Replication
Version 2018.3 SP1
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.
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:

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

![Replication Model Diagram]

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:

<table>
<thead>
<tr>
<th>Software</th>
<th>AMC 8.2</th>
<th>AMC 8.3</th>
<th>AMC 8 FR4</th>
<th>AMC 8 FR5</th>
<th>AMC 8.6</th>
<th>AMC 8.7</th>
<th>AMC 10.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft SQL Server 2008 R2</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Microsoft SQL Server 2012</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Microsoft SQL Server 2014</td>
<td></td>
<td></td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Microsoft Windows Server 2003 (32-bit and 64-bit editions)</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microsoft Windows Server 2008 R2</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Microsoft Windows Server 2012 R2</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
</tbody>
</table>

## 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:

```sql
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

Configuring a SQL Distribution involves three elements:

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

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

   ![Configure Distribution Wizard](image)

3. 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**.
4. 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.
Configure Distribution Wizard

SQL Server Agent Start
Select whether to automatically start the SQL Server Agent service when the computer is started.

Because the replication agents that synchronize subscriptions run unattended, you should configure SQL Server Agent to start automatically.

Do you want to configure the SQL Server Agent service on 2012R2-EN-01 to start automatically when the computer is started?

- Yes, configure the SQL Server Agent service to start automatically
- No, I will start the SQL Server Agent service manually

For the wizard to configure the SQL Server Agent service, the SQL Server service account must have administrator permissions on the server computer. If the service does not have these permissions, you must change the configuration manually.
The Snapshot Folder page displays.

5. 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**.
6. Change the name of the Distribution Database to **AMC_Distribution**. This ensures that the AMC distribution database can be clearly identified. Click **Next**.

7. Accept the Publishers default settings and click **Next**.
8. Select **Configure distribution**, and click **Next**.

9. Allow the Configure Distribution Wizard to complete.
10. All three elements should complete successfully, Configuring the Distributor, Enabling the Publisher, and Configuring the SQL Agent.

11. 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, and 10.1 – 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

1. Open SQL Server Management Studio and log in with an Account that has SA rights.
2. Open the supplied PrepareManagementCenterForReplication.sql. Ensure that the ManagementServer database is the active database in the toolbar.
3. Select Execute and ensure that the script completes successfully.
4. Right-click the Local Publications folder under the Replication folder. Select New Publication to launch the New Publication Wizard.

6. 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.

7. 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.
8. The properties table requires filtering, select **Add**. In the Add Filter dialog, select the **Properties (dbo)** table in the dropdown.

10. Click OK.

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

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

15. Select **Run under the SQL Server Agent service account** as the account under which the Snapshot Agent process will run.

16. 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.
17. The Agent Security page displays, click **Next**.

18. The Wizard Actions page displays, select **Create the publication**, and click **Next**.
19. The Complete the Wizard page displays, enter the name **AMC_Publication**. This ensures that the AMC articles can be clearly identified. Click **Finish**.

20. Both elements should complete successfully: Creating the Publication and Adding the articles.
21. Check that the Publication has been successfully created. Open the **Local Publications** node and ensure that **[ManagementServer]: AMC_Publication** is present.

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

#### 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 file: False
- Allow non-OSX 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
- Enable schema change: False

### Updateable subscriptions
- Allow immediate updating subscriptions: False
- Allow queued updating subscriptions: False

---

**Replicate schema changes**

Determines whether to replicate schema changes to published objects.
23. 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

1. Launch SQL Server Management Studio and log in with an Account that has SA rights.

2. Navigate to Replication > Local Publications > right-click the AMC_Publication and select New Subscriptions.
3. The New Subscription Wizard launches. Select the **Publisher** from the dropdown and select **AMC_Publication**. Click **Next**.

4. Select **Run all agents at the Distributor, [SQL name] (push subscriptions)** and click **Next**.
5. Select Add Subscriber -> Add SQL Server Subscriber.

6. In the SQL Server login dialog, enter the log in credentials to connect to the SQL Server. The Account must have SA rights.
7. Select the **ManagementServer** database on the Subscriber SQL node and then click **Next**.

8. Specify the **Process account** and the **Connection options** for the distribution agent.
9. 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.
10. Ensure that the Agent is scheduled to **Run Continuously**. Click **Next**.

11. 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.
Initialize Subscriptions
Specify whether to initialize each subscription with a snapshot of the publication data and schema.

<table>
<thead>
<tr>
<th>Subscriber</th>
<th>Initialize</th>
<th>Initialize When</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012R2-EN-02</td>
<td>✔️</td>
<td>Immediately</td>
</tr>
</tbody>
</table>

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

13. Click **Finish**. This creates a subscriber for the corresponding publisher.
14. 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.

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

4. 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.
5. 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)](#).