



Management Center

## Replication

Version 2022.3

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## Notice

While every precaution has been taken in the preparation of the document, no responsibility is assumed for errors or omissions, nor is any liability assumed for loss or damage resulting from the use of the information it contains.

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## Introduction

### Purpose of this Document

The purpose of this document is to provide the steps required to configure replication for the Ivanti Management Center (AMC) across a global environment. This configuration is supported by Ivanti User Workspace Manager for a global rollout.

**Note**

This guide covers the steps required to configure Replication using Microsoft SQL Server 2014. The steps required to set up Network Load Balancing (NLB) of the Ivanti Management Center are not covered

The current AMC design requires an AMC database per serving site and all configuration/agent updates must be saved and distributed at each serving site.

The solution uses Microsoft SQL Server replication to implement an AMC publisher and AMC subscribers. All agents and configuration updates are saved to the publisher database and the data replicated to each serving site database. This ensures a single point for managing all Ivanti Management Center instances.

### Assumptions

This guide assumes the following:

- An Ivanti Management Center is installed at all serving sites and the Management Server database is configured using the UWM Server Configuration Portal.

**Note**

The subscriber database must be empty when it is first initialized. If any machines have polled the subscriber, or if any edits have been made with the Management Console since installing the server, the snapshot fails to initialize.

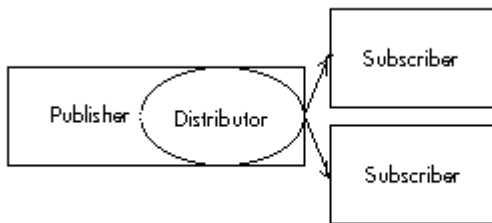
- An extra AMC is installed that will be used as the AMC publisher and the Management Server database is configured using the UWM Server Configuration Portal.
- The SQL Server Agent is running.

The table below shows the functionality available at the publisher and subscribers:

AMC Publisher Functionality	AMC Subscribers Functionality
Packages = Prerequisites, Agents, & Configurations	Computers = Computers, Discovered Computers (from Membership Rules), CCA Install
Deployment Groups = Settings, Installation Schedule, Event Filtering, Deployment Credentials & Package Assignment	Auditing = Events, Alerts
Deployment Group Membership = Membership Rules	Failover = Failover Servers
Security = Users, Policy, and ownership of all objects	
Licensing = Licenses are replicated.	
Auditing = Alert Rules, Event Definitions, Report Definitions	

## Management Center Replication Design

The replication model supported is publisher, distributor, and subscriber using a central publisher replication topology. One SQL Server is configured as a publisher and distributor and the other SQL servers are configured as subscribers.



This design allows for one-way replication using SQL Server transactional replication, where an initial snapshot of data is applied at the subscribers. When data modifications are made at the publisher, the individual transactions are captured and sent to subscribers.

The transaction log is used to capture incremental changes made to data in the published articles, which is stored in the distribution database. Changes are then pushed to the subscribers and applied in the same order as they occurred.

One database must be the publisher and other databases are subscribers. The distribution database is set up on the publisher.

Only members of the **sysadmin** server role can set up and configure replication.

### Setup Process

1. [Configuring the SQL Server Agent](#)
2. [Configuring the Distributor](#)
3. [Configuring the Publication](#)
4. [Configuring the Subscribers](#)

## Supported Operating Systems

The design in this document includes support for only the software revisions listed below:

Software	AMC 8.2	AMC 8.3	AMC 8 FR4	AMC 8 FR5	AMC 8.6	AMC 8.7	AMC 10.0	AMC 10.1	MC 2018	MC 2019	MC 2020
Microsoft SQL Server 2008 R2	•	•	•	•	•	•					
Microsoft SQL Server 2012				•	•	•	•	•	•	•	•
Microsoft SQL Server 2014							•	•	•	•	•
Microsoft Windows Server 2003 (32-bit and 64-bit editions)	•	•	•								
Microsoft Windows Server 2008 R2	•	•	•	•	•	•	•	•	•	•	•
Microsoft Windows Server 2012				•	•	•	•	•	•	•	•
Microsoft Windows Server 2012 R2				•	•	•	•	•	•	•	•

## Design Notes

The following technical points must be followed for supported replication using Microsoft SQL Server:

- The times of all SQL servers must be synchronized (however they can be in different time zones).
- The default collation of all SQL servers must be the same.
- Machine package status information is not automatically updated on AMC subscribers when changes are made to the **Deployment Group > Settings > Packages** page in the Management Console connected to the AMC publisher. The package status information on the AMC subscriber is only updated when the Deployment Agent (CCA) polls.
- To ensure that the CCA Install functionality works on all subscribers, the encryption key must be stored on the Publisher AMC, and retrieved on all Subscriber AMC's. See the [Server Configuration Portal Help](#) for more details.
- The Management Center does not prevent edits to replicated data on any of the Subscriber AMCs. To ensure edits don't happen, it is recommended to set up the security on the Publisher AMCs to ensure users of the Subscriber AMCs cannot change replicated data.

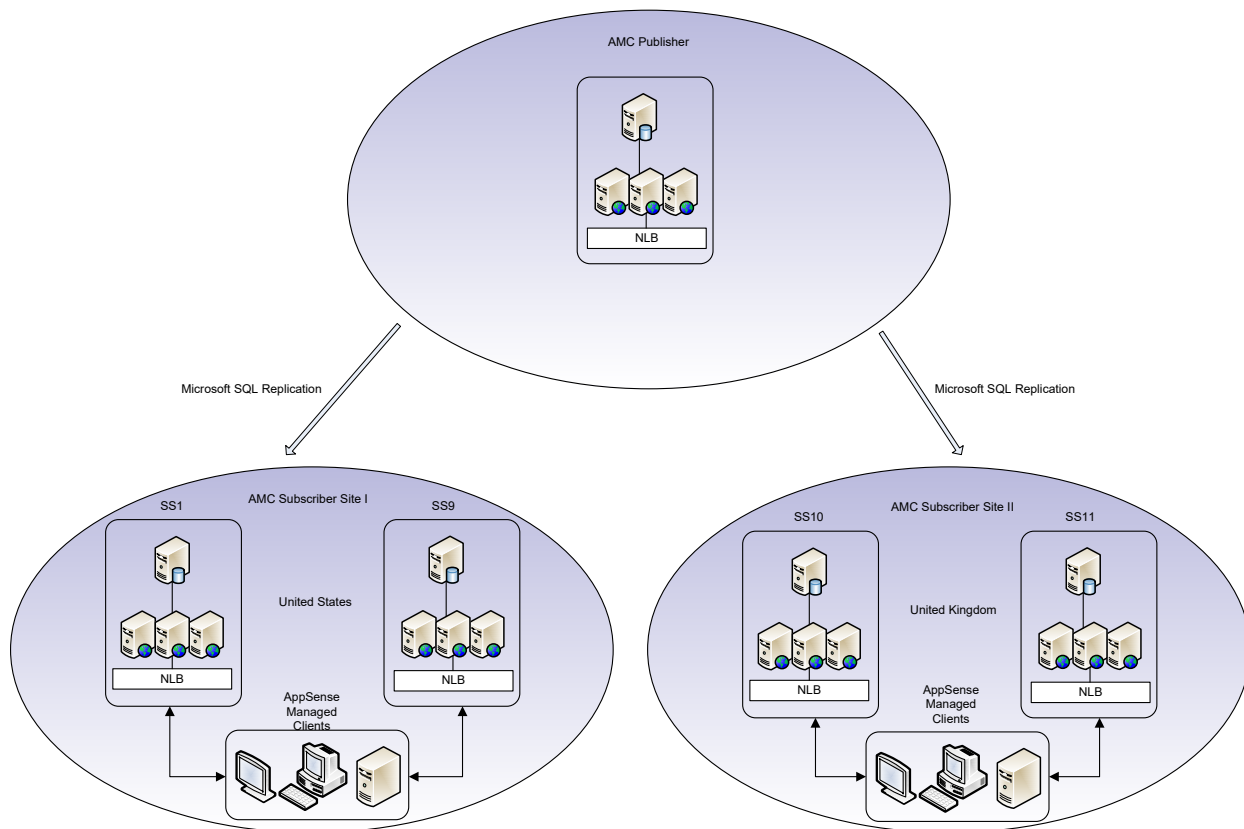
- The Subscriber AMC's database must be a newly created database when the subscriber is first initialized. If any machines have polled the subscriber before the first initialization, or if any edits have been made with the Management Console since installing the server, the initial snapshot fails.



### Caution

The **max text repl size** configuration setting of all SQL Servers must be sufficiently large to store agents and configurations. A minimum of 30MB (31457280 Bytes) is recommended

## Logical Replication Design for Multiple Sites

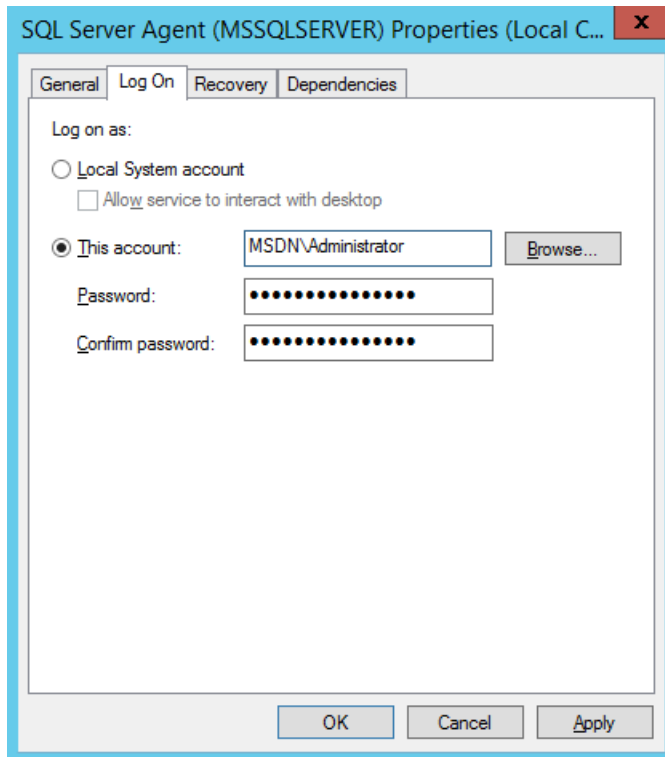




## Configuring the SQL Server Agent

This section outlines the steps required to configure the SQL Server Agent, which must be completed on all SQL Server nodes.

1. Launch the **SQL Server Configuration Manager**.
2. Open the **Properties** of the SQL Server Agent service.
3. Set the Account to run with a Domain Account that has SA rights.



4. Start the **SQL Server Agent** service.
5. Repeat on all SQL nodes (Publisher and Subscribers).

---

## Configuring the Distributor

This section outlines the steps required to configure the AMC\_Distribution, which must be completed on the SQL node used by the AMC publisher.

Before configuring the distributor, you need to enable Agent XPs for the SQL Server Agent. To do this, execute the following SQL query:

---

```
sp_configure 'show advanced options', 1;  
GO  
RECONFIGURE;  
GO  
sp_configure 'Agent XPs', 1;  
GO  
RECONFIGURE  
GO
```

---

The output should read:

---

Configuration option 'show advanced options' changed from 0 to 1. Run the RECONFIGURE statement to install.

Configuration option 'Agent XPs' changed from 0 to 1. Run the RECONFIGURE statement to install.

