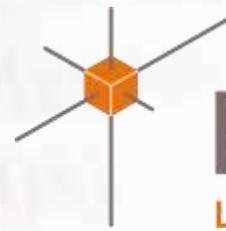


weise (klug); Weise, Weisheit
-n, -n; ↑ R 5 ff. (kluger Mensch)
weisen (↑ R 10)



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Lernen von den Besten.

SQL Server 2012 Always on

Spieglein, Spieglein an der Wand, wer
ist der schönes Cluster im Land?

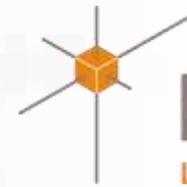
weise (klug); Weise, Weisheit
-n, -n; ↑ R 5 ff. (kluger Mensch)
weisen (↑ R 10 ff.)



Holger Voges

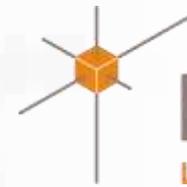
CCA, MCSE, MCDBA, MCT, MCITP DB Administrator /
DB Developer, MCTIP Enterprise Administrator,
MCSA Windows Server 2012

Netz-Weise
Freundallee 13a
30173 Hannover
www.netz-weise.de



Agenda

- SQL-Server HA – Die guten alten Zeiten
 - Transaction-Log Shipping
 - Cluster-Server im Überblick
 - Datenbank-Spiegelung im Überblick
- HA Heute – Always On



Transaction Log Shipping

- Transaktionsprotokolle werden per Backup/Restore übertragen
- Import über SQL-Server Job
- Je nach Backupintervall entstehen Lücken im Restore
- Fehleranfällig

weise (klug); 'Weise, der
-n, -n; ↑ R 5 ff. (kluger Mensch)
weisen (↑ R 10 ff.)



