



# Data Replication

## Setup Guide for Replicating Data Via a Web Service

Version 9.8.0.19

Software Release Date: 7/22/21

## Document History

Version	Author	Date	Reviewer	Date	Comments
1	JHLorenzin	7/19/21	ALaspertini	7/19/21	

# Syniti Data Replication

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# Syniti Data Replication

Syniti Data Replication allows you to replicate data from relational database tables to a remote target using the **SDR Web Service** in the following ways:

- **Refresh (Snapshot replication)**

A one-time complete replication from any major relational database source to a remote target, according to replication settings and scripts. You can control the timing of the replication, identify the columns to be replicated and add scripts to transform data during replication. Source databases include Oracle, Microsoft SQL Server, IBM Db2 for i, IBM Db2 LUW, Sybase, Informix, MySQL.

**Continuous refresh**

A regularly scheduled refresh replication as described above. The schedule is defined in the replication settings.

- **One-way mirroring (Incremental Replication)**

A continuous update of replicated tables based on changes to the source database that have been recorded in the database server log. Typically, this involves an initial refresh operation, as described above, to set up the target table. Then you can define the replication settings to check the transaction log on the source database at regular intervals. Any changes found in the log are applied to target data by connecting to the target platform via a web service.

For complete details on the setup process, check the *Syniti Data Replication User Guide* available from the Management Center **Help** menu or the *Syniti Data Replication Setup Guide*, available for download in the [Help Center](#).

## Overview

Syniti Data Replication can regularly collect changes to data stored in one database and update another database with the changes when the source and target databases are connected via some form of network. However, with the advent of cloud computing and an increased need for network security, there is a need to perform the same change data capture operations between databases with no direct network connection. Syniti Data Replication offers a solution to manage data changes via a web service. For optimal performance, it is designed primarily to capture changes only in the source database and propagate those changes to the target.

This solution is designed for environments with the Microsoft IIS web server, and uses .NET Data Providers to connect to source and target databases. It supports all the major databases listed in the [Help Center](#) as source databases and Microsoft SQL Server, Oracle, SAP Sybase ASE and IBM DB2 for i, LUW and z/OS as target databases.

## Installation Requirements

For the system running the SDR Web Service:

- Microsoft IIS 6 or above
- An accessible installation of Microsoft SQL Server for the Web Service log.

**Note on Microsoft SQL Server:** You need an accessible installation of SQL Server for the Web Service and the Replication Agent to write messages to a SQL Server log. The SQL Server connection is defined in the Web.config configuration file. The SQL Server installation can be available via a network. It does not need to be installed locally.

**Note on included components:** Syniti DR makes use of SharpZipLib, and ICSharpCode.SharpZipLib.dll is distributed with the product. For all licensing terms and conditions related to SharpZipLib, and to download the source code for the library, please access the following link: <http://www.icsharpcode.net/opensource/sharpziplib/>.

## Installation and Configuration Overview

The steps below provide an overview of the installation and configuration process. Each step is described in more detail in following sections

- 1. Source Database .NET Data Provider**  
Install and test the .NET Data Provider for the source database (to be used by DBMoto Cloud Edition to access changed data.)
  - 2. Target Database .NET Data Provider**  
Install and test the .NET Data Provider for the target database (to be used by the SDR Web Service to update tables on the remote system.)
  - 3. Install the SDR Web Service**  
Copy the files in the Syniti Data Replication install folder <SDR\_Install\_Folder>\ServerFiles\WebService to c:\inetpub\wwwroot\SDRWebService and set up the Microsoft IIS SDR Web Service.
  - 4. Source and Target Connections**  
In the Syniti DR Management Center, configure source and target connections, taking care to set target data to go to XML output.
  - 5. Replication Setup**  
In the Syniti DR Management Center, set up replications.
  - 6. Edit web service configuration file** to set up the target systems for replicated data and the SQL Server database for logging.
- 1. Run Syniti Replications**  
Activate the Replication Agent.

## Replication Process Overview

1. Replication Agent initiates replication to detect changes on source database.
2. Replication Agent outputs changes to an XML file.
3. Replication Agent calls the SDR Web Service with compressed SQL commands to process on the target database.
4. SDR Web Service updates the target tables.
5. SDR Web Service returns results.
6. SDR Web Service updates log database (SQL Server) with results.

## Set up SDR Web Service

The SDR Web Service interacts with Syniti Data Replication via the Replication Agent to decompress the XML-formatted SQL commands passed to it from the Replication Agent, and then run the SQL commands against the target database via a .NET Data Provider.

