

# Modern SQL Server Features That Make Life Better

# About Me

- Entered IT in Feb 2008
- Started working with SQL Server in 2009
- Earned MCTS for SQL Server 2008 Implementation and Maintenance in May 2013
- Officially became a Database Administrator in 2014
- Passed the AZ900 and DP900 Azure and Azure Data Fundamentals in early 2021
- Blog at <https://leemarkum.com/>
- Currently a Cloud Database Administrator at Upland Software (Views expressed here are my own)
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# Modern SQL Server Features That Make Life Better

## Agenda

- Discuss features in the following categories:
- High Availability/Disaster Recovery
- Performance
- Troubleshooting
- Permissions
- T-SQL

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- How did I decide which SQL Server Versions to Discuss?
- <https://sqlserverupdates.com/>
- Extended support for SQL Server 2012 ends in July 2022.
- Extended Support for SQL Server 2014 ends in July 2024.

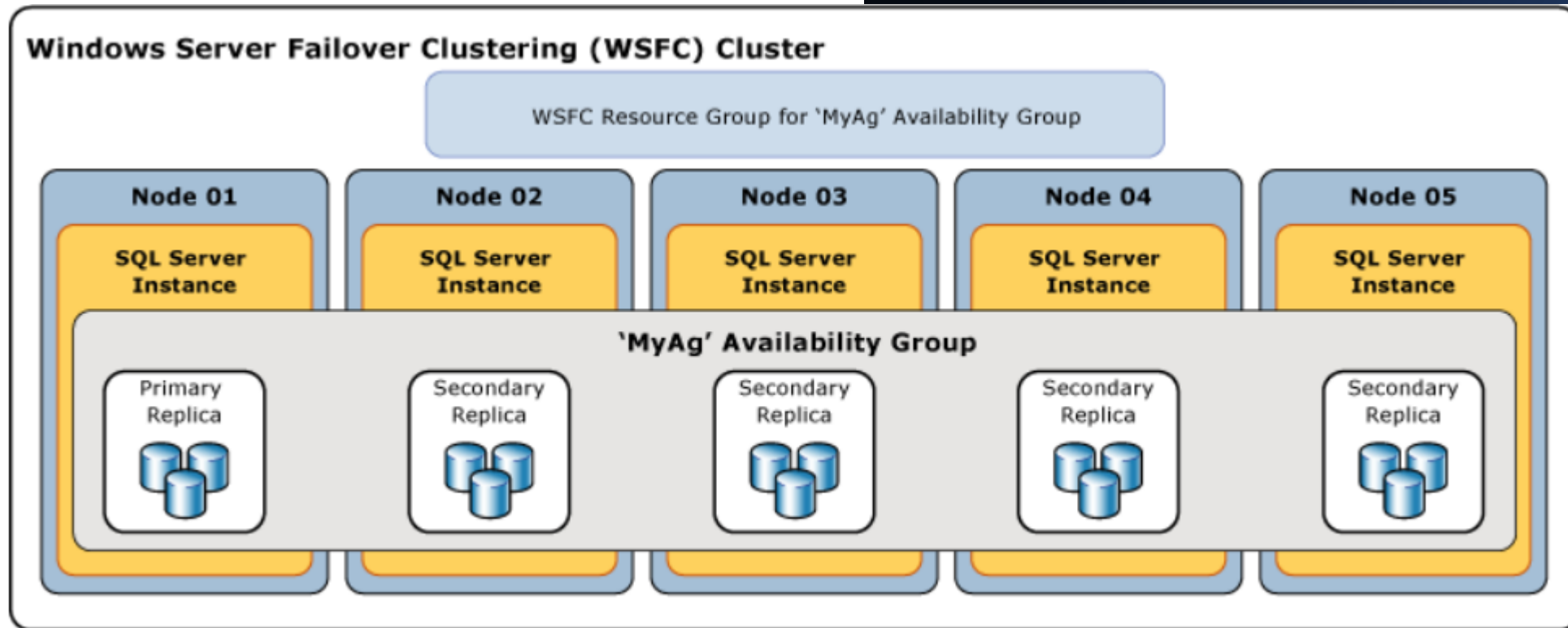
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## HA/DR Category

Availability Groups (2012 and Up, but don't try in on 2012)

<https://bit.ly/3xieeks> (MS Docs - What is an AlwaysOn Availability Group)

