SQL SERVER ALWAYS ON AVAILABILITY GROUPS

#ALWAYSUP #READSCALEBALANCING #CLUSTERLESS #WINDOWSLINUX





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AGENDA

- INTRODUCING HIGH AVAILABILITY + DISASTER RECOVERY CONCEPTS
- WHAT IS ALWAYS ON AVAILABILITY GROUP FEATURE

  + ENHACEMENTS AMONG DIFFERENT VERSIONS (2012-2014-2016)
- INTERNALS
- MANAGEMENT STUDIO DASHBOARD AND LATENCY REPORT
- NEW IN SQL 2017
- RECOMMENDATIONS

INTRODUCTION HIGH AVAILABILITY+ DISASTER RECOVERY CONCEPTS

- **HIGH AVAILABILITY:**

IS ABOUT PUTTING A SET OF TECHNOLOGIES INTO PLACE BEFORE A FAILURE OCCURS,

IN ORDER TO PREVENT THE FAILURE FROM AFFECTING THE AVAILABILITY OF DATA AND THE SYSTEM ITSELF

- **DISASTER RECOVERY**

IS ABOUT TAKING ACTION *AFTER* A FAILURE OCCURS,

IN ORDER TO RECOVER ANY LOST DATA AND TO MAKE THE DATA AVAILABLE AGAIN

- **RECOVERY TIME OBJECTIVE :**

A.K.A RTO, IS THE MAXIMUM ALLOWABLE DOWNTIME IF A FAILURE OCCURS

- **RECOVERY POINT OBJECTIVE:**

A.K.A RPO, IS THE MAXIMUM ALLOWABLE DATA-LOSS IF A FAILURE OCCURS

Level of Availability	Percent of Uptime	Downtime per Year	Downtime per Day
1 Nine	90%	36.5 days	2.4 hrs.
2 Nines	99%	3.65 days	14 min.
3 Nines	99.9%	8.76 hrs.	86 sec.
4 Nines	99.99%	52.6 min.	8.6 sec.
5 Nines	99.999%	5.25 min.	.86 sec.

WHAT IS ALWAYS ON AVAILABILITY GROUP FEATURE + ENHACEMENTS AMONG DIFFERENT VERSIONS

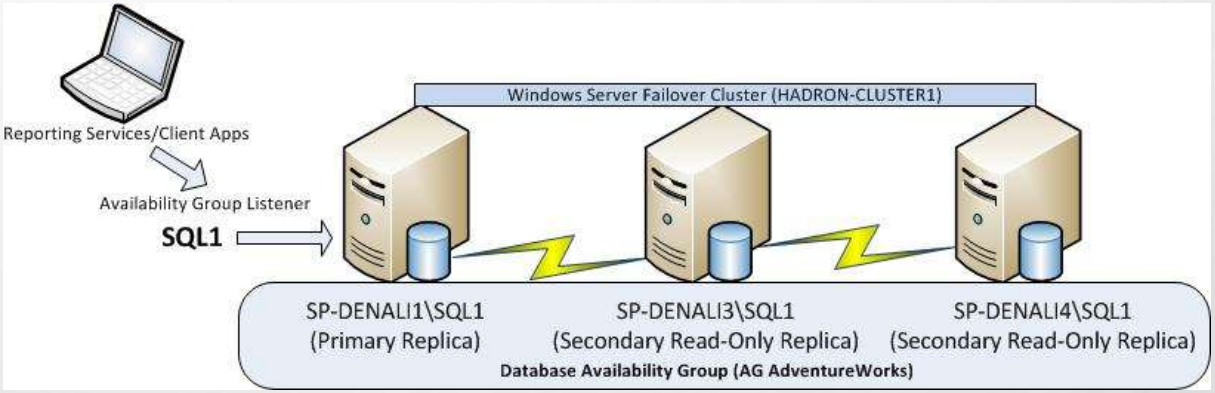
THE ALWAYS ON AVAILABILITY GROUPS FEATURE IS A HIGH-AVAILABILITY AND DISASTER-RECOVERY SOLUTION THAT PROVIDES AN ENTERPRISE-LEVEL ALTERNATIVE TO DATABASE MIRRORING.