Install the web service as follows:

1. On the server where you plan to install the SDR Web Service, make sure that you have correctly installed Microsoft IIS 6.0 or higher, and ASP.NET.
2. Run the IIS Manager.

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3. Create a directory called SDRWebService for the default web site (wwwroot.)
4. Copy the files in the Syniti Data Replication install folder <SDR\_Install\_Folder>\ServerFiles\WebService to c:\inetpub\wwwroot\SDRWebService directory you just created. The new SDRWebService folder should contain the following files:  
DBMotoCloud.asmx  
Global.asax file  
Web.config  
bin\DBMotoCloud.Common.dll  
bin\DBMotoCloud.dll  
bin\ICSharpCode.SharpZipLib.dll  
bin\log4net.dll
5. Start the IIS Manager from the Administrative Tools option in the Windows Control Panel.
6. In the IIS Manager, select the SDRWebService directory and, from the right mouse button menu, choose "Convert to application."
7. In the Web.config file, locate the <connectionString> element under <log4net> and edit the connection string to point to the Microsoft SQL Server installation to use for logging Web Service activity. The tables for logging will be created automatically based on the login ID and catalog you supply.

```
<log4net>
  <root>
    <level value="DEBUG" />
    <appender-ref ref="WebAppender" />
  </root>
  <appender name="WebAppender" type="log4net.Appender.AdoNetAppender">
    <bufferSize value="1" />
    <connectionType value="System.Data.SqlClient.SqlConnection, System.Data,
Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089" />
    <connectionString value="Data Source=MyLocalSQLServer;Initial
Catalog=myDatabase;User ID=algl;Password=mypwd" />
  </appender>
</log4net>
```

8. Save changes to the Web.config file.  
You will later need to edit this file again to add target connections that you create in the Management Center.

## Set up a Replication via Web Service

One-way mirroring provides a continuous update of a replicated table based on changes to the source database that have been recorded in the database server log. Typically, this involves an initial refresh operation to set up the target table with data from the source table. Then you can define the replication settings to check the transaction log on the source database at regular intervals. Any changes found in the log are applied to the target database.

The following targets are supported when replicating using the SDR Web Service:

Microsoft SQL Server  
IBM DB2 for i, LUW and z/OS  
Oracle  
SAP Sybase ASE

Before setting up connections and a replication in Syniti Data Replication:

- Make sure you have database connections via a .NET data provider to the source database tables.

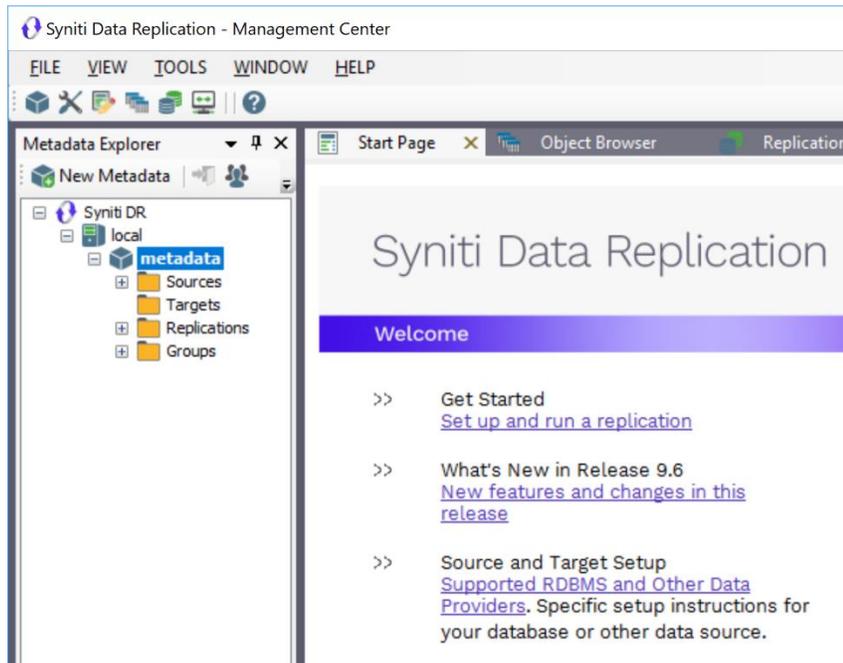
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- On a system connected to the target database, make sure there is a .NET data provider to access the target tables.

