Syniti Replicate

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Setup Guide for SAP CDC for RFC

Version 10.4

Syniti Replicate

Table of Contents

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Introduction

This document describes the steps required to install and consume Syniti Data Replication – Mirroring solution ABAP components.

The Syniti Replicate – Mirroring solution ABAP components are divided in 2 groups:

- Generation Components
- Consumption API

The Generation Components are ABAP programs that should be used to generate the ABAP and HANA DB objects required to execute data mirroring.

The Consumption API can be consumed externally using CData ODBC Driver for SAP ERP for reading and querying data and SAP Connector for Microsoft .NET 3.0 for updating the solution and generated mirroring tables.

Pre-Requisites

SAP Environment Compatibility S/4HANA

Transports are compatible with SAP installations of S/4HANA 1709 [S4CORE 102] or higher.

User Authorization

The following Authorization Objects have to be assigned to the user performing the generation steps.

Authorization Object	Authorization Field	Authorization Value
S_TCODE	TCD	/BS4/GENERATOR
/BS4/SDRMP	PROGRAM	/BS4/GENERATOR
	ACTVT	16 (Execute)
S_DEVELOP	DEVCLASS	<Customer's Package>
	OBJTYPE	TABL
	OBJNAME	SDR
	P_GRP	
	ACTVT	02
S_TRANSPRT	TTYPE	
	ACTVT	03

The following Authorization Objects have to be assigned to the user utilizing the Consumption APIs Read Capabilities.

Authorization Object	Authorization Field	Authorization Value
S_RFC	RFC_NAME	/BS4/SDRM_READ_TABLE or /BS4/SDRM_RFC_API
	RFC_TYPE	FUNC or FUGR
	ACTVT	16
/BS4/SDRMF	RFC_NAME	/BS4/SDRM_READ_TABLE
	ACTVT	16 (Execute)
S_TABU_NAM	TABLE	<Name of Tables in scope>
	ACTVT	03 (Display)
S_TABU_DIS	DICBERCLS	<Authorization Group of Tables in scope>
	ACTVT	03 (Display)

The following Authorization Objects have to be assigned to the user utilizing the Consumption APIs Update Capabilities.

Authorization Object	Authorization Field	Authorization Value
S_RFC	RFC_NAME	/BS4/SDRM_UPDATE_MASTER_TABLE and /BS4/SDRM_UPDATE_LOG_TABLE and /BS4/SDRM_DELETE_MASTER_TABLE and /BS4/SDRM_DELETE_LOG_TABLE or /BS4/SDRM_RFC_API
	RFC_TYPE	FUNC or FUGR
	ACTVT	16
/BS4/SDRMF	RFC_NAME	/BS4/SDRM_UPDATE_MASTER_TABLE and /BS4/SDRM_UPDATE_LOG_TABLE and /BS4/SDRM_DELETE_MASTER_TABLE and /BS4/SDRM_DELETE_LOG_TABLE
	ACTVT	16 (Execute)
S_TABU_NAM	TABLE	<Name of Tables in scope>
	ACTVT	02 (Display)
S_TABU_DIS	DICBERCLS	<Authorization Group of Tables in scope>
	ACTVT	02 (Display)

Setup Summary

This section provides a summary of all the steps required for setting up and using Syniti Replicate. Use the link for each step for more information.

Download and Install Syniti Replicate	The Knowledge Platform Product Suites article acts as a hub to point to various resources. To download and/or register Syniti Replicate, log in to the support site, then click the relevant link in the Replicate section of the article. • Syniti Knowledge Base • Enter a generic support ticket
Install. Mirroring Transport S/4HANA	Enter a support ticket to request installation components. Install the provided transport in the SAP Application Server.
Syniti Replicate Setup	In the Syniti Replicate Management Center: 1. In the Metadata Explorer, create a source connection to your RDBMS. 2. Create a source connection using the SAP NetWeaver Extract option in the **Database** field. 3. Create a replication.
Start Replicating	In the Syniti Replicate Service Monitor: 1. Start the Replication Agent.

Download and Install Syniti Replicate

To download and/or register Syniti Replicate, log in to the support site, then click the relevant link in the Replicate section of the article.

Install Mirroring Transport S/4HANA

The first step required to set-up the solution, is to install the provided transport in the SAP Application Server.

The transport files list is listed next. To have them installed, please contact the customer Basis team.

Syniti - Data Replication - Mirroring - Transport.zip

Transports 900461 and 900467 are located in folder “Syniti - SDR Read Table Transports - S4H” included with the installation package.

Transport Contents S/4HANA

Object Name	Type	Description
/BS4/SDRM /BS4/SDRM_API /BS4/SDRM_CONSTANTS /BS4/SDRM_EXCEPTIONS	Package	Packages that contain all objects related to Syniti Replicate – Mirroring.
/BS4/ERROR_LOG /BS4/GEN_DB_OBJS /BS4/GEN_TR_OBJS /BS4/MASTER_LOG /BS4/TGT_OBJECTS	Table	Syniti Replicate – Mirroring delivered tables. These tables contain the names of the generated ABAP and HANA objects as well as mappings between standard tables and mirroring target tables. The Master Log table contain the header entry for all mirroring actions and the Error Log table store the messages raised when errors occur when populating target tables.
/BS4/TID_RANGE	Structure	Syniti Replicate – Mirroring delivered Structures.
/BS4/TID_RANGE_TT	Table Type	Syniti Replicate – Mirroring delivered Table Types.
/BS4/SDRM_RFC_API	Function Group	Syniti Replicate – Mirroring Consumption API Function Group.
/BS4/SDRM_READ_TABLE /BS4/SDRM_UPDATE_LOG_TABLE /BS4/SDRM_UPDATE_MASTER_TABLE /BS4/SDRM_DELETE_LOG_TABLE /BS4/SDRM_DELETE_MASTER_TABLE	Function Module	Syniti Replicate – Mirroring Consumption API Function Modules.
/BS4/GENERATOR	Program	Syniti Replicate – Mirroring – ABAP and HANA DB objects generation program.
/BS4/GENERATOR	Transaction	Syniti Replicate – Mirroring – Generator
/BS4/GENERATOR /BS4/MESSAGE_PROVIDER /BS4/SPECIFICATION	Interface	Syniti Replicate – Mirroring – OO Interfaces

