

Monitoring and Alerting of AlwaysOn Availability Groups

To keep you in the know

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About Me



Shawn Meyers

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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



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
- 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 be 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
- ▣ Wait stats



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



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/



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](https://msdn.microsoft.com/en-us/library/dn135338(v=sql.110).aspx)



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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