max DTUs**	200	400	800	1600	3000
Included storage (GB)	250	250	250	250	250
Max storage choices (GB)*	250, 500, 750, 1024	250, 500, 750, 1024	250, 500, 750, 1024	250, 500, 750, 1024	250, 500, 750, 1024
Max in-memory OLTP storage (GB)	N/A	N/A	N/A	N/A	N/A
Max concurrent workers (requests)	400	800	1600	3200	6000
Max concurrent logins	400	800	1600	3200	6000
Max concurrent sessions	4800	9600	19200	30000	30000

# Premium service tier

Performance level	P1	P2	P4	P6	P11	P15
Max DTUs	125	250	500	1000	1750	4000
Included storage (GB)	500	500	500	500	4096	4096
Max storage choices (GB)*	500, 750, 1024	500, 750, 1024	500, 750, 1024	500, 750, 1024	4096	4096
Max in-memory OLTP storage (GB)	1	2	4	8	14	32
Max concurrent workers (requests)	200	400	800	1600	2400	6400
Max concurrent logins	200	400	800	1600	2400	6400
Max concurrent sessions	30000	30000	30000	30000	30000	30000



# Premium RS service tier

Performance level	PRS1	PRS2	PRS4	PRS6
Max DTUs	125	250	500	1000
Included storage (GB)	500	500	500	500
Max storage choices (GB)*	500, 750, 1024	500, 750, 1024	500, 750, 1024	500, 750, 1024
Max in-memory OLTP storage (GB)	1	2	4	8
Max concurrent workers (requests)	200	400	800	1600
Max concurrent logins	200	400	800	1600
Max concurrent sessions	30000	30000	30000	30000

# Choosing a service tier

	<b>Basic</b>	<b>Standard</b>	<b>Premium</b>	<b>Premium RS</b>
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The background of the slide features a wide-angle photograph of a sunset or sunrise over a range of mountains. The sky is filled with horizontal clouds, transitioning from deep red and orange at the top to a lighter yellow and pink near the horizon. In the foreground, there's a layer of low-hanging, textured clouds. The dark silhouettes of mountain peaks are visible against the bright sky.

# Demo

AZURE SQL DATABASE DEPLOYMENT

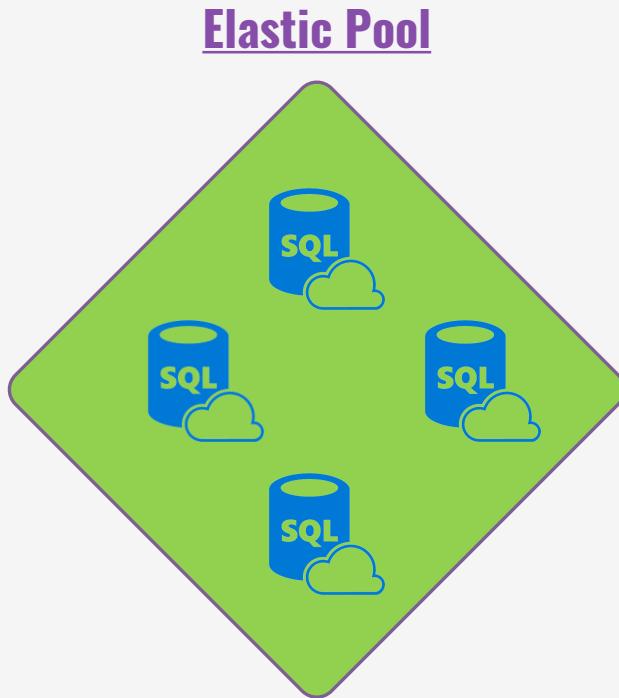
# Always ?