/BS4/DATA_CLASS */BS4/DATA_TYPE* */BS4/DDL_TYPE* */BS4/DELIVERY_CLASS* */BS4/MESSAGE_SEVERITY* */BS4/RANGE_OPTION* */BS4/RANGE_SIGN* */BS4/SIZE_CATEGORY* */BS4/TABLES* */BS4/TABLE_CLASS* */BS4/VIEW_ACTION*	Class	Syniti Replicate – Mirroring – Constants Enumeration Classes
/BS4/CX_GENERATION_ERROR */BS4/CX_SDRM* */BS4/CX_SPECIFICATION_ERROR*	Class	Syniti Replicate – Mirroring – Exception Classes
/BS4/DB_SPECIFICATION */BS4/DDL_GENERATOR* */BS4/DDL_SPEC* */BS4/DROP_TRIGGER_DELETE_SPEC* */BS4/DROP_TRIGGER_INSERT_SPEC* */BS4/DROP_TRIGGER_UPDATE_SPEC* */BS4/LOG_TABLE_SPEC* */BS4/MASTER_SEQUENCE_SPEC* */BS4/MESSAGE_LOGGER* */BS4/SEQUENCE_SPEC* */BS4/TABLE_GENERATOR* */BS4/TABLE_SPECIFICATION* */BS4/TRIGGER_DELETE_SPEC* */BS4/TRIGGER_INSERT_SPEC* */BS4/TRIGGER_SPEC* */BS4/TRIGGER_UPDATE_SPEC*	Class	Syniti Replicate – Mirroring – Classes
/BS4/SDRM_API */BS4/SDRM_GENERATION* */BS4/SDRM_SPEC*	Message Class	Syniti Replicate – Mirroring – Message Classes

/BS4/SDRMF */BS4/SDRMP*	Authorization Object	Syniti Replicate – Mirroring – Authorization Objects

Executing the Generation Program

The Syniti Replicate Mirroring solution uses a mix of Transportable Objects (i.e.: Transparent Tables) and Data Base Objects (i.e.: Sequences and Triggers) to implement the change data capture solution.

The Transparent Tables can be separated in 4 different groups, Control, Master Log, Log, and Error Log tables.

The Control Tables are provided with the installation packaged and are used to keep up an inventory of what Log Transparent Tables (/BS4/GEN_TR_OBJS) and Database Objects (/BS4/GEN_DB_OBJS) were generated, as well as the mapping between Standard SAP Tables in scope for Mirroring and their corresponding Log Tables (/BS4/TGT_OBJECTS).

The Error Log Table (/BS4/ERROR_LOG) is also provided with the installation package and is populated with any error message raised during the execution of Triggers during the Mirroring activities.

The Master Log Table (/BS4/MASTER_LOG) is also provided with the installation package and is used to track all Mirroring activities.

Log Tables on the other hand are not provided with the installation package and need to be generated in the development environment of the source system. Log tables are Transportable Objects and need to be placed in Transport Requests and promoted through the landscape to the desired production environment.

No Database Object is provided with the installation package. All Database Objects must be generated directly in each environment of the source system.

To generate both Log Tables and Database Objects, report /BS4/GENERATOR (transaction code /BS4/GENERATOR) is available.

Master Log Table Database Objects - Sequence

As explained in the previous section, the Master Log Tables is provided with the installation packaged and does not need to be generated using /BS4/GENERATOR. However, the Database Objects associated with it must be created. In this case, only a Sequence will be created in the database as no Triggers are required for Master Log Table.

To execute this step, all that is required is to select the Master Table radio button under Generation Control in the selection screen and execute the report as shown in Figure 1 - Master Log Table Database Objects Generation.

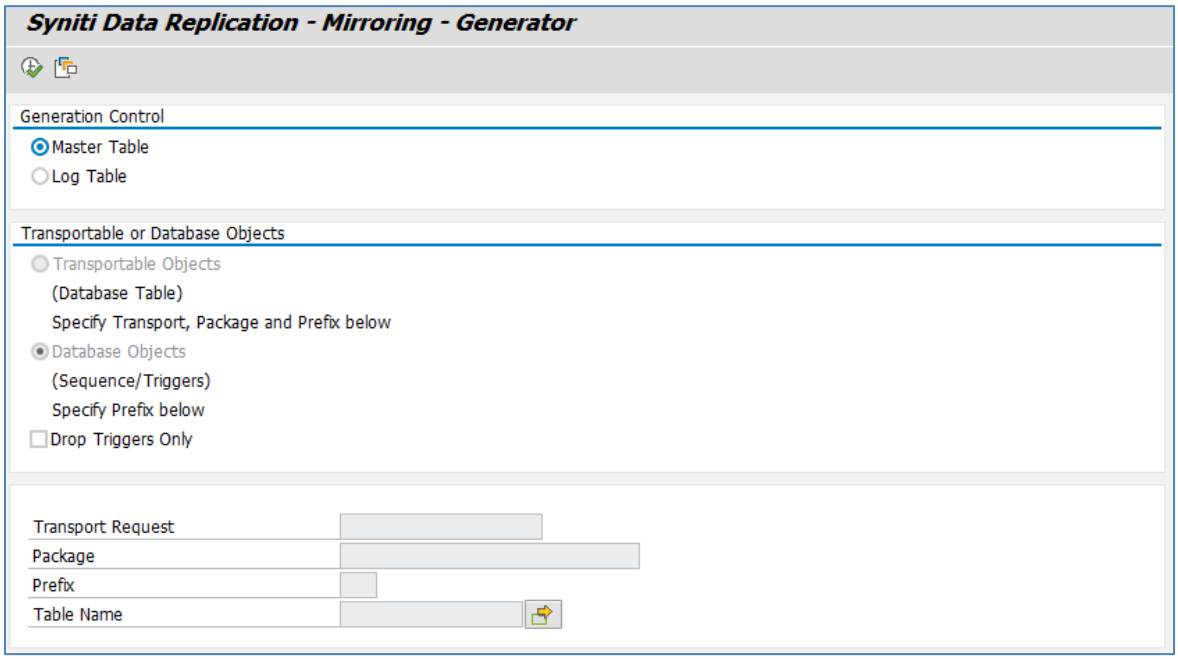


Figure 1 - Master Log Table Database Objects Generation

Once the report is executed, **Sequence /BS4/MASTER_LOG_SEQ** will be created and the execution log will be displayed. In the following example, the Master Log Table Sequence had previously been created, therefore in the execution log the message states that a new one cannot be created. When the program is executed in an environment where the Master Log Table Sequence does not exist, a successful message would be displayed.