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\\SQL1\TPLog



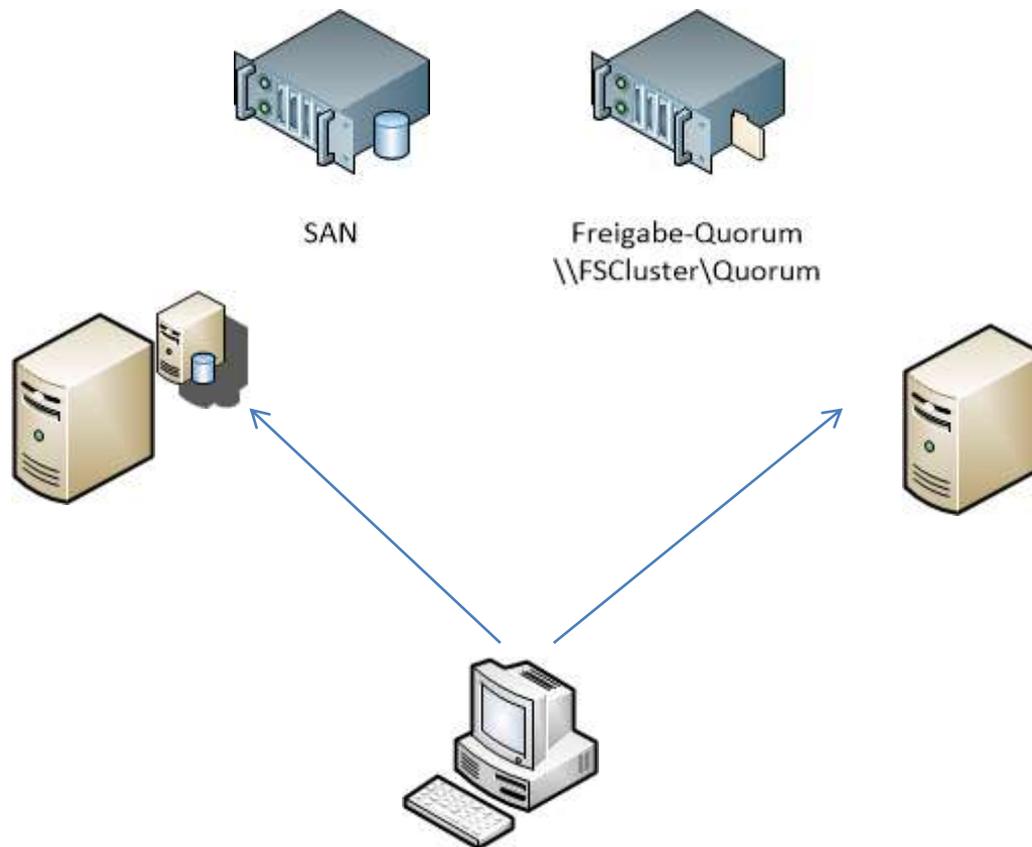
C:\Import

wei|se (klug); 'Weise, ...
-n, -n; ↑ R 5 ff. (kluger Mensch)
weisen (↑ R 10 ff.)



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Microsoft Failover Cluster



weise (klug); Weise, Weisheit
-n, -n; ↑ R 5 ff. (kluger Mensch)
weisen (↑ R 10 ff.)



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Quorum – einfache Mehrheit genügt

- Quorum = Mehrheit
- Quorum wird benötigt, um Split Brain zu vermeiden
- Mögliche Quorum-typen:
 - Node-Majority
 - Node and File-Share Majority
 - Node and Disk Majority
 - Disk Only

weise (klug); Weise, Weisheit
-n, -n; ↑ R 5 ff. (kluger Mensch)
weisen (↑ R 10 ff.)

Datenbankspiegelung

- Daten werden online gespiegelt
- Synchroner Spiegelung -> kein Datenverlust, nur niedrige Latenzen
- Asynchroner Spiegelung -> minimaler Datenverlust, hohe Latenz möglich
- Prinzipal online, Mirror offline

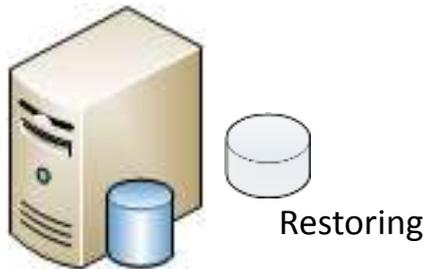
wei|se (klug); 'Weise, der
-n, -n; ↑ R 5 ff. (kluger Mensch)
weisen (↑ R 10 ff.)



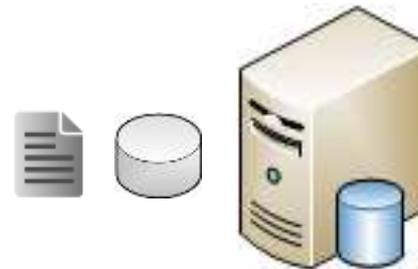
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Datenbank-Spiegelung

Mirror



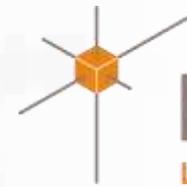
Prinzipal



Always on – Best of

- Mischung aus Failover-Cluster und Spiegelung
- Failover-Cluster für Zugriffspunkt und Failover
- Spiegelung zum Synchronisieren der Daten
- Kein Shared Storage notwendig!
- Bis zu 4 Replikas möglich
- Lesende Replikas möglich

weise (klug); Weise, Weisheit
-n, -n; ↑ R 5 ff. (kluger Mensch)
weisen (↑ R 10 ff.)

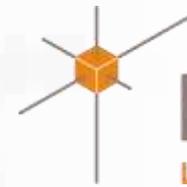


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Always on – Worst of

- Enterprise Edition notwendig
- Failover-Cluster notwendig

weise (klug); Weise, Weisheit
-n, -n; ↑ R 5 ff. (kluger Mensch)
weisen (↑ R 10 ff.)



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Availability Groups + Replika

- Gruppen von Datenbanken, die gemeinsam verschoben werden (wie Cluster-Gruppen)
- Jede Availability Group verfügt über 1 Listener
- Die einzelnen Mitglieder halten Replika

weise (klug); Weisheit, Weisheit
-n, -n; ↑ R 5 ff. (kluger Mensch)
weisen (↑ R 10 ff.)

