Sitecore CMS 6.3 - 7.2

SQL Server Replication Guide

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Chapter 1

SQL Server Replication Guide

This document provides guidance for using SQL Server replication with Sitecore.

This information in this document is valid for Sitecore CMS 6.3 and later. SQL Server replication is supported on Sitecore 6.3 and later.

This chapter contains the following sections:

- SQL Server Replication Overview
- SQL Server Replication Configuration

1.1.1 The Addition of a uniqueidentifier Column

SQL Server uses a globally unique identifier (GUID) column to identify each row in the table being replicated during the merge replication process. When configuring merge replication, you are prompted to add a **uniqueidentifier** column to tables that do not have it. Agree when prompted to proceed with the merge replication process.

- Troubleshooting SQL Server Replication

1.2 SQL Server Replication Overview

You can use SQL Server replication to synchronize Sitecore databases in multiple locations. For example, you can use SQL Server replication to synchronize the Master database between multiple Content Management (CM) environments.

Important:
Synchronize the operating system time between Content Management and Content Delivery environments. The operating system time must be the same for all CM, CD and database instances on all Web Servers and Database Servers.

1.2.1 Distributor

A distributor is a database server responsible for synchronizing data using SQL Server replication, managing publications and subscriptions. SQL Server uses a distribution database to manage replication.

1.2.2 Publication

A publication is a database to synchronize using SQL Server replication. Select a database in one environment as the publication database. The corresponding database(s) in other environments will function as subscriptions.

1.2.3 Subscriptions

A subscription is a database to synchronize using SQL Server replication.

Because any environment can initiate data changes in a replicated database, the publication database functions as a subscription database.

You can use any of the techniques described in the following sections to create subscriber databases from the publication database.

Initialize Subscriptions with a Database Backup

To initialize a subscriber with a database backup:

1. Disable write access to the publication database.
2. Archive the publication database.
3. Restore the database to replicate to as one or more subscribers.
4. Configure SQL Server replication as described in this document.
5. Enable write access to the publication and subscriber databases.

Initialize Subscriptions with a Snapshot Using a Network Share

To initialize a subscriber with a snapshot, when you are configuring SQL Server replication as described in this document, do the following:

1. Make sure that the `EventQueue` table on the publication server is empty. To do this, execute the following SQL command: `delete from EventQueue`. Otherwise you may experience problems with the initialization timestamp columns in the subscriber tables.
2. In the **New Publication Wizard**, in the **Snapshot Agent** window, select the **Create a snapshot immediately and keep the snapshot available to initialize subscriptions** check box.

For more information about the New Publication Wizard, see the section *Publication Configuration*.

Note
Because you only initialize a subscriber once, you do not need to schedule the snapshot agent.

Initialize Subscriptions with SQL Server Integration Services

You can initialize a subscriber by copying the publication database using SQL Server Integration Services.[1]

1.2.4 Replication Modes that Sitecore CMS Supports

Sitecore CMS supports Merge replication mode for Sitecore content databases.

Sitecore does not support Transactional and Snapshot replication modes due to technical limitations in conflict resolution, database schema requirements, and synchronization frequency associated with these modes. Sitecore has not tested Transactional and Snapshot replication modes and use of these modes may lead to unexpected behavior in regards to data and cache consistency.

Sitecore CMS does not support replication of the *Analytics* database in any way.

[1] For instructions to copy a database using SQL Server Integration Services, see http://msdn.microsoft.com/en-us/library/ms188664.aspx.

1.3 SQL Server Replication Configuration

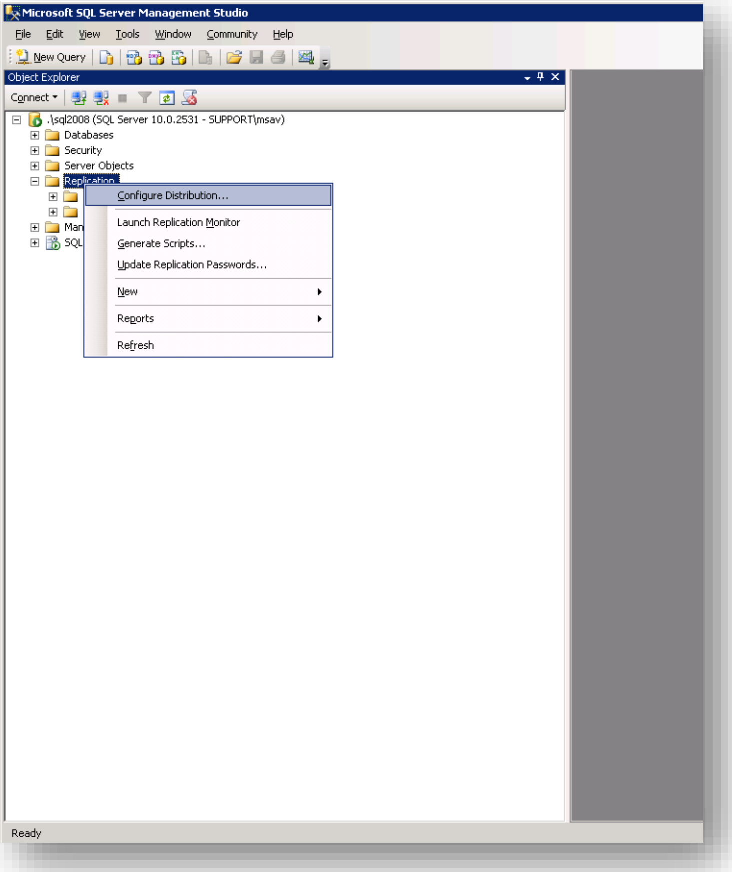
Consider the information in the following sections when configuring SQL Server replication.

To configure SQL Server to participate in SQL Server replication, you should ensure that the *SQL Server Agent Windows* service starts automatically.