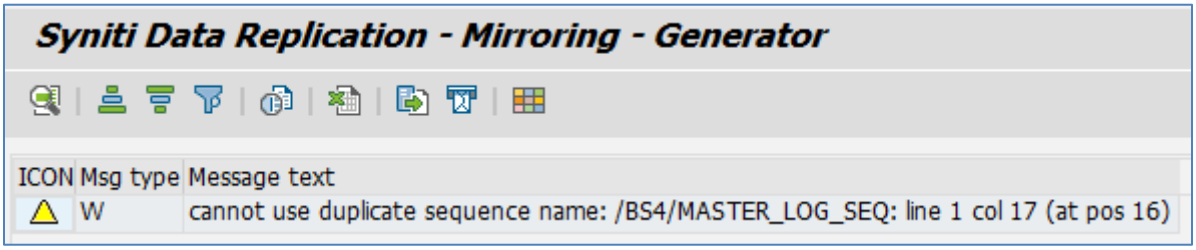


Figure 2 - Master Log Table Sequence Generation Log

Log Table Transportable Objects – Transparent Table

The next objects that need to be created are the **Transportable Objects** for the tables in scope for Change Data Capture/Mirroring.

To execute this step using /BS4/GENERATOR, radio button **Log Table** must be selected under Generation Control section, and radio button Transportable Objects must be selected under Transportable or Database Objects section. On the main section, the following fields must be provided:

- **Transport Request**: Transport Request to be used to promote the Log Tables to other environments;
- **Package**: Development Package in which the Log Table should be created;
- **Prefix**: Used to construct the name of the Log Table - SDR<TABLE_NAME>;
- **Table Name**: Name of the table for which a Log Table should be created.

Figure 3 - Log Tables Transportable Objects Generation shows an example of how create Log Table ZSDRLFA1 for table LFA1 in package ZSDRGEN.

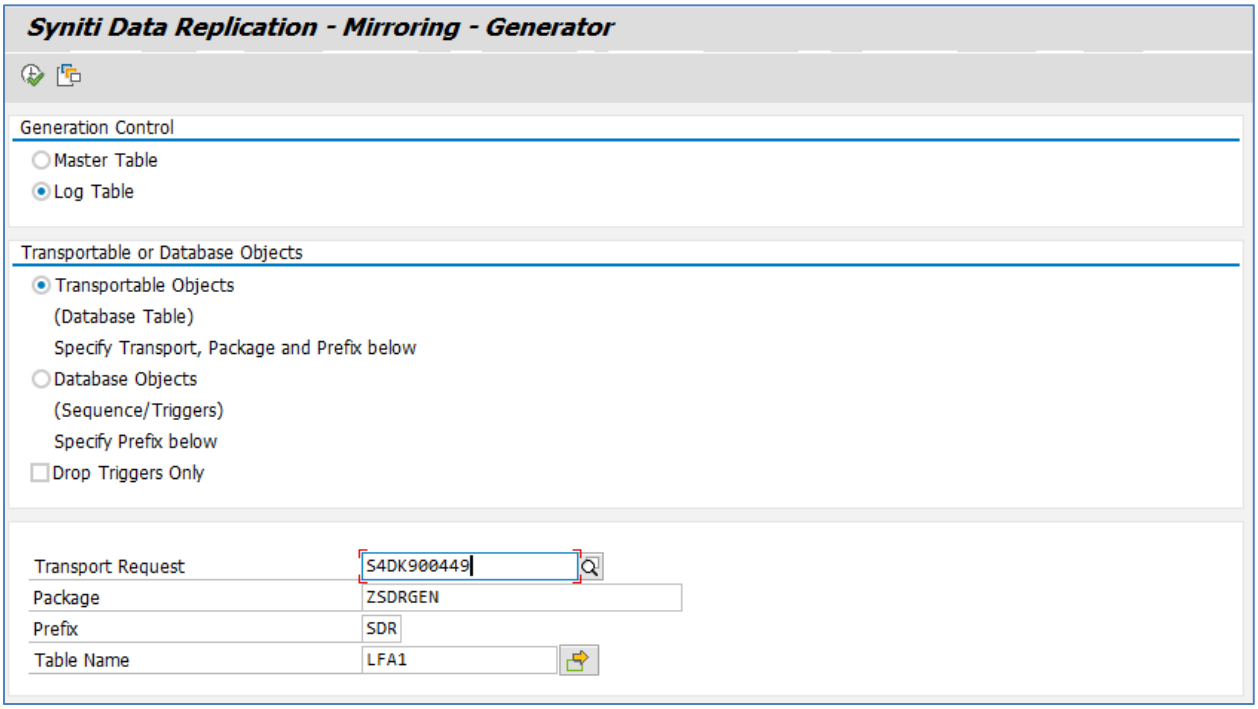


Figure 3 - Log Tables Transportable Objects Generation

During the execution of the report for the creation of Log Tables Transportable Objects, the Package assignment and Transport Request assignment have to be confirmed.

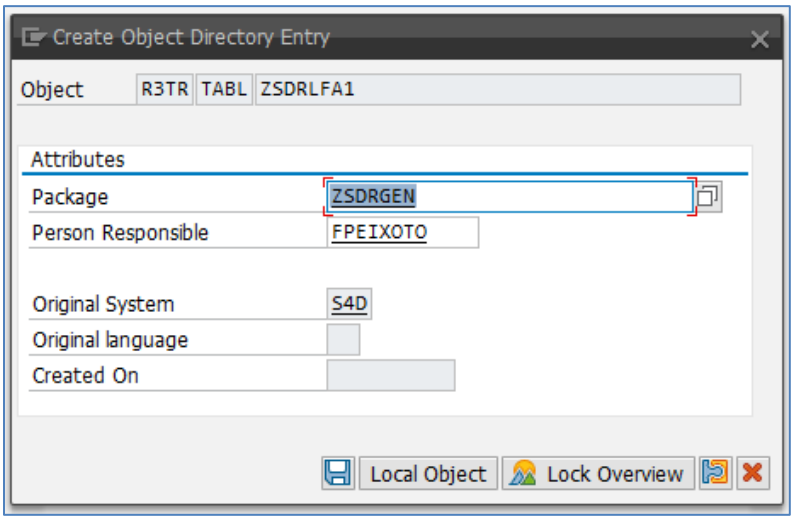


Figure 4 - Log Tables Transportable Objects Generation - Package Assignment

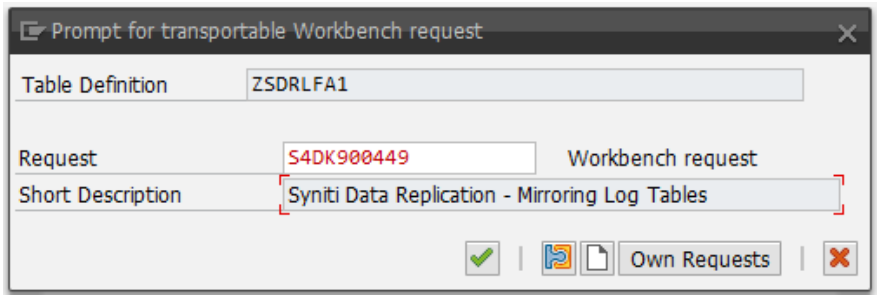


Figure 5 - Log Tables Transportable Objects Generation - Transport Request Assignment

Once the report is executed, Table SDR<TABLE_NAME> will be created and the execution log will be displayed.