---

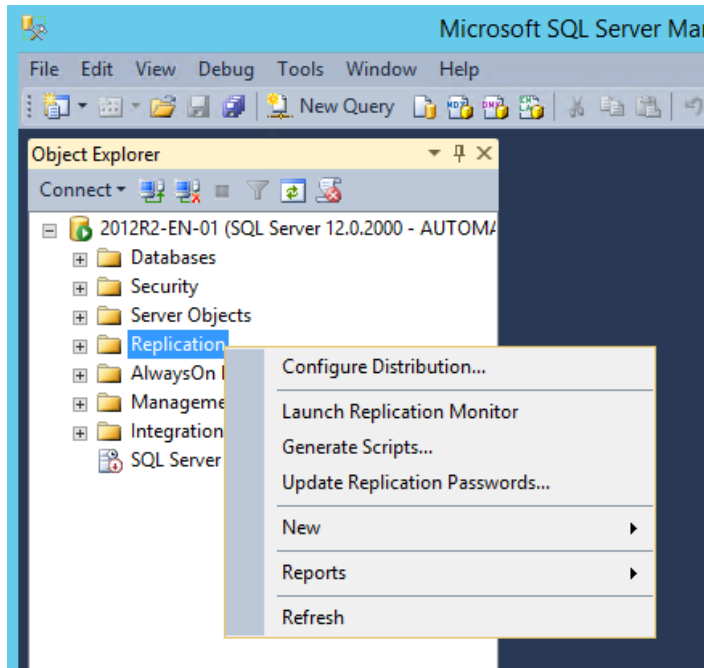
### Reference

[http://blog.sqlauthority.com/2014/05/27/sql-server-fix-agent-starting-error-15281-sql-server-blocked-access-to-procedure-dbo-sp\\_get\\_sqlagent\\_properties-of-component-agent-xps-because-this-component-is-turned-off-as-part-of-the/](http://blog.sqlauthority.com/2014/05/27/sql-server-fix-agent-starting-error-15281-sql-server-blocked-access-to-procedure-dbo-sp_get_sqlagent_properties-of-component-agent-xps-because-this-component-is-turned-off-as-part-of-the/)

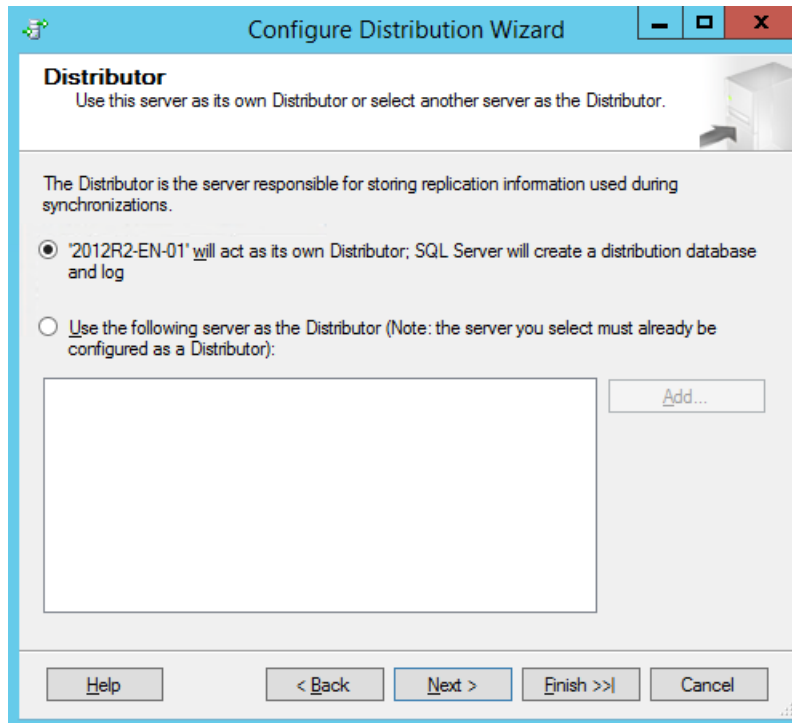
Configuring a SQL Distribution involves three elements:

- Configuring the Distributor
- Enabling the Publisher
- Configuring the SQL Agent

6. Launch an elevated **SQL Server Management Studio** and log in with an Account that has SA rights.
7. Right-click the **Replication** folder, and then click the **Configure Distribution** to launch the Configure Distribution Wizard.



8. Select **[SQL Name] will act as its own Distributor; SQL Server will create a distribution database and log**. The SQL Server name will vary depending on your naming conventions. Click **Next**.

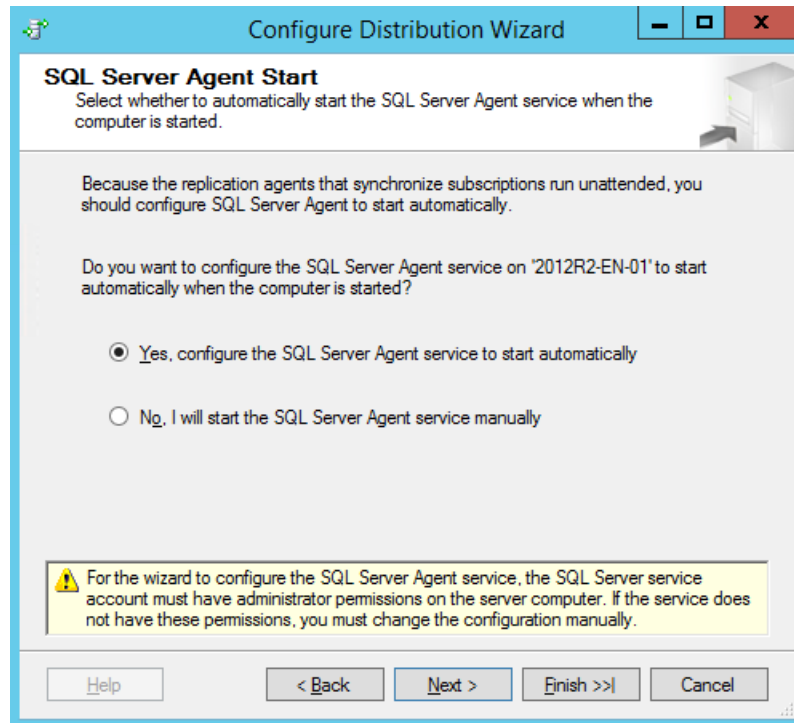


9. Configure the SQL Server Agent service to start **automatically** and click **Next**.



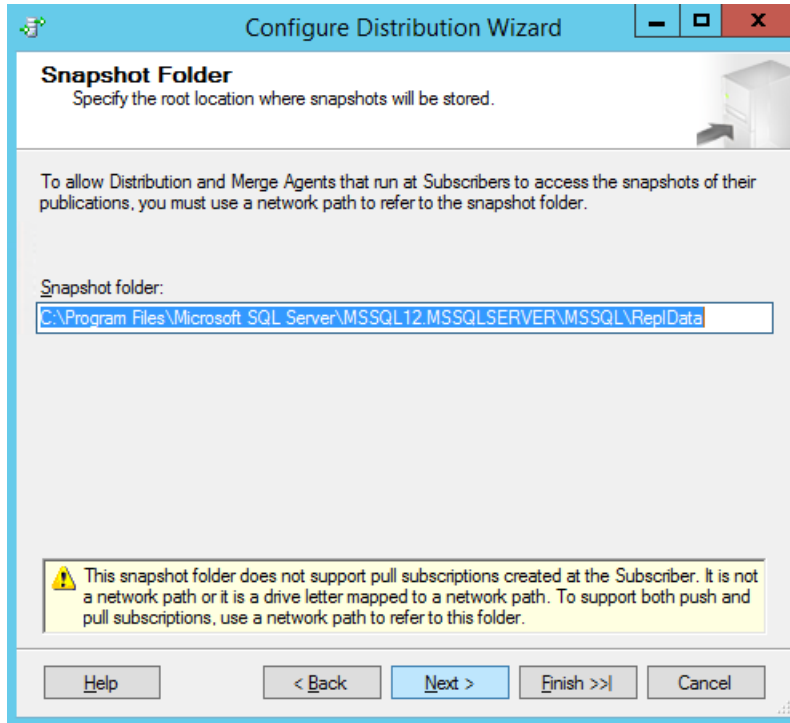
#### Note

This prompt may not appear if the agent was configured to start automatically in the SQL server installation.

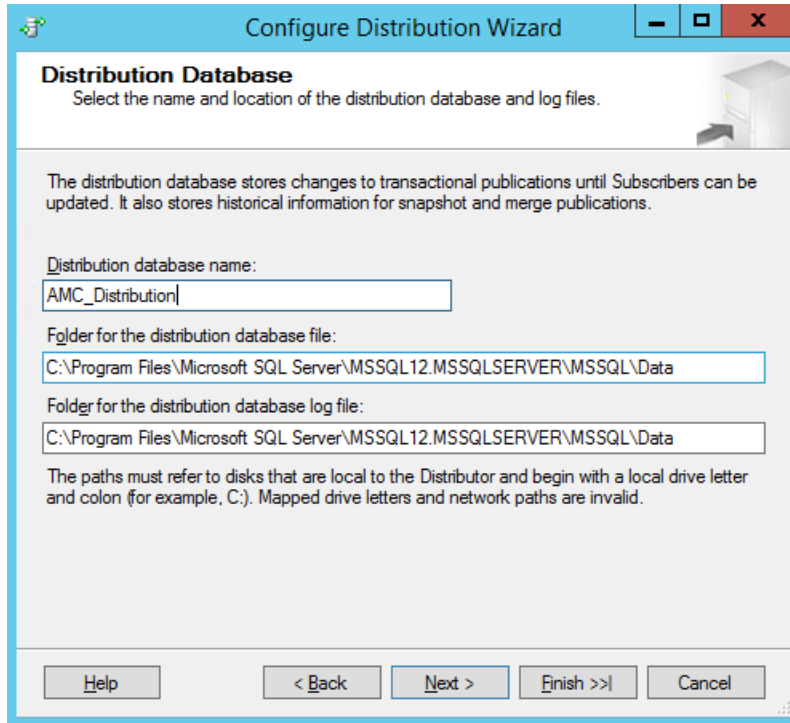


The Snapshot Folder page displays.

10. The Snapshot folder is not required for Transactional Replication at the subscriber nodes, but it is still required to configure a Distributor. Accept the default setting, and click **Next**.



11. Change the name of the Distribution Database to **AMC\_Distribution**. This ensures that the AMC distribution database can be clearly identified. Click **Next**.



**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:  
AMC\_Distribution

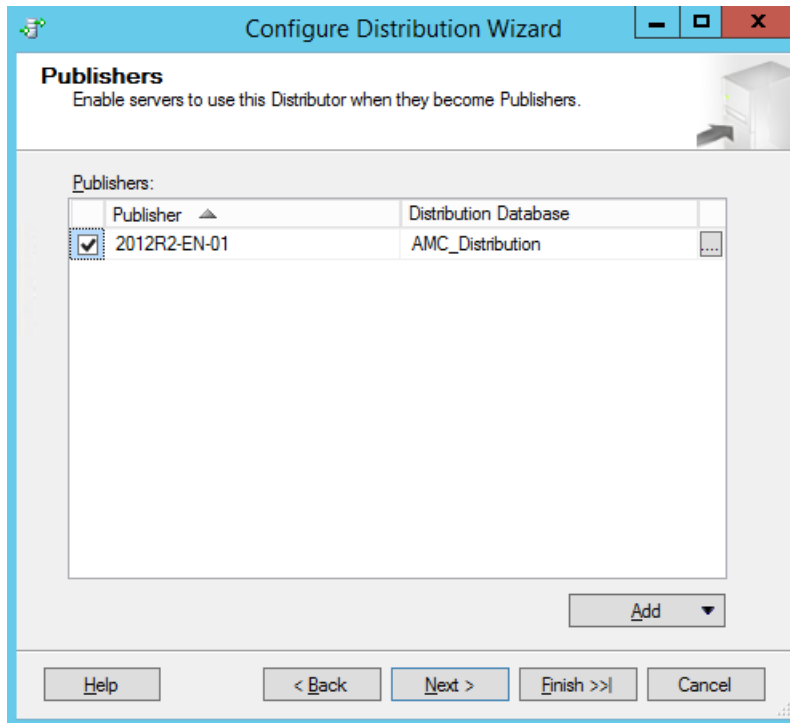
Folder for the distribution database file:  
C:\Program Files\Microsoft SQL Server\MSSQL12.MSSQLSERVER\MSSQL\Data

Folder for the distribution database log file:  
C:\Program Files\Microsoft SQL Server\MSSQL12.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.

