Azure SQL Database for the Production DBA

Tim Radney

tim@sqlskills.com

Tim Radney

- **Consultant/Trainer/Speaker/Author**
- **Principal Consultant, SQLskills.com**
  - ▫ Email: Tim@SQLskills.com
  - ▫ Blog: https://www.SQLskills.com/blogs/Tim
  - ▫ Blog: http://www.timradney.com
  - ▫ Twitter: @TRadney
- **Microsoft Data Platform MVP**
- **Chapter Leader "Columbus GA SQL Users Group"**
- **PASS Regional Mentor "South East USA"**
- **Outstanding PASS Volunteer**
- **Regular presenter at worldwide conferences on administration, disaster recovery and performance tuning.**
- **Friend of Red Gate**
- **(I also like electronics, aquaponics, farming chickens, crops, and tilapia)**

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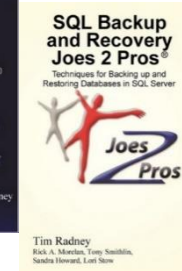
Reminder: Intersect with Speakers and Attendees

- **Tweet tips and tricks that you learn and follow tweets posted by your peers!**
  - Follow: #SQLintersection and/or #DEVintersection
- **Join us – WEDNESDAY Evening – for SQLafterDark**
  - Doors open at 7:00 pm
  - Trivia game starts at 7:30 pm
    - *Winning team receives something fun!*
  - Raffle at the end of the night
    - *Lots of great items to win including a seat in a SQLskills Immersion Event!*
  - The first round of drinks is sponsored by SentryOne and SQLskills

Overview

- **What is Azure SQL Database?**
- **Features**
- **Unsupported features**
- **Demo: creating an Azure SQL Database**
- **Demo: DTU Calculator**
- **Tuning differences**
- **Tuning options**
- **Demo: tuning options**

What is Azure SQL Database?

- **Azure SQL Database is a database-as-a-service**
  - SQL Database is a cloud relational database service
  - Predictable performance and pricing
  - Elastic database pool for unpredictable workloads
  - 99.99% availability built-in
  - Geo-replication and restore services for data protection
  - Supports existing SQL Server tools, libraries, and APIs
  - Scalability with minimal downtime
  - Secure and compliant for your sensitive data

Features

- **Backups**
  - They are handled for you; you handle restores
  - Point-in-time restores
  - Retention is based on tier
    - *Basic* = 7 days; *Standard* = 35 days; *Premium* 35 days
  - Restores are to a new database
  - https://azure.microsoft.com/en-us/documentation/articles/sql-database-business-continuity/

Features

- **Dynamic Data Masking**
  - Can limit access to sensitive data by controlling how the data appears
  - Masking rules can be defined on particular columns
  - No physical changes are made to the data
  - https://azure.microsoft.com/en-us/documentation/articles/sql-database-dynamic-data-masking-get-started/
- **Row-Level Security**
  - Can restrict row-level access based on a user's identity
  - Access restriction logic is located in the database tier
  - https://msdn.microsoft.com/en-us/library/dn765131.aspx

Features

- **Always Encrypted**
  - Allows clients to encrypt sensitive data inside client applications and not reveal the encryption keys to the Database Engine
  - Can ensure sensitive data never appears as plaintext inside the system
  - Only client applications or app servers that have access to the keys can access plaintext data
  - Encryption keys are stored in the Azure Key Vault
  - https://msdn.microsoft.com/en-us/library/mt163865.aspx

Features

- **Transparent Data Encryption**
  - Real-time encryption and decryption of the database, backups, and transaction log files at rest
  - Encrypts the storage of an entire database by using a symmetric key
  - Azure SQL Database now supports Azure Key Vault integration with TDE
  - https://msdn.microsoft.com/en-us/library/dn948096.aspx
- **Geo-replication**
  - Available in all tiers
  - Provides a readable replica database (secondary) in a different region
  - Estimated Recovery Time (ERT) <30s with a Recovery Point Objective (RPO) <1h
  - http://bit.ly/1McsB0y

Features

- **Elastic database pools**
  - Pool of resources (eDTUs) that individual databases can auto-scale within set parameters
  - Under heavy load, a database can consume more eDTUs to meet demand
  - Provisioning resources for an entire pool simplifies management tasks rather than for each database
  - http://bit.ly/23fDp2d
- **In-memory support for Premium tier**
  - A memory-optimized table is represented in active memory
  - http://bit.ly/1WLQoDy

Features

- **Query Store**
  - Detailed historical information about all queries
  - Enables you to easily identify queries that are performing poorly
  - Keeps a history of each query, including its associated plans, run-time statistics, and information about resource consumption
  - Query Store is a database level feature (on by default)
  - https://msdn.microsoft.com/en-US/library/dn817826.aspx
- **Index Advisor**
  - Provides index recommendations that have the potential to improve current query performance
  - http://bit.ly/1HikabH

Unsupported Features

- **No SQL Server Agent**
  - You can use an on-premises SQL Server Agent
  - You can use an Azure VM running SQL Server
  - Azure options, Elastic Jobs or Azure Automation
- **Database Mail**
- **Events, event notifications, and query notifications**
- **SQL Server Trace / Profiler**
- **Trace flags**
- **SSIS and SSRS**
- **Log shipping, database mirroring, transactional replication**
- **And more … http://bit.ly/1f5VcUW**

Demo

Creating an Azure SQL Database

Demo

DTU Calculator

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Tuning Differences

- **Instance level settings you can't change**
  - Tempdb
  - Cost threshold for parallelism
  - Max degree of parallelism
  - Min and max server memory
  - Optimize for ad hoc workloads
  - Anything requiring sp_configure and RECONFIGURE
- **Global temp tables not supported**
- **DBCC FREEPROCCACHE not supported**