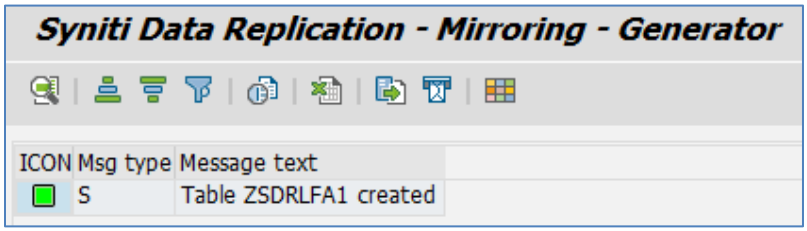


Figure 6 – Log Tables Transportable Objects Generation Log

Log Table Database Objects – Triggers & Sequence

The next objects that need to be created are the **Database Objects** for the tables in scope for Change Data Capture/Mirroring.

To execute this step using /BS4/GENERATOR, radio button **Log Table** must be selected under **Generation Control** section, and radio button **Database Objects** must be selected under **Transportable or Database** Objects section. On the main section, the following fields must be provided:

- **Prefix**: Used to construct the name of the Log Table Sequence and Triggers- SDR<TABLE_NAME>_[SEQ, _INS, _UPD, DEL];
- **Table Name**: Name of the table for which a Log Table should be created.

Figure 7 - Log Tables Database Objects Generation shows an example of how create Sequence ZSDRLFA1_SEQ and Triggers ZSDRLFA1_INS, ZSDRLFA1_UPD, ZSDRLFA1_DEL for table LFA1.

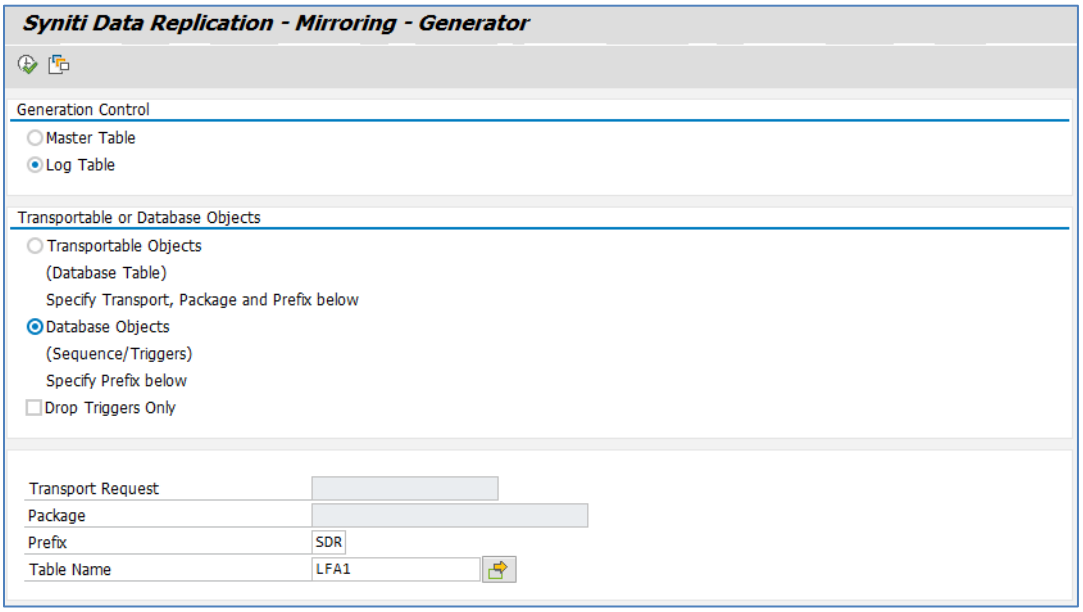


Figure 7 - Log Tables Database Objects Generation

Once the report is executed, the following objects will be created and the execution log will be displayed.

- Sequence **SDR<TABLE_NAME>_SEQ**;
- Triggers:
  - **SDR<TABLE_NAME>_INS**;
  - **SDR<TABLE_NAME>_UPD**;
  - **SDR<TABLE_NAME>_DEL**;

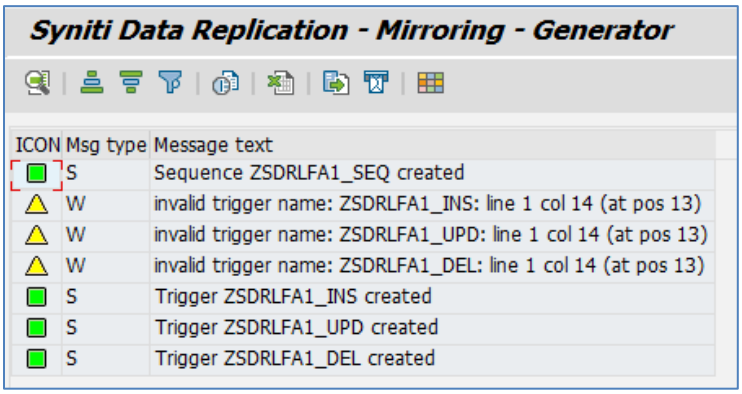


Figure 8 - Log Tables Database Objects Generation Log

It is possible to execute /BS4/GENERATOR to drop the created triggers for a table. To perform this action, radio button **Log Table** must be selected under **Generation Control** section, and radio button **Database Objects** must be selected under **Transportable or Database Objects** section as well as the check box **Drop Triggers Only**. On the main section, the following fields must be provided:

- Prefix: Used to construct the name of the Log Table Triggers- SDR<TABLE_NAME>_[INS, UPD, DEL];
- Table Name: Name of the table for which a Log Table should be created.