Replikas und Rollen

- Replika können lesend genutzt werden!
- Replika können asynchron und synchron sein
- Es können bis zu 5 Replika eingerichtet werden – 1 Primäre und bis 4 Sekundäre
- Maximal 4 Read-only-Replikas
- Maximal 2 Synchronre Replikas

wei|se (klug); 'Weise,
-n, -n; ↑ R 5 ff. (kluger Mensch)
Weisen (↑ R 10 ff.)



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New Availability Group

Specify Availability Group Name

Specify an availability group name.

Availability group name:

Navigation: Introduction, **Specify Name**, Select Databases, Specify Replicas, Select Data Synchronization, Validation, Summary, Results

New Availability Group

Select Databases

Select user databases for the availability group.

User databases on this instance of SQL Server:

Name	Size	Status
AdventureWorks2012		2,420 KB (inused)
msdb	0.1 MB	100 KB (attached)

Navigation: Introduction, **Select Databases**, Specify Name, Specify Replicas, Select Data Synchronization, Validation, Summary, Results

New Availability Group

Specify Replicas

Specify an instance of SQL Server to host a secondary replica.

Replica: Endpoints | Backup Preferences | Listener

Availability Replicas:

Server Instance	Initial Role	Automatic Failover (Up to 2)	Synchronous Commit (Up to 3)	Readable Secondary
SQL1	Primary	<input type="checkbox"/>	<input type="checkbox"/>	No
SQL2	Secondary	<input type="checkbox"/>	<input type="checkbox"/>	Yes

Buttons: Add Replica..., Remove Replica

Summary for the replica hosted by SQL2

Replica mode: Asynchronous commit
This replica will use asynchronous-commit availability mode and support only forced follower (with possible data loss).

Readable secondary: Yes
In the secondary role, this availability replica will allow all connections for read access, including connections running with older clients.

Navigation: Introduction, Specify Name, Select Databases, **Specify Replicas**, Select Data Synchronization, Validation, Summary, Results

Buttons: < Previous, Next >, Cancel

weise (klug); Weise, Weisheit
 -n, -n; ↑ R 5 ff. (kluger Mensch)
 Weisen (↑ R 10 ff.)



New Availability Group

Specify Replicas

Specify an instance of SQL Server to host a secondary replica.

Replicas | Endpoints | Backup Preferences | Listener

Endpoint values:

Server Name	Endpoint URL	Port Number	Endpoint Name	Encrypt Data	SQL Server Service Account
SQL1	TCP://SQL1.NW.local:5022	5022	Host_endpoint	Y	NW\SQL1
SQL2	TCP://SQL2.NW.local:5022	5022	Host_endpoint	Y	NW\SQL2

Specify an instance of SQL Server to host a secondary replica.

Replicas | Endpoints | Backup Preferences | Listener

Where should backups occur?

Prefer Secondary
 Automated backups for this availability group should occur on a secondary replica, if there is no secondary replica performed on the primary replica.

Secondary only
 All automated backups for this availability group must occur on a secondary replica.

Primary
 All automated backups for this availability group must occur on the current primary replica.

Any Replica
 Backups can occur on any replica in the availability group.

Replica backup priorities:

Server Instance	Backup Priority (Lowest=1, Highest=100)	Exclude Replica
SQL1	50	<input type="checkbox"/>
SQL2	50	<input type="checkbox"/>

< Previous | Next > | Cancel

Specify an instance of SQL Server to host a secondary replica.

Replicas | Endpoints | Backup Preferences | Listener

Specify your preference for an availability group listener that will provide a client connection point:

Do not create an availability group listener now
 You can create the listener later using the Add Availability Group Listener dialog.

Create an availability group listener
 Specify your listener preferences for this availability group.

Listener DNS Name:

Port:

Network Mode:

Subnet	IP Address
192.168.2.0/24	192.168.2.208

Add... Remove

< Previous | Next > | Cancel

weise (klug); Weise, Weisheit
 -n, -n; ↑ R 5 ff. (kluger Mensch)
 Weisen (↑ R 10 ff.)