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Tuning Options

- **Increase to a higher DTU tier**

	Basic	Standard				Premium				
		S0	S1	S2	S3	P1	P2	P4	P6/P3	P11
Maximum database size	2 GB	250 GB				500 GB				1 TB
DTUs	5	10	20	50	100	125	250	500	1,000	1,750
Point-in-time restore	Any point last 7 days	Any point last 14 days				Any point last 35 days				
Disaster recovery	Geo-Restore, restore to any Azure region	Standard Geo-Replication, offline secondary				Active Geo-Replication, up to 4 online (readable) secondary backups				
Max In-Memory OLTP storage	NA	NA	NA	NA	NA	1 GB	2 GB	3 GB*	8 GB	10 GB*
Max concurrent requests	30	60	90	120	200	200	400	800	1,600	2,400
Max concurrent logins	30	60	90	120	200	200	400	800	1,600	2,400
Max sessions	300	600	900	1,200	2,400	2,400	4,800	9,600	19,200	32,000

* In-Memory OLTP storage limits will soon adjust to 4 for P4 and 14 for P11.

https://azure.microsoft.com/en-us/documentation/articles/sql-database-service-tiers/

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Tuning Options

- **With minor changes, your existing workload scripts should work**
  - File statistics
    - http://www.sqlskills.com/blogs/paul/how-to-examine-io-subsystem-latencies-from-within-sql-server/
    - sys.master_files does not exist, modified to use sys.databases
  - File statistics over time
    - http://www.sqlskills.com/blogs/paul/capturing-io-latencies-period-time/
    - sys.master_files does not exist, modified to use sys.databases
    - Global ##temp tables are not supported, changed to local
    - Local #temp tables are referenced differently, changed the check to use OBJECT_ID

Tuning Options

- **With minor changes, your existing workload scripts should work**
  - Wait statistics
    - http://www.sqlskills.com/blogs/paul/wait-statistics-or-please-tell-me-where-it-hurts/
    - sys.dm_os_wait_stats contains wait statistics for the container your database is in, use sys.dm_db_wait_stats for database specific data
  - Waits over a period of time
    - http://www.sqlskills.com/blogs/paul/capturing-wait-statistics-period-time/
    - Change os to db, same issue with global ##temp tables
- **Getting started tuning performance in Azure SQL Database**
  - http://bit.ly/1pHB7dn

Demo

Tuning Options

Summary

- **What we covered**
    - What is Azure SQL Database?
    - Features
    - Unsupported features
    - Demo: creating an Azure SQL Database
    - Demo: DTU Calculator
    - Tuning differences
    - Tuning options
    - Demo: tuning options

Save the Date!

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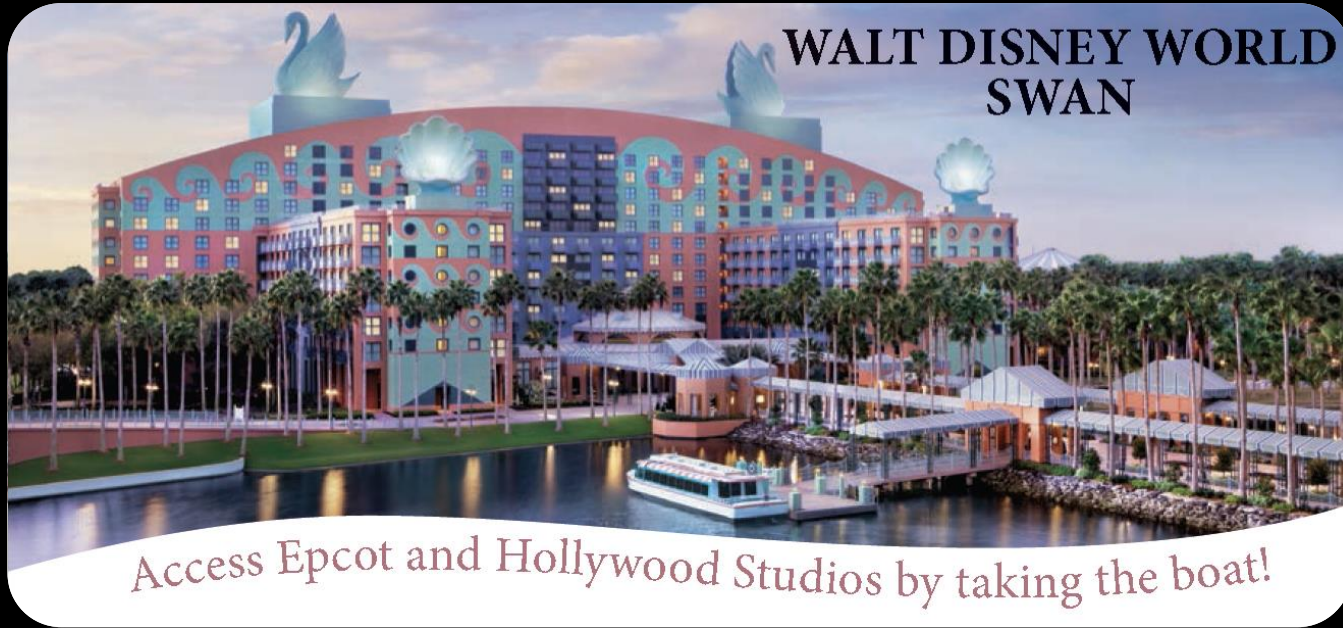
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Leave the every day behind and enter a world of wonder and enchantment at the Walt Disney World® Resort. Located in the heart of the most magical place on earth, the Walt Disney World Swan and Dolphin Resort provides a truly extraordinary backdrop for our event! Beautiful tropical landscaping, tranquil waterways, and classic art and architecture work together to create a stunning landmark!