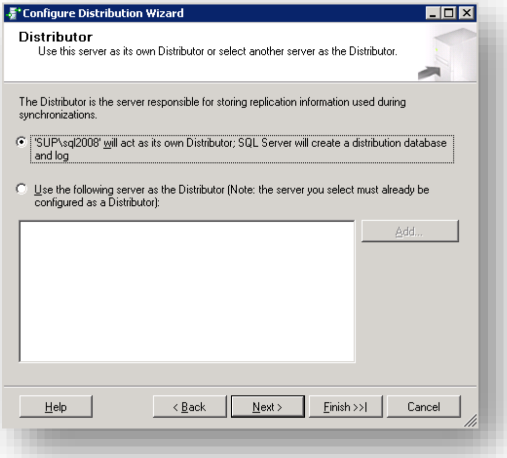
1.3.1 Distributor Configuration

To configure the publisher as the distributor:

1. Ensure that the *SQL Server Agent Windows* service starts automatically.
2. In **SQL Server Management Studio**, expand the branch for the database, right-click *Replication*, and then click **Configure Distribution**.


Microsoft SQL Server Management Studio
File Edit View Tools Window Community Help
New Query
Object Explorer
Connect
.\sql2008 (SQL Server 10.0.2531 - SUPPORT\msav)
Databases
Security
Server Objects
Replication
Man
SQL
Configure Distribution...
Launch Replication Monitor
Generate Scripts...
Update Replication Passwords...
New
Reports
Refresh
Ready

3. The **Configure Distribution Wizard** appears. Click **Next**.



Distributor

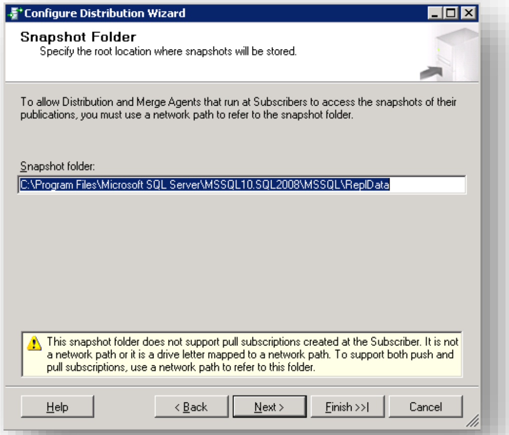
Use this server as its own Distributor or select another server as the Distributor.

The Distributor is the server responsible for storing replication information used during synchronizations.

● 'SUP\sql2008' will act as its own Distributor; SQL Server will create a distribution database and log

○ Use the following server as the Distributor (Note: the server you select must already be configured as a Distributor):

4. In the **Distributor** window, select the option that allows the database to act as its own distributor, and then click **Next**.



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.

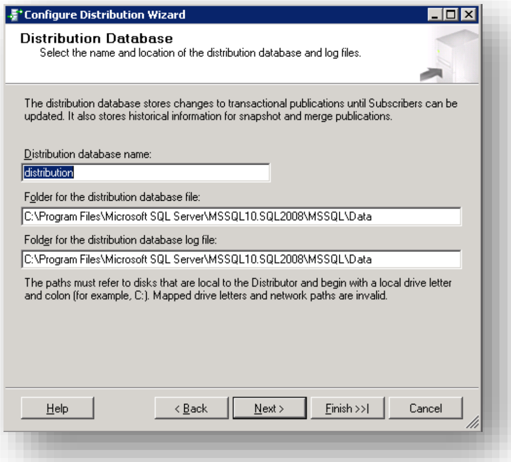
Snapshot folder: C:\Program Files\Microsoft SQL Server\MSSQL10.SQL2008\MSSQL\ReplData

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.

5. In the **Snapshot Folder** window, in the **Snapshot folder** field, enter the path to the folder where you want to store snapshots.

   To make snapshots easily available for initializing subscriptions, enter the path to a network share. For more information about initializing subscriptions, see the section *Subscriptions*.

6. Click **Next**.



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: distribution

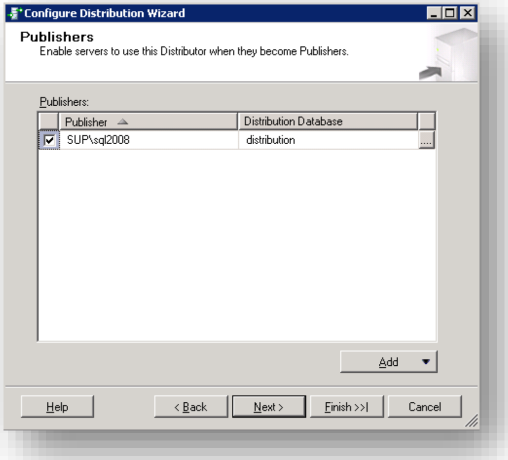
Folder for the distribution database file: C:\Program Files\Microsoft SQL Server\MSSQL10.SQL2008\MSSQL\Data

Folder for the distribution database log file: C:\Program Files\Microsoft SQL Server\MSSQL10.SQL2008\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.

7. In the **Distribution Database** window, in the **Distribution database name** field, enter a name for the distribution database.

8. In the **Folder for the distribution database file** field and in the **Folder for the distribution database log file** field, enter appropriate values and then click **Next**.



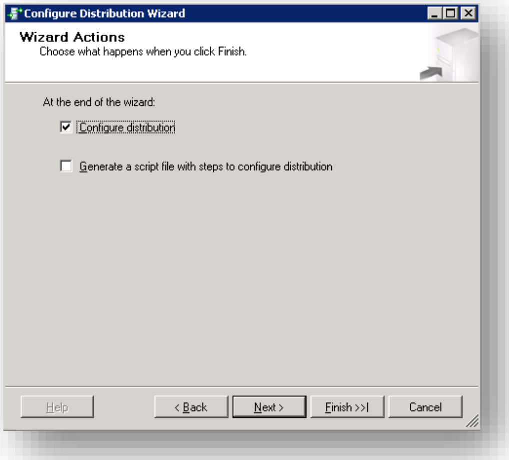
Publishers

Enable servers to use this Distributor when they become Publishers.