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Results of availability group validation.

Name
✓ Checking whether the endpoint is encrypted using a compatible algorithm
✓ Checking shared network location
✓ Checking for free disk space on the server instance that hosts secondary replica SQL2
✓ Checking if the selected databases already exist on the server instance that hosts secondary replica SQL2
✓ Checking for compatibility of the database file locations on the server instance that hosts secondary replica SQL2
✓ Checking for the existence of the database files on the server instance that hosts secondary replica SQL2
✓ Checking the listener configuration
✓ Checking replica availability mode

```
SQLQuery1.sql - SQ...administrator (SR) x ADVAG:SQL1
--- YOU MUST EXECUTE THE FOLLOWING SCRIPT IN SQLCMD MODE.
[+]_Connect SQL1
IF (SELECT state FROM sys.endpoints WHERE name = N'Hadr_endpoint') <> 0
[BEGIN
ALTER ENDPOINT [Hadr_endpoint] STATE = STARTED
END
GO

[+]use [master]
GO

[+]GRANT CONNECT ON ENDPOINT::[Hadr_endpoint] TO [NW\SQL2]
GO

[+]_Connect SQL2
IF (SELECT state FROM sys.endpoints WHERE name = N'Hadr_endpoint') <> 0
[BEGIN
ALTER ENDPOINT [Hadr_endpoint] STATE = STARTED
END
GO

[+]use [master]
GO

[+]GRANT CONNECT ON ENDPOINT::[Hadr_endpoint] TO [NW\SQL1]
GO

[+]_Connect SQL1
IF EXISTS(SELECT * FROM sys.server_event_sessions WHERE name='AlwaysOn_health')
[BEGIN
```

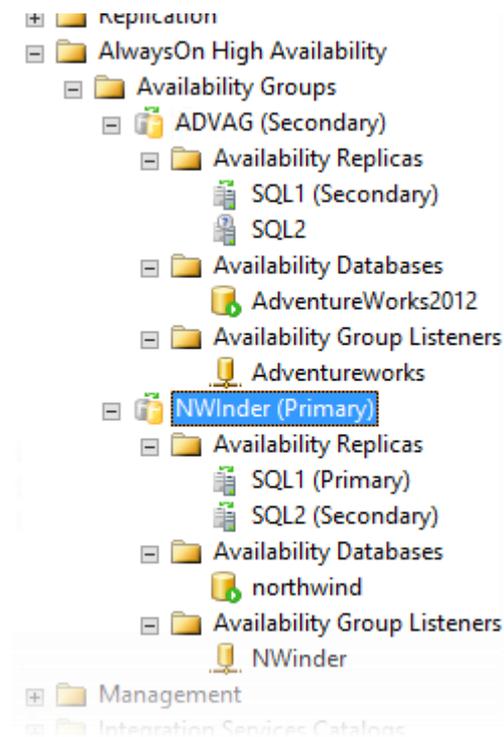
wei|se (klug); 'Weise,
-n, -n; ↑ R 5 ff. (kluger Me
weisen (↑ R 10)



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Availability Groups verwalten

- Verwaltung im Management Studio
- Jede AG wird einzeln verwaltet



weise (klug); Weise, ...
-n, -n; ↑ R 5 ff. (kluger Mensch)
Weisen (↑ R 10 ff.)



Netz-Weise
Lernen von den Besten.