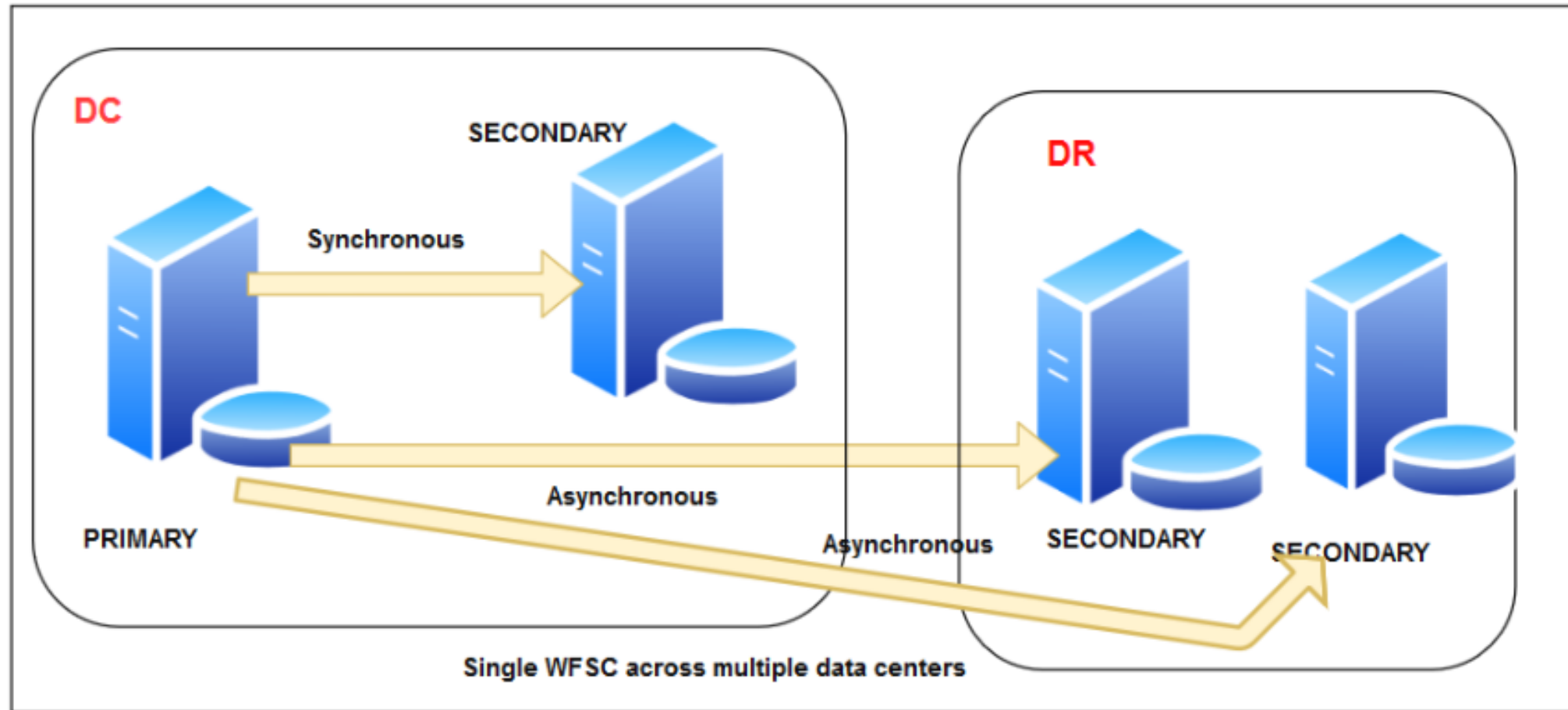
<https://bit.ly/3dqxrG> (Lee Markum - My Availability Group Database Isn't Synchronizing)



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HA/DR Category

Availability Groups(2012 and Up,  
but don't try it on SQL 2012)



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## HA/DR Category

### Accelerated Database Recovery(2019)

<https://www.mssqltips.com/sqlservertip/5971/accelerated-database-recovery-in-sql-server-2019/>

Uses the “persisted version store”

A sample record from my CollegeFootball database

Coach	Years	OverallRecord	PercentOverall	ConferenceRecord	PercentConference	Bowls	NationalChampionships	ConferenceChampionships
Lincoln Riley	2017-	24-4	0.857	16-2	88.90%	0-2	-	2

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## Performance Category

- Intelligent Query Processing(2017/2019)
  - Memory Grant Feedback
  - Lightweight Query Profiling – On by default in SQL Server 2019, but not in SQL Server 2017
  - Last Execution plan DMF - sys.dm\_exec\_query\_plan\_stats – New in SQL Server 2019
    - Lightweight Query Profiling Must be On
    - The DMF can be enabled globally using Trace flag 2451
    - The DMF can be turned on at the database level using:  
ALTER DATABASE SCOPED CONFIGURATION SET LAST\_QUERY\_PLAN\_STATS = ON;



