

# **DBMoto**®

Microsoft SQL Server Always On Configuration Version 9.0.0.10

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# **Document History**

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# Overview

This document gives detailed steps on setting up transactional replications on a Microsoft SQL Server database that is part of an Always On Availability Group. It uses the environment described below as an example.

For a full explanation of Availability Groups and the Always On concept, refer to Microsoft SQL Server documentation, for example <u>Overview of Always On Availability Groups (SQL Server</u>). Here is a brief overview as it relates to setting up Always On Availability Groups with DBMoto.

In a Microsoft SQL Server environment, an *availability group* can provide a failover environment for a set of user databases by supporting a set of primary databases and one to eight sets of secondary databases. Each set of availability database is hosted by an *availability replica*. A single *primary replica* hosts the primary databases, and one to eight *secondary replicas*, which host a set of secondary databases that serve as a potential failover targets for the availability group. The use of Always On Availability Groups requires the establishment of a Windows Server Failover Clustering (WSFC) cluster. Each availability replica within an availability group resides on a different node of the same WSFC cluster.

# Environment

The example used to explain how to set up and use an Always On Availability Group with DBMoto is described below.

The initial Always On SQL Server environment:

VH4-206: Synchronous Replica – Current Primary VH4-207: Synchronous Replica Availability Group: TEST1\_AG AG database: AGTest1 AG Listener: TEST1\_AG\_Listen (192.168.1.81, port 1433) Cluster name: AGTestcluster





The environment set up for replication with DBMoto:

VH4-206: Original Publisher VH4-207: Publisher Replica VH4-205: Distributor

NOTE: Do not set a distributor on any of the publishers in this case as the failover of a distributor is not supported.



# **Configure the Replication Environment**

# 1. Configure a Remote Distributor

To connect to VH4-205 from MS SQL Server Management Studio:



1. Right click on **Replication** and select **Configure Distribution**.



2. Select the first option to set up VH4-205 as distributor:



Configure Distribution Wizard	- 🗆 X
Distributor Use this server as its own Distributor or select another server as the Distrib	utor.
The Distributor is the server responsible for storing replication information used synchronizations.	during
<ul> <li>VH4-205' will act as its own Distributor; SQL Server will create a distribution log</li> </ul>	i database and
<ul> <li>Use the following server as the Distributor (Note: the server you select must configured as a Distributor):</li> </ul>	already be
	Add
Help < Back Next > Finish >>	Cancel

- 3. Click Next.
- 4. The Server Agent should be started automatically.



#### 5. Click Next.



6. Specify the **Snapshot Folder** location:

I Configure Distribution Wizard - 🗖 🗙
Snapshot Folder Specify the root location where snapshots will be stored.
To allow Distribution and Merge Agents that run at Subscribers to access the snapshots of their publications, you must use a network path to refer to the snapshot folder.
Snapshot folder: C:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL\RepIData
This snapshot folder does not support pull subscriptions created at the Subscriber. It is not a network path or it is a drive letter mapped to a network path. To support both push and pull subscriptions, use a network path to refer to this folder.
Help          Rinish >>          Cancel

- 7. Click Next.
- 8. Name the distributor 'DBRS\_distribution' and specify the path for the database file and database log file:



I Configure Distribution Wizard - Configure Distribution Wizard
Distribution Database Select the name and location of the distribution database and log files.
The distribution database stores changes to transactional publications until Subscribers can be updated. It also stores historical information for snapshot and merge publications.
Distribution database name:
DBRS_distribution
Folder for the distribution database file:
C:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL\Data
Folder for the distribution database log file:
C:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL\Data
The paths must refer to disks that are local to the Distributor and begin with a local drive letter and colon (for example, C:). Mapped drive letters and network paths are invalid.
Help < Back Next > Finish >>  Cancel

9. Click **Next** to specify VH4-205, VH4-206 and VH4-207 as publishers.

-ð*			Configure Dist	ribution Wiz	ard	_ □	x	
Р	<b>iblishe</b> Enable se	<b>rs</b> ervers to use t	this Distributor when t	they become Pub	lishers.			
	Publisher	s:						
	Pub	lisher 🔺 4-205		Distribution Data DBRS_distributi	abase on			
						Add SOL Set	nver Publi	cher
	Help		< Back	Next >	Fini	Add Oracle	Publisher	
							-11	



- 10. Click **Add**, then **Add SQL Server Publisher** to connect to each server that will act as publisher. Note that VH4-205 already exists in the list and you can choose to leave it that way.
- 11. Check that your screen looks like the one below after adding the servers.

