
Attunity SQL Server-CDC for SSIS Tutorial

A step-by-step sample of an SQL Server CDC solution

This document outlines a simple and easy to follow tutorial that demonstrates how to use the Attunity SQL Server-CDC for SSIS in order to implement a data integration solution based on capturing changes made to a selected SQL Server database.

This tutorial uses a sample TPCD database that you create using the SQL Server Management Console. You create the database tables and populate them with data from a script that is downloaded from the Attunity FTP site. This tutorial can be completed in about 30 minutes. It is easiest to run this sample on a stand-alone and default SQL Server database installation.

This tutorial takes you through the following steps:

- [What You Need](#)
- [Create the Source TPCD Database](#)
- [Creating a New SSIS Project](#)
- [Configuring a new CDC Service](#)
- [Building Packages \(Full Load and CDC\)](#)
- [Viewing the Generated Packages and Tables](#)
- [Testing the Solution](#)
- [Summary](#)

What You Need

To work with this tutorial, make sure that you have the following.

- Source SQL Server database (2000 or 2005) with a database called TPCD
 - Note:** You need to create this database in your SQL Server source and then populate it with the correct tables. A script that creates the tables is available from the Attunity FTP at the following link:
ftp://ftp.attunity.com/public/source/sqltpcd/SQL_Server_TPCD.sql
- Target SQL Server database (2005 or 2008) with:
 - The default tempdb system database (used to store destination tables).
 - Business Intelligence Development Studio.
 - Attunity SQL Server-CDC for SSIS installed.

Note: For a full description of the system hardware and software prerequisites necessary to use the Attunity SQL Server-CDC for SSIS, see the User Guide or online help.

In addition, you can find help in the Attunity forum for the Attunity SQL Server-CDC for SSIS at the following link:

<http://www.attunity.com/forums/attunity-sql-server-cdc-ssis/>

Create the Source TPCD Database

Before you begin working on this sample, create a database called TPCD and populate it with tables and data. The tables in this database contain the source data that is replicated to the target.

To create the TPCD database

1. Open the SQL Server Management Studio for SQL Server 2000 or 2005.
2. Create the Source TPCD database. You can use the default database settings for this tutorial.
3. Run the script to create the sample tables and data. The script is available at:
ftp://ftp.attunity.com/public/source/sqltpcd/SQL_Server_TPCD.sql

Creating a New SSIS Project

In this step you create a new SSIS project using the Business Intelligence Development Studio.

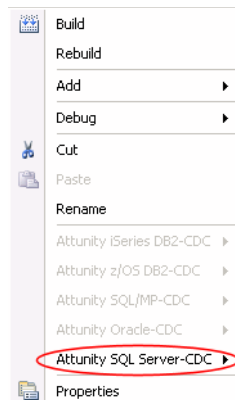
To create a new SSIS Project

1. Click the **Start** menu point to **Programs**, then point to **Microsoft SQL Server** and then click **SQL Server Business Intelligence Development Studio** to open the development studio.
2. On the **File** menu, point to **New**, and then click **Project**.
Note: If a wizard opens to help create a new project, close the wizard and use the dialog box as described in the following steps.
3. In the **New Project** dialog box, click **Business Intelligence Projects**.
4. In the **Templates** pane, click **Integration Services Project**.
5. In the **Name** field, type `SQLServerCDC`.
6. In the **Location** field, type the full path to the folder that you are using for your projects. The full path to this folder should be short, for example `C:\Projects`.
7. Click **OK**.

The `SQLServerCDC` project is listed in the Solution Explorer. You can now begin [Configuring a new CDC Service](#).

After you create the project, right-click on the project name (`SQLServerCDC`) in the Solution Explorer and verify you can see the Attunity SQL Server-CDC option in the action menu as shown in the following figure. If this option does not appear in the menu, make sure that Attunity SQL Server-CDC for SSIS was installed successfully.