Publishers:

	Publisher	Distribution Database
☑	SUP\sql2008	distribution

9. In the **Publishers** window, select the database server, and then click **Next**.



Wizard Actions

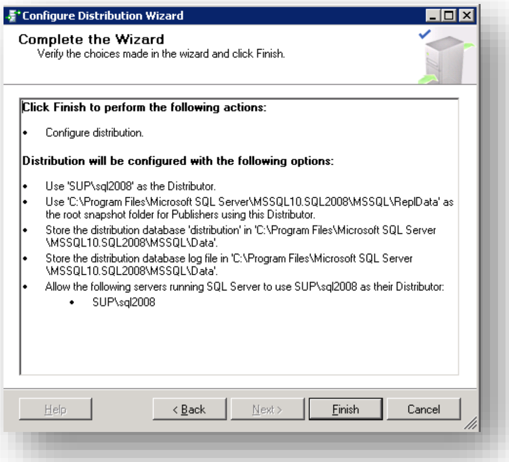
Choose what happens when you click Finish.

At the end of the wizard:

☑ Configure distribution

□ Generate a script file with steps to configure distribution

10. In the **Wizard Actions** window, select the **Configure distribution** check box, and then click **Next**.



Complete the Wizard

Verify the choices made in the wizard and click Finish.

Click Finish to perform the following actions:

- Configure distribution.

Distribution will be configured with the following options:

- Use 'SUP\sql2008' as the Distributor.
- Use 'C:\Program Files\Microsoft SQL Server\MSSQL10.SQL2008\MSSQL\ReplData' as the root snapshot folder for Publishers using this Distributor.
- Store the distribution database 'distribution' in 'C:\Program Files\Microsoft SQL Server \MSSQL10.SQL2008\MSSQL\Data'.
- Store the distribution database log file in 'C:\Program Files\Microsoft SQL Server \MSSQL10.SQL2008\MSSQL\Data'.
- Allow the following servers running SQL Server to use SUP\sql2008 as their Distributor:
    - SUP\sql2008

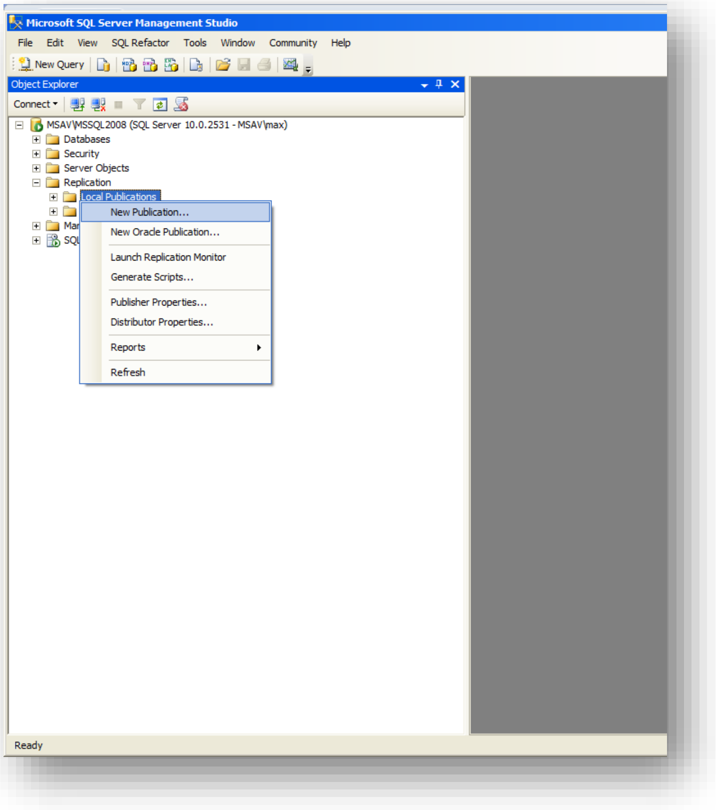
11. In the **Complete the Wizard** window, review the options that you selected and then click **Finish**.

1.3.2 Publication Configuration

To create a new publication:

1. Ensure that the *SQL Server Agent Windows* service starts automatically.

2. Open **SQL Server Management Studio**.


Microsoft SQL Server Management Studio
File Edit View SQL Refactor Tools Window Community Help
New Query
Object Explorer
Connect
MSAV\MSSQL2008 (SQL Server 10.0.2531 - MSAV\max)
Databases
Security
Server Objects
Replication
Local Publications
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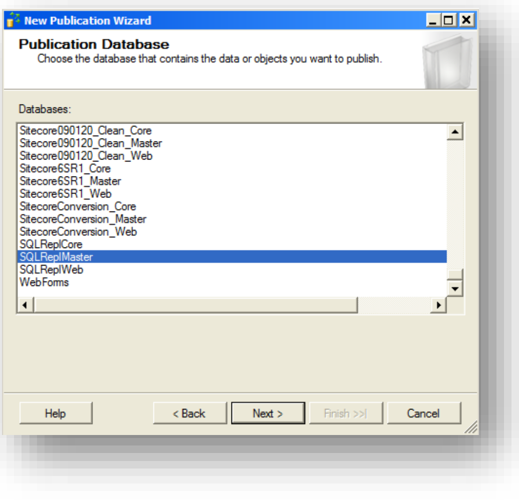
SQL
New Publication...
New Oracle Publication...
Launch Replication Monitor
Generate Scripts...
Publisher Properties...
Distributor Properties...
Reports
Refresh
Ready

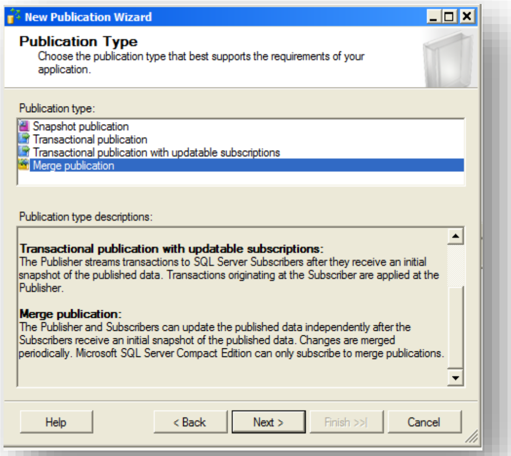
3. In **SQL Server Management Studio**, in the **Object Explorer**, expand the database, expand *Replication*, right-click *Local Publications*, and then click **New Publication**.