# SLA / Availability

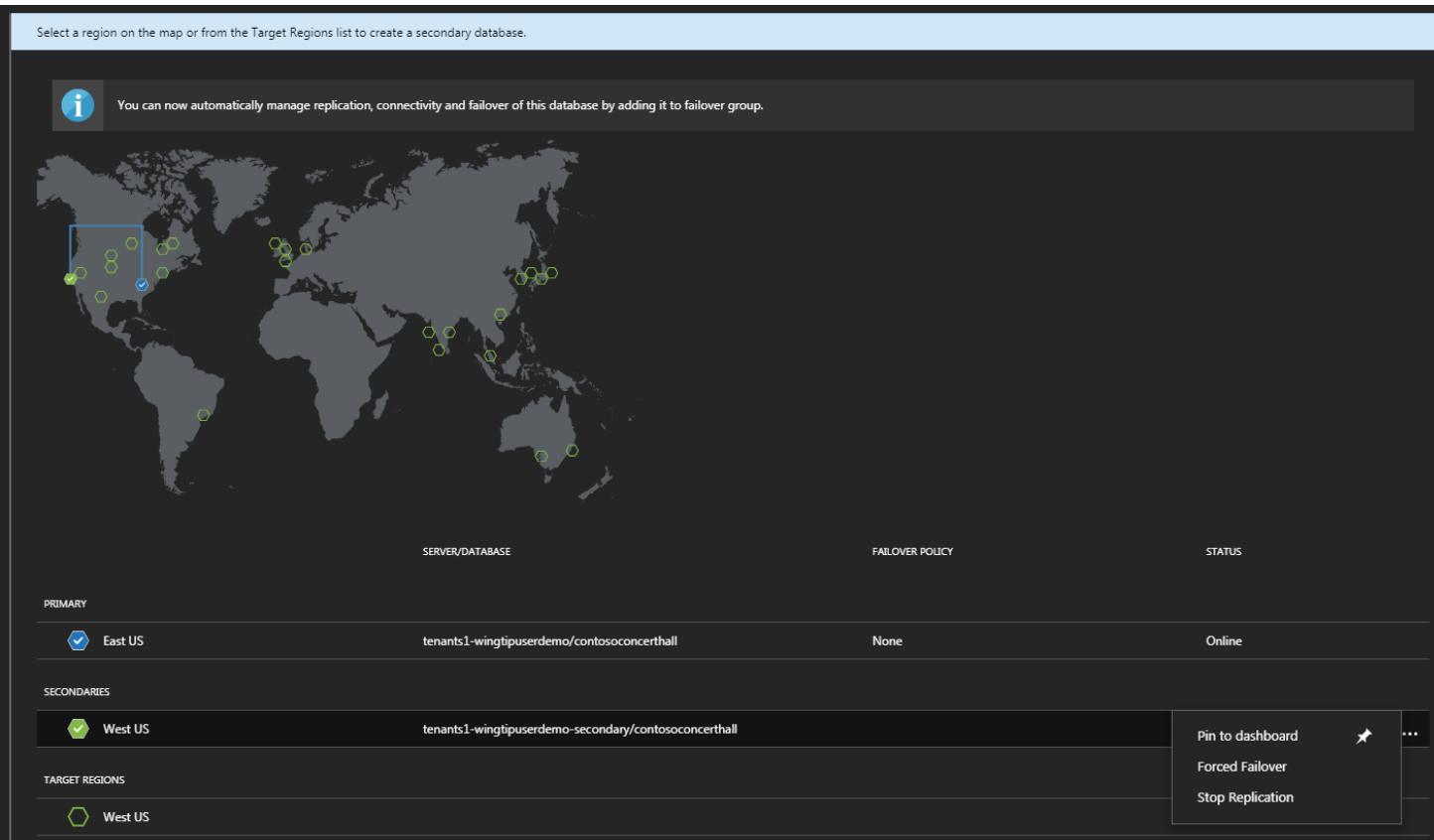
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# 99,99 % garantiert