Attunity SQL Server-CDC for SSIS Menu Item



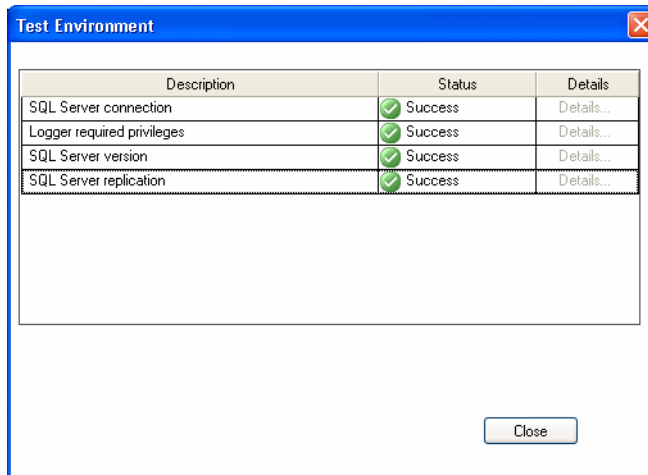
Configuring a new CDC Service

The next step is to configure a CDC service. You use the Attunity SQL Server-CDC for SSIS to configure the CDC service.

To configure the CDC service

1. In the SQL Business Intelligence Development Studio **Solution Explorer**, right click the **SQLServerCDC** project (the project you created in the [Creating a New SSIS Project](#) step) and then point to **Attunity SQL Server-CDC** and then click **Configure CDC Service**.
2. In the Welcome screen, click **Next**.
3. In the SQL Server Connection screen, enter the following information, then click **Next**.
 - **Source SQL Server Name:** Type the name of the SQL Server database instance you are working with.
 - **Log on to the server:** Select the type of authentication you are using, either Windows Authentication or SQL Server Authentication.
If you select SQL Server Authentication, type the **User Name**, and **Password** for the SQL Server database you are using.
 - **Database Name:** Type or select TPCD from the list.
 - **Table Schema:** Select dbo.
 - Click **Test Environment**. The following dialog box is displayed:

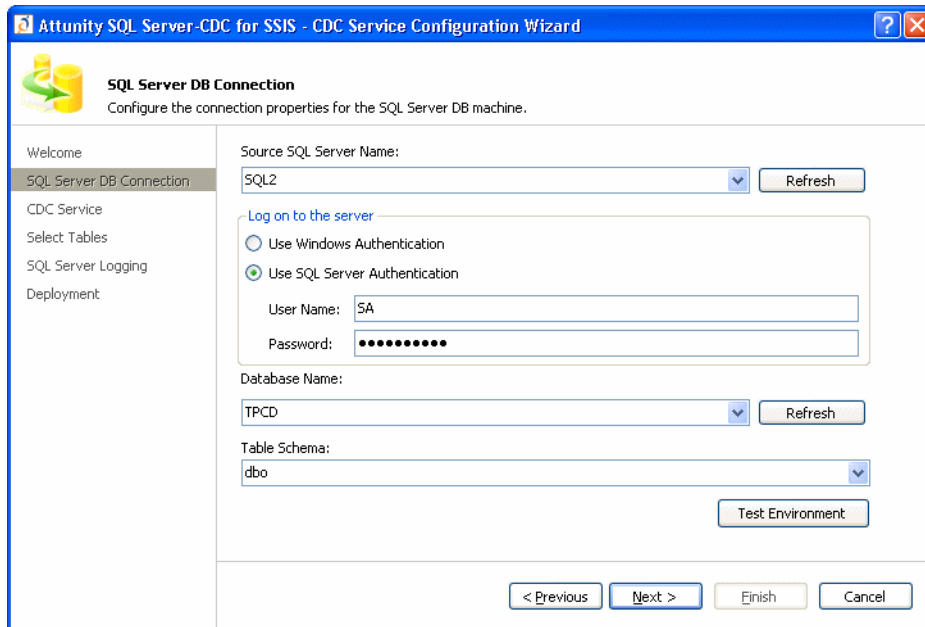
Test Environment



This dialog box displays whether your environment is set correctly to create a SQL Server CDC solution. For more information, press **F1** to see the online help for this dialog box.

Note: If you are using a standard SQL Server database, the SQL Replication test will fail if it has not been configured for replication. For information on configuring a SQL Server database for replication, see the appendix "Enabling SQL Server Replication" in the *Attunity SQL Server-CDC for SSIS User Guide* PDF (in the **Start** menu, point to **All Programs, Attunity**, and then **Attunity SQL Server-CDC**) or press **F1** and browse to the "Enabling SQL Server Replication" section in the online help.