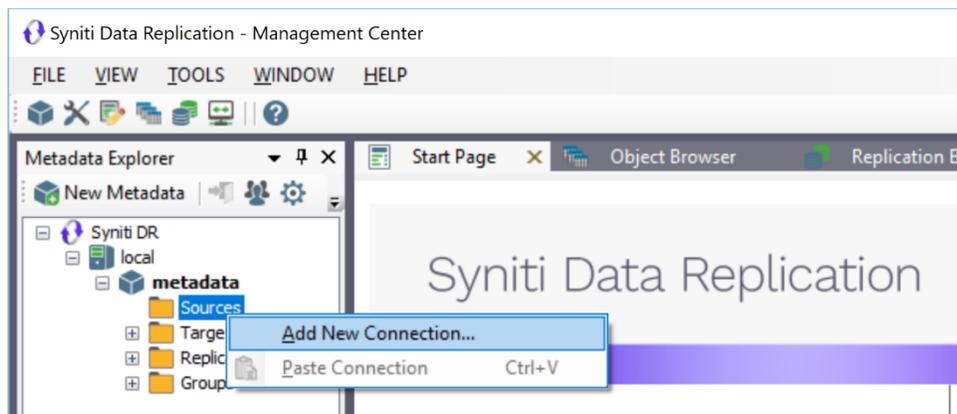
## 1. Create a Source Connection

1. Start Syniti DR Management Center.

Syniti DR provides a default database (Microsoft SQL Server CE) for your metadata, all the information that Syniti DR needs to store about your replication setup.



2. In the Metadata Explorer, expand the metadata node to view the **Sources** and **Targets** nodes.
3. Select the **Sources** node.
4. From the right mouse button menu, choose **Add New Connection**.

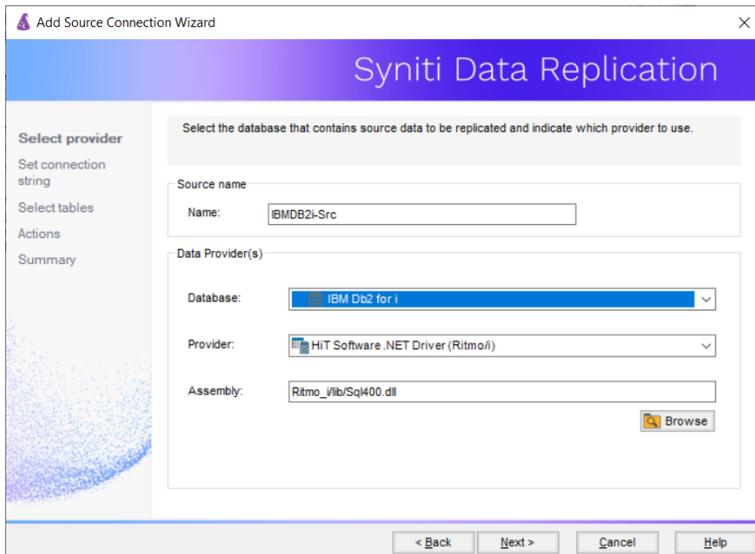


5. In the Add Source Connection Wizard, follow steps to add a connection string and test the connection to the database.

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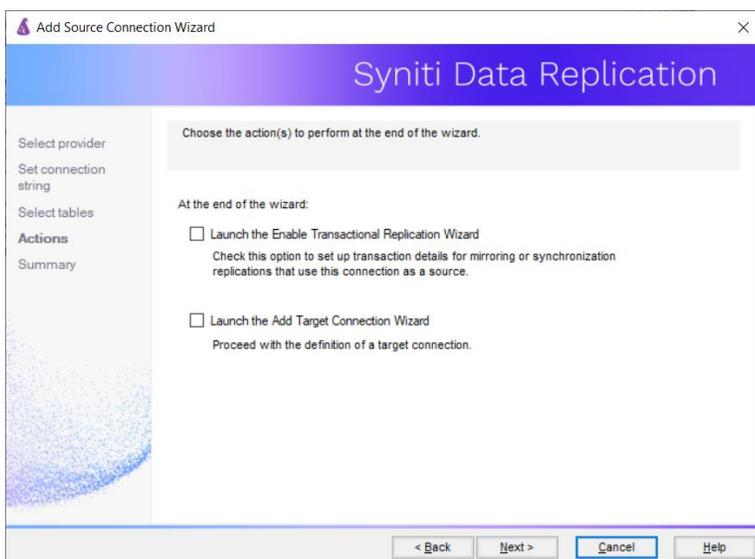
# Syniti Data Replication

Check the Supported Provider List in the [Help Center](#) before entering a value in the **Assembly** field.