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## Performance Category

### Query Store(2016)

- <https://bit.ly/2JGUC5J> (Lee Markum - Overview of Query Store)
- <https://bit.ly/3Ao8LKF> (Erin Stellato on Query Store - St. Charles SQL Server Meetup channel on YouTube)
- Stores query runtime performance from the perspective of CPU, Duration, logical reads and other metrics
- Wait Stats information is available in SQL 2017 and above
- Custom Capture Policies in 2019 to allow better control over what is captured so Query Store performs better.
- Is enabled at the database level
- Stores query plan information
- Allows you to detect regression and force “good query plans”
- Various reports show performance graphically

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## Troubleshooting

- Verbose Truncation Warnings(2019)
- The dreaded “string or binary data would be truncated” error
- A better error message – “String or binary data would be truncated in table ‘%.\*ls’, column ‘%.\*ls.’
- Truncated value ‘%.\*ls’
- Can be turned on in SQL Server 2017 using trace flag 460.
- Available in compatibility level 150 (SQL Server 2019) by default

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## Troubleshooting

- Temporal Tables/System-Versioned Tables (2016)
  - Can help you answer, what happened to the data and when
  - Composed of a “normal” table and a history table
  - Special time range start and time range end columns exist in the history table.
  - A temporal table must have a Primary Key
  - Can be a replacement for triggers as a means of tracking changes to tables.
  - Temporal Tables do not track WHO made the modification. But see Aaron Bertrand’s solution for that here on MSSQLTips: <https://bit.ly/3672sNH>

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## Permission Enhancements(SQL 2014)

- Granting Users Read/SELECT Permissions Is Now easier
- CONNECT ANY DATABASE – Grants a login access to all current and future databases. Can be combined with other permissions to provide further capabilities
- SELECT ALL USER SECURABLES – Grants SELECT permissions to all objects to which a login has access.

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## Various T-SQL Enhancements

- DROP IF EXISTS(SQL Server 2016SP1) – Works for tables, table constraints, table columns, procedures, and triggers
- CREATE OR ALTER syntax for views, procedures, functions and triggers(2016SP1)
- JSON format support (FOR JSON, OPENJSON, ISJSON, JSON\_VALUE, JSON\_QUERY) (SQL Server 2016)
- ALTER TABLE can now alter many columns while the table remains online, using WITH (ONLINE = ON | OFF).
- Inline specification of CLUSTERED and NONCLUSTERED indexes is now allowed for disk-based tables. (2014)
- New string functions are CONCAT\_WS, TRANSLATE, and TRIM, and WITHIN GROUP is now supported for the STRING\_AGG function.(2017)

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Where can you find this type of information for yourself?

- <https://docs.microsoft.com/en-us/sql/sql-server/what-s-new-in-sql-server-2016?view=sql-server-ver15> (covers 2016-2019)
- <https://docs.microsoft.com/en-us/previous-versions/sql/> (You guessed it, everything prior to SQL 2016)
- Various MSSQLTIPS articles: <https://www.mssqltips.com/sqlservertip/5376/tsql-enhancements-in-sql-server-2017/>
- <https://blog.pythian.com/top-10-new-features-of-sql-server-2019/>
- <https://docs.microsoft.com/en-us/sql/machine-learning/sql-server-machine-learning-services?view=sql-server-ver15>
- <https://bit.ly/3dBKtmL> (MS Docs -covers setting up a Listener and a multi-subnet scenario)
- <https://bit.ly/2SLX4wt> (MSSQLTips article on multi-subnet AGs)
- <https://bit.ly/2TymrIj> (SQLShack article on Distributed AGs)

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## Honorable Mentions

- In-Memory OLTP(SQL 2014) – This can produce significant improvements for some workloads.
- Python/R Integration(Machine Learning Services SQL 2014 and Up)  
Machine learning is used for, among other things, predictive analysis. It can sift through data and find trends and extrapolate based on the data in the sample data model.
- Backup encryption (2014)
- Always Encrypted (2016)
- Dynamic Data Masking(2016)
- Row Level Security(2016)
- ColumnStore Indexes (2012, but many enhancements since)

# Modern SQL Server Features That Make Life Better

## Summary

- Discussed features in the following categories:
  - High Availability/Disaster Recovery
    - Availability Groups, Accelerated Disaster Recovery
  - Performance
    - Intelligent Query Processing, Query Store
  - Troubleshooting
    - Verbose truncation warnings, temporal tables
  - Permissions
    - CONNECT ANY DATABASE, SELECT ALL SECURABLES
  - T-SQL
    - DROP IF EXISTS, CREATE OR ALTER syntax, Inline specification of CLUSTERED and NONCLUSTERED indexes