INTRODUCED IN SQL SERVER 2012, ALWAYS ON AVAILABILITY GROUPS MAXIMIZES THE AVAILABILITY OF A SET OF USER DATABASES FOR AN ENTERPRISE.

AN *AVAILABILITY GROUP* SUPPORTS A FAILOVER ENVIRONMENT FOR A DISCRETE SET OF USER DATABASES, KNOWN AS *AVAILABILITY DATABASES*, THAT FAIL OVER TOGETHER.

WHAT IS ALWAYS ON AVAILABILITY GROUP FEATURE + ENHACEMENTS AMONG DIFFERENT VERSIONS

- ALWAYSON CONCEPTS



Windows Server Failover Cluster

AVAILABILITY GROUP

Availability Replica's

Availability Databases

Data Transfer Mode Synchronous ASynchronous

Failover Mode Automatic Manual

Availability Group Listener

WHAT IS ALWAYS ON AVAILABILITY GROUP FEATURE + ENHACEMENTS AMONG DIFFERENT VERSIONS

SQL SERVER 2012:

-5 Replica's (1 Primary, 4 Secondary)
-2 Synchronous partners
-2 Failover Targets
-Readable secondaries
-Availability Group Listener

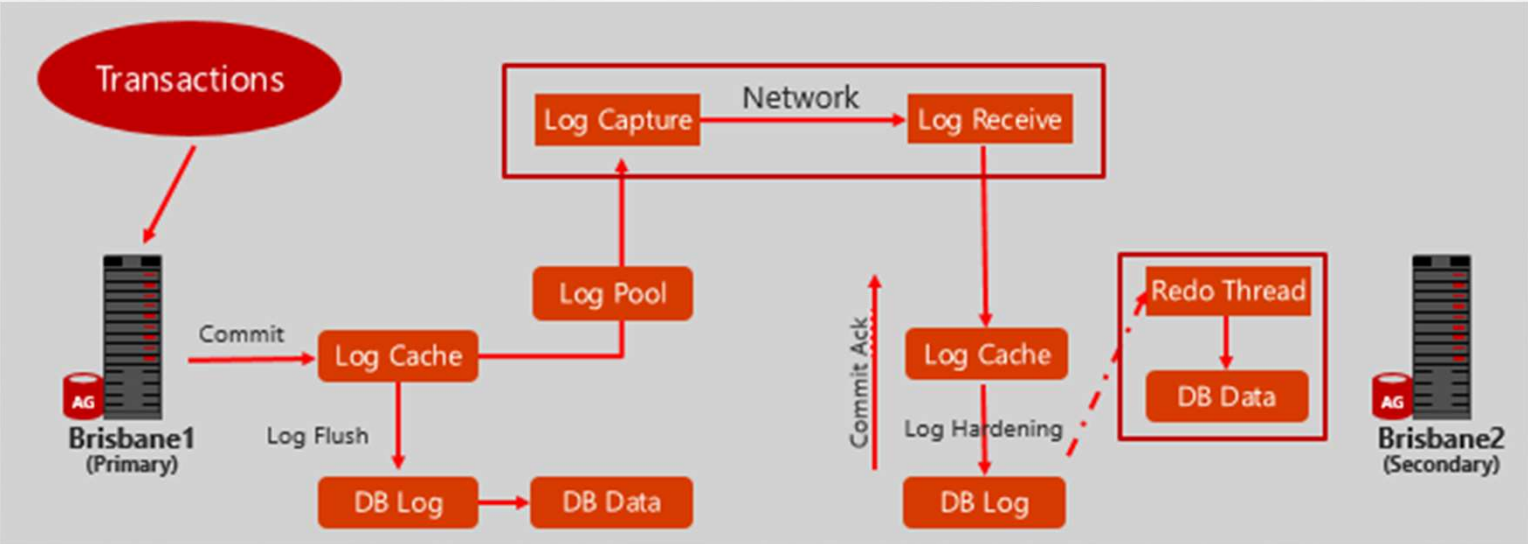
SQL SERVER 2014:

-9 Replica's (1 Primary, 8 Secondary)
-3 Synchronous partners
-Azure Integration

SQL SERVER 2016:

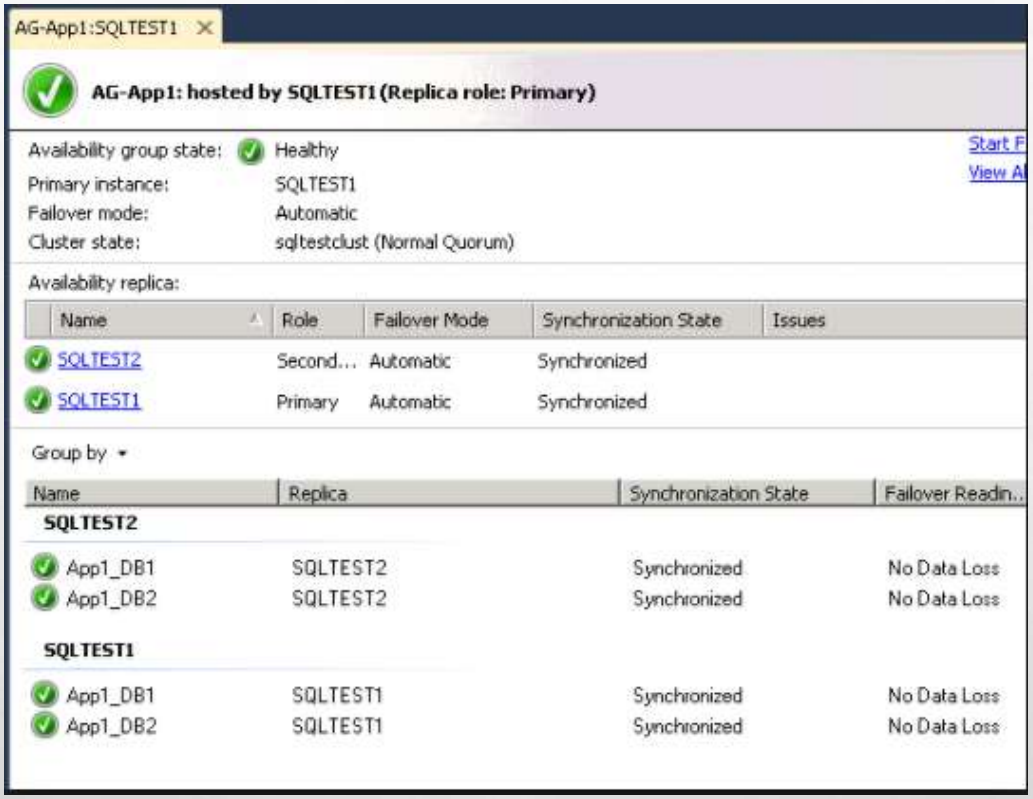
-Cross Domain / No Domain Support
-Database Level Failover
-Direct Seeding
-Distributed AGs
-DTC Support -> Doesn't support transactions on two databases on the same instance
-Enhanced Azure Support
-gMSA Support
-Improved Uptime operations
-Increased Failover Targets -> 3 nodes for automatic failover
-Performance Improvements -> Parallel redo threads
-Round Robin Readable Secondaries
-SSISDB Support
-Standard Edition Support
-Improved TDE Support

INTERNALS


Transactions
Log Capture
Network
Log Receive
Log Pool
Commit
Log Cache
Log Flush
DB Log
DB Data
Brisbane1
(Primary)
AG
Commit Ack
Log Cache
Log Hardening
DB Log
Redo Thread
DB Data
AG
Brisbane2
(Secondary)

MANAGEMENT STUDIO DASHBOARD AND LATENCY REPORT

Dashboard



MANAGEMENT STUDIO DASHBOARD AND LATENCY REPORT

Latency Report (Since Mgmt studio 17.4)

https://blogs.msdn.microsoft.com/sql_server_team/new-in-ssms-always-on-availability-group-latency-reports/



Always On Replica Roles (at data collection time)

Availability Group Name	Availability Replica Name	Role
LatencyDemo	SQLNode1	SECONDARY

Secondary Replica Statistics (microseconds)