Figure 9 - Log Tables Database Objects Generation - Drop Triggers shows an example of how create Sequence ZSDRLFA1_SEQ and Triggers ZSDRLFA1_INS, ZSDRLFA1_UPD, ZSDRLFA1_DEL for table LFA1.

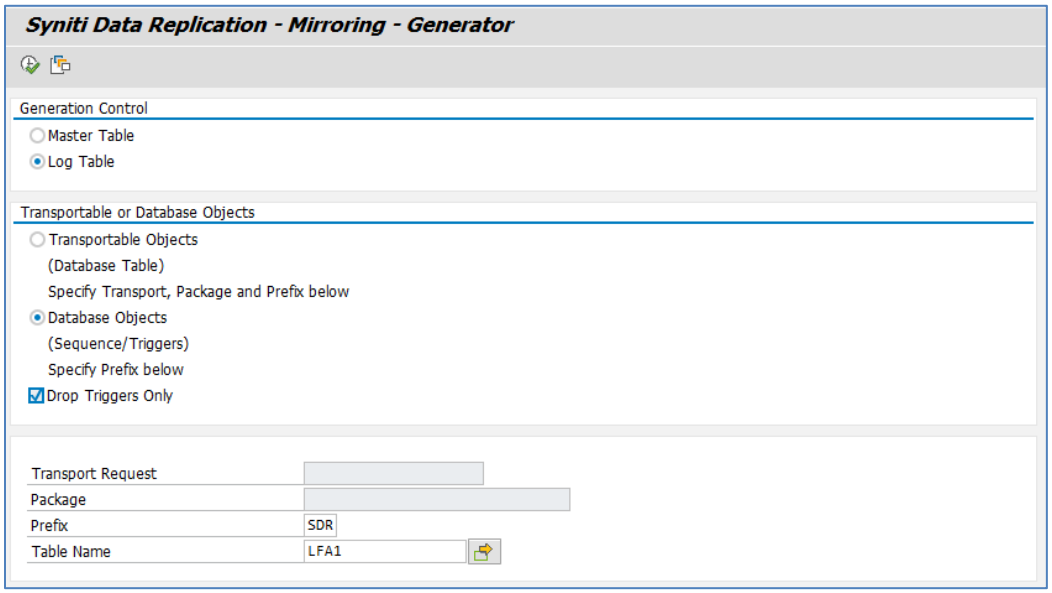


Figure 9 - Log Tables Database Objects Generation - Drop Triggers

Once the report is executed, the Triggers will be dropped and the execution log will be displayed.

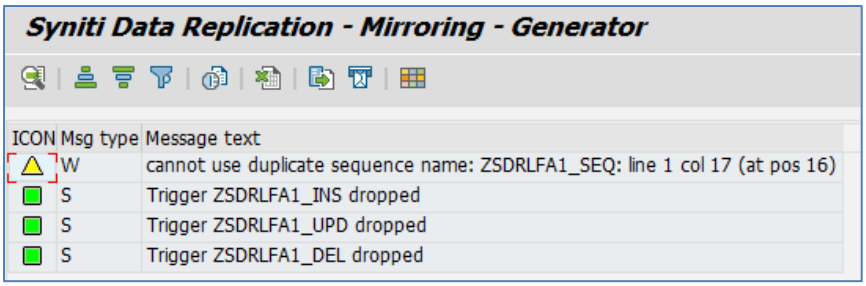


Figure 10 - Log Tables Database Objects Generation - Drop Triggers Log

Executing the Consumption APIs

As mentioned in the Overview section, the Syniti Replicate Mirroring solution, realizes the Consumption API using Remote Function Modules that can be consumed externally using CData ODBC Driver for SAP ERP for reading and querying data, and SAP Connector for Microsoft .NET 3.0 for updating the solution and generated mirroring tables. The Consumption API consists of the Remote Function Modules below:

- **/BS4/SDRM_READ_TABLE**: Read API – can be used with CData ODBC Driver
- **/BS4/SDRM_UPDATE_MASTER_TABLE**: Update Master Log Table
- **/BS4/SDRM_UPDATE_LOG_TABLE**: Update Log Tables

The following sections depicts how the different components of the Consumption API can be utilized. Usage with CData ODBC Driver is not covered.

Read API

The Read API (/BS4/SDRM_READ_TABLE) can be used to read any table in the system, provided that the user executing it has the required authorizations. This includes the tables delivered with the solution as well as the ones generated using /BS4/GENERATOR. This API works in the same way other Syniti solutions work to extract data from SAP ERP/S/4HANA (e.g.: Collect, Syniti Data Replication – Read Table for CData ODBC Driver).

The input parameters for the Read API are the following:

- **QUERY_TABLE**: Name of the Table to be read;
- **DELIMITER**: Field separator for output data;
- **NO_DATA**: Flag that controls if DATA output table is filled;
- **ROWSKIPS**: Number of rows to be skipped while extracting data;
- **ROWCOUNT**: Number of rows to be selected while extracting data;
- **OPTIONS**: Table of free text fields to define the extraction where clause;
- **FIELDS**: Table of structured field. Structure field FIELDNAME can be used to specify a projection clause.

The output parameters for Read API are the following:

- **TABLE_ROWS**: Total number of rows in the QUERY_TABLE. It is only populated when ROWCOUNT is negative.
- **FIELDS**: Return the details of the fields of QUERY_TABLE;
- **DATA**: Return the extracted data in a table of text fields.

Reading Master Log Table

In order to read the Master Log Table, input field **QUERY_TABLE** must be populated with value '/BS4/MASTER_LOG'. The other input fields are optional. The example below reads 100 entries (ROWCOUNT = 100) from the Master Log Table skipping the first 10 entries (ROWSKIPS = 10).

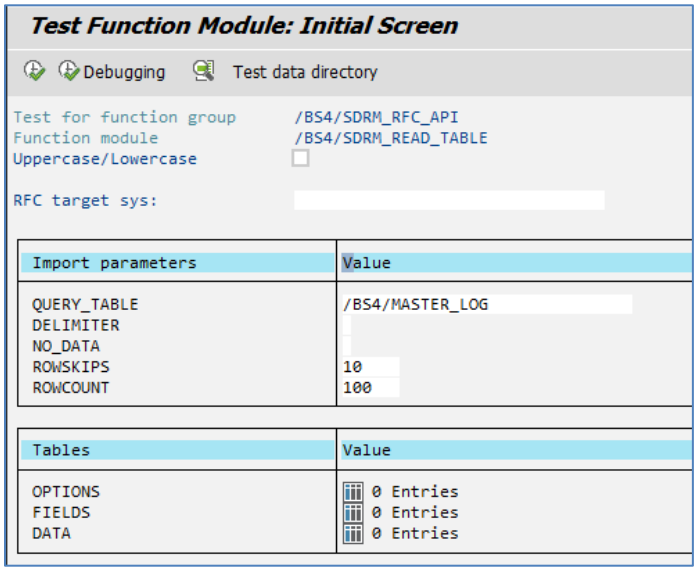


Figure 11 - Read API - Master Log Table

Once the API is executed, tables FIELDS and DATA are populated.