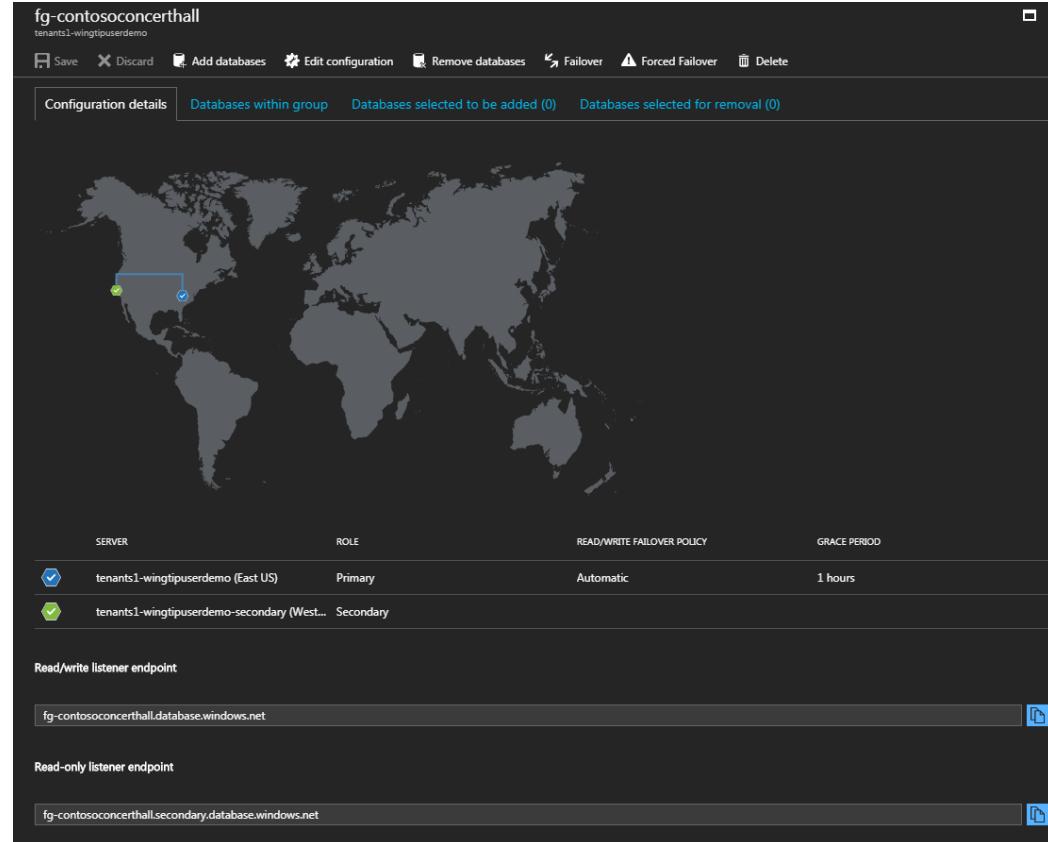
# Geo-Redundance

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# Failover-Groups

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# Demo

AZURE SQL DATABASE GEO-REDUNDANCE

# Builtin!



# Automated Backup

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## **How much backup storage is included at no cost?**

Backup storage up to 200% of max database size => no additional costs

## **How often do backups happen?**

Fulls – weekly; Differentials – every few hours; transaction logs – every 5 - 10 minutes

## **How long do you keep my backups?**

Basic service tier is 7 days

Standard service tier is 35 days

Premium service tier is 35 days

# Long-Time-Retention Backup

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Create a vault in the same Azure subscription, same geographic region and resource group

Configure a retention policy for any database

- That policy causes the weekly full database backups to be copied to the Recovery Services vault
- Retained there for the specified retention period (up to 10 years)

**=> *additional costs for Azure Backup Vault***

# Performance-Tuning

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## Performance recommendations