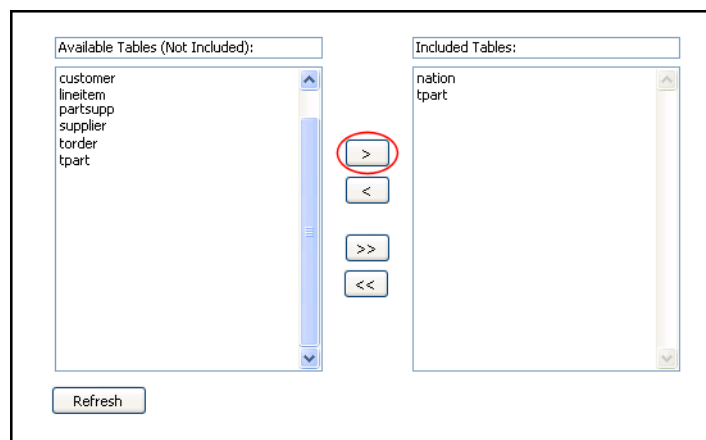
Sample SQL Server Connection Screen



4. In the CDC Service screen, click **Next**. Do not make any changes to the default settings.

- In the Select Tables screen, select the **NATION** and **TPART** tables in the **Available Tables** field, then click the right arrow to move them into the **Included Tables** field.

Select Tables



Click **Next**.

- In the SQL Server Logging screen, click **Run Scripts**. In the SQL Server Login dialog box, click **Run**. The User Name and Password are already entered.
Note: The User indicated must have the required privileges to run the script. If not, enter the credentials for a user with the required privileges or request that your System Administrator run the script for you.
When you see the message, **The scripts were created successfully**, click **OK**.
- Click **Next** to go to the Deployment screen.
- In the Deployment screen, click **Deploy**. The deployment process is displayed in this screen.

When the deployment process finishes, select the **Activate CDC Service** check box, and then click **Finish**.

You have just created a CDC service. This means that changes from your source tables are captured and stored. To apply these changes to a target database, you can now begin [Building Packages \(Full Load and CDC\)](#).

Building Packages (Full Load and CDC)

The next step is to build the CDC and full-load packages. You use the Attunity SQL Server-CDC for SSIS to build the packages.

There are two types of packages:

- Full load packages: When running a full load package all data in the destination tables is replaced with the data from the source tables. This is true even if the source tables are empty. In that case, the data in the destination tables will be erased and no new data is entered.
- CDC packages: When running a CDC package, only the data that changed from the last time the package was run is changed in the destination tables.

To build packages

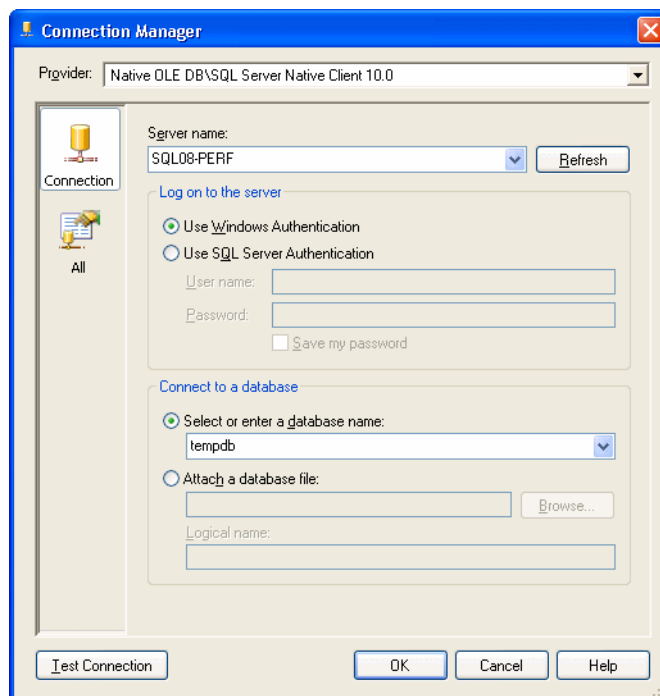
1. In the SQL Business Intelligence Development Studio **Solution Explorer**, right click the project you are working with and then point to **Attunity SQL Server-CDC** and then click **Generate CDC Packages**.

The Package Builder Wizard Welcome screen opens.