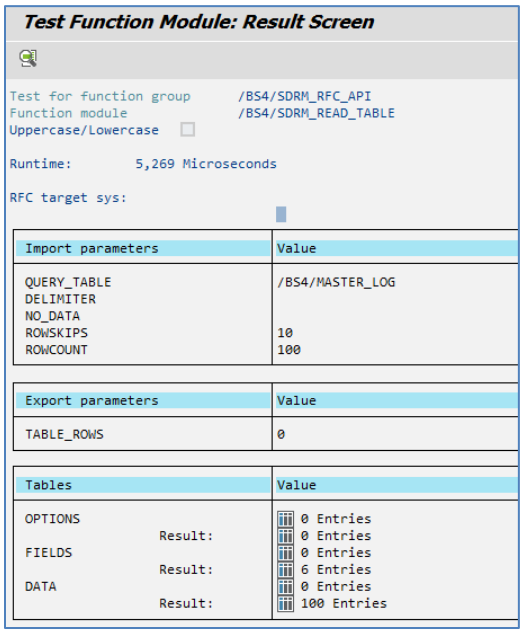


Figure 12 - Read API - Master Log Table – Output

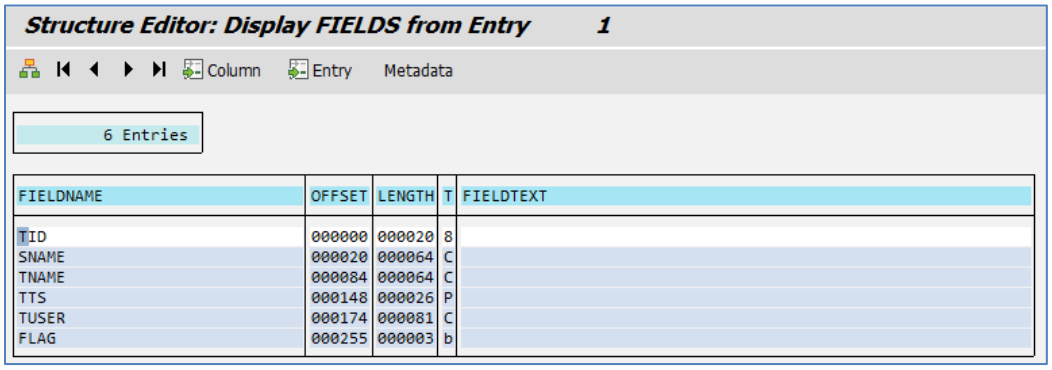


Figure 13 - Read API - Master Log Table - Fields Table

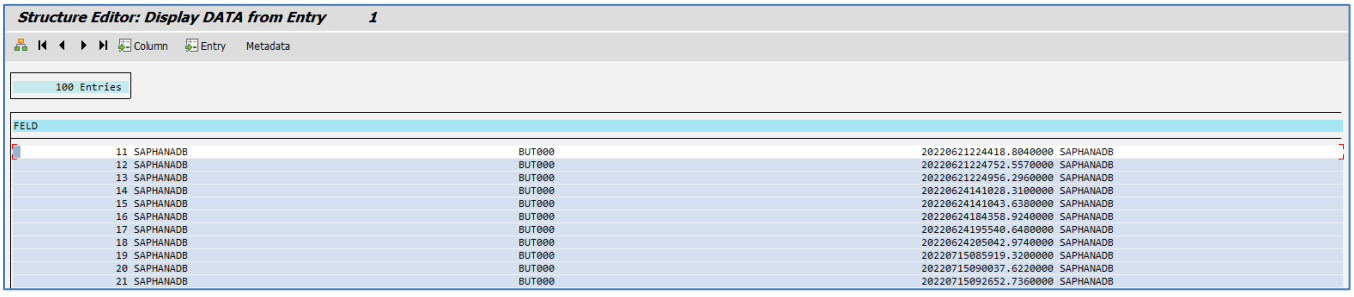


Figure 14 - Read API - Master Log Table - Data Table

Reading Log Table

In order to read a Log Table, input field **QUERY_TABLE** must be populated with value Log Table Name (e.g.: ZSDRBUT000). The other input fields are optional. The example below reads all entries from the Log Table ZSDRBUT000 using semi colon as the data delimiter (**DELIMITER** = ';').

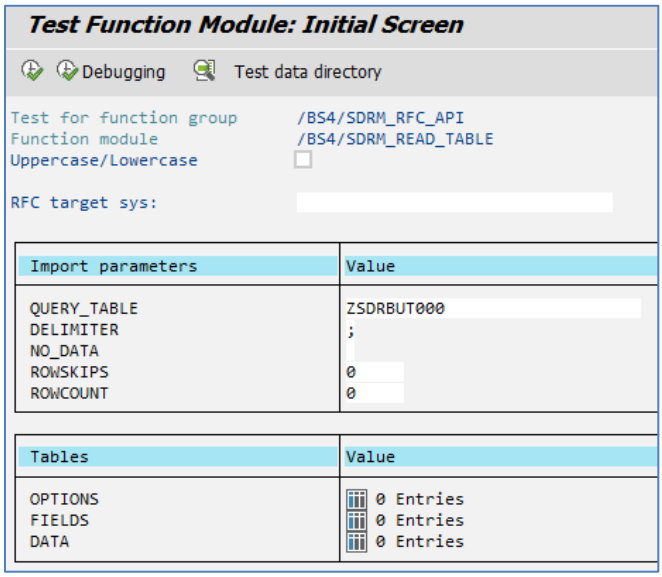


Figure 15 - Read API - Log Table

Once the API is executed, tables FIELDS and DATA are populated.