4. In the **New Publication Wizard** click **Next**.



Sitecore090120_Clean_Core
Sitecore090120_Clean_Master
Sitecore090120_Clean_Web
Sitecore6SR1_Core
Sitecore6SR1_Master
Sitecore6SR1_Web
SitecoreConversion_Core
SitecoreConversion_Master
SitecoreConversion_Web
SQLReplCore
SQLReplMaster
SQLReplWeb
WebForms

5. In the **Publication Database** window, select the publication database, and then click **Next**.



Publication Type

Choose the publication type that best supports the requirements of your application.

Publication type:

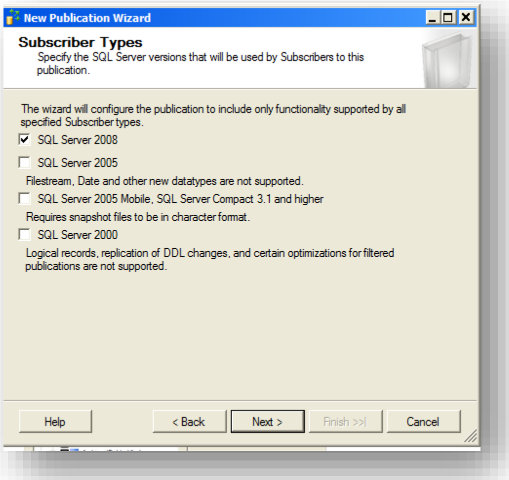
- Snapshot publication
- Transactional publication
- Transactional publication with updatable subscriptions
- Merge publication

Publication type descriptions:

Transactional publication with updatable subscriptions:
The Publisher streams transactions to SQL Server Subscribers after they receive an initial snapshot of the published data. Transactions originating at the Subscriber are applied at the Publisher.

Merge publication:
The Publisher and Subscribers can update the published data independently after the Subscribers receive an initial snapshot of the published data. Changes are merged periodically. Microsoft SQL Server Compact Edition can only subscribe to merge publications.

6. In the **Publication Type** window, in the **Publication Type** field, select *Merge publication*, and then click **Next**.



Subscriber Types

Specify the SQL Server versions that will be used by Subscribers to this publication.

The wizard will configure the publication to include only functionality supported by all specified Subscriber types.

☑ SQL Server 2008

☐ SQL Server 2005

Filestream, Date and other new datatypes are not supported.

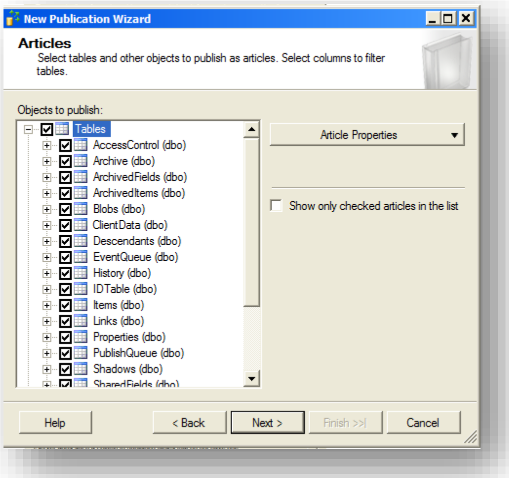
☐ SQL Server 2005 Mobile, SQL Server Compact 3.1 and higher

Requires snapshot files to be in character format.

☐ SQL Server 2000

Logical records, replication of DDL changes, and certain optimizations for filtered publications are not supported.

7. In the **Subscriber Types** window, select the version of SQL Server that all your Sitecore instances are running on, and then click **Next**.



Articles

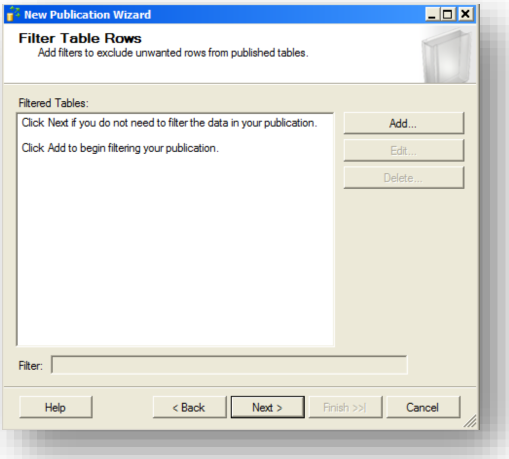
Select tables and other objects to publish as articles. Select columns to filter tables.

Objects to publish:

☑ Tables
- ☑ AccessControl (dbo)
- ☑ Archive (dbo)
- ☑ ArchivedFields (dbo)
- ☑ ArchivedItems (dbo)
- ☑ Blobs (dbo)
- ☑ ClientData (dbo)
- ☑ Descendants (dbo)
- ☑ EventQueue (dbo)
- ☑ History (dbo)
- ☑ IDTable (dbo)
- ☑ Items (dbo)
- ☑ Links (dbo)
- ☑ Properties (dbo)
- ☑ PublishQueue (dbo)
- ☑ Shadows (dbo)
- ☑ SharedFields (dbo)

□ Show only checked articles in the list

8. In the **Articles** window, select all of the tables, and then click **Next**.



Filter Table Rows

Add filters to exclude unwanted rows from published tables.