2. In the Welcome screen, click **Next**.
3. In the Target Database Connection screen, click **New** to open the Microsoft SSIS Connection Manager dialog box.
4. From the **Provider** list, select **Native OLE DB \SQL Server Native Client**.

Note: This sample uses a SQL Server database as the target database. The Attunity SQL Server-CDC for SSIS supports using any OLE DB supported database as the target. To use a different database you select the database you are using from the OLE DB Connection Manager dialog box. See the User Guide for the Attunity SQL Server-CDC for SSIS for additional information.

SSIS Connection Manager

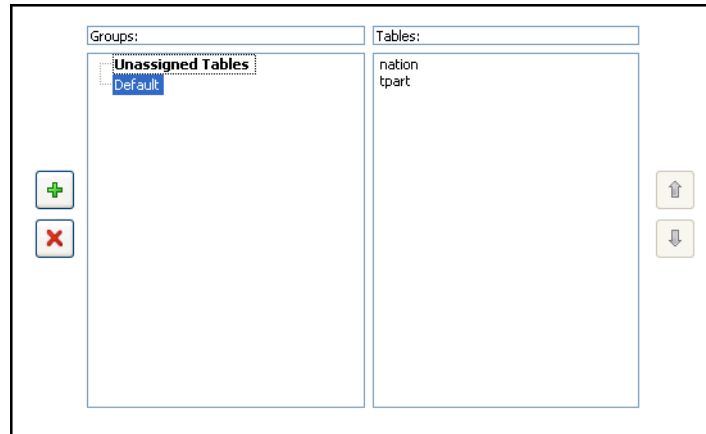


5. Enter the following information for your target SQL Server Database, then click **OK** to return to the Target Database Connection step in the Package Builder wizard.
 - **Server name:** Enter the IP address or the name of the computer with the SQL Server database you are using.
 - Select **Use Windows Authentication**.
 - Select **Select or enter a database name** then select `tempdb` from the list.
6. From the Target Database Connection page in the Package Builder wizard, enter `dbo` in the **Table Schema** field, then click **Next**.
7. In the Table Mapping screen, click **Map All Tables**, then click **Next**.

Note: This will automatically create identical target tables in the SQL Server database.

8. In the Group Definition screen, click **Next**. This will create a default group that contains all of the tables. Click **Default** to ensure that both of the tables are included in the group.

Default Package with Tables



Click **Next** to continue to the Package Creation Plan.

9. In the Package Creation Plan, click **Next**.
10. In the Create Packages screen, click **Create**. The progress for each step is displayed.
11. After the package creation is complete, click **Finish**. This completes the Package Builder wizard.

You just generated full-load and CDC packages and the target tables.

Viewing the Generated Packages and Tables

In this step, you use the Business Intelligence Development Studio to view the packages and the SQL Server Management Console to view the tables.

To view the generated packages and tables

1. In the Business Intelligence Development Studio **Solution Explorer**, under the **SQLServerCDC** project the `default_CDC.dtsx` package should appear under the **SSIS Packages** folder.

Double-click the `default_CDC.dtsx` package to view its Control Flow and Data Flow.

2. In the Business Intelligence Development Studio **Solution Explorer**, under the **SQLServerCDC** project the `default_FullLoad.dtsx` package should appear under the **SSIS Packages** folder.

Double-click the `default_FullLoad.dtsx` package to view its Control Flow and Data Flow.

3. From the Windows **Start** menu, go to **All Programs, Microsoft SQL Server**, then select **SQL Server Management Studio**.

4. In the Object Explorer, find the SQL Server target computer you are working with. Expand the **Databases** folder for that computer, then expand the **System Databases** folder, then expand the tempdb database. The **NATION** and **TPART** tables should now appear in the list.

Right-click the **NATION** and **TPART** tables and:

- for SQL Server 2005, select **Open Table**.
- for SQL Server 2008, select **Select Top 1000 Rows**.

Verify that the tables are empty.

Testing the Solution

In this step you test the solution by following these steps:

- [Load the Target Tables by Running the Full-Load Package](#)
- [Check the CDC Service](#)
- [Make Changes to the SQL Server Database Source Tables](#)
- [Capture and Process the Changes](#)

Load the Target Tables by Running the Full-Load Package

In this step you run the full load package to bulk load the source data into the SQL Server destination tables. Then view the values for the data in the **NATION** and **TPART** tables.