Always on Dashboard

ADVAG:SQL1 - Microsoft SQL Server Management Studio (Administrator)

Object Explorer: SQL1 (SQL Server 11.0.3000 - NW\administrator)

ADVAG:SQL1

ADVAG: hosted by SQL1 (Replica role: Primary) Last updated: 11.12.2012 09:29:01
Auto refresh: on

Availability group state: ✔ Healthy
Primary instance: SQL1
Failover mode: Manual
Cluster state: SQLCluster (Normal Quorum)

Availability replicas:

Name	Role	Failover Mode	Synchronization State	Issues
✔ SQL1	Primary	Manual	Synchronized	
✔ SQL2	Seco...	Automatic	Synchronized	

Group by:

Name	Replica	Synchronization State	Failover Readi...	Issue
SQL1				
✔ AdventureWorks2012	SQL1	Synchronized	No Data Loss	
SQL2				
✔ AdventureWorks2012	SQL2	Synchronized	No Data Loss	

Ready

DEU 09:29 11.12.2012

Application Intent Routing

- Mit einem aktuellen .net / native Client kann das Ziel der Nutzung angegeben werden
- ApplicationIntent=ReadOnly/ReadWrite
- Anhand der Applicationintent wird eine Replika ausgewählt

Availability Replicas

Server Instance	Role	Availability Mode	Failover Mode	Connections in Primary Role	Readable Secondary	Session Timeout (seconds)	Endpoint
SQL1	Primary	Synchron...	Manual	Allow read/write connections	Yes	10	TCP://S
SQL2	Secon...	Synchron...	Autom...	Allow all connections	Read-intent or	10	TCP://S

Read-intent or dropdown menu options: No, Read-intent only, Yes

Always On Troubleshooting

- Sp_server_diagnostics
- Sys.dm_hadr_availability_replica_states (Replica health)
- Sys.dm_hadr_availability_replica_cluster_states
- Sys.dm_hadr_availability_replica_cluster_states
- Sys.dm_hadr_availability_group_states

AlwaysOn Availability Groups Dynamic Management Views and Functions (Transact-SQL)

SQL Server 2012 | 1 out of 1 rated this helpful - Rate this topic

This section contains the dynamic management views and functions that are related to AlwaysOn Availability Groups.

▲ In This Section

sys.dm_hadr_auto_page_repair	sys.dm_hadr_cluster_networks
sys.dm_hadr_availability_group_states	sys.dm_hadr_database_replica_cluster_states
sys.dm_hadr_availability_replica_cluster_nodes	sys.dm_hadr_database_replica_states
sys.dm_hadr_availability_replica_cluster_states	sys.dm_hadr_instance_node_map
sys.dm_hadr_availability_replica_states	sys.dm_hadr_name_id_map
sys.dm_hadr_cluster	sys.dm_hadr_listener_states
sys.dm_hadr_cluster_members	

Interessante neue Features

- Jede Menge interessante neue DMVs
<http://www.sqlservercentral.com/blogs/basits-sql-server-tips/2012/07/03/useful-new-dmvs-in-sql-server-2008-r2-sp1-and-sql-server-2012/>
- Datenbanken auf SMB-Shares
- Backup-Komprimierung auch in Standard-Edition
- Server-Event-Logging in SQL 2012 ab Standard
- SQL-Server 2012-Installation mit Sysprep(!)
- Setup-Parameter zum Überprüfen der Installation
- Mgmt-Studio Express vollwertiges MGMT-Studio! (SP1)
- Sys.dm_db_stats_properties (SP1) liefert Statistik-Infos
- Slipstream-Paket (SP1)
- Server-Core-Installation

weise (klug); Weisheit, Weisheit
-n, -n; ↑ R 5 ff. (kluger Mensch)
weisen (↑ R 10 ff.)

Quellen

- Steffen Krause – Videoreihe zur Always On Installation auf YouTube
<http://blogs.technet.com/b/sqlteamgermany/archive/2012/01/02/videoserie-alwayson-in-sql-server-2012.aspx>
- Whitepaper „Microsoft SQL Server AlwaysOn Solutions Guide for High Availability and Disaster Recovery“
<http://download.microsoft.com/download/D/2/0/D20E1C5F-72EA-4505-9F26-FEF9550EFD44/Microsoft%20SQL%20Server%20AlwaysOn%20Solutions%20Guide%20for%20High%20Availability%20and%20Disaster%20Recovery.docx>
- What's new in SQL Server 2012
<http://msdn.microsoft.com/en-us/library/bb500435.aspx>