Filtered Tables:

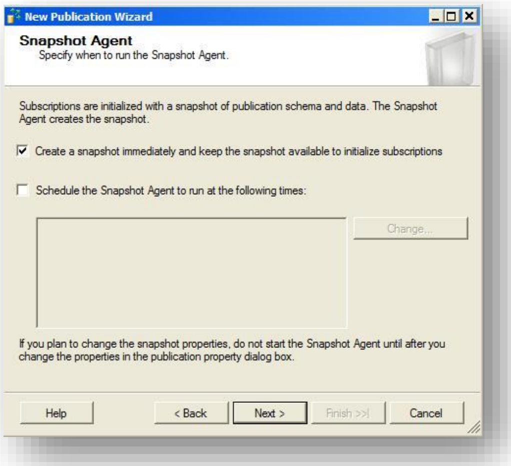
Click Next if you do not need to filter the data in your publication.

Click Add to begin filtering your publication.

Filter:

You do not need to replicate views.

9. In the **Filter Table Rows** window, click **Next**.



New Publication Wizard

Snapshot Agent

Specify when to run the Snapshot Agent.

Subscriptions are initialized with a snapshot of publication schema and data. The Snapshot Agent creates the snapshot.

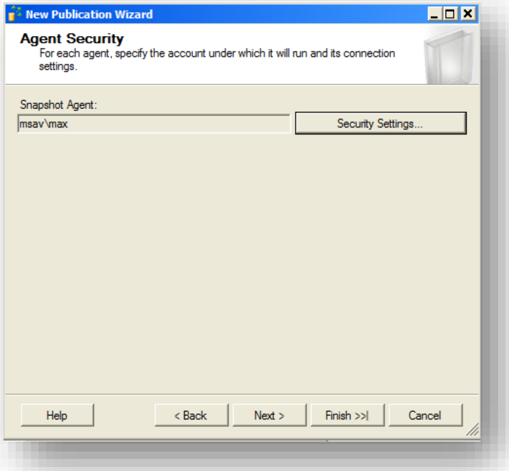
☑ Create a snapshot immediately and keep the snapshot available to initialize subscriptions

□ Schedule the Snapshot Agent to run at the following times:

If you plan to change the snapshot properties, do not start the Snapshot Agent until after you change the properties in the publication property dialog box.

10. In the **Snapshot Agent** window, select the **Create a snapshot immediately and keep the snapshot available to initialize subscriptions** check box, and then click **Next**.

    For more information about initializing subscriptions from snapshots, see the section *Initialize Subscriptions with a Snapshot Using a Network Share*.



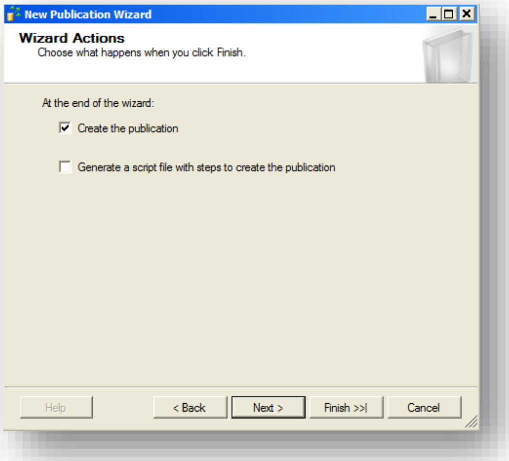
New Publication Wizard

Agent Security

For each agent, specify the account under which it will run and its connection settings.

Snapshot Agent: msav\max

11. In the **Agent Security** window, if you need to configure security, click **Security Settings**, and configure the security settings as required. Then click **Next**.



Wizard Actions

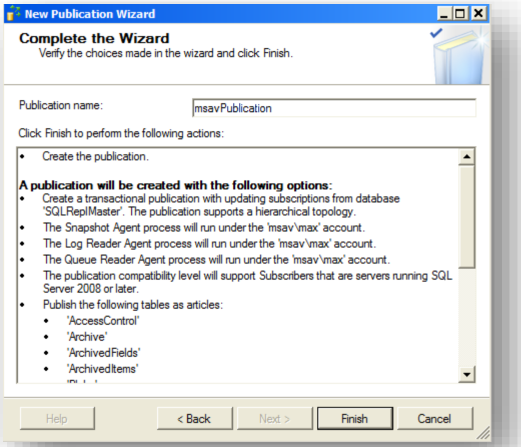
Choose what happens when you click Finish.

At the end of the wizard:

☑ Create the publication

☐ Generate a script file with steps to create the publication

12. In the **Wizard Actions** window, select the **Create the publication** checkbox, and then click **Next**.



Complete the Wizard

Verify the choices made in the wizard and click Finish.

Publication name: msavPublication

Click Finish to perform the following actions:

- Create the publication.

A publication will be created with the following options:

- Create a transactional publication with updating subscriptions from database 'SQLReplMaster'. The publication supports a hierarchical topology.
- The Snapshot Agent process will run under the 'msav\max' account.
- The Log Reader Agent process will run under the 'msav\max' account.
- The Queue Reader Agent process will run under the 'msav\max' account.
- The publication compatibility level will support Subscribers that are servers running SQL Server 2008 or later.
- Publish the following tables as articles:
  - 'AccessControl'
  - 'Archive'
  - 'ArchivedFields'
  - 'ArchivedItems'

13. In the **Complete the Wizard** window, in the **Publication name** field, enter a name for the publication, and then click **Finish**.

Note
You can enter any allowed value for **Publication name**.

14. To ensure that replication works, you must configure the publication to replicate the *EventQueue* table after the other tables.