đ		Configure Dist	ribution Wizard	-		x
Put	<b>olishers</b> Enable servers	to use this Distributor when t	hey become Publishers.			7
F	ublishers:					
	Publisher		Distribution Database			
[	✓ VH4-205		DBRS_distribution			
[	<ul> <li>VH4-206</li> </ul>		DBRS_distribution			
[	VH4-207		DBRS_distribution			
				Add	•	
	Help	< Back	Next > Finish >>		Cancel	

#### 12. Click Next.



13. Enter the password that the publishers will use to connect to the distributor:

🐨 Configure Distribution Wizard 🗕 🗖 🗙
Distributor Password Specify the password remote Publishers will use to connect to the Distributor.
This password is used by a remote Publisher when it automatically connects to the Distributor to perform replication administrative operations.
Password: Confirm password: Tensure the password you enter meets password policy requirements. If the password does not meet the requirements, the wizard will not complete successfully.
Help < Back Next > Finish >> Cancel

**NOTE:** This password is used internally between publishers and distributor. Make a note of it as you will need to use it again when configuring a new publisher.

- 14. Click Next, then select Configure distribution.
- 15. Click Next.
- 16. Click **Finish** to complete the wizard.

Now the distributor is successfully set up.



## 2. Configure Distribution at the Primary Replica

- 1. Connect to the primary replica, VH4-206:
- 2. Right click on **Replication** and select **Configure Distribution**:





3. Select the option to connect to another server as the remote distributor.

🕈 Configure Distribution Wizard 📃 🗖 🗙
Distributor Use this server as its own Distributor or select another server as the Distributor.
The Distributor is the server responsible for storing replication information used during synchronizations.
<ul> <li>"VH4-206" will act as its own Distributor; SQL Server will create a distribution database and log</li> </ul>
<ul> <li>Use the following server as the Distributor (Note: the server you select must already be configured as a Distributor):</li> </ul>
Add
wizard. Click Add if the Distributor is not in the list.
Help         Kext >         Finish >>          Cancel

#### 4. Click **Add** and select VH4-205.





5. Type the same password used earlier to configure the distributor:

đ	Configure Distribution Wizard		x
Admi Spi adr	inistrative Password eofly the password used to connect to the Distributor to perform ministrative functions.		
Sp Di	pecify the password required for "VH4-206" to establish an administrative I istributor, "VH4-205".	link with the	
Pa T	assword:		
Н	lelp < Back Next > Finish >>	Cancel	

- 6. Click Next.
- 7. Select Configure distribution.
- 8. Click Next.
- 9. Click **Finish** to complete the wizard.

Now the remote distributor is successfully set up.

### 3. Configure Distribution for the Secondary Replica

To connect to the secondary replica, VH4-207, repeat the same steps as for the primary replica.

### 4. Set Log Reader Agent PublisherFailoverPartner Property

The SQL Server Log Reader Agent is set up to monitor the transaction log on the primary publisher, VH4-206. In case of failover to VH4-207, the agent job cannot be switched to pick up changes from the secondary (now primary) replica, unless the PublisherFailoverPartner property is set to VH4-207. This is the failover partner instance participating in a database mirroring session with the publication database. On failover, the publisher of the secondary replica will start to replicate to the remote distributor.

1. Connect to the distributor, VH4-205.



2. Select **Replication** and select **Distributor Properties**.

-	Distributor Properties - VH4-205	x
Select a page	🖾 Script 👻 🛐 Help	
<sup></sup> <sup>™</sup> Publishers	Distribution databases Databases:	
	Name A Transaction R History Retention DBRS distribution 0 - 72 hours 48 hours	
Connection		
Server: VH4-205	New Delete	
Connection: sa	To set the security for a Queue Reader Agent, click the properties button () for the distribution database associated with the agent.	
View connection properties	Agent Profiles	
Progress	Set the default profiles to use when replication agents are created. Profile Defaults	
Ready		
	OK Cancel	

- 3. Select **Profile Defaults**.
- 4. Select the Log Reader Agents page from the list.



	Agent Profiles
Select a page C Distribution Agents S Merge Agents C Snapshot Agents S Log Reader Agents Queue Reader Agents	Agent profiles:          D Name       Type         Ø Default agent profile       System         Verbose history agent pr       System
Connection	
Server: VH4-205	
Connection: sa	
View connection properties	New Delete
Progress	
Ready	Change all existing Log Header Agents to use the profile marked as the default profile. Qhange Existing Agents
	OK Cancel

Default agent profile (default for new agents) is selected. To make a copy of this profile and apply a custom setting:



5. Click **New** to open the **New Agent Profile** dialog.

I N	lew Agent Profile	_ <b>D</b> X
Name: Description:		
Profile parameters		
Parameter 🔺	Default Value	Value
-HistoryVerboseLevel	1	1
-Login Timeout	15	15
-LogScanThreshold	500000	500000
-PollingInterval	5	5
-QueryTimeout	1800	1800
-ReadBatchSize	500	500
Show only provide	n used in this profile	
Show only parameter	s used in this profile	
	Car	Help

- 6. Type a name for the new profile.
- 7. Uncheck Show only parameters used in this profile.
- 8. Scroll to the property called **PublisherFailoverPartner**.