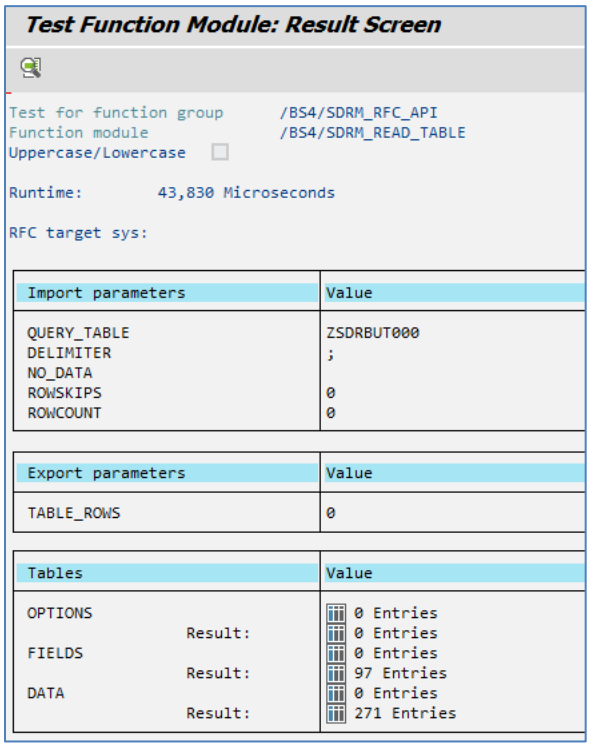


Figure 16 - Read API - Log Table – Output

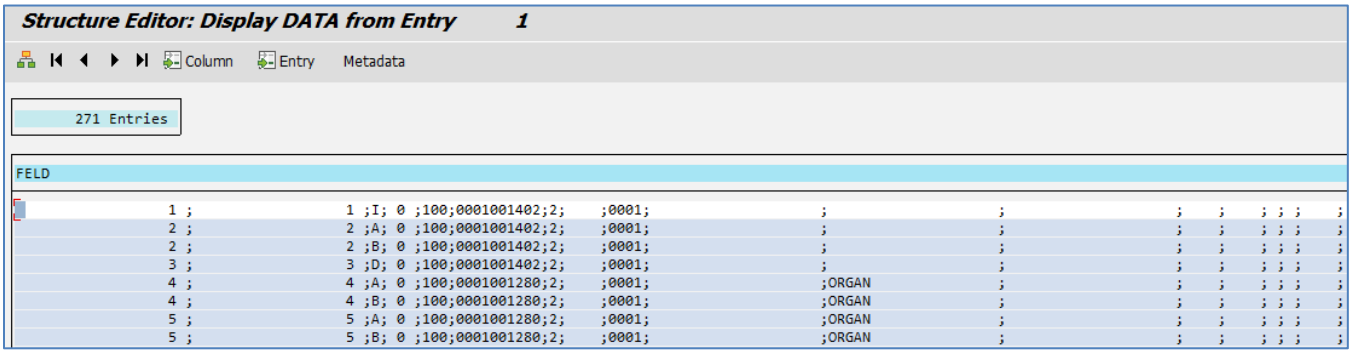


Figure 17 - Read API - Log Table - Data Table

Reading Generated Target Objects

In order to read the Generated Target Objects Table, input field **QUERY_TABLE** must be populated with value '/BS4/TGT_OBJECTS'. The other input fields are optional. The example below uses the **OPTIONS** table to read only the Target Objects for Log Table ZSDRLFA1 (OPTIONS[] = TNAME = 'ZSDRLFA1').

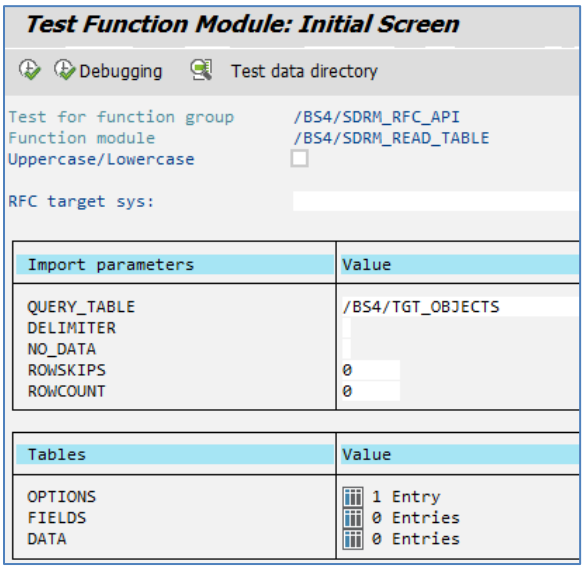


Figure 18 - Read API - Target Objects

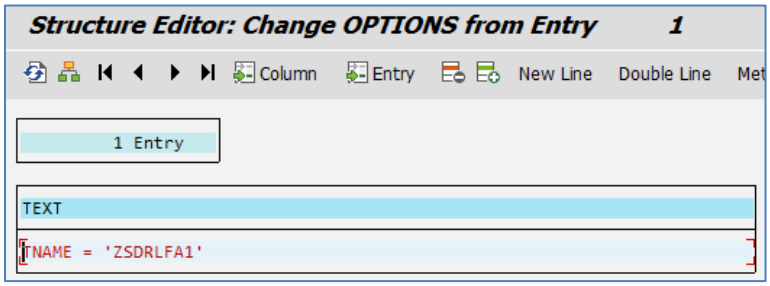


Figure 19 - Read API - Target Objects – Options

Once the API is executed, tables FIELDS and DATA are populated.