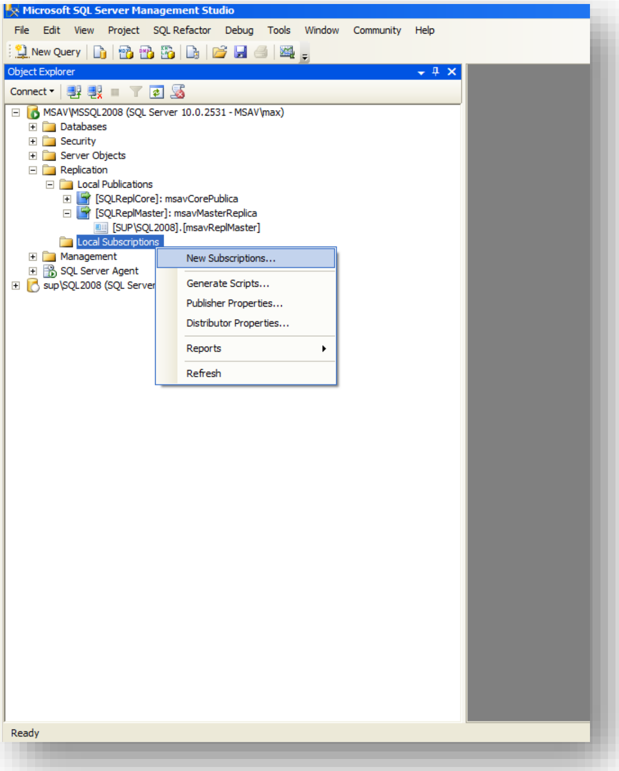
    To replicate the *EventQueue* table, execute the following SQL script on the Publication database:

```
EXEC sp_changemergearticle
            @publication = 'msavPublication',
            @article = 'EventQueue',
            @property='processing_order',
            @value=100;
GO
```

1.3.3 Subscription Configuration

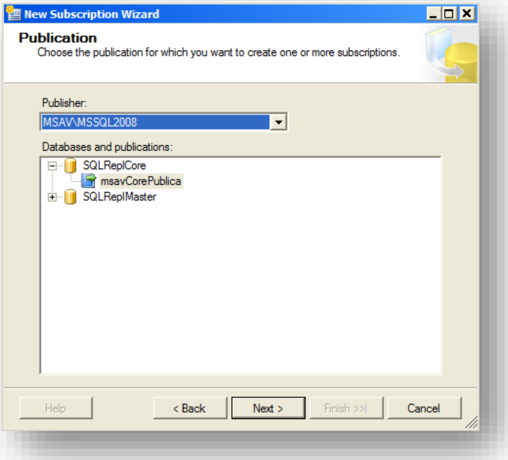
To configure subscription:

1. Ensure that the *SQL Server Agent Windows* service starts automatically.
2. In **SQL Server Management Studio**, expand the database, expand *Replication*, right-click *Local Subscriptions*, and then click **New Subscriptions**.



Microsoft SQL Server Management Studio
File Edit View Project SQL Refactor Debug Tools Window Community Help
New Query
Object Explorer
Connect
MSAV\MSSQL2008 (SQL Server 10.0.2531 - MSAV\max)
Databases
Security
Server Objects
Replication
Local Publications
[SQLReplCore]: msavCorePublica
[SQLReplMaster]: msavMasterReplica
[SUP\SQL2008].[msavReplMaster]
Local Subscriptions
Management
SQL Server Agent
sup\SQL2008 (SQL Server
New Subscriptions...
Generate Scripts...
Publisher Properties...
Distributor Properties...
Reports
Refresh
Ready

3. In the **New Subscription Wizard** that appears, click **Next**.



New Subscription Wizard

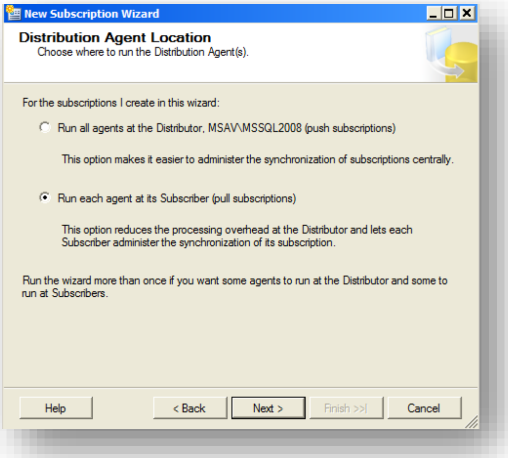
Publication

Choose the publication for which you want to create one or more subscriptions.

Publisher: MSAV\MSSQL2008

4. In the **Publication** window, in the **Publisher** field, select the publisher.

5. In the **Database and publication** field, select the publication and then click **Next**.



Distribution Agent Location

Choose where to run the Distribution Agent(s).

For the subscriptions I create in this wizard:

○ Run all agents at the Distributor, MSAV\MSSQL2008 (push subscriptions)

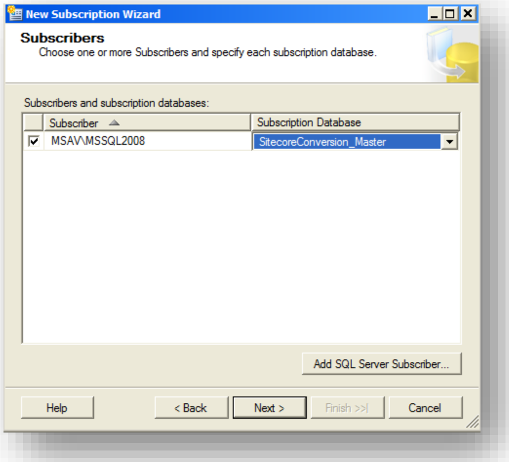
This option makes it easier to administer the synchronization of subscriptions centrally.

● Run each agent at its Subscriber (pull subscriptions)

This option reduces the processing overhead at the Distributor and lets each Subscriber administer the synchronization of its subscription.

Run the wizard more than once if you want some agents to run at the Distributor and some to run at Subscribers.

6. In the **Distribution Agent Location** window, select the **Run each agent as its Subscriber (pull subscriptions)** option to reduce the load on the distributor, and then click **Next**.