9. Set the name of the secondary replica, VH4-207.

M		New	Agent Profile	_ □	x
Na	me:	Agent Profi	le for AG		
Description:					
Pro	file parameters —				
	Parameter 🔺		Default Value	Value	^
	-LogScanThrest	nold	500000	500000	
	-MessageInterva	al	3600		Н
	-Output				
	-Output Verbosel	Level	0		
	-PacketSize		4096		≡
	-PollingInterval		5	5	
	-PublisherFailove	erPartner		VH4-207	
	-QueryTimeout		1800	1800	
	-ReadBatchSize		500	500	ш
			0		×
[	Show only par	ameters use	d in this profile	3	
_			OK Cancel	Help	

10. Click **OK** to save the profile.



11. In the Agent Profile properties, select the new agent profile as default instead of the **Default agent profile**.

	Agent Profiles
Select a page Distribution Agents	🖾 Script 👻 🎼 Help
Merge Agents     Snapshot Agents     Log Reader Agents	Agent profiles:
i Queue Reader Agents	D       Name       ▲       Type         Agent Profile for AG       User          □       Default agent profile       System          □       Verbose history agent pr       System
Connection	
Server: VH4-205	
Connection: sa	
View connection properties	New Delete
Progress	
Ready	Change all existing Log Reader Agents to use the profile marked as the default profile. Change Existing Agents
	OK Cancel

12. Click OK.

13. Click **OK** again to exit the Distributor Properties dialog.

NOTE: The steps above for setting the agent profile work for a single secon dary replica. For multiple secondary replicas. it may be possible to define multiple agent profiles, each one using a different PublisherFailoverPartner value, and set it properly as default to each publisher. However, the details are beyond the scope of this document. Please contact HiT Software support at support.hitsw.com for additional information.

### 5. Add Linked Servers to Secondary Replicas

In the event that a secondary replica transitions to the primary role, it must be configured so that the secondary can take over after a failover.



All possible publishers will connect to the subscriber using a linked server. To create a linked server to the subscriber, VH4-205, open a connection to the secondary replicas and create the linked server to it.

- 1. Connect to the secondary replica VH4-207.
- 2. Run the query below:

```
EXEC sys.sp_addlinkedserver @server = 'VH4-205'
```

### 6. Configure the SQL Server Connection in DBMoto

Now it is time to configure the source connection in DBMoto that points to the SQL Server Availability Group (AG). This is so that the application can connect to the AG and switch dynamically among the cluster replicas.

In the DBMoto Management Center:

1. From the Metadata Explorer **Sources** list, right click and choose **Add New Connection**.





2. In the **Select Provider** screen, type a name and choose **Microsoft SQL Server** as the provider.

8		Source Connection Wizard	×
		DBM	1oto°
> Select provider	Select the datab	ase that contains source data to be replicated and indicate which provider	to use.
Set connection string	Source name		
Setup Info	Name:	SQL Server AG	
Select tables	Data Provider(s)		
	Database:	Microsoft SQL Server	~
	Provider:	Microsoft.NET Driver (SQLClient)	~
	Assembly:		
			Browse
KILD.			
www.hitsw.com			
		< Back Next > Cancel	Help

3. Specify connection parameters.



	Source Conr	nection Wizard	
		DBN	/loto
elect provider	Specify the connection parameters for	or the source connection.	
et connection ring	Connection properties		
tup Info	A Required		^
last hables	Data Source		
lect tables	User ID	sa	
mmary	Password	*******	
and the second	<ul> <li>Optional</li> </ul>		
and the second second	Initial Catalog		
	Enlist	False	
100	Encrypt	False	
	Integrated Security	False	
	Network Library	dbmssocn	
	Packet Size	8192	~
	Password User password.		
		👱 Edit (	Test
ww.hitsw.com			
		< Back Next > Cancel	Help

- 4. In the Setup Info screen, select Log Reader.
- 5. Set the IP address that you use to connect to SQL Server from DBMoto to the <u>Availability Group listener IP address</u>. Using the listener IP, allows DBMoto to automatically switch from one replica to another once a failover has occurred.
- 6. Specify the user name and password for the connection. Click **Verify** to check for an existing distributor. DBMoto determines that a remote distributor has been established but a login is required to be able to connect to it.
- 7. The Change Distributor dialog automatically shows the remote distributor name VH4-205, and asks you to specify a user name and password.



🗄 Change Distributor 🛛 🗙				
Distributor				
🔘 Use Local Distrib	utor			
Server:	VH4-206			
Database:	DBRS_distribution			
Use Remote Distributor				
Server:	VH4-205			
Database:	DBRS_distribution			
Login		_		
O Use W Use S	indows authentication ΩL Server authentication			
User:				
Passw	vord:			
Specify Install Pa Path:	ath for the Distributor			
	<u>O</u> K <u>C</u> an	cel		

- 8. Type the user name and password.
- 9. Click OK.

