

# SQL Server 2016 New Features

## Stretch Database

Let Your Database Do the Split Into the Cloud

Andre Essing

Senior Consultant & Trainer



BASLE ▪ BERN ▪ BRUGG ▪ DÜSSELDORF ▪ FRANKFURT A.M. ▪ FREIBURG I.BR. ▪ GENEVA  
HAMBURG ▪ COPENHAGEN ▪ LAUSANNE ▪ MUNICH ▪ STUTTGART ▪ VIENNA ▪ ZURICH

**trivadis**  
makes **IT** easier. 

# About Me

## ANDRE ESSING

Senior Consultant  
Trainer



FRIEND OF  
redgate  
2016

**Microsoft**  
**CERTIFIED**  
Solutions Expert

Data Platform

**Microsoft**  
**CERTIFIED**  
Trainer

## Profile

DBA and Senior Consultant,  
Microsoft Certified Solutions Expert,  
Trainer and SQL Server Enthusiast

- Working in IT since 1998
- SQL Server since version 7.0
- Focus on SQL Server infrastructure and mission critical systems
- Microsoft Certified Trainer and MCSE: Data Platform
- Microsoft P-TSP Data Platform
- Friend of Redgate
- PASS Chapter Leader Bavaria and SQL Saturday Organizer

## Contact

### Web & Mail

www [www.trivadis.com](http://www.trivadis.com)

Blog [www.andreessing.de](http://www.andreessing.de)

E-Mail [andre.essing@trivadis.com](mailto:andre.essing@trivadis.com)

### Social

Twitter [twitter.com/aessing](https://twitter.com/aessing)

Xing [xing.com/profile/Andre\\_Essing](https://xing.com/profile/Andre_Essing)

LinkedIn [linkedin.com/in/aessing](https://linkedin.com/in/aessing)

### Publications

SlideShare [slideshare.net/AndreEssing](https://slideshare.net/AndreEssing)

**trivadis**  
makes **IT** easier.



# How Much Free Space Is in Your Garage?

# ■ Just Give Me a Reason

## Why Stretch Database

Ever growing databases

- Massive tables (billions of rows / TBs size)
- Users need to retain data indefinitely
- Cold data accessed infrequently but must be online
- Maintenance and SLA challenges (e.g. re-index and restore times)

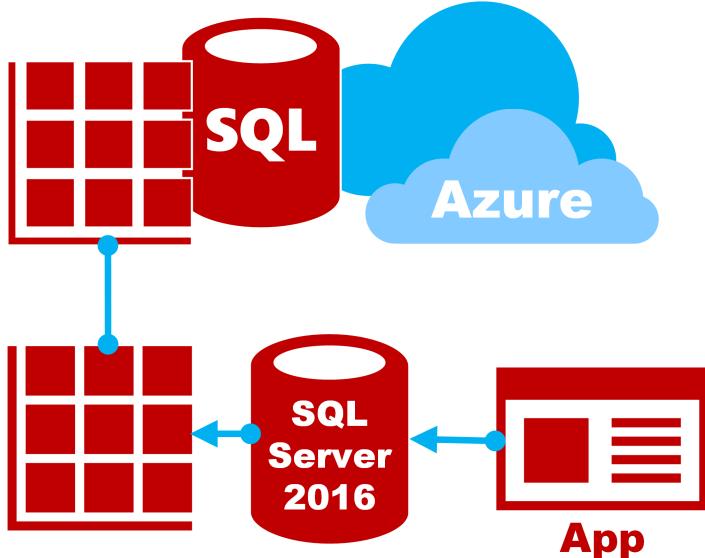


Existing solutions

- Keep adding storage and datacenter capacity  
*Does not solve maintenance and SLA issues*
- Move data to another location (database, flat-files, Big Data, backups, tapes, ...)  
*Data is near-line or offline*
- Delete older data  
*Unknown if data is valuable / Legal restrictions could apply*