Note: You must run the full-load packages before running the CDC packages. Running the full-load package automatically sets the correct starting place for the CDC package execution.

To load the target tables

1. From the **Start** menu, go to **All Programs, Microsoft SQL Server**, then select **SQL Server Business Intelligence Development Studio**.
2. In the **Solution Explorer**, right-click the `default_FullLoad.dtsx` package and select **Execute Package**.

The control flow will turn green to indicate that the package was executed.

3. From the **Debug** menu, select **Stop Debugging** to return to the design mode.
4. From the **Start** menu, go to **All Programs, Microsoft SQL Server**, then select **SQL Server Management Studio**.
5. In the Connect to Server dialog box, enter the name of the computer with the target SQL Server database you are using, and select **Windows Authentication**. Click **Connect**.
6. In the Object Explorer, find the SQL Server target computer you are working with. Expand the **Databases** folder for that computer, then expand the **System Databases** folder, then expand the tempdb database.
7. Expand the **Tables** folder.
8. Right-click the **NATION** table and:
 - for SQL Server 2005, select **Open Table**.
 - for SQL Server 2008, select **Select Top 1000 Rows**.

View that the table now contains records and note the values in the `COMMENT` column, which you will change later.

9. Right-click the `TPART` table and:
 - for SQL Server 2005, select **Open Table**.
 - for SQL Server 2008, select **Select Top 1000 Rows**.

View that the table now contains records in the `P_RETAILPRICE` column, which you will change later.

Check the CDC Service

In this step you check to verify that the CDC service is running and is ready to capture changes.

To check the CDC service

1. From the **Start** menu, go to **All Programs, Attunity, Attunity SQL Server-CDC**, then select **Management Console**.
2. Expand **Solutions**, then expand the **SQLServerCDC** solution.
3. Select **CDC Management**. Check to make sure that the **CDC Service** status is set to **Started**. If not, click **Start** and make sure that the green check mark appears.
4. Check to make sure that the **Change Capture** status is set to **Active**. If not, click **Resume** and make sure that the green check mark appears.
5. Select **SSIS Processing**. A list of the tables in the packages is displayed. Check to see that there is a green circle in the **Processing Complete** column for each table to ensure that no additional processing is necessary.

Make Changes to the SQL Server Database Source Tables

In this step you will update one column in the `NATION` table and one column in the `TPART` table. You will also insert a new record into the `TPART` table.

To make changes to the SQL Server database source tables

1. From the **Start** menu, go to **All Programs, Microsoft SQL Server**, then select **SQL Server Management Studio**.
2. In the **Connect to Server** dialog box, enter the name of the computer with the source SQL Server database you are using. Select the type of authentication you are using, and if necessary enter your credentials, then click **Connect**.
3. In the **Object Explorer**, find the SQL Server source computer you are working with. Expand the **Databases** folder for that computer, then expand the `TPCD` database.
4. Expand the **Tables** folder.
5. Right-click the `NATION` table and select **Edit Table**.

View the table records and note the values in the `COMMENT` column, which you will now change.

6. Change the value for one of the records in the `COMMENT` column. To do this, click in the `COMMENT` column and change the comment.

When you make this change, it is captured by the CDC Service you created and stored. It is applied to the target the next time the CDC package is run.

7. To generate a `DELETE` of a record, right-click a different record in the `NATION` table, and select **Delete**.

8. To generate an INSERT of a record click in the final row in the NATION table, this is the row that has the Null values. Begin to type to create a new row and add the following information to create a new record.
 - In the nation_key column, enter 25.
 - In the name column, enter SOUTH AFRICA.
 - In the region_key column, enter 0.
 - In the comment column, enter Far Away.
9. Close the SQL Server Management Console. Make sure that all of the changes were committed.
10. Right-click the TPART table and select **Edit Table**.

View the table records and note the values in the P_RETAILPRICE column, which you will now change.
11. From the Standard toolbar at the in the SQL Server Management Console, click New Query.
12. Enter the following statement in the SQL Query pane:

```
update tpart set p_retailprice=p_retailprice * 1.1
```

This query represents a 10 percent increase to the retail price for all of the parts.
13. Close the SQL Server Management Console. Make sure that all of the changes were changed or committed.

Capture and Process the Changes

In this step you verify that the changes were captured, then run the CDC package to update the destination tables. After you updated the destination tables, use the SQL Server Management Console to verify that the changes were made to the destination tables.