A message prompt shows that the distributor is correctly set up.

- 10. Click Next.
- 11. In the Select Tables screen, select a few test tables from the AG database (in this case, AGTest1.)



8	Source Connection Wizard
	DBMoto
Select provider Set connection	Expand the treeview and select the objects you want to replicate under the source connection.
string Setup Info	Filter: 📉 🍸 🗶 📩 🗸
> Select tables Summary	SOL Server AG AGTest1 do Orders Persons Products Shippers Suppliers Test Test Test Test ReportServer Test
www.hitsw.com	< <u>Back</u> <u>Next</u> > <u>Cancel</u> <u>Help</u>

12. Click Next.

13. Click **Finish** to create the connection.

### 7. Add Replications and Create the Publication Database

Add a target connection and create replications in the usual way.

### 8. Redirect the Publisher to the AG Listener Name

- 1. In the SQL Server Management Studio, connect to the distributor VH4-205.
- 2. For **each replica** (VH4-206 and VH4-207), run the stored procedure sp\_redirect\_publisher to associate the original publisher and the published DB with the AG listener name:

```
USE DBRS_distribution;
GO
EXEC sys.sp_redirect_publisher
   @original_publisher = 'VH4-206',
   @publisher_db = 'AGTest1',
   @redirected_publisher = 'TEST1_AG_Listen';
```



NOTE: Run this stored procedure again, substituting VH4-207 for VH4-206

3. In the distribution database, for **each replica** (VH4-206 and VH4-207), run the stored procedure sp\_validate\_replica\_hosts\_as\_publishers to verify that the replica host is now configured to serve as publisher for the published database:

```
USE DBRS_distribution;
GO
DECLARE @redirected_publisher sysname;
EXEC sys.sp_validate_replica_hosts_as_publishers
    @original_publisher = 'VH4-206',
    @publisher_db = 'AGTest1',
    @redirected_publisher = 'TEST1_AG_Listen';
```

NOTE: Run this stored procedure again, substituting VH4-207 for VH4-206

NOTE: This procedure is necessary whenever a new database is added to a replication: the publisher database will have to be specified in the queries.

# **Test the Configuration**

Let the replications start and run the initial refresh. Run some transactions from the active node (VH4-206) and verify that they are correctly replicated to the target.

Execute a manual failover to the secondary replica using the Failover wizard in SQL Server. Wait to see the secondary node become the primary replica. Run some transactions from the active node (VH4-207) and verify that they are correctly replicated to the target.

### Notes

- 1. The SQL Server Reader Agent has to be running on the Distributor machine only.
- 2. When creating the distributor, this error can be generated:

Named Pipes Provider: Could not open a connection to SQL Server [53].

OLE DB provider "SQLNCLI11" for linked server "repl\_distributor" returned message "Login timeout expired".

```
OLE DB provider "SQLNCLI11" for linked server "repl_distributor" returned message "A network-related or
```

instance-specific error has occurred while establishing a connection to SQL Server. Server is not found or not accessible.



Check if instance name is correct and if SQL Server is configured to allow remote connections. For more information see SQL Server Books Online.".

#### SOLUTION:

Check if the instance name is correct, by running 'select @@servername'. This name should match the server name you are using in the distributor wizards and in the SQL statements you have run so far, for instance 'VH4-207'. If this is not the case, you will need to reconfigure the name of the local instance by running:

- sp\_dropserver 'oldname' (the name found from the select @servername)
- sp\_addserver 'newname' (for instance, VH4-207)
- Restart the SQL Server services
- 3. When running the failover to the VH4-207, make sure the Log Server Agent is running and has no errors.

Check eventual errors here:

- In the SQL Server Console, click on 'SQL Server Agent'.
- Expand and double click on 'Job Activity Monitor'
- Check the job named to match the database (in the example above 'VH4-206-AGTest1-1')
- In the SQL Server Console, click on 'Replication'.
- Select 'Launch Replication Monitor'.
- Check if all publishers are functioning or show any error icon. In case of errors, expand to find the error items. For example, the following error could occur:

```
The process could not execute 'sp_replcmds' on VH4-207
```

Status: 0, code: 15517, text: 'Cannot execute as the database principal because the principal "dbo" does not exist, this type of principal cannot be impersonated, or you do not have permission.'.

SOLUTION:

The error states that the current owner of the job is not a DBO on the Publication Database. Hence the next logical step is to make the job owner the DBO of the database as follows.

- Connect to VH4-207
- Change the owner of the database:

```
USE AGTest1;
```

```
sp_changedbowner 'sa'
```