Monitoring and Alerting of AlwaysOn Availability Groups

To keep you in the know

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About Me

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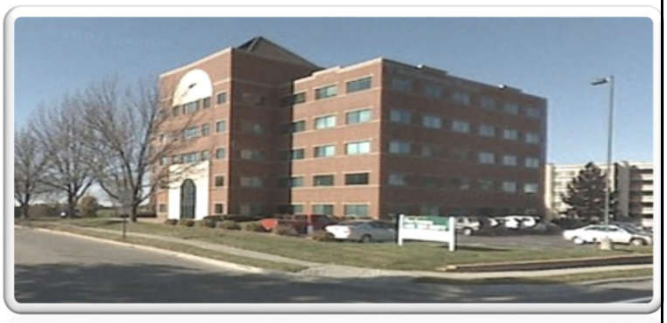
- SQL Server Principal Architect, practice lead
- Experience in VMware, Microsoft, SQL Server, storage infrastructure, performance tuning.
- Been working with SQL sever since 6.5 in 1996.

About HoB

- Founded in 1998
- Partner-Focused Strategy
- House of Brick's Key Services include:
  - **Virtualization and Cloud Computing — VBCA**
  - **Replatforming and Data Migration**
  - **Managed Services**
  - **License Optimization (Oracle and SQL Server)**



Introduction

- Volunteer
- Ask questions
- Assuming you already have Availability Groups running
- Naming standards for AlwaysOn

Agenda – What is covered

- Define monitoring and alerting
- Availability Group dashboard
- SQL Server Alerts for AGs
- Extended Events monitoring
- Policies for monitoring
- Scripts to monitor

What is not covered

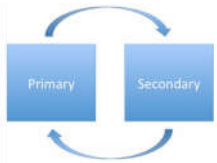
- How to build Availability Groups
- Troubleshooting errors in Availability Groups
- Failover Cluster Instances
- Please talk to me after the session or email me and I will do my best to answer these types of questions.

Availability Groups

- Introduced in SQL 2012
- Enterprise only feature***(Basic AGs in Standard Edition)
- 1 Primary and 4 secondary replicas (5 nodes), with 3 synchronous for SQL Server 2012
- 1 Primary and 8 secondary replicas (9 nodes), with 3 synchronous for SQL Server 2014 and SQL Server 2016
- Non domain Availability Groups are only available with Windows Server 2016

Availability Groups Failover

- Automatic and manual
  - For automatic to work must in synchronous mode
  - Synchronous requires fast, low latency network connection
  - Synchronous with fast, low latency can add latency to application
- Without data loss and with potential for data loss
  - When synchronous failover can occur without losing data
  - In asynchronous mode failover can lose data
    - You must accept a dialogue box stating I understand the risks

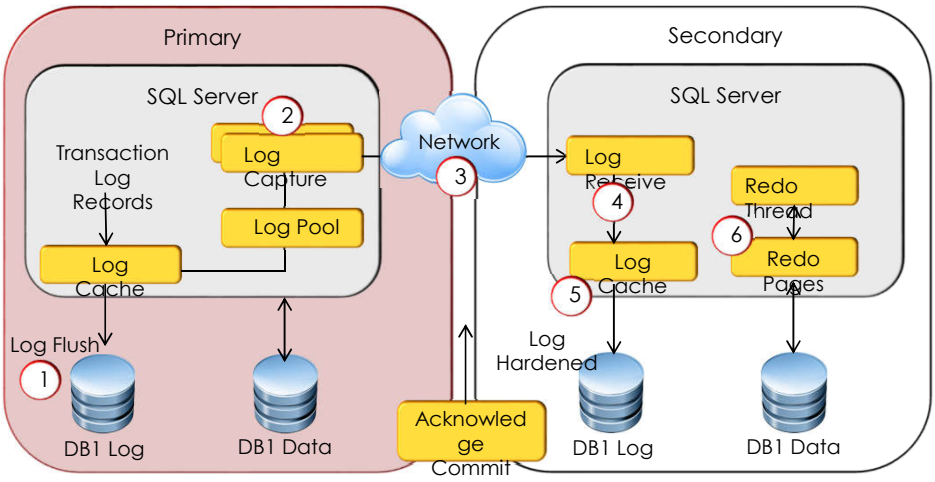


Monitoring and Alerting

- Monitoring – is the continuous tracking of a defined metric
- Alerting – Is the notification to someone who can take action when a metric passes a threshold
  - Critical alerts
  - Warning alerts
- Blog post which explains this in good detail http://houseofbrick.com/alerting-versus-monitoring/