# The Solution Is Just Around the Corner

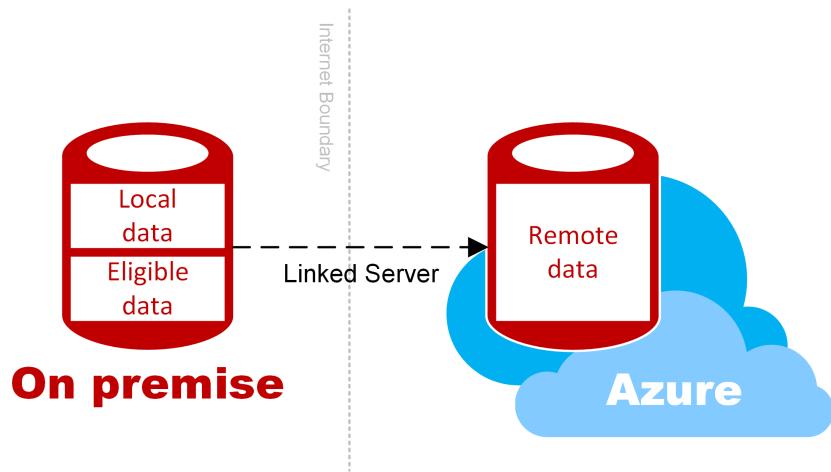
## What Is Stretch Database



- Entire table stays online and can be queried
- No application changes needed
- Reduces complexity
- Frees up on premise resources
- Supports Always Encrypted and row-level security
- Great in combination with Temporal Tables

# ■ Know the Blueprint Before You Start Building a House

## Stretch Database Architecture



- Creates a secure linked server in the on premises SQL Server (via secure channel TLS1.1 / 1.2)
- Linked server has the remote database as target
- Tables will be automatically provisioned in the remote database
- Queries run against the local and the remote database
- Watch out for “remote query” operator



# Catch the Fish

## Technical Deep Dive

# ■ Use the Right Ingredients

## Prerequisites

Before you start

- Be sure the table is eligible for stretching
- You need an Azure account and subscription
- Create a Azure SQL Database Server
- Permit access to the server in Azure

Permissions you need on premise

- SYSADMIN or SERVERADMIN (once per instance)
- ALTER ANY CREDENTIAL (to create credentials)
- DB\_OWNER (for databases and tables)



# Showtime

## Prerequisites



02 - SQL Server 2016 New Features Stretch Database - Prerequisites.ps1

# ■ Stretch It Out

## Enable Stretch Database

Per instance

- Enable Stretch Database feature

Per database

- Create a Database Master Key (DMK)
- Create credentials to connect to the Azure SQL Server
- Enable stretching on database level

Per table

- Configure table for stretching



# ■ It's Your Choice

## Use Filter Predicate

- Filter the data to be migrated to the cloud
  - Is based on inline table-valued functions
  - If your function is slow, data migration is slow
- Filter predicate can be exchanged
- There are some limitations and rules
  - The filtering function has to be deterministic
- Adds complexity to your database
  - Only use when there is no other way

<https://msdn.microsoft.com/en-us/library/mt613432.aspx>



# Showtime

## Enable Stretching



03 - SQL Server 2016 New Features Stretch Database – Enable Stretching.sql

## ■ Take a Break

### Pause and Resume

- Pause data migration for troubleshooting
- Pause is also good for maximizing network bandwidth
- Applies to each table individually