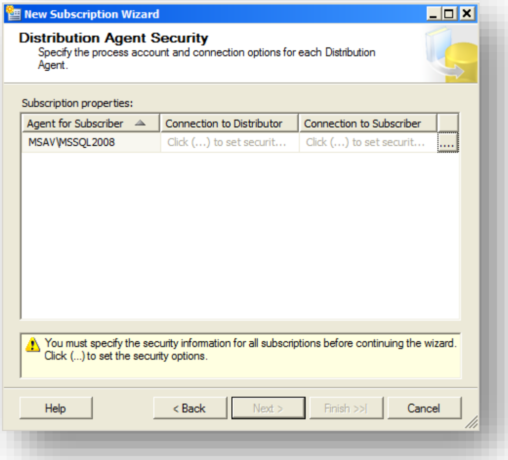
Subscribers

Choose one or more Subscribers and specify each subscription database.

Subscribers and subscription databases:

	Subscriber	Subscription Database
☑	MSAV\MSSQL2008	SitecoreConversion_Master

7. In the **Subscribers** window, add subscribers and subscription databases.



Distribution Agent Security

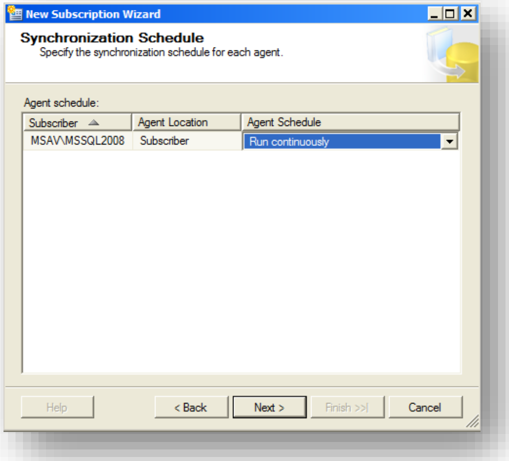
Specify the process account and connection options for each Distribution Agent.

Subscription properties:

Agent for Subscriber	Connection to Distributor	Connection to Subscriber
MSAV\MSSQL2008	Click (...) to set securit...	Click (...) to set securit...

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

8. In the **Distribution Agent Security** window, select an appropriate account for each subscriber, and then click **Next**.



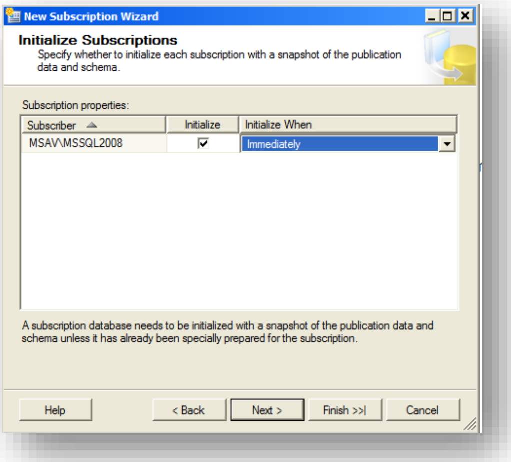
Synchronization Schedule

Specify the synchronization schedule for each agent.

Agent schedule:

Subscriber	Agent Location	Agent Schedule
MSAV\MSSQL2008	Subscriber	Run continuously

9. In the **Synchronization Schedule** window, in the **Agent Schedule** field, select *Run continuously*, and then click **Next**.



Initialize Subscriptions

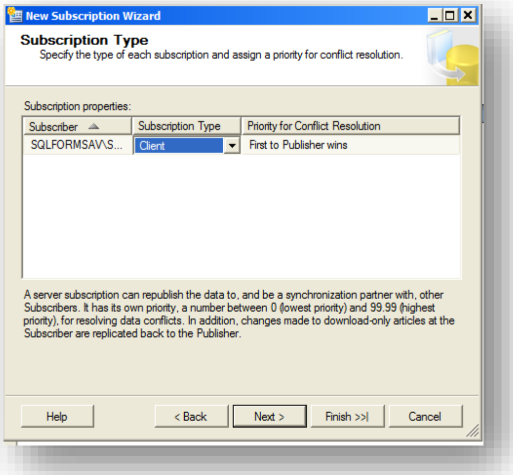
Specify whether to initialize each subscription with a snapshot of the publication data and schema.

Subscription properties:

Subscriber	Initialize	Initialize When
MSAV\MSSQL2008	☑	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.

10. In the **Initialize Subscriptions** window, in the **Subscription properties** field in the **Initialize When** column, select *Immediately*, and then click **Next**.



Subscription Type

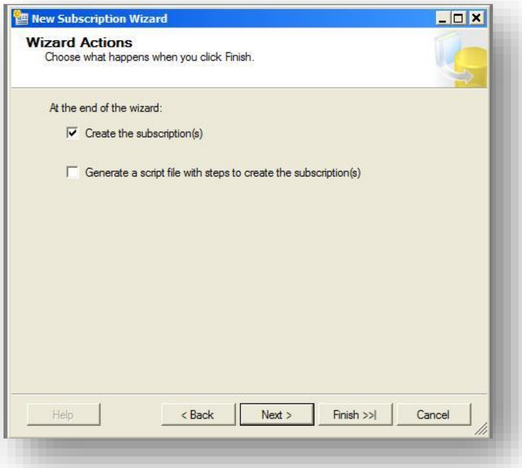
Specify the type of each subscription and assign a priority for conflict resolution.

Subscription properties:

Subscriber	Subscription Type	Priority for Conflict Resolution
SQLFORMSAV\S...	Client	First to Publisher wins

A server subscription can republish the data to, and be a synchronization partner with, other Subscribers. It has its own priority, a number between 0 (lowest priority) and 99.99 (highest priority), for resolving data conflicts. In addition, changes made to download-only articles at the Subscriber are replicated back to the Publisher.

11. In the **Subscription Type** window, in the **Subscription properties** field in the **Subscription Type** column, select *Client*, and then click **Next**.