Buttons: Help, < Back, Next >, Finish >>, Cancel

12. Accept the Publishers default settings and click **Next**.



**Configure Distribution Wizard**

**Publishers**  
Enable servers to use this Distributor when they become Publishers.

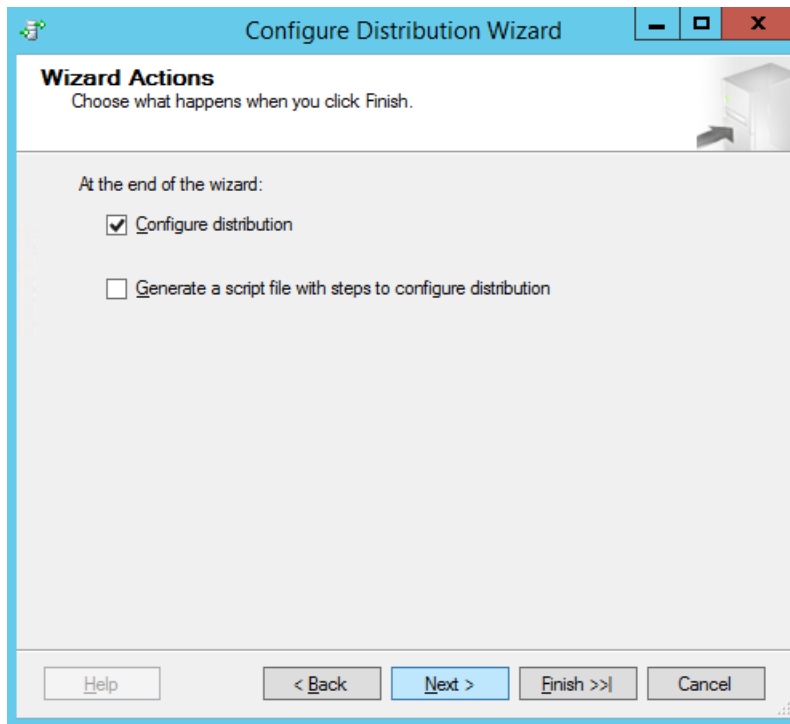
Publishers:

Publisher	Distribution Database
<input checked="" type="checkbox"/> 2012R2-EN-01	AMC_Distribution

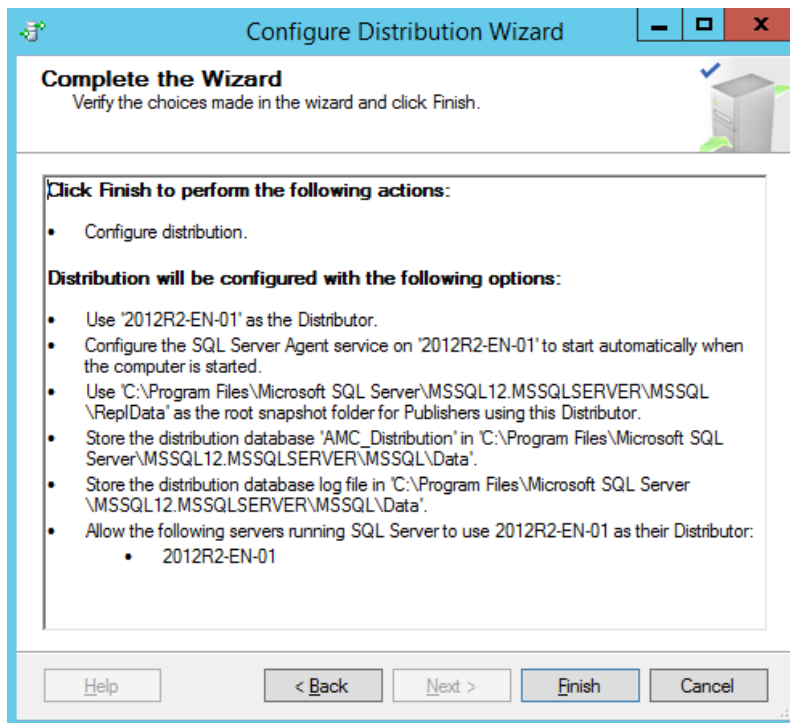
Add

Buttons: Help, < Back, Next >, Finish >>, Cancel

13. Select **Configure distribution**, and click **Next**.

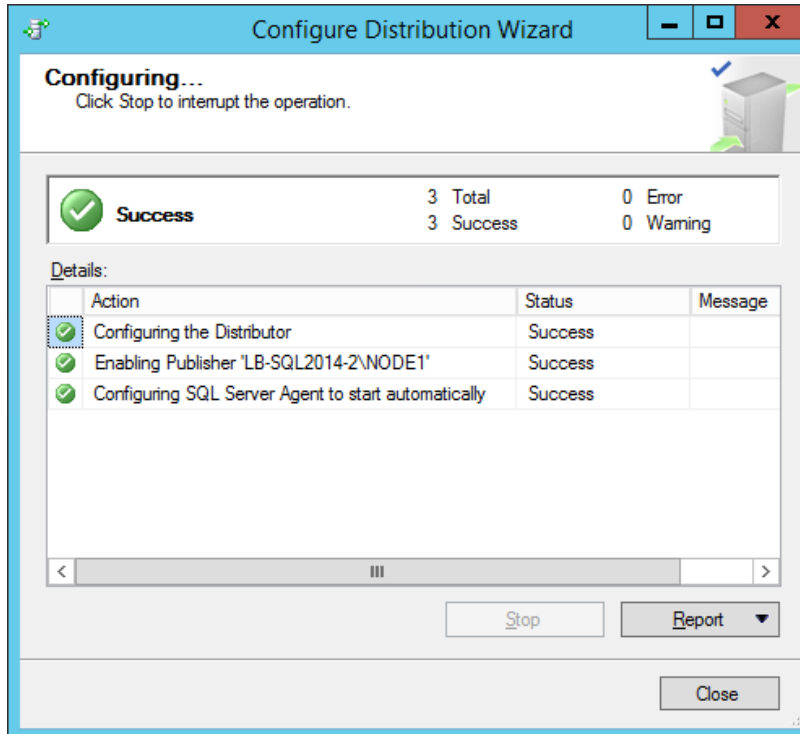


14. Allow the Configure Distribution Wizard to complete.

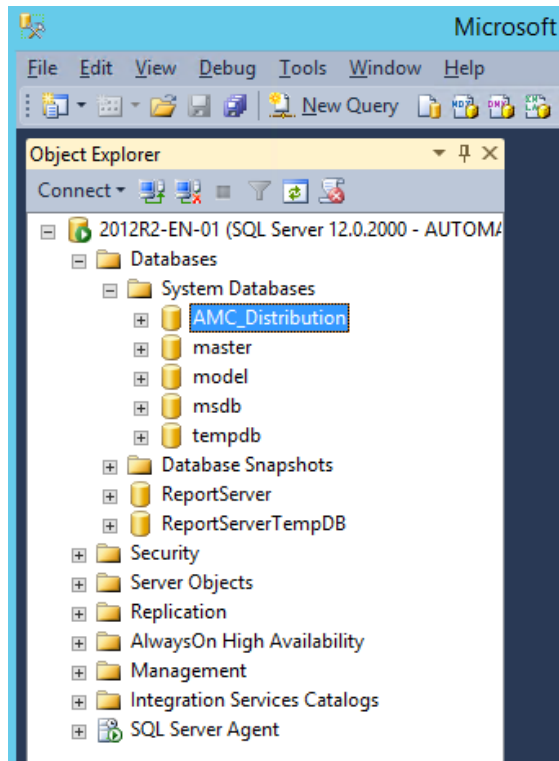




15. All three elements should complete successfully, Configuring the Distributor, Enabling the Publisher, and Configuring the SQL Agent.



16. To check that the Distribution Database has been successfully created, open the **System Databases** node and ensure that an **AMC\_Distribution** database is present.



## Configuring the Publication

This section outlines the steps required to configure the AMC\_Publication, which must be completed on the SQL node used by the AMC publisher.

An SQL publication involves three elements:

- Configuring the AMC database
- Creating the Publication
- Adding the Articles

The publication is called **AMC\_Publication** and includes the following articles in the **ManagementServer** database.



### Note

Management Server 8.2 and 8.3 - 27 articles are published.

Management Server 8 FR4 – 28 articles are published.

Management Server 8 FR5, 8.6 and 8.7 – 29 articles are published.

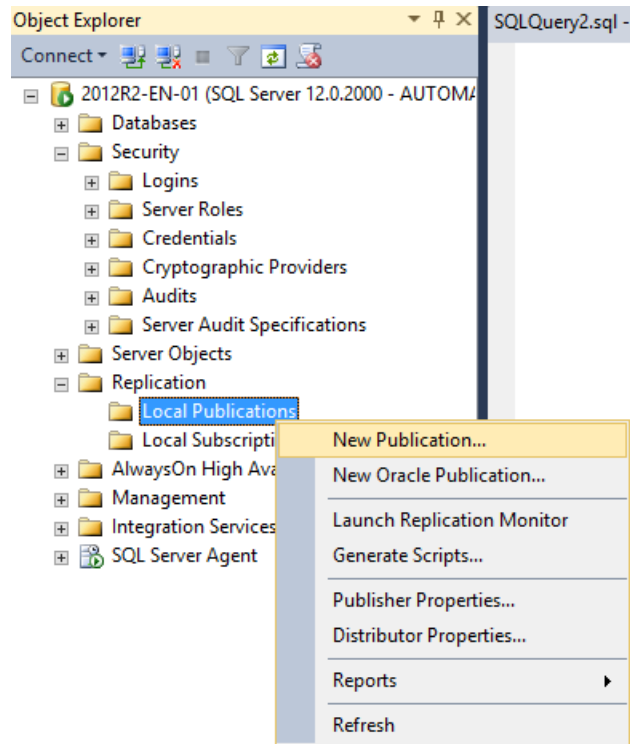
Management Server 10, 10.1, 2018, 2019 and 2020 – 30 articles are published.