# ■ Personal Trainer

## Managing the Stretch Database

Remove the authenticated connection

- sys.sp\_rda\_deauthorize\_db

Reestablish the authenticated connection

- sys.sp\_rda\_reauthorize\_db

Reconcile local indexes on the remote table

- sys.sp\_rda\_reconcile\_indexes

Specifies how to query a Stretch Database

- sys.sp\_rda\_set\_query\_mode
- DISABLED, LOCAL\_ONLY, LOCAL\_AND\_REMOTE





# Keep It Healthy

## Monitoring and Troubleshooting

### Stretch Database configuration

- sys.databases
- sys.tables
- sys.database\_scoped\_credentials

### Remote database and tables

- sys.remote\_data\_archive\_databases
- sys.remote\_data\_archive\_tables

### Status of the migration

- sys.dm\_db\_rda\_migration\_status
- sys.dm\_db\_rda\_schema\_update\_status



# Showtime

Manage  
Stretch Database



04 - SQL Server 2016 New Features Stretch Database – Manage Stretch Database.sql

# ■ Relax

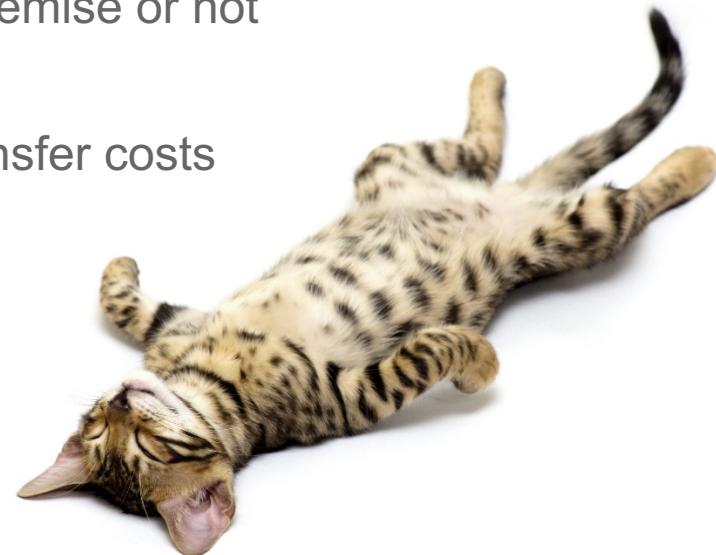
## Disable Stretch Database

Per table

- Decide if data is migrated back to on premise or not
- Disable stretching for the table
- Migrate data from cloud incurs data transfer costs
- Does not delete the remote table

Per database

- Check if no more tables are stretched
- Disable stretching for the database
- Does not delete the remote database



# Showtime

## Disable Stretching



05 - SQL Server 2016 New Features Stretch Database – Disable Stretching.sql

# ■ You Should Have a Plan B

## Backup and Restore

- Backup does not include remote data
  - This is called a “shallow backup”
  - Deep backups are not supported yet
- Stretch Database fully supports point in time restore
- After a restore, reauthorize the connection to Azure
  - `sys.sp_rda_reauthorize_db`
- The remote data gets back into a consistent state
  - Runs automatically, no user intervention is required



# ■ There Are Always Some Glitches

## Blocking Issues

- Table properties
  - Tables containing FILESTREAM data, Replicated tables, Memory-optimized tables, ...
- Data types and column properties
  - XML, hierarchyid, timestamp, CLR user-defined types (UDTs), ...
- Column types
  - COLUMN\_SET, Computed columns
- Constraints
  - Check constraints, Foreign key constraints, ...
- Indexes
  - Full text indexes, XML indexes, Spatial indexes, ...
- Some other limitations
  - <https://msdn.microsoft.com/en-us/library/mt605114.aspx>



# Lets Wrap It Up

## Summary

- Has a lot of restrictions
- Keep your configuration simple
  - Try to avoid filter predicates
  - Only DBAs should configure stretching
- Think about security
  - Encrypt your data
  - Secure the Azure SQL Database server
- Good solution for archiving data
- Available in SQL Server 2016 Express Edition



# Questions and Answers...

Andre Essing  
Senior Consultant & Trainer

+49 89 992759598

[andre.essing@trivadis.com](mailto:andre.essing@trivadis.com)



BASLE ▪ BERN ▪ BRUGG ▪ DÜSSELDORF ▪ FRANKFURT A.M. ▪ FREIBURG I.BR. ▪ GENEVA  
HAMBURG ▪ COPENHAGEN ▪ LAUSANNE ▪ MUNICH ▪ STUTTGART ▪ VIENNA ▪ ZURICH

**trivadis**  
makes **IT** easier.