Definitions

- Service Level Agreement – The business rules guiding level of uptime, acceptable amount of data loss and recovery time
- RPO – Recovery point objective; to what point in time do we want to be able to recover to
- RTO – Recovery time objective; in what time do we want to be able to recover
- RPO and RTO tend to impact each other, as you shorten one the other may grow larger
- The SLA should define the RPO and RTO



Monitoring AGs

- Availability Group dashboard
- Perfmon
- SQL server alerts
- SQL Server policies
- Extended Events

Availability Group Dashboard

- Shows all nodes and databases
- Refreshes every 30 seconds by default
- Can sort and filter items in multiple ways
- Links to other nodes
- Can start a failover from this window
- Customizable to what you care about most

Basic Failover

DEMO

Perfmon Counters for AGs

- Every SQL Server should have a Perfmon Counter running at all times
- These are just the additional perfmon counters to add when running AGs
- SQLServer:Database Replica – These are by database, there are more which I sometime add depending upon situation
  - Transaction Delay
  - Mirrored Write Transactions/sec
- SQLServer:AvailabilityReplica
  - Bytes Sent to Replica/sec
  - Sends to Replica/sec
  - Receives from Replica/sec
  - Flow Control Time (ms/sec)
  - Flow Control Time
  - Resent message/sec

Extended Events for AGs

- When you enable AlwaysOn Availability Groups a new Extended Event session is created
  - It is called AlwaysOn_health
- Shows same data as the View Health Events from the dashboard
- Great blog post from Jonathan Kehayias on the subject
  - https://www.sqlskills.com/blogs/jonathan/new-alwayson_health-extended-events-session-in-sql-server-2012-rc0/

Extended Event

DEMO

Alerting

- When a failover occurs
- Replication stops
- Replication restarts
- When not meeting SLA
  - For RTO
  - Or RPO
- Using SQL Server Alerts and Policies

SQL Server Alerts

- Many SQL Server alerts
- Ones I care the most about
  - 1480 : AG Role Change
  - 35264 : AG Data Movement Suspended
  - 35265 : AG AG Data Movement Resumed
- There are 17 logged and 276 not logged event types
- 228 are severity 16 or higher

```
SELECT *
FROM sys.messages
WHERE text LIKE ('%Availability%')
AND language_id = 1033;
```

Recover Time Objective

- This is only an estimate
- Recovery Time = Detection Time + Redo Time + Failover Time
- Detection time varies by nature of failure
  - SQL Server crash usually detected quicker
  - Node timeout may take full time
  - Multiple cluster settings which control this
- Redo time is the data which has been sent but not applied
  - Redo Queue\Redo Rate
  - RTO will count for the longest redo time for all databases in the group
- Actual time it takes to Failover – network redirect, etc

Recovery Point Objective

- This is amount of data loss
- Log send queue / log generation rate
- Log generation rate changes rapidly, this metric will bounce around
- A quicker method is last commit time, but only tells you how much time, not how much data

Alert RPO and RTO

- Use Policies and Alerts
- Policy will create a system event, alert will pick up system event and notify
- Be careful about policies, you will have some delays when you perform maintenance or large ETL
- How to setup the polices
- https://msdn.microsoft.com/en-us/library/dn135338(v=sql.110).aspx

Script

- Redo_queue and Send_queue are objects you can query
- This is a snapshot and can used for simple monitoring
- Policies include logic to generation rate based on values over time

```
select log_send_queue_size, log_send_rate, redo_queue_size, redo_rate
from [master].[sys].[dm_hadr_database_replica_states]
```

DEMO

- Grow database script is from SQL Skills
- https://www.sqlskills.com/blogs/jonathan/enlarging-the-adventureworks-sample-databases/

Wait Stats

- Any wait stat which starts with HADR is related to some sort of High Availability or Disaster Recovery technology
- There are many HADR waits, over 50
- I haven't seen enough of a trend to know which ones are the problems

Questions

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