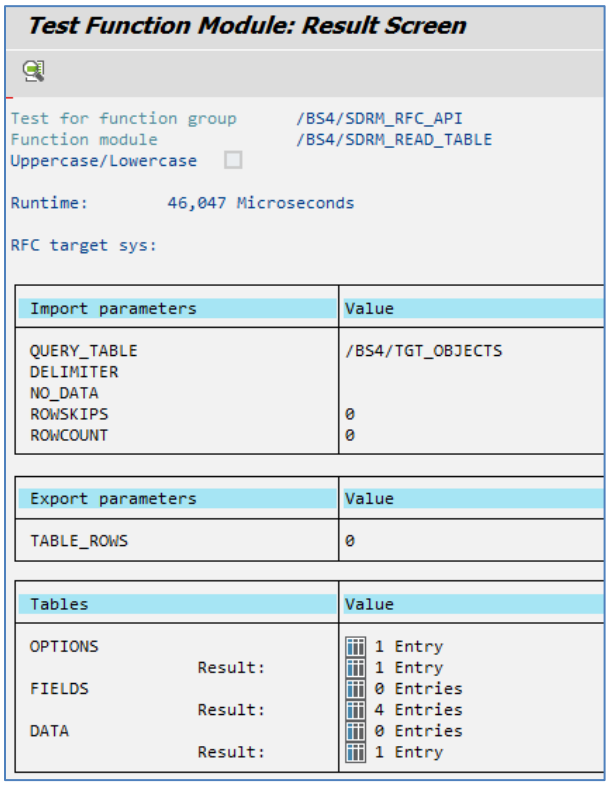


Figure 1 - Read API - Target Objects - Output

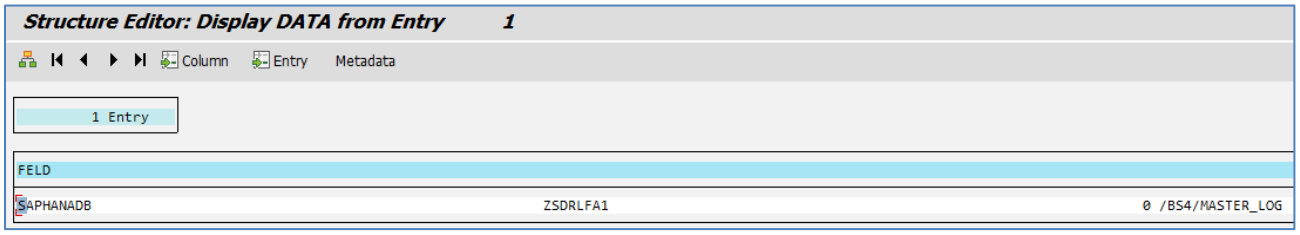


Figure 21 - Read API - Target Objects - Data Table

Reading Generated Transportable Objects

In order to read the Generated Transportable Objects Table, input field **QUERY_TABLE** must be populated with value '/BS4/GEN_TR_OBJS'. The other input fields are optional.

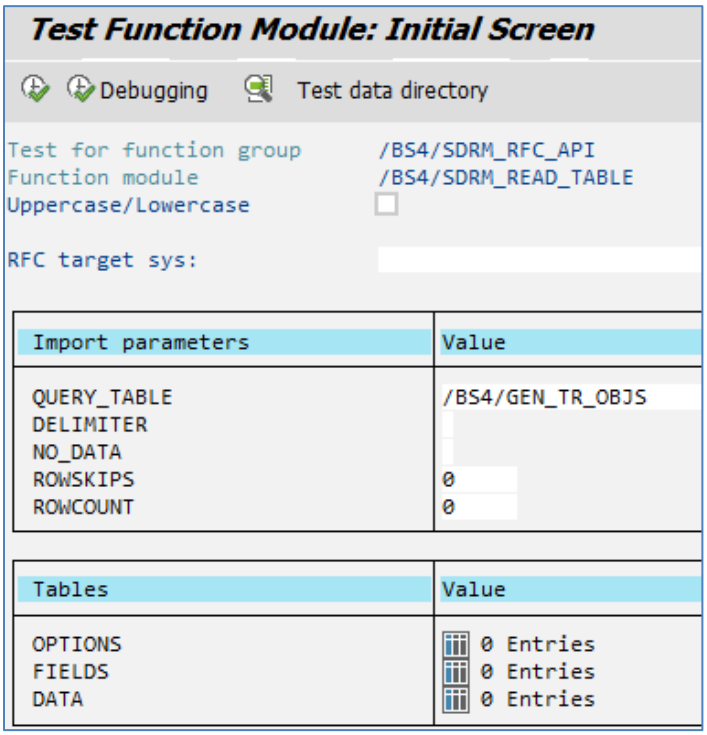


Figure 22 - Read API - Generated Transportable Objects

Once the API is executed, tables FIELDS and DATA are populated.

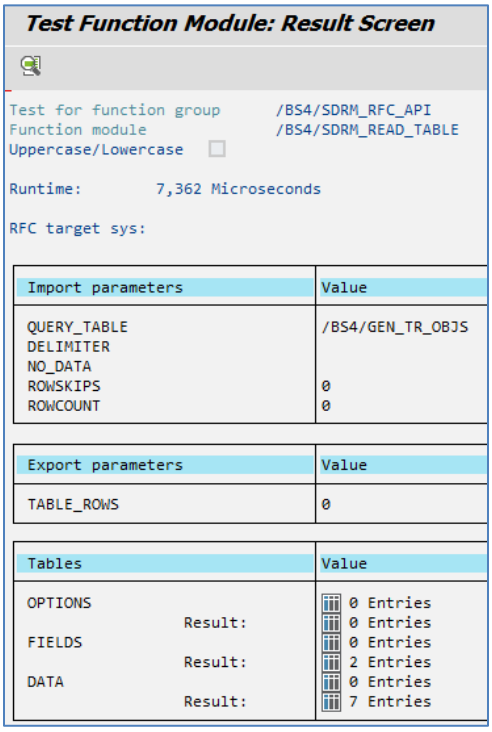


Figure 23 - Read API - Generated Transportable Objects – Output

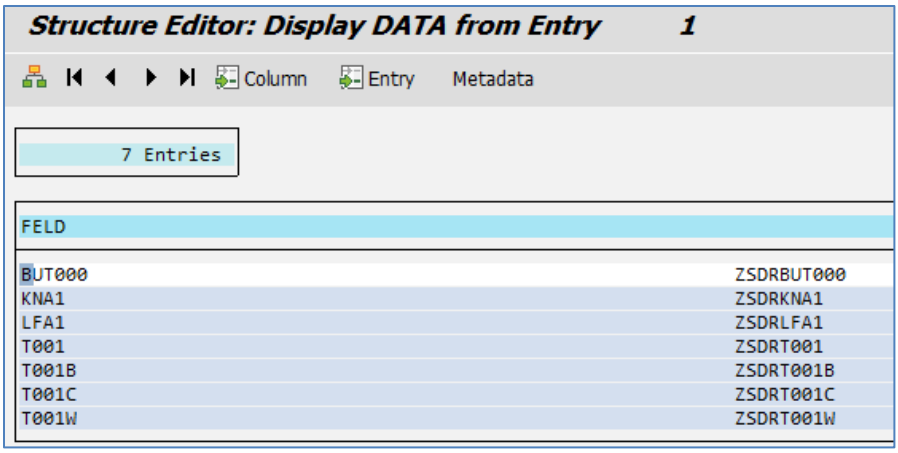


Figure 24 - Read API - Generated Transportable Objects - Data Table

Reading Generated Database Objects Table

In order to read the Generated Database Objects Table, input field **QUERY_TABLE** must be populated with value '/BS4/GEN_TR_OBJS'. The other input fields are optional.