### Publication Articles:

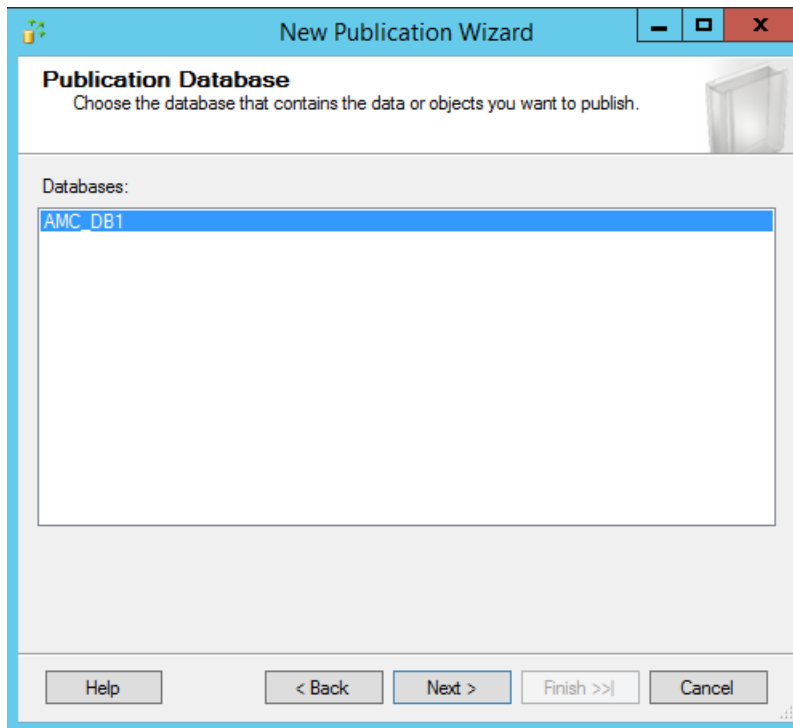
- ActionConfigurations
- Actions
- AlertRules
- Conditions
- DeploymentCredentials
- EventDefinitionParams
- EventDefinitions
- GroupEventFilter
- GroupInstallationSchedule
- GroupPackages
- Groups
- LicenseFeature (Management Server 10 and later)
- Licenses
- LicensingV2 (Management Server 8 FR5 and later)
- Packages

- 
- PackageVersionPrerequisites
  - PackageVersions
  - Patches (Management Server 8 FR4 and later)
  - Policies
  - PrerequisiteCheck
  - PrerequisiteCommand
  - PrerequisiteExitCode
  - PrerequisiteResource
  - Prerequisites
  - Products
  - Properties
  - ReportDefinitions
  - SecurityElements
  - SecurityRoles
  - Users

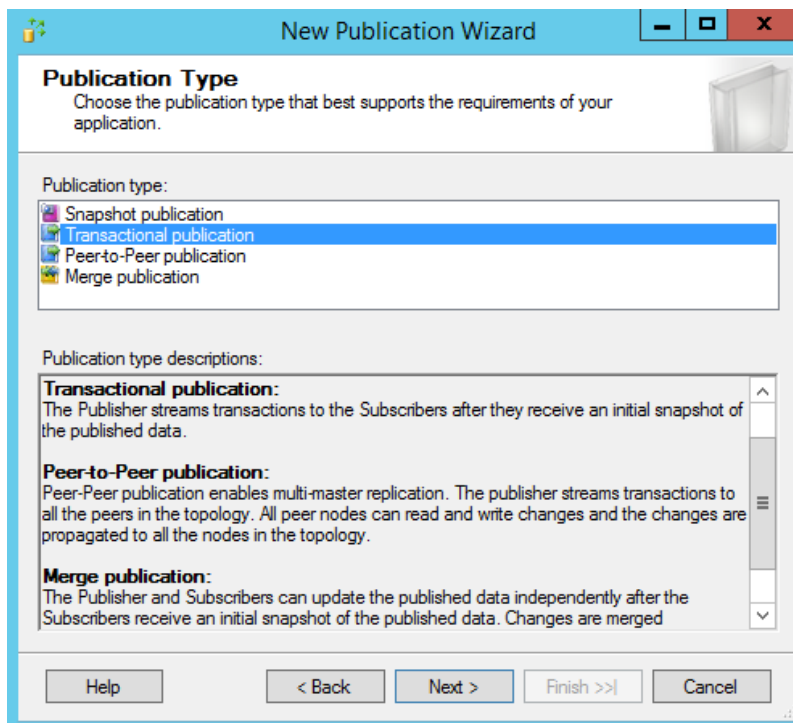
17. Open **SQL Server Management Studio** and log in with an Account that has SA rights.
18. Open the supplied **PrepareManagementCenterForReplication.sql**. Ensure that the ManagementServer database is the active database in the toolbar.  
Refer to the following community article for a script to achieve this: [BP09 - Configuring SQL Replication for UWM Management Center](#).
19. Select **Execute** and ensure that the script completes successfully.
20. Right-click the **Local Publications** folder under the Replication folder. Select **New Publication** to launch the New Publication Wizard.



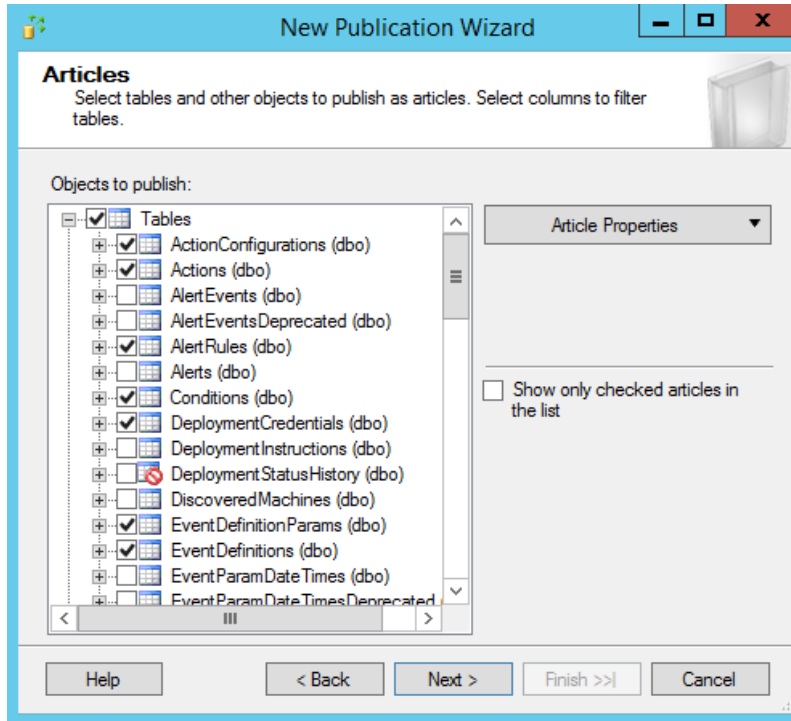
21. The New Publication Wizard launches. Select the **ManagementServer** database, and click **Next**.



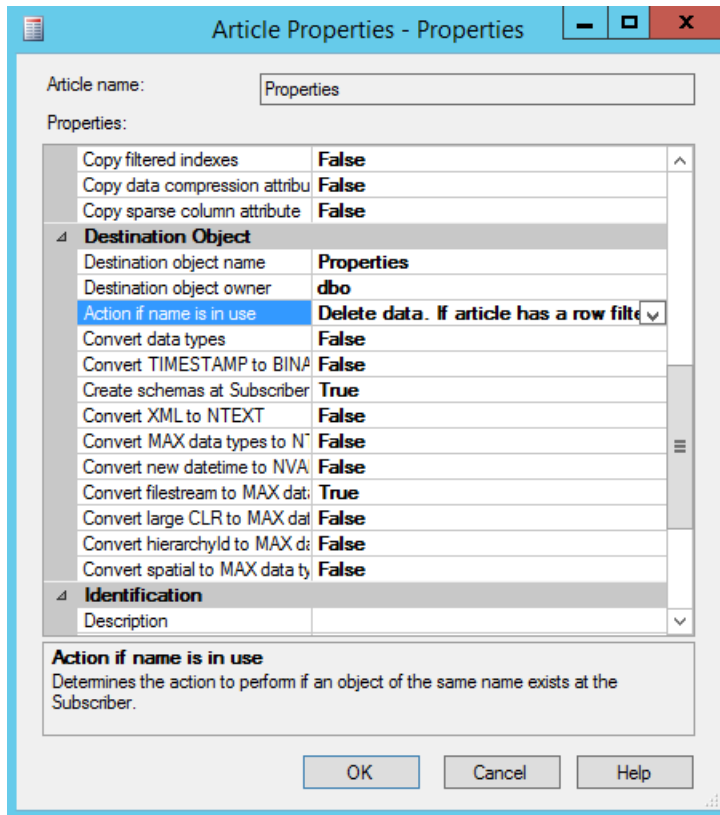
22. Select **Transaction publication**, and click **Next**.



Select the **publication articles** listed at the top of this section. No Stored Procedures, Views, or User Defined Functions will be published.



23. Right-click the **Properties (dbo)** table and select **Set Properties of This Table Article**. In the Article Properties dialog, change **Action if name is in use** to **Delete Data**. If article has a row filter, delete only data that matches the filter. Click **OK** to close the dialog. Then click **Next** to continue.



Article name:

Properties:

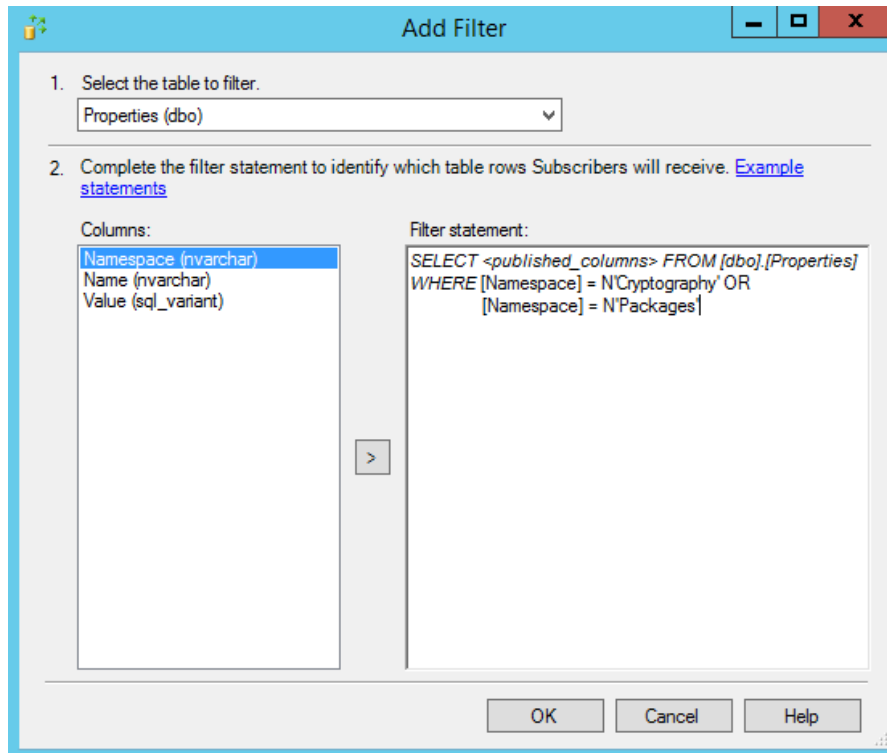
Copy filtered indexes	False
Copy data compression attribute	False
Copy sparse column attribute	False
<b>Destination Object</b>	
Destination object name	Properties
Destination object owner	dbo
Action if name is in use	Delete data. If article has a row filter
Convert data types	False
Convert TIMESTAMP to BINARY	False
Create schemas at Subscriber	True
Convert XML to NTEXT	False
Convert MAX data types to NTEXT	False
Convert new datetime to NVARCHAR	False
Convert filestream to MAX data type	True
Convert large CLR to MAX data type	False
Convert hierarchyid to MAX data type	False
Convert spatial to MAX data type	False
<b>Identification</b>	
Description	

**Action if name is in use**  
Determines the action to perform if an object of the same name exists at the Subscriber.

OK Cancel Help

24. The properties table requires filtering, select **Add**. In the Add Filter dialog, select the **Properties (dbo)** table in the dropdown.
25. In the Filter Statement, modify the second line to state “**WHERE [Namespace] = N'Cryptography' OR [Namespace] = N'Packages'**”





**Add Filter**

1. Select the table to filter.  
Properties (dbo)

2. Complete the filter statement to identify which table rows Subscribers will receive. [Example statements](#)

Columns:

- Namespace (nvarchar)
- Name (nvarchar)
- Value (sql\_variant)