To capture and process the changes

1. In the CDC Management Console, expand **Solutions**, then expand the **SQLServerCDC** solution.
2. Select **CDC Management**. Check to make sure that processing took place.
 - Check the **Processing Start Time**.
 - Check the **Status Update Time**.
 - In the **Change Records** section, check that 43 records were processed.

CDC Management Pane

The screenshot shows the CDC Management Pane with the following details:

- Service Status:** CDC Service is **Started**. Buttons: Start, Stop, Reset CDC...
- Change Capture:** Status is **Active**. Buttons: Resume, Pause, Error Handling (Retry, Skip). Logger status is **Started**. Detailed status: processing. Status message: Reading change events.
- Processing start time (UTC):** 1/18/2010 10:08:38 AM. **Status update time (UTC):** 1/18/2010 12:09:20 PM.
- Performance:** Processed Change Records/Sec History graph showing activity for the last 8 minutes. The y-axis ranges from 0 to 4. There are several small peaks and one large peak reaching approximately 4.
- Transactions:** Active: 0, Buffered on disk: 0, Last timestamp (UTC): 1/18/2010 12:12:34 PM.
- Local Resources:** Memory usage (MB): 0 (0%), Disk usage (MB): 0.04.
- Statistics:**

Transactions	Change Records	Errors
Completed: 4	Processed: 43	Total: 0
Timed out: 0	Deleted: 0	
Rolled back: 0		

3. Select **SSIS Processing**. In the **Processing Complete** column, there will be a yellow circle displayed for each of the tables indicating that changes were captured and are ready to be processed.

Tables Ready for Processing



Change Table	Group	Not Processed Since (UTC)	Processing Complete
nation	Default	1/18/2010 12:09:46 PM	No
tpart	Default	1/18/2010 12:12:34 PM	No

4. In the Business Intelligence Development Studio **Solution Explorer**, right-click the default_CDC.dtsx package and select **Execute Package**.

The control flow will turn green to indicate that the package was executed.

5. From the **Debug** menu, select **Stop Debugging** to return to the design mode.
6. Open the SQL Server Management Studio. You may need to reconnect to the target database instance.
7. In the Object Explorer, find the target SQL Server computer you are working with. Expand the **Databases** folder for that computer, then expand the **System Databases** folder, then expand the tempdb database.
8. Expand the **Tables** folder.
9. Right-click the NATION table and:
 - for SQL Server 2005, select **Open Table**.
 - for SQL Server 2008 select **Select Top 1000 Rows**.
 Check that the values in the COMMENT column was updated.
 Check that the record you deleted is not included.
 Check that the South Africa record was added.
10. Right-click the TPART table and
 - for SQL Server 2005, select **Open Table**.
 - for SQL Server 2008 select **Select Top 1000 Rows**.
 Check that the values in the P_RETAILPRICE column was updated.
11. In the CDC Management Console, select **SSIS Processing**. In the **Processing Complete** column, make sure that a green circle is displayed for each of the tables indicating that no further processing is necessary.

Table Processing Complete

Change Table	Group	Not Processed Since (UTC	Processing Complete
nation	Default		 Yes
tpart	Default		 Yes

Congratulations, you have just completed the sample tutorial!!

Summary

This tutorial showed how to use the Attunity SQL Server-CDC for SSIS to create a CDC Solution that tracked changes made to a source SQL Server database and applies the changes to a target SQL Server database. The following summarizes the actions you took in this tutorial:

- Used the Configure CDC Service wizard to configure a new CDC service and select the source tables to use.

- Used the Package Builder wizard to Build the SSIS full-load and CDC packages with the Attunity SQL Server-CDC for SSIS.
- Executed the full-load package to populate the tables in SQL Server, then checked the values in the `NATION` and `TPART` tables.
- Made changes to the SQL Server database. The changes included updates to existing columns and adding a new record to the `TPART` table.
- Used the Attunity SQL Server-CDC for SSIS Management Console to see that the changes were captured by the CDC service.
- Used the Business Intelligence Development Studio to execute the CDC package to make sure the changes were entered in the SQL Server tables.
- Used the SQL Server Management Console to check that the values in the tables were updated.
- Used the CDC Management Console to make sure that no additional processing for the CDC was necessary for any of the tables in the CDC Solution.