- Create index recommendations
- Drop index recommendations

## Fix schema issues recommendations

## Automatic tuning options

- CREATE INDEX
- DROP INDEX
- PLAN REGRESSION CORRECTION



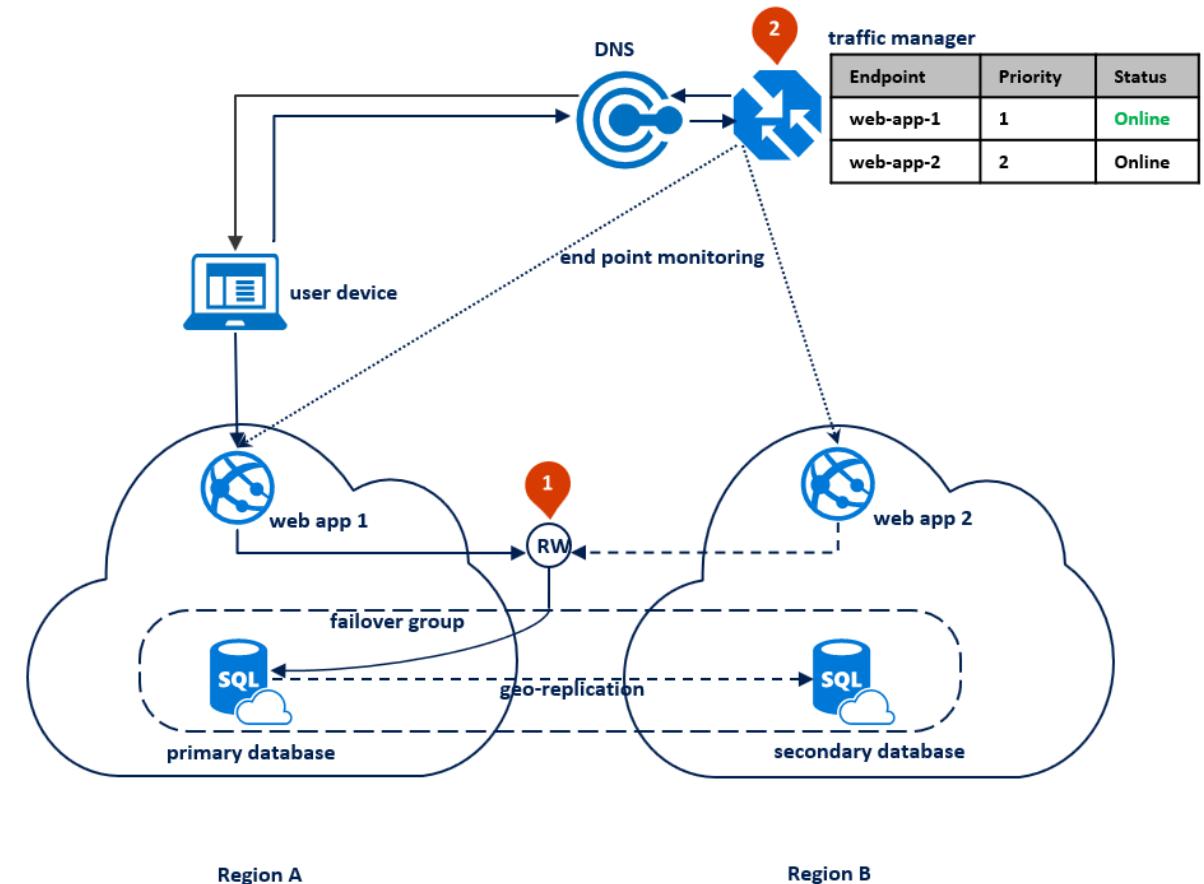
# Particularities

Reconnect Capabilities

Session Handling !?

App-Preparation for High Availability

- Example-Scenario from  
<https://docs.microsoft.com/en-us/azure/sql-database/sql-database-designing-cloud-solutions-for-disaster-recovery>