The screenshot shows the 'Add Source Connection Wizard' dialog box with the 'Select provider' screen selected. The wizard title is 'Syniti Data Replication'. The main instruction is 'Select the database that contains source data to be replicated and indicate which provider to use.' The 'Source name' field contains 'IBMDB2-Src'. The 'Data Provider(s)' section has three fields: 'Database' is set to 'IBM Db2 for I', 'Provider' is set to 'HiT Software .NET Driver (Ritmo/I)', and 'Assembly' is set to 'Ritmo\_vlibrSql400.dll'. There is a 'Browse' button next to the Assembly field. At the bottom, there are navigation buttons: '< Back', 'Next >', 'Cancel', and 'Help'.

6. In the **Select Tables** screen, choose the tables that you plan to replicate.
7. In the **Actions** screen, check the option **Launch the Enable Transactional Setup Wizard**.



The screenshot shows the 'Add Source Connection Wizard' dialog box with the 'Actions' screen selected. The wizard title is 'Syniti Data Replication'. The main instruction is 'Choose the action(s) to perform at the end of the wizard.' Under the heading 'At the end of the wizard:', there are two options, both with unchecked checkboxes: 'Launch the Enable Transactional Replication Wizard' (with a sub-note: 'Check this option to set up transaction details for mirroring or synchronization replications that use this connection as a source.') and 'Launch the Add Target Connection Wizard' (with a sub-note: 'Proceed with the definition of a target connection.'). At the bottom, there are navigation buttons: '< Back', 'Next >', 'Cancel', and 'Help'.

8. Complete the wizard.

## 2. Enable Transactional Replication

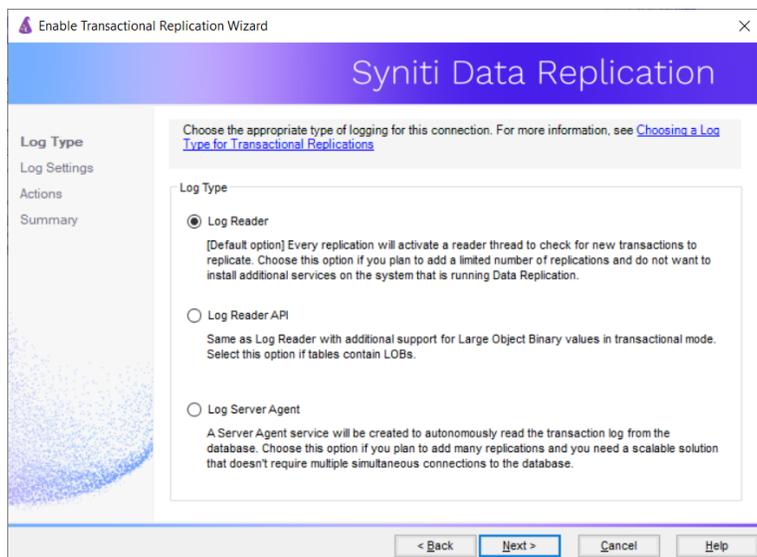
This section assumes you are planning to replicate data to a Cassandra target using mirroring (rather than Refresh) from a relational database. For Refresh replications, you do not need to complete the Enable Transactional Replication wizard. If you have checked the Source Connection wizard option to launch the Enable Transactional Replication wizard, follow the steps below. To open the wizard from the Management Center, choose the connection in the Metadata Explorer, then right-click to choose Transactional Setup > Enable...

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In the **Enable Transactional Replication wizard**:

1. Select the type of transactional replication to use. The options depend on the source database and can include log reader, log server agent, triggers, plus log reader API (for IBM Db2 for i only). Check the help for more information on the best option.

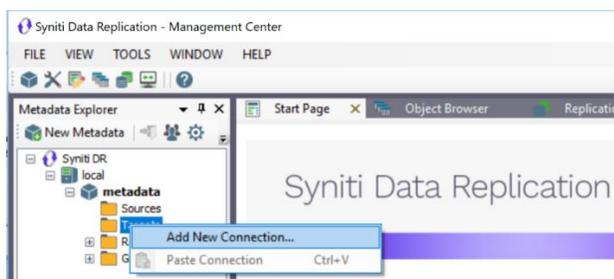


2. Click **Next** to enter the log settings. The fields and appropriate values depend on the database and log type. You can obtain a setup guide for a specific relational database by making a request in the [Help Center](#).
3. Click **Next** to verify your settings against the source connection to the database. If any information is missing, you will not be able to proceed.
4. In the Actions screen, check the option to launch the **Add Target Connection wizard**.
5. Click **Next** to review your changes.
6. Click **Finish** to complete the wizard.