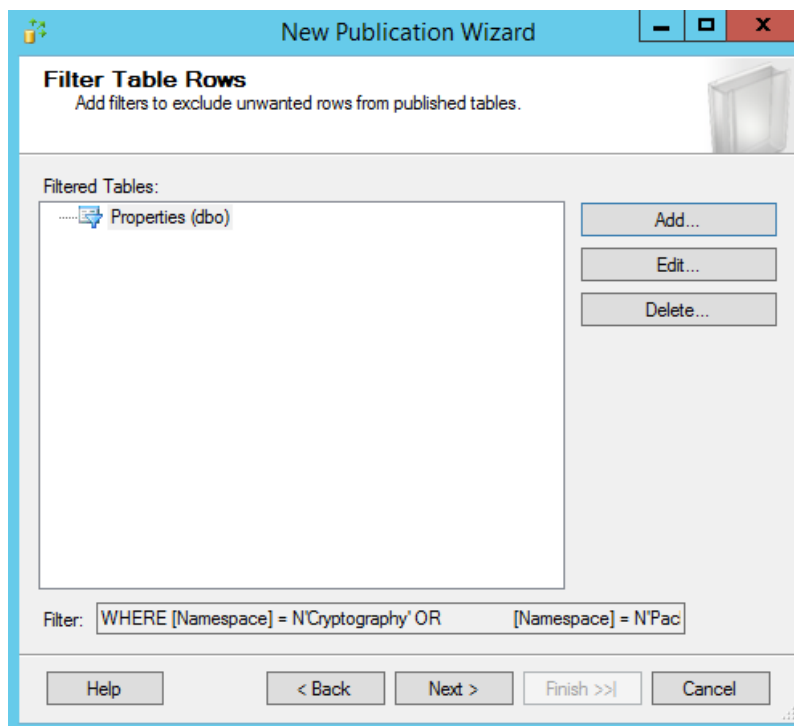
Filter statement:

```
SELECT <published_columns> FROM [dbo].[Properties]
WHERE [Namespace] = N'Cryptography' OR
[Namespace] = N'Packages'
```

OK Cancel Help

26. Click **OK**.

27. Click **Next**.



**New Publication Wizard**

**Filter Table Rows**  
Add filters to exclude unwanted rows from published tables.

Filtered Tables:

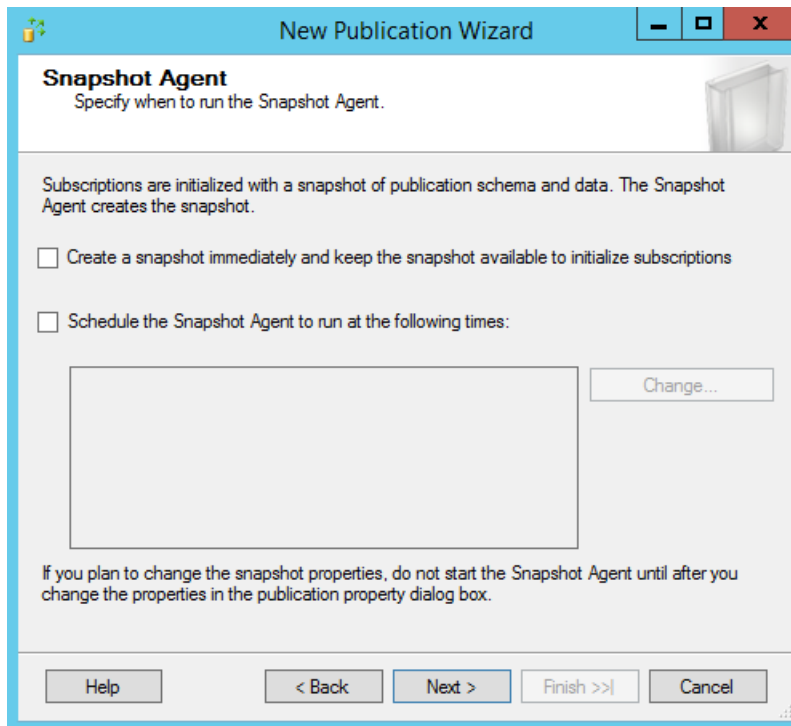
- Properties (dbo)

Add... Edit... Delete...

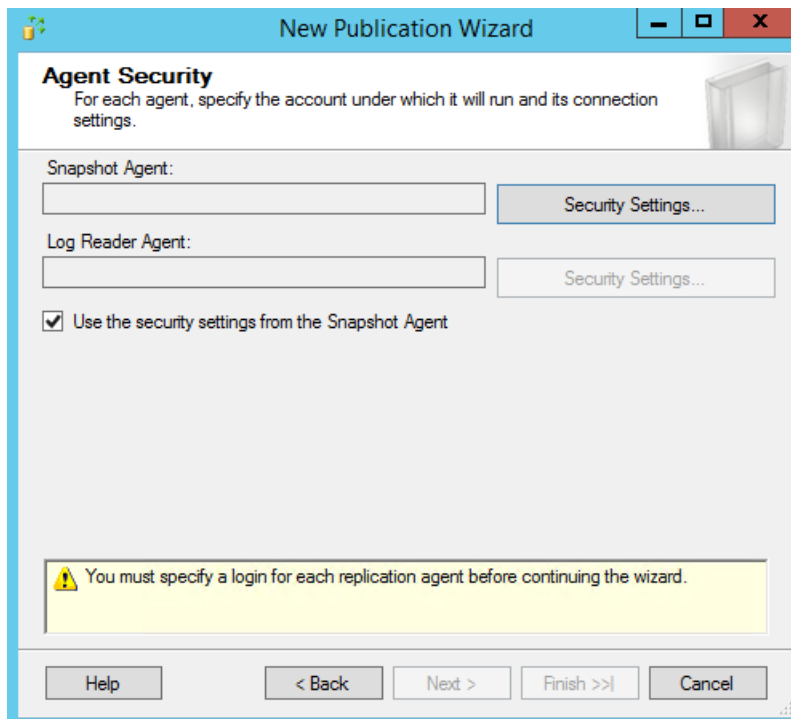
Filter: WHERE [Namespace] = N'Cryptography' OR [Namespace] = N'Pac

Help < Back Next > Finish >> Cancel

28. The Snapshot Agent page displays, ensure that neither option is selected, and Click **Next**.



29. The Agent Security page displays, click **Security Settings**.



30. The Snapshot Agent Security dialog displays.



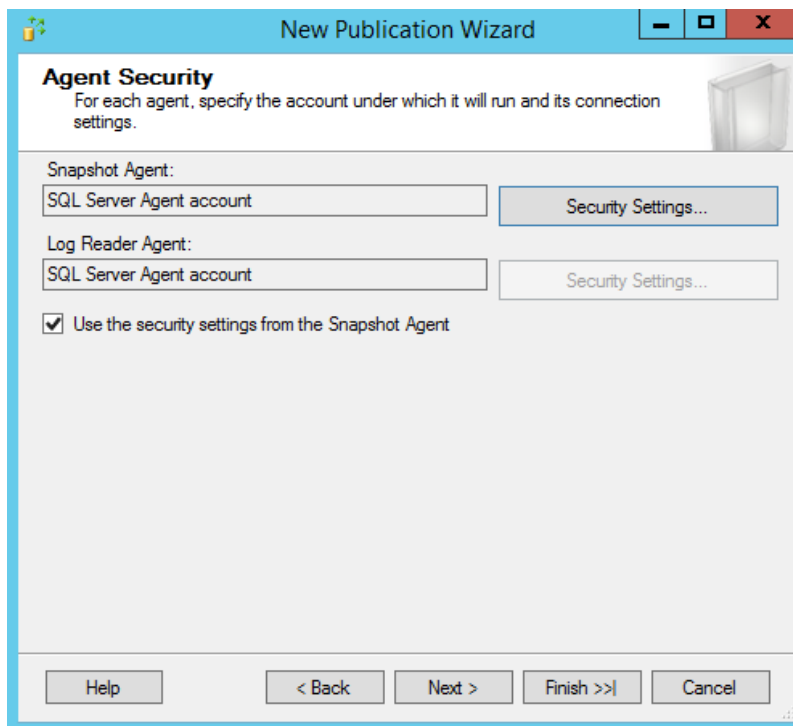
31. Select **Run under the SQL Server Agent service account** as the account under which the Snapshot Agent process will run.
32. Select connect to the publisher **by impersonating the process account**. Click **OK**.



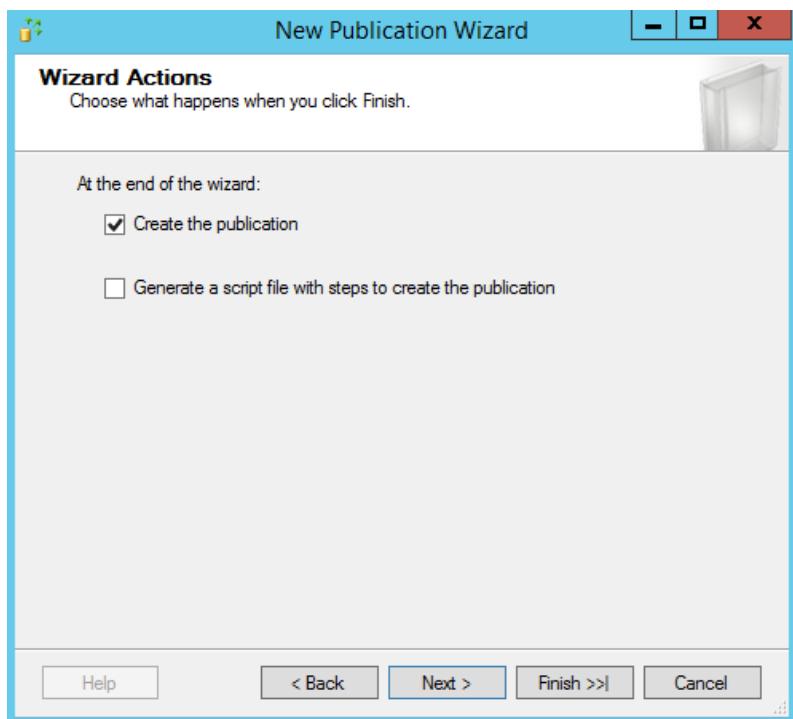
#### Note

Security is not compromised because the SQL Agent is already configured to run under the context of a Windows Account and uses Kerberos authentication.

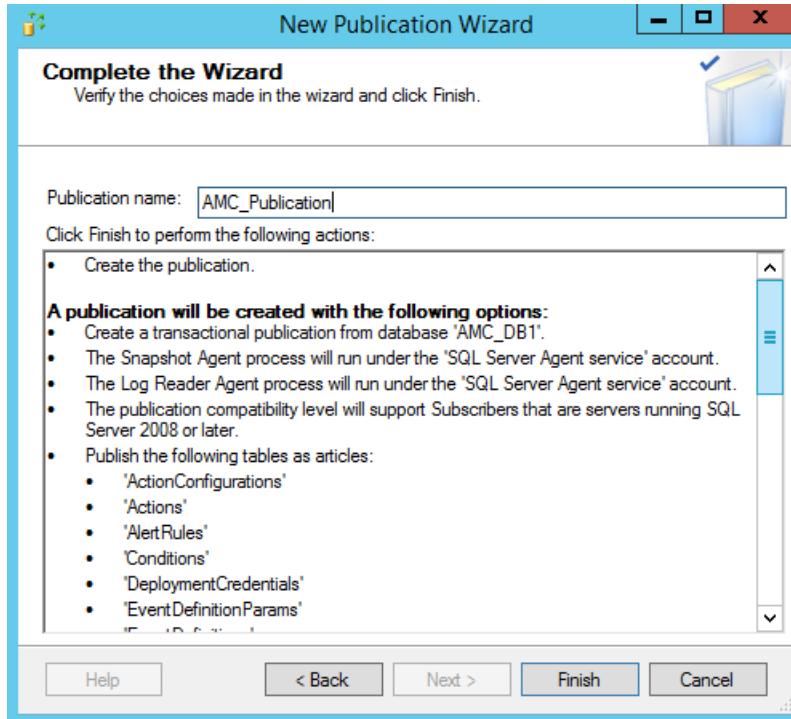
33. The Agent Security page displays, click **Next**.



34. The Wizard Actions page displays, select **Create the publication**, and click **Next**.



35. The Complete the Wizard page displays, enter the name **AMC\_Publication**. This ensures that the AMC articles can be clearly identified. Click **Finish**.