Local Flush	Decompression	Receive	Send
2050	1	29	139

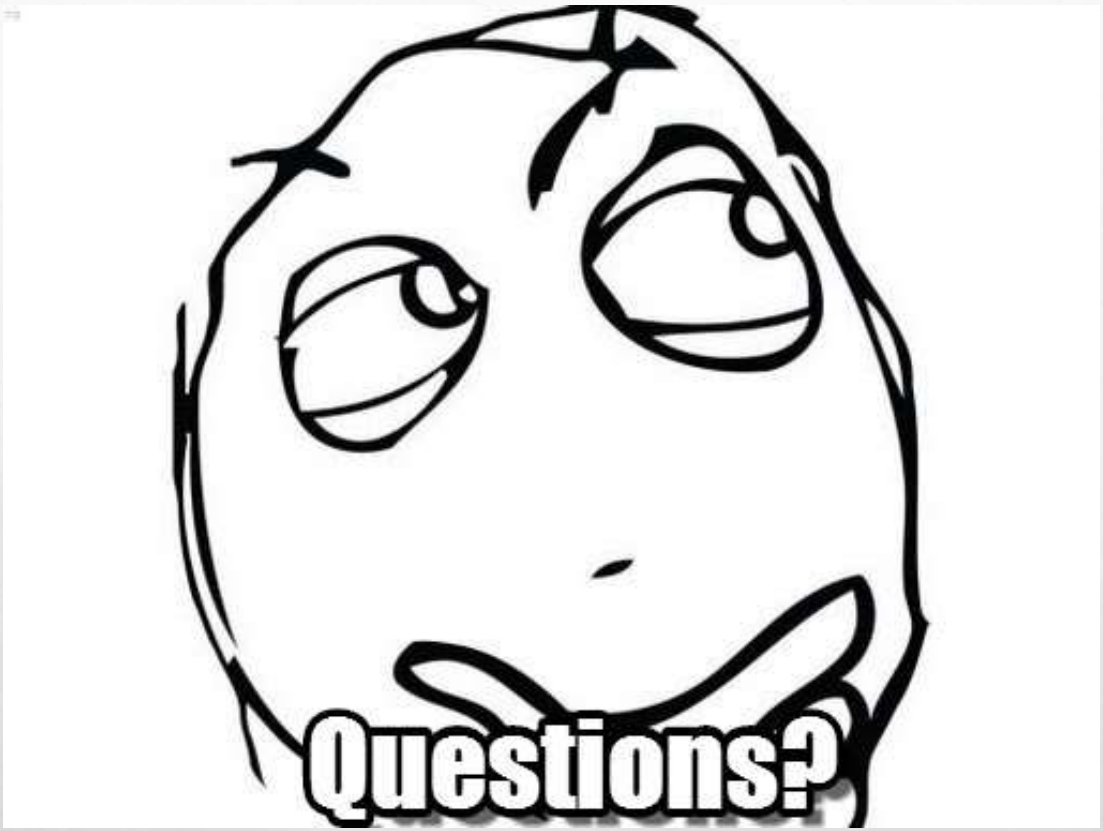
NEW IN SQL 2017

SQL SERVER 2017

- Availability Groups can now be set up without an underlying cluster (WSFC) across mixed environments (instances on Windows and Linux/Docker).
- There is a new Minimum Replica Commit setting – this means you can dictate that a certain number of secondary replicas must commit a transaction before committing on the primary.

RECOMMENDATIONS:

- ✓ Multi subnet listeners -> Replication, integration services packages and Apps using OLE DB (msft is building a new driver version)) Driver can be impacted!
- ✓ Databases from Simple to full recovery model -> becarefoul on the transaction log database size.. Rebuild can impact!
- ✓ Performance -> If you are planning to use automatic failover and synchronouse commit TEST PERFORMANCE!
- ✓ Threads -> If you are out of threads that can impact the always on as well (Threads exhaustion)!
- ✓ Check cluster network parameters -> HERE
- ✓ Issue with SQL Server 2016 migration -> HERE
- ✓ Support me! -> HERE
- ✓ Check bites per sector storage configuration -> HERE
- ✓ Iops + Throughput in cloud!! This Will depend on the number of Iops and instance type throughput as well


Questions?


THANK YOU!