The source connection is now set up for transactional replications.

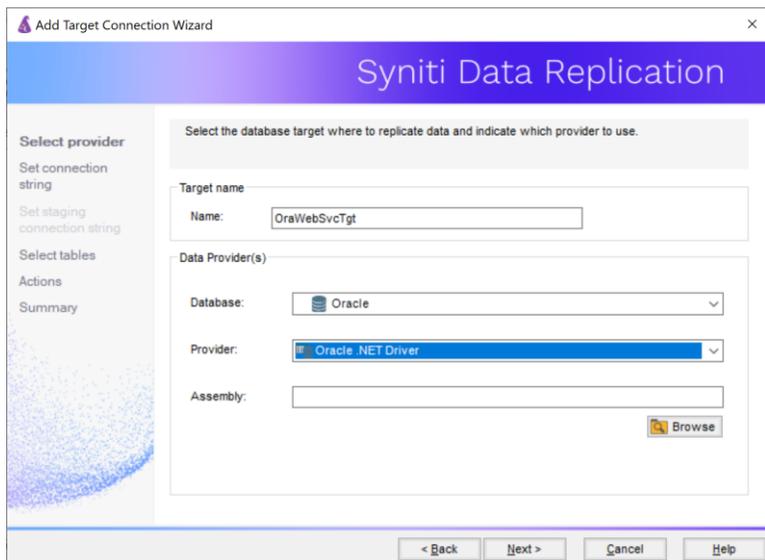
## 3. Create a Target Connection

1. Select the **Targets** node.
2. From the right mouse button menu, choose **Add New Connection**.

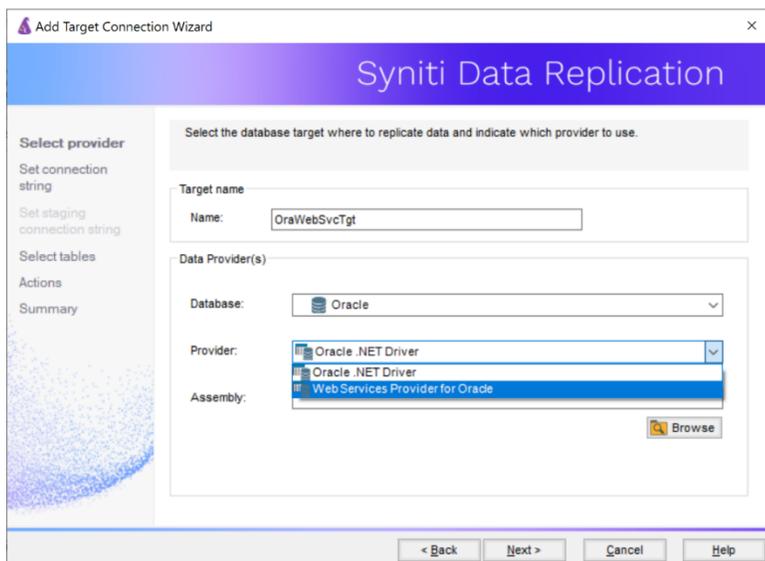


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3. In the Target Connection Wizard Provider field, select one of the supported target databases.

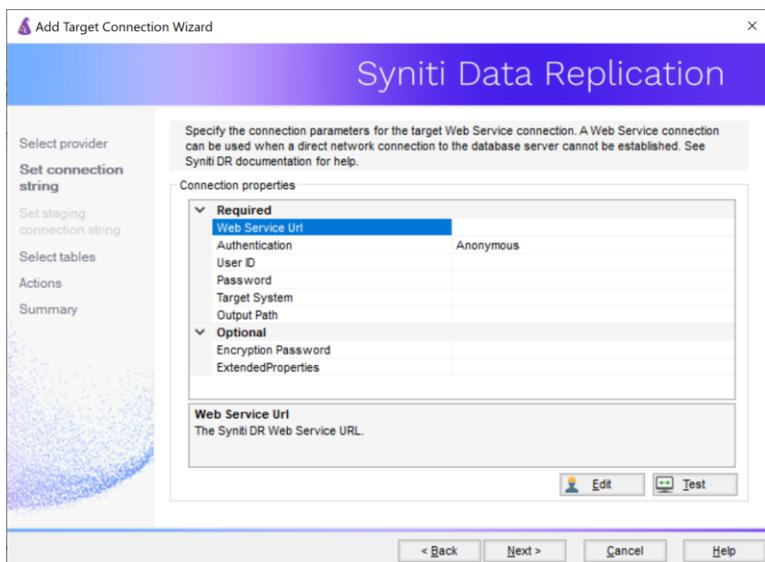


4. Click the down arrow in the Provider field to choose the Web Services Provider option.



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- In the **Set Connection String** page, set values for the Web Service Url, Target System and Output Path fields to manage the folders that the Broker monitors for processing, and configure the target database details.