**Complete the Wizard**  
Verify the choices made in the wizard and click Finish.

Publication name:

Click Finish to perform the following actions:

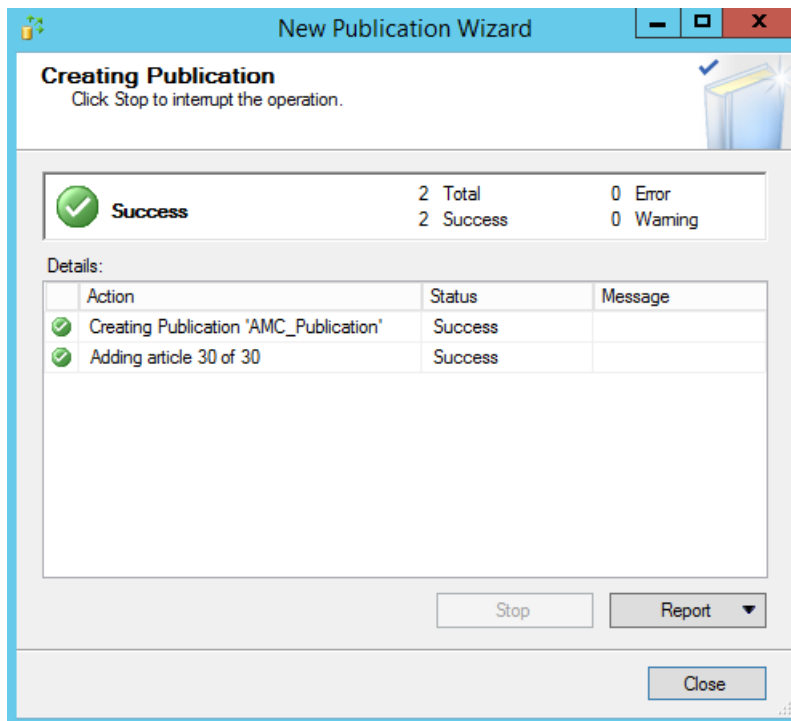
- Create the publication.

**A publication will be created with the following options:**

- Create a transactional publication from database 'AMC\_DB1'.
- The Snapshot Agent process will run under the 'SQL Server Agent service' account.
- The Log Reader Agent process will run under the 'SQL Server Agent service' account.
- The publication compatibility level will support Subscribers that are servers running SQL Server 2008 or later.
- Publish the following tables as articles:
  - 'ActionConfigurations'
  - 'Actions'
  - 'AlertRules'
  - 'Conditions'
  - 'DeploymentCredentials'
  - 'EventDefinitionParams'

Buttons: Help, < Back, Next >, Finish, Cancel

36. Both elements should complete successfully: Creating the Publication and Adding the articles.



**Creating Publication**  
Click Stop to interrupt the operation.

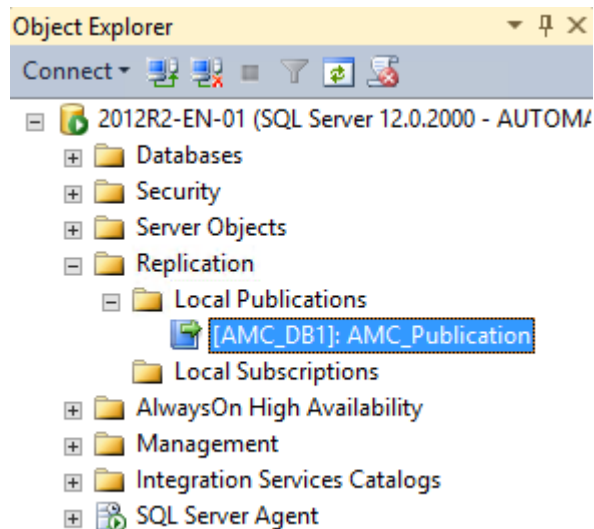
**Success** 2 Total 0 Error  
2 Success 0 Warning

Details:

Action	Status	Message
Creating Publication 'AMC_Publication'	Success	
Adding article 30 of 30	Success	

Buttons: Stop, Report, Close

37. Check that the Publication has been successfully created. Open the **Local Publications** node and ensure that **[ManagementServer]: AMC\_Publication** is present.



38. Right-click the **Publication** and select **Properties** to open the **Properties** window. Navigate to **Subscription Options** and change **Replicate schema changes** to **False**.

Select a page

General

Articles

Filter Rows

Snapshot

FTP Snapshot

Subscription Options

Publication Access List

Agent Security

Connection

Server: 2012R2-EN-01

Connection:  
AUTOMATION\slaveadmin  
[View connection properties](#)

Progress

Ready

ScriptHelp

Creation and Synchronization

Independent Distribution Agent	True
Snapshot always available	False
Allow anonymous subscriptions	False
Attachable subscription database	False
Allow pull subscriptions	True
Allow initialization from backup files	False
Allow non-SQL Server Subscribers	False

Data Transformation

Allow data transformations	False
----------------------------	-------

Peer-to-Peer Replication

Allow peer-to-peer subscriptions	False
Allow peer-to-peer conflict detection	False
Peer originator id	0
Continue replication after conflict detection	False

Schema Replication

Replicate schema changes	False
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Updatable subscriptions

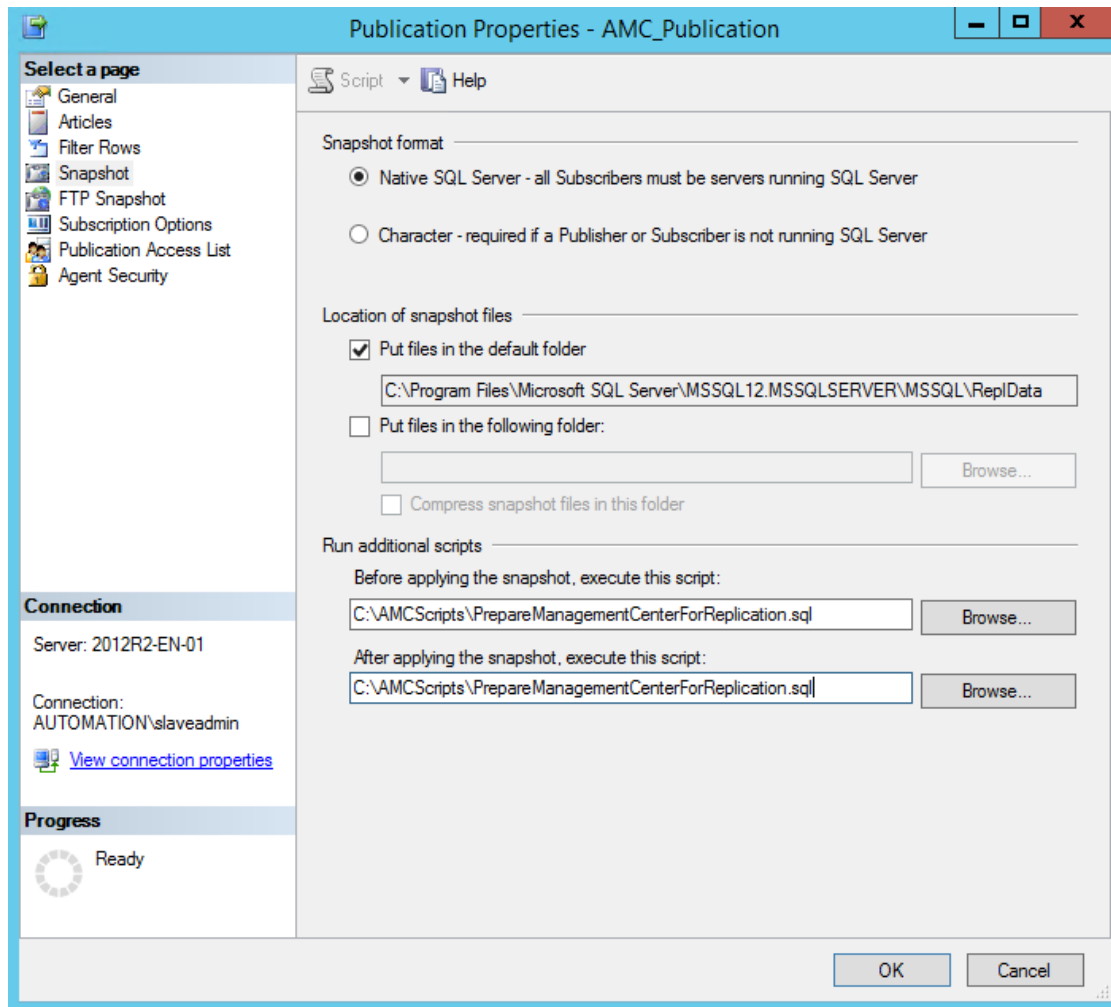
Allow immediate updating subscriptions	False
Allow queued updating subscriptions	False

Replicate schema changes

Determines whether to replicate schema changes to published objects.

OKCancel

39. In the same property sheet, navigate to **Snapshot** and change both the before and after scripts to the supplied **PrepareManagementCenterForReplication.sql**. Click **OK**.



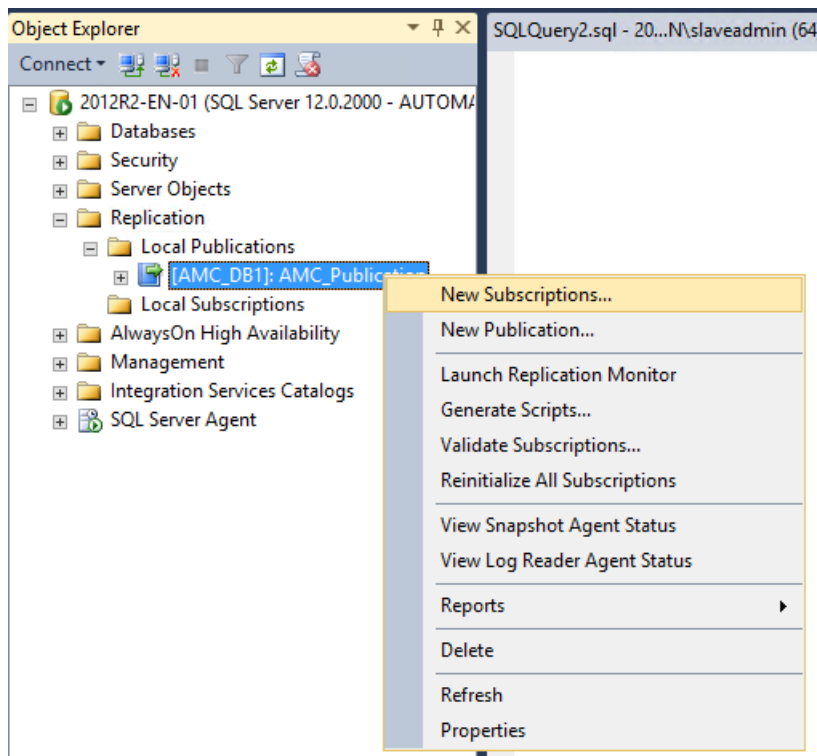


## Configuring the Subscriber(s).

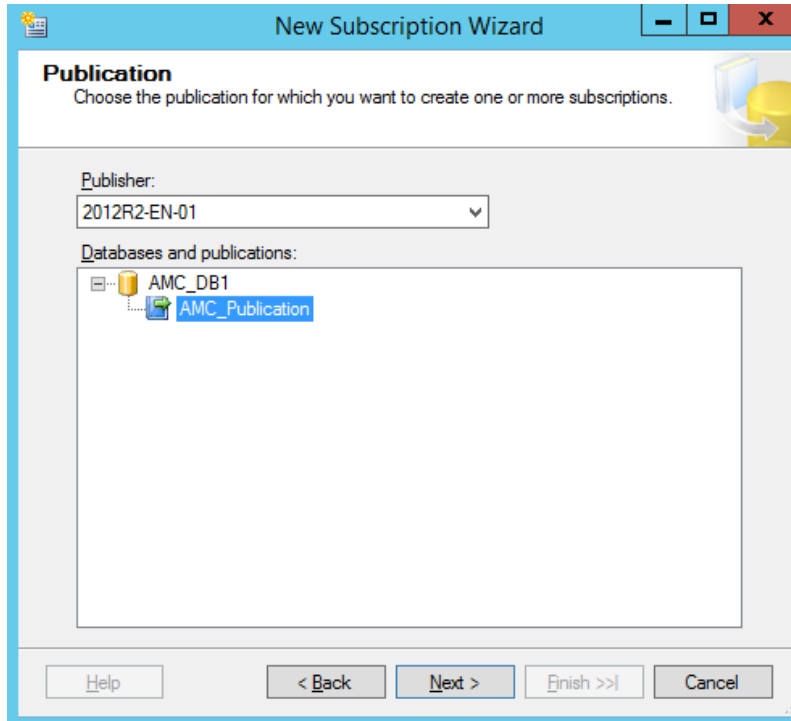
This section outlines the steps required to configure the AMC Subscriber, which must be completed on the SQL Server used by the AMC Publisher. Repeat for each subscriber node in the replication topology.