Wizard Actions

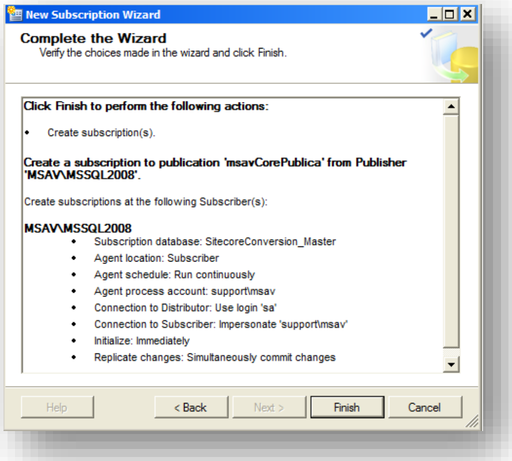
Choose what happens when you click Finish.

At the end of the wizard:

☑ Create the subscription(s)

□ Generate a script file with steps to create the subscription(s)

12. In the **Wizard Actions** window, select the **Create the subscription(s)** check box, and then click **Next**.



Complete the Wizard

Verify the choices made in the wizard and click Finish.

Click Finish to perform the following actions:

- Create subscription(s).

Create a subscription to publication 'msavCorePublica' from Publisher 'MSAV\MSSQL2008'.

Create subscriptions at the following Subscriber(s):

MSAV\MSSQL2008

- Subscription database: SitecoreConversion_Master
- Agent location: Subscriber
- Agent schedule: Run continuously
- Agent process account: support\msav
- Connection to Distributor: Use login 'sa'
- Connection to Subscriber: Impersonate 'support\msav'
- Initialize: Immediately
- Replicate changes: Simultaneously commit changes

13. In the **Complete the Wizard** window, review the option you selected, and then click **Finish**.

1.3.4 Polling Interval

By default, SQL Server merges replication polls for data to synchronize at an interval of 60 seconds. This value may be incorrect for certain environments.

Warning
Reducing the polling interval can increase server load.

To configure the polling interval:

1. In **SQL Server Management Studio**, expand **SQL Server Agent**, then expand the **Jobs** folder, right-click the merge agent job, and then select **Properties**. The **Job Properties** dialog box appears.

2. In the **Job Properties** dialog box, click the **Steps** tab, select the **Run Agent** step, and then click **Edit**. The **Job Step Properties** dialog box appears.
3. In the **Job Step Properties** dialog box, in the **Command** field, add `–PollingInterval <seconds>`, where `<seconds>` is the number of seconds between polls.

   For example, enter -`PollingInterval 1` to poll for data changes every second.

1.3.5 Replication Agent Profiles

To improve performance, you can configure the high-volume server-to-server replication SQL Server Replication Agent Profiles for the merge replication agent.[2]

1.3.6 The Addition of a uniqueidentifier Column

SQL Server uses a globally unique identifier (GUID) column to identify each row in the table being replicated during the merge replication process. When configuring merge replication, you are prompted to add a **uniqueidentifier** column to tables that do not have it. Agree when prompted to proceed with the merge replication process.

[2] For more information about SQL Server Replication Agent Profiles, see http://technet.microsoft.com/en-us/library/ms151223.aspx.

1.4 Troubleshooting SQL Server Replication

This section contains instructions for troubleshooting issues with SQL Server replication.

1.4.1 Cannot Execute sp_replcmd

The log reader agent can fail to start with an error such as the following:

Cannot execute sp_replcmd

In this case, execute the following query on the publisher for the problematic database:

```
        exec sp_changedbowner 'sa'
```

1.4.2 The Identity Range Managed by Replication Is Full

SQL Server can raise an exception such as the following:

The identity range managed by replication is full and must be updated

In this case, to prevent collisions when automatically incrementing identifiers, you should configure the publications and subscribers to use different ranges for the identity columns.

The columns that may cause this exception are WorkflowHistory and PublishQueue. For Sitecore versions 6.3.0 and 6.4.0, the **EventQueue** column may also cause this exception. For Sitecore versions 6.3.1, 6.4.1 and later EventQueue cannot cause this exception.

To configure identity ranges:

1. In **Microsoft SQL Server Management Studio**, expand **Replication**, expand **Local Publications**, then right-click the publication, and then click **Properties**. The **Publication Properties** dialog box appears.
2. In the **Publication Properties** dialog box, click **Articles**.
3. In the **Publication Properties** dialog box, right-click the problematic table, and then click **Set Properties of This Table Article**. The **Article Properties** dialog box appears.
4. In the **Article Properties** dialog box, under **Identity Range Management**, enter alternate values for **Publisher range size** and **Subscriber range size**.

1.4.3 The Merge Process Was Unable to Deliver the Snapshot to the Subscriber

You can get the following SQL error when replication for a database is set if the `EventQueue` table is not empty:

```
The merge process was unable to deliver the snapshot to the Subscriber. If
using Web synchronization, the merge process may have been unable to create
or write to the message file. When troubleshooting, restart the
synchronization with verbose history logging and specify an output file to
which to write.
The process could not bulk copy into table '"dbo"."EventQueue"'.
Could not bulk load. The sorted column 'Stamp' is not valid. The ORDER hint
is ignored.
```

The reason is that the SQL server cannot initialize a subscriber database from the snapshot, which contains values in a column of the "Timestamp" type (the `EventQueue` table has such a column).

In this case, do the following (assuming that you set replication to DB1 and DB2, publication is set to DB1, and subscription is set to DB2):

1. Remove the subscription for the DB2 database (under the Local Subscriptions node in the SQL Management studio).
2. Remove the publication of the DB1 database (under the Local Publications node in SQL Management studio).
3. Erase all the rows in the `EventQueue` table of the DB1 database (perform the `TRUNCATE TABLE EventQueue` SQL command).
4. Disable write access to the DB1 database or make sure in another way that it is not modified and no rows are added to the `EventQueue` table until you finish setting a new publication.
5. Create a publication of the DB1 database (so that the snapshot is created while the `EventQueue` table is empty).
6. Create an empty database (for example NewDB2) to use it as a subscription database instead of the DB2 one (the DB2 database is no longer needed).
7. Set a subscription for the NewDB2 database (so that the NewDB2 database is initialized from the snapshot).