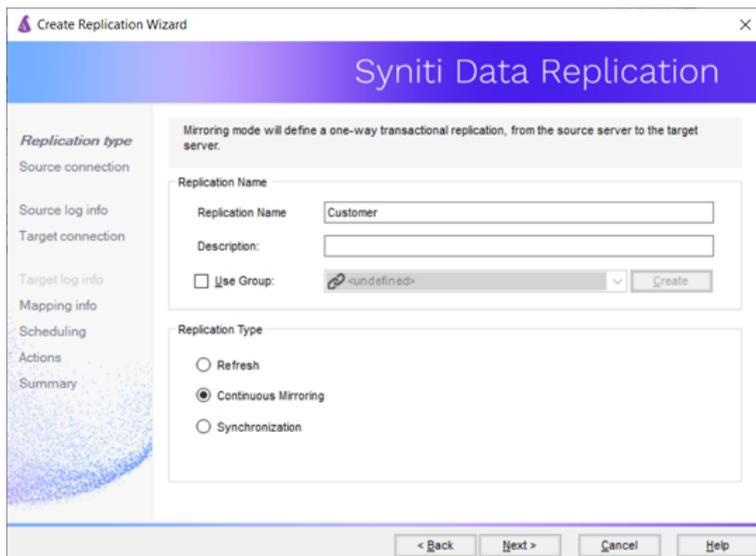


<b>Web Services Url</b>	The URL for the SDR Web Service you set up earlier in this guide. Type the URL for the SDR Web Service. The path should end with “SDRWebService/DBMotoCloud.aspx”.
<b>Authentication</b>	The authentication method supported by the web service.
<b>User ID</b>	A user name that can access the SDR Web Service
<b>Password</b>	The password for the user.
<b>Target System</b>	A name to identify the target system that will be used in the Web.config file.
<b>Output Path</b>	<p>The path for the folder that will contain XML files with the SQL statements to send to the target.</p> <p>Output file names are named as follows:            &lt;Replication_Name&gt;&lt;timestamp&gt;&lt;incremental_number&gt;.xml</p> <p>The timestamp goes to 5 fractional places per second, and the incremental number is used to identify multiple files that are part of the same replication instance.</p> <p>The XML file format for data changes is as follows. For each record, there is an index followed by a SQL statement.</p> <pre>&lt;?xml version="1.0" encoding="utf-8"?&gt; &lt;group name="TBL_CUSTOMER_SL00001" source="SQLSERVERBOA" &gt;   &lt;cdc ts="2010-10-12T14:17:18.334498"&gt;     &lt;command index="0"&gt;&lt;text&gt;DELETE FROM     &amp;quot;DBMCloudTest&amp;quot;. &amp;quot;dbo&amp;quot;.TBL_CUSTOMER_SL WHERE CUSTOMERID     = &amp;apos;1&amp;apos;&lt;/text&gt;&lt;/command&gt;     &lt;command index="1"&gt;&lt;text&gt;DELETE FROM &amp;quot; DBMCloudTest     &amp;quot;. &amp;quot;dbo&amp;quot;.TBL_CUSTOMER_SL WHERE CUSTOMERID =     &amp;apos;10&amp;apos;&lt;/text&gt;&lt;/command&gt;     &lt;command index="2"&gt;&lt;text&gt;DELETE FROM &amp;quot; DBMCloudTest</pre>