Configuring an SQL Subscription involves one element:

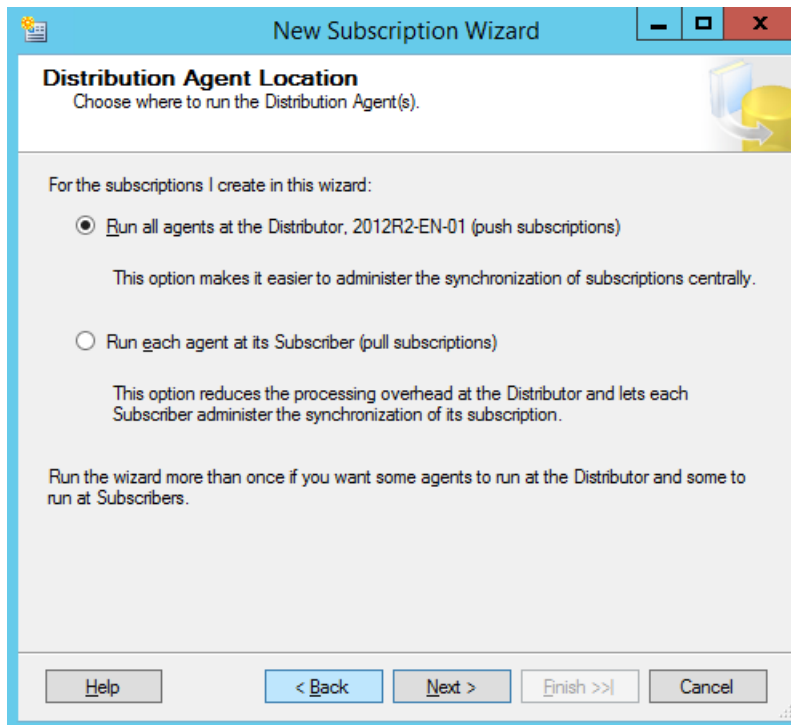
- Creating the Subscription
40. Launch **SQL Server Management Studio** and log in with an Account that has SA rights.
  41. Navigate to **Replication > Local Publications >** right-click the **AMC\_Publication** and select **New Subscriptions**.



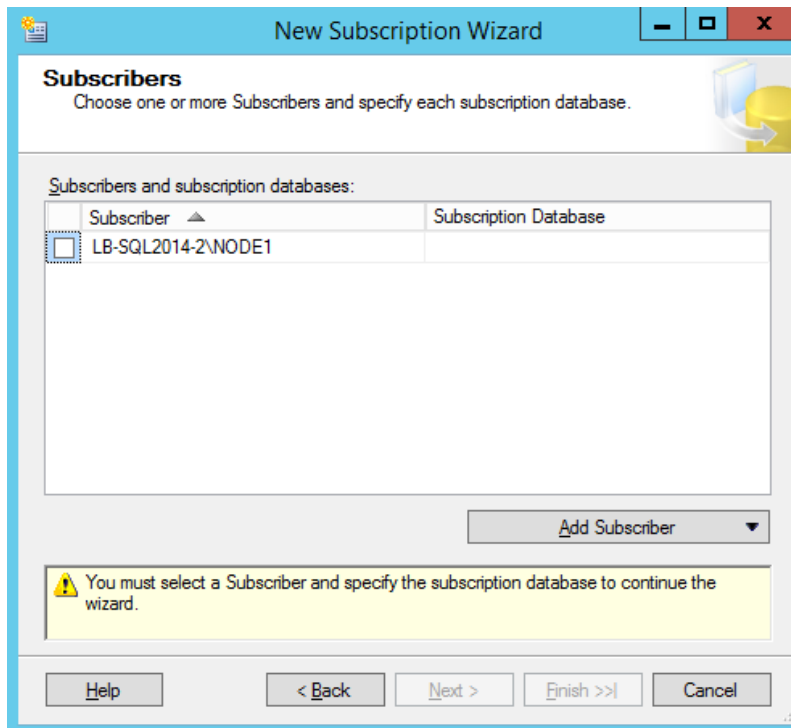
42. The New Subscription Wizard launches. Select the **Publisher** from the dropdown and select **AMC\_Publication**. Click **Next**.



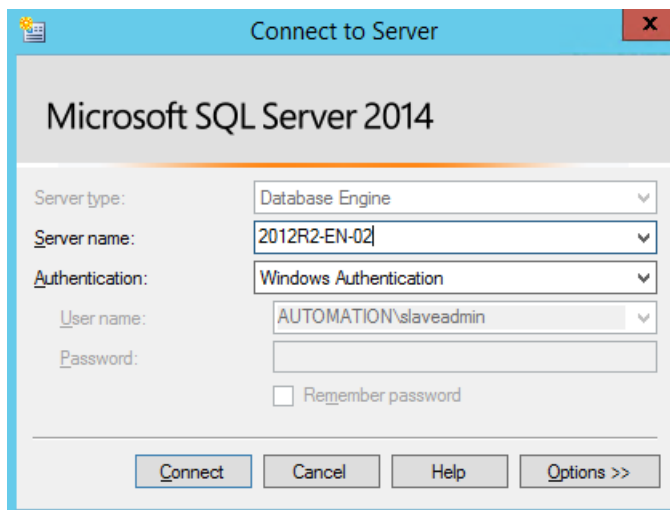
43. Select **Run all agents at the Distributor, [SQL name] (push subscriptions)** and click **Next**.



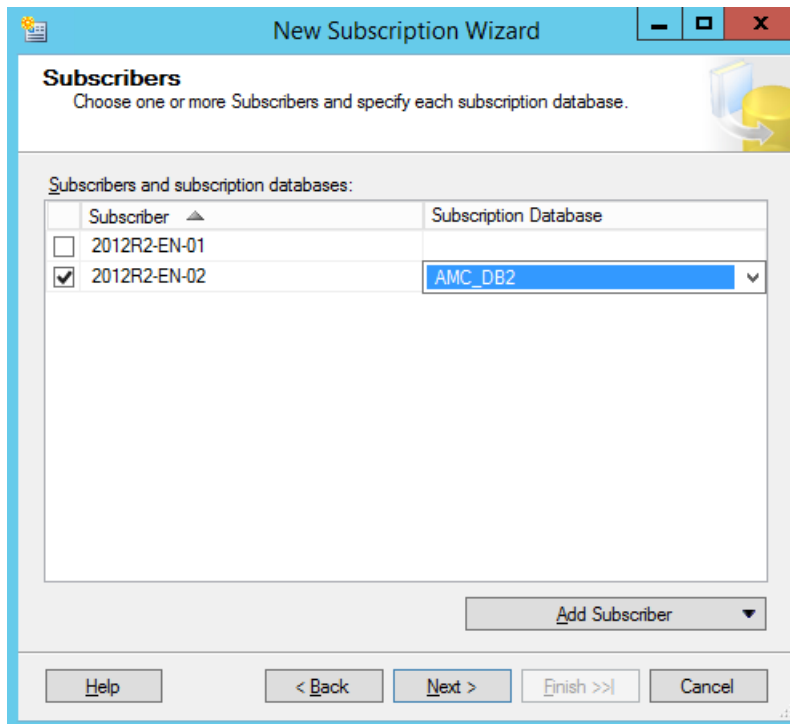
44. Select **Add Subscriber** -> **Add SQL Server Subscriber**.



45. In the SQL Server login dialog, enter the log in credentials to connect to the SQL Server. The Account must have SA rights.



46. Select the **ManagementServer** database on the Subscriber SQL node and then click **Next**.



**New Subscription Wizard**

**Subscribers**  
Choose one or more Subscribers and specify each subscription database.

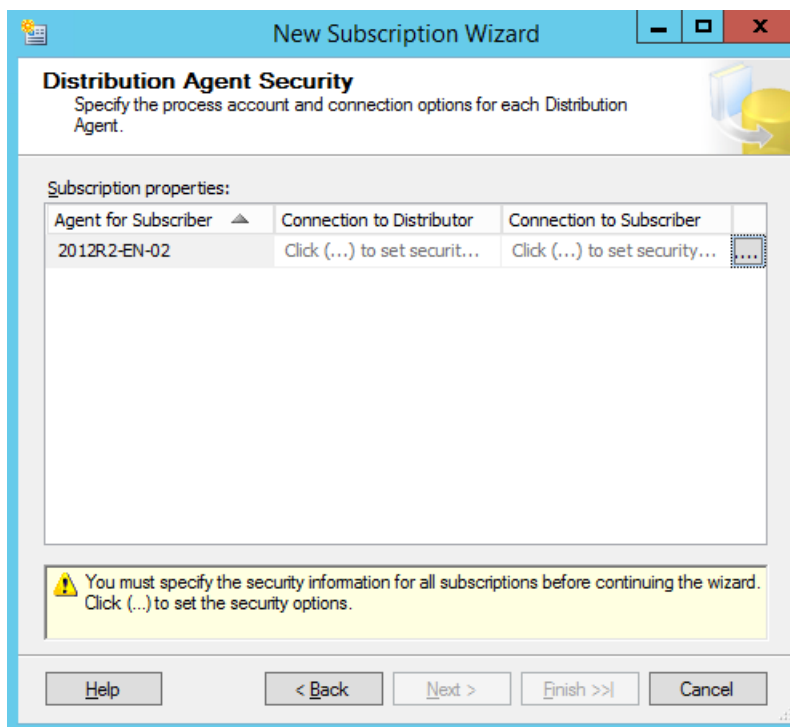
Subscribers and subscription databases:

Subscriber	Subscription Database
<input type="checkbox"/> 2012R2-EN-01	
<input checked="" type="checkbox"/> 2012R2-EN-02	AMC_DB2

Add Subscriber

Help < Back Next > Finish >> Cancel

47. Specify the **Process account** and the **Connection options** for the distribution agent.



**New Subscription Wizard**

**Distribution Agent Security**  
Specify the process account and connection options for each Distribution Agent.

Subscription properties:

Agent for Subscriber	Connection to Distributor	Connection to Subscriber
2012R2-EN-02	Click (...) to set securit...	Click (...) to set security... ..

You must specify the security information for all subscriptions before continuing the wizard. Click (...) to set the security options.

Help < Back Next > Finish >> Cancel

48. Select **Run under the SQL Server Agent service account**. Connect to the distributor and the subscriber by impersonating the process account. Click **OK**. Then click **Next**.



#### Note

Security is not compromised because the SQL Agent has already been configured to run under the context of a Windows Account and will use Kerberos authentication

Distribution Agent Security
X

Specify the domain or machine account under which the Distribution Agent process will run when synchronizing this subscription.