# Particularities

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Reconnect Capabilities

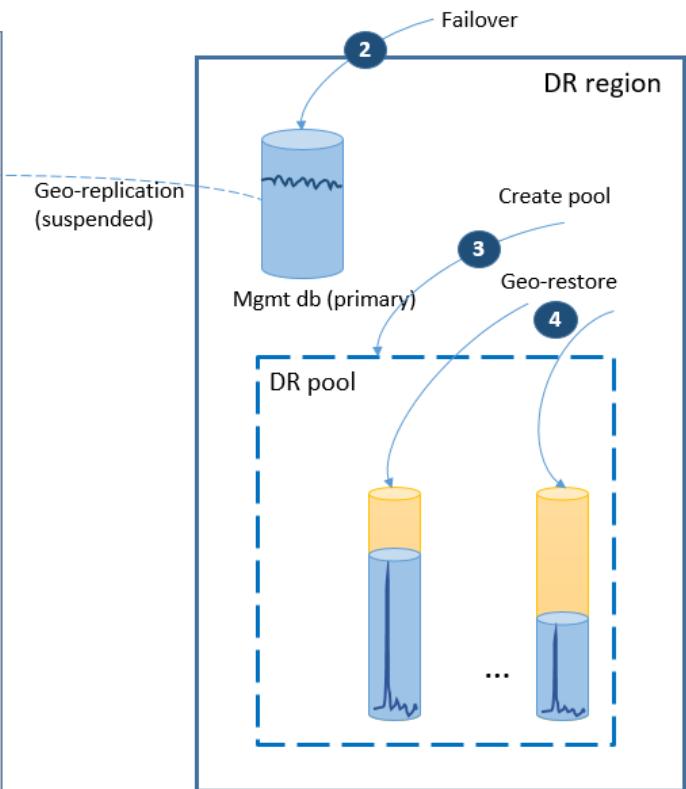
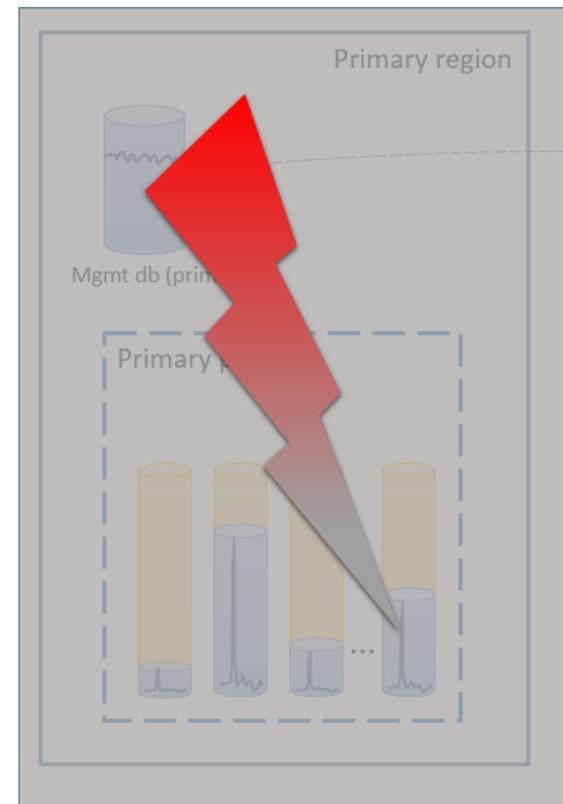
Session Handling !?

App-Preparation for High Availability

- Example-Scenario from  
<https://docs.microsoft.com/en-us/azure/sql-database/sql-database-designing-cloud-solutions-for-disaster-recovery>

Disaster recovery strategies - ElasticPools

- Example-Scenario from  
<https://docs.microsoft.com/en-us/azure/sql-database/sql-database-disaster-recovery-strategies-for-applications-with-elastic-pool>



# Roadmap

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## **VNETs / Network Isolation**

- <https://docs.microsoft.com/en-us/azure/sql-database/sql-database-vnet-service-endpoint-rule-overview>

## **new Performance-Levels**

- <https://azure.microsoft.com/en-us/blog/new-performance-levels-and-storage-add-ons-in-azure-sql-database/>

# Helpful Links

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## **ARM Templates**

- <https://github.com/Azure/azure-quickstart-templates>

## **Documentation**

- <https://docs.microsoft.com/en-us/azure/sql-database/>



# Conclusion

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Fast & Easy Deployment  
Easy to Manage  
Automatic Backup  
Automatic Tuning



# CREATIVE COMMONS PHOTOS



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