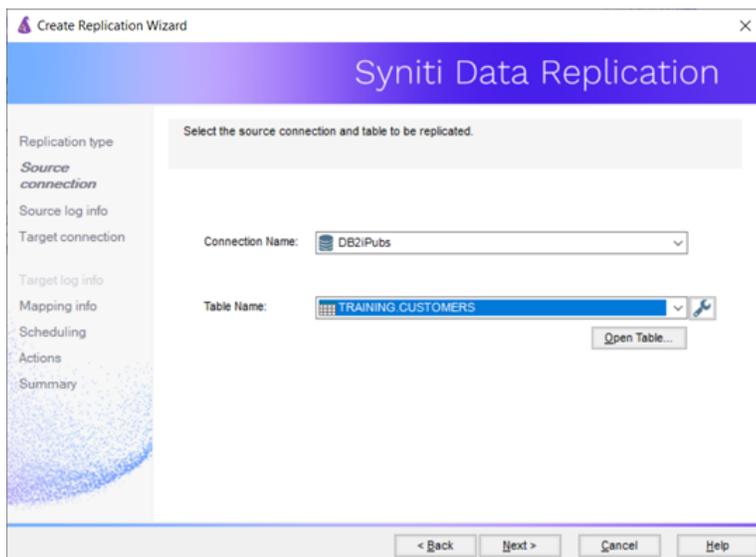


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- In the Replication Mode area, choose **Mirroring** to capture changed data only.



- Click **Next** to go to the Select Source Connection screen.



- Choose the source name from the drop-down list that includes all the source connections you have created.
- Choose the table that you want to replicate from the drop-down list.
- If you want more information about the table before proceeding, click **Open Table...**
- Click **Next** to go to the Source **Log Info** screen.

The first two fields on this screen depend on the source database you are using. In this explanation, we assume you are using IBM Db2 for i (iSeries or AS/400). Check the help for the [Replication Wizard](#) for details on the other databases.

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The Journal field is automatically filled in by retrieving the information from Db2 for i. The Receiver field will be automatically filled in after setting the Transaction ID. You do not need to modify these fields. However, if the library that you have specified as a source is not journaled, you will need to ask your system administrator to journal the library.

12. In the Transaction ID field, click **Read** to open the Read Point dialog.
13. Choose either the current transaction or a transaction ID based on a time and date.
14. Click **OK** to add the value to the **Source Log Info** screen.
15. Set the value of the **Read Interval** field to the frequency with which you want Syniti DR to check the transaction log for new events to mirror.
16. Click **Next** to go to the **Select Target Connection** screen.
17. Choose the target name from the drop-down list that includes all the target connections you have created.
18. Choose the table to which you want to replicate from the drop-down list.  
If no tables are listed, you need to exit the wizard and add or create a target table.
19. If you want more information about the table before proceeding, click **Open Table...**
20. Click **Next** to go to the **Set Mapping Info** screen.  
Source and target columns with the same name are automatically mapped. You can also map columns by dragging the target column and dropping it on the source column, or you can map a column to an expression. For more information about mapping, check the Replication Wizard help topic. An alternative is to write a script to set mappings at runtime.
21. Click **Next** to go to the **Scheduling** screen.
22. Make sure the **Enable Replication** option is checked. This is required for the replication to run.
23. Set a start time for the replication. The **Start Time** field indicates the time at which the Data Replicator will begin considering the replication for execution.
24. Check the option to **Execute Initial Refresh** if needed.  
If you check this option, a full replication will be performed from the source to the target table, prior to starting the mirroring process where only incremental changes will be replicated.
25. Go to the **Mirroring Schedule** tab.
26. Select how you want to run the replication:
  - Run Continuously: the transaction log will be checked for changes to the table using the frequency that you specified on the Set Log Info tab. Any changes will be replicated to the target table.
  - Schedule Interruptions: the replication process will run as above, except for interruptions specified when you click the Schedule button in the Scheduler dialog.
27. Click **Next** to go to the **Summary** screen.
28. Click **Finish** to complete the wizard.

## 6. Update the Web.config File with Target System Details

Edit the SDRWebService/Web.config file to add connection details for each target system that the web service will update as in the example below.

1. Open the Web.config file in a text editor.

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2. Locate the section <connectionStrings> near the top of the file.

```
1 <?xml version="1.0"?>
2 <configuration>
3   <configSections>
4     <section name="targetSystemConfiguration" type="DBMotoCloud.TargetSystemConfigurati
5     <section name="log4net" type="log4net.Config.Log4NetConfigurationSectionHandler,Log
6     <sectionGroup name="applicationSettings" type="System.Configuration.ApplicationSett
7     <section name="DBMotoCloud.Properties.Settings" type="System.Configuration.Client
8   </sectionGroup>
9 </configSections>
10 <!--
11   For a description of web.config changes see 
```