☐ Run under the following Windows account:

Process account:

Example: domain\account

Password:

Confirm Password:

☒ Run under the SQL Server Agent service account (This is not a recommended security best practice.)

Connect to the Distributor

☒ By impersonating the process account
 ☐ Using a SQL Server login

The connection to the server on which the agent runs must impersonate the process account. The process account must be a member of the Publication Access List.

Connect to the Subscriber

☒ By impersonating the process account
 ☐ Using the following SQL Server login:

Login:

Password:

Confirm password:

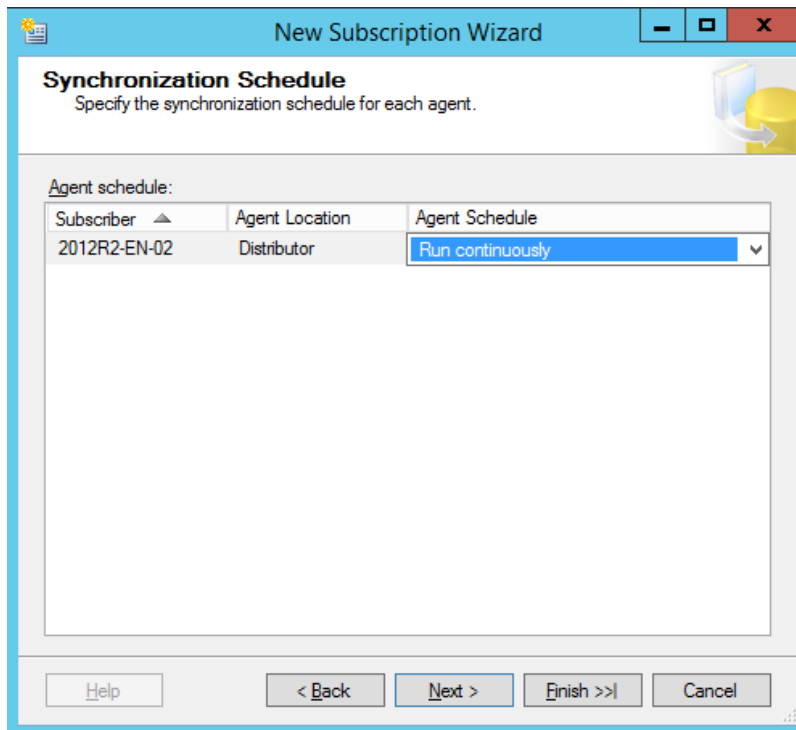
The login used to connect to the Subscriber must be a database owner of the subscription database.

OK

Cancel

Help

49. Ensure that the Agent is scheduled to **Run Continuously**. Click **Next**.



**New Subscription Wizard**

**Synchronization Schedule**  
Specify the synchronization schedule for each agent.

Agent schedule:

Subscriber	Agent Location	Agent Schedule
2012R2-EN-02	Distributor	Run continuously


Help < Back Next > Finish >> Cancel

50. Ensure that the Subscriber is initialized **Immediately**. Click **Next**.



#### Note

When using SQL Server 2016 the option to use Memory Optimization is available for each subscriber, this feature is **not** compatible with Ivanti User Workspace Manager (UWM) products.


New Subscription Wizard


### Initialize Subscriptions

Specify whether to initialize each subscription with a snapshot of the publication data and schema.

Subscription properties:

Subscriber	Initialize	Initialize When
2012R2-EN-02	<input checked="" type="checkbox"/>	Immediately

A subscription database needs to be initialized with a snapshot of the publication data and schema unless it has already been specially prepared for the subscription.


The Snapshot Agent must run and generate a snapshot of the publication before the subscriptions can be initialized.

Help

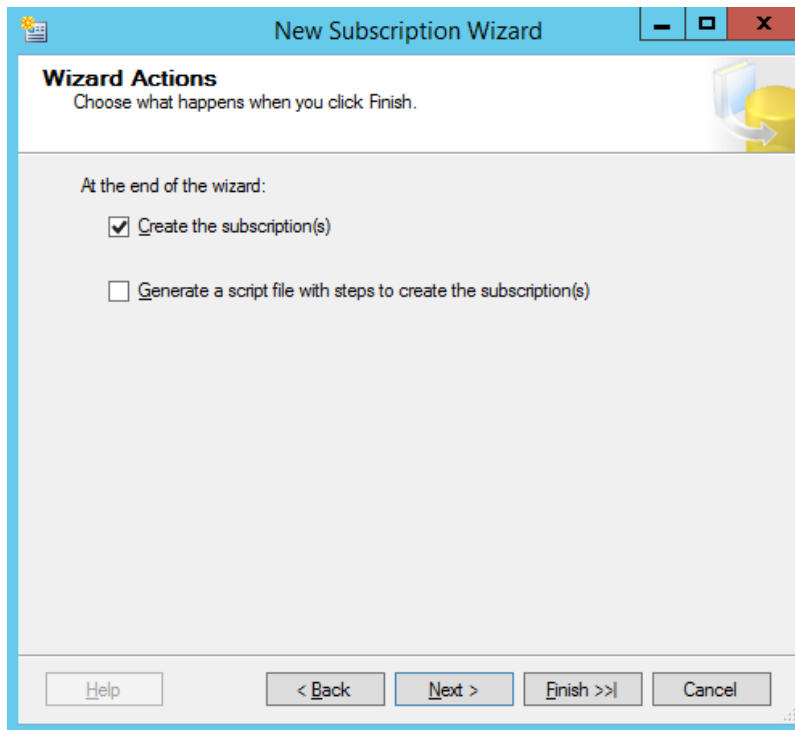
< Back

Next >

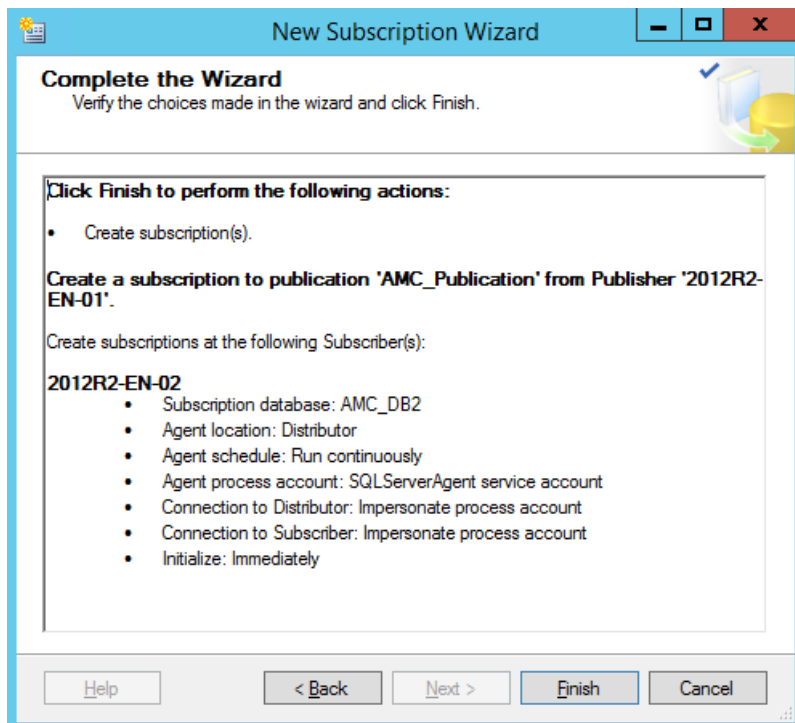
Finish >>|

Cancel

51. In Wizard Actions, select **Create the subscription(s)** and Click **Next**.

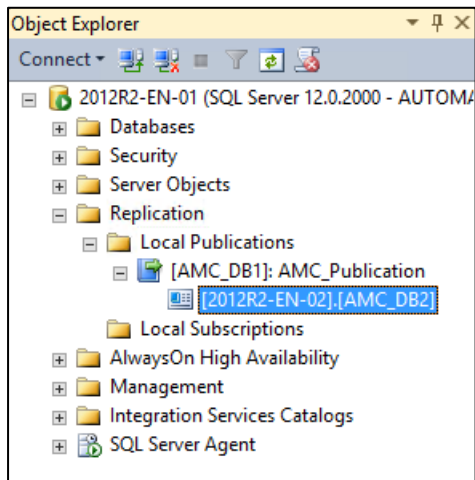


52. Click **Finish**. This creates a subscriber for the corresponding publisher.





53. Expand the **Local Publications** node to view the subscriber.



## Upgrading Management Servers When Replication Is Configured

In this section:

- [Removing Replication](#)
- [Upgrade Replication Publisher & Subscriber servers](#)
- [Setup new Replication](#)

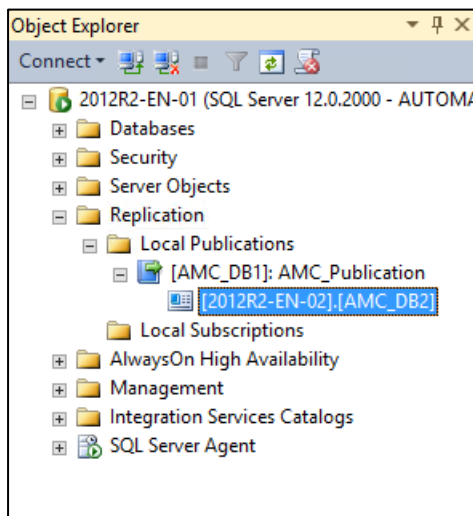
### Removing Replication

Remove the replication from the environment to ensure that the upgrades run smoothly.

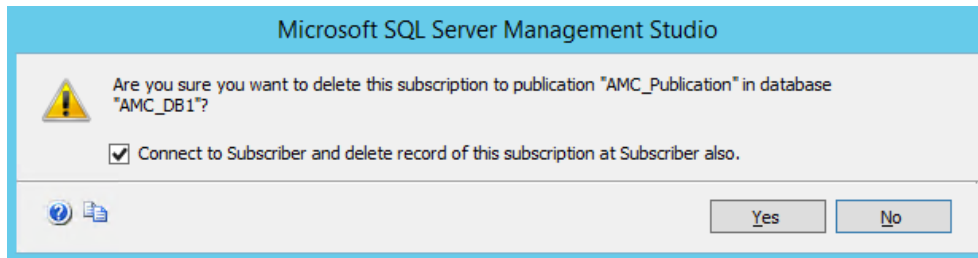
Removing replication leaves the replicated databases in a disconnected mode where updates to the publisher are no longer pushed to the subscribers. However, on the subscribers, events and alerts can still be collected and machines will still join groups. Removing replication does not prevent the subscriber servers operating for this automatic day-to-day usage.

Once replication is stopped, it is not be possible to push out new configurations or agents until the upgrade process is complete. Do not change configuration directly on the subscribers because this can cause failures when replication is re-enabled.

54. Open **Microsoft SQL Server Management Studio**.
55. Connect to the SQL instance that is acting as the publisher.
56. Expand the **Replication** node in Object Explorer until you see all the subscribers.



57. Select each subscriber in turn and delete using right-click > **Delete**. Ensure **Connect to Subscriber and delete record of this subscription at the Subscriber also** is selected.



58. Once all the subscribers are deleted, delete the Publication in the same way.

Once this is done, replication has been removed for the estate.

## Upgrade Replication Publisher & Subscriber Servers

Use the standard product guides to upgrade the Publisher and Subscriber servers.

Upgrades can be done in any order. However, replication can only be re-enabled when the publisher and subscriber have matching versions. Therefore, it may make sense to upgrade the Publisher server first, and then upgrade the Subscribers individually.

## Set Up New Replication

Once the **Publisher** server has been upgraded to the latest version, follow the steps in this document for configuring the publisher. See [Configuring the Publication](#).

Once a **Subscriber** server has been upgraded to the latest version, follow the steps in this document for configuring the subscribers. See [Configuring the Subscriber\(s\)](#)