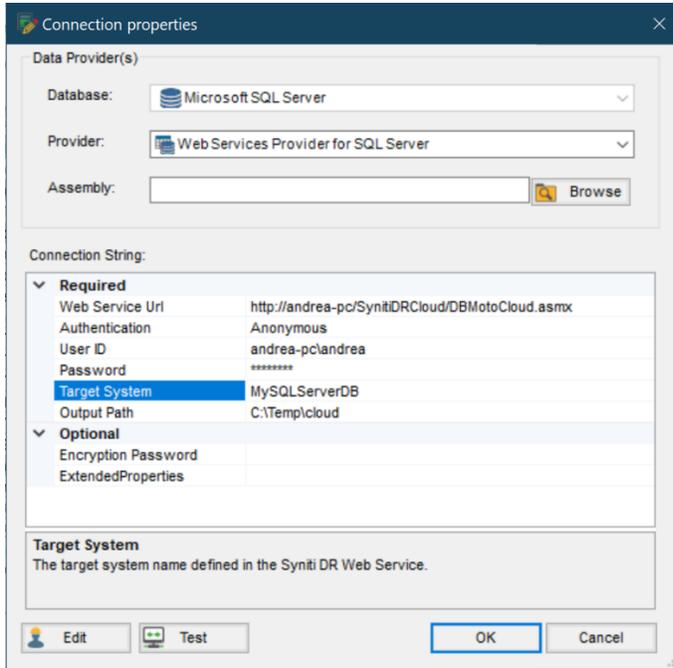
3. Copy the following template into the editor, right after the <connectionStrings> entry.

```
<add name="MySQLServerDB" connectionString="Data Source=12.2.3.123;User
ID=sdruser;Password=myspd;Enlist=False;" providerName="System.Data.SqlClient" />
```

```
13   The following attributes can be set on the <httpRuntime> tag.
14   <system.Web>
15     <httpRuntime targetFramework="4.6" />
16   </system.Web>
17 -->
18 <connectionStrings>
19   <add name="MySQLServerDB" connectionString="Data Source=12.2.3.123;User
    ID=sdruser;Password=myspd;Enlist=False;" providerName="System.Data.SqlClient" />
20 </connectionStrings>
21
```

4. In the Metadata Explorer, locate the target connection you have set up as a web service connection.
5. Right click and choose **Connection Properties**.
6. In the Connection Properties dialog, click in the Connection field value to display connection string information.

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- Copy and paste the Target System name into the connectionStrings section of Web.config to replace the template value.
- In the Connection Properties dialog, click **Edit** to open a text version of the connection string.
- Copy the string and paste it into the Web.config connectionStrings section to replace the connectionString value.
- Your Web.config file entry should look as follows:

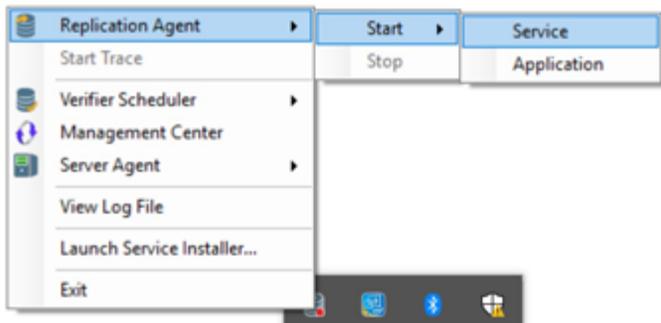
```
<connectionStrings>  
<add name="MySQLServerDB" connectionString="Data Source=12.2.3.123;User  
ID=sdruser;Password=mypwd;Enlist=False;" providerName="System.Data.SqlClient" />  
</connectionStrings>
```
- Save the Web.config file after checking your entry carefully.
- Repeat the steps for any other target connections you have set up as a web service connection.

## 7.Run the Replication

To run the replication, you need to start the Syniti DR Replication Agent.

If you installed the Replication Agent as a service during setup, you just need to start the service using the Service Monitor program  in the Windows Notification Area.

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The replication that you have scheduled should start at the specified time. Use the [Replication Monitor](#) tab in the Management Center to track the progress of the replication.

If you would like to install the Replication Agent as a service:

- From the Windows Desktop **Start** menu, choose **Syniti Data Replication**, then **Service Installer**.
- Manage the service from Service Monitor program (located in the Syniti DR install folder or on the Windows **Start > Programs > Startup** menu).
- Use the [Replication Monitor](#) tab in the Management Center to track the progress of the replication.

To run the Replication Agent interactively:

- In the Windows Notification Area, select  the Service Monitor icon.
- From the right mouse button menu, choose **Replication Agent**, then **Start** then **Application**. The replication that you have scheduled should start at the specified time.
- Use the [Replication Monitor](#) tab in the Management Center to track the progress of the replication.

## Further Information

The Syniti Data Replication User's Guide, available in from the Management Center, provides detailed information on the features available to create, modify and customize replications.

Last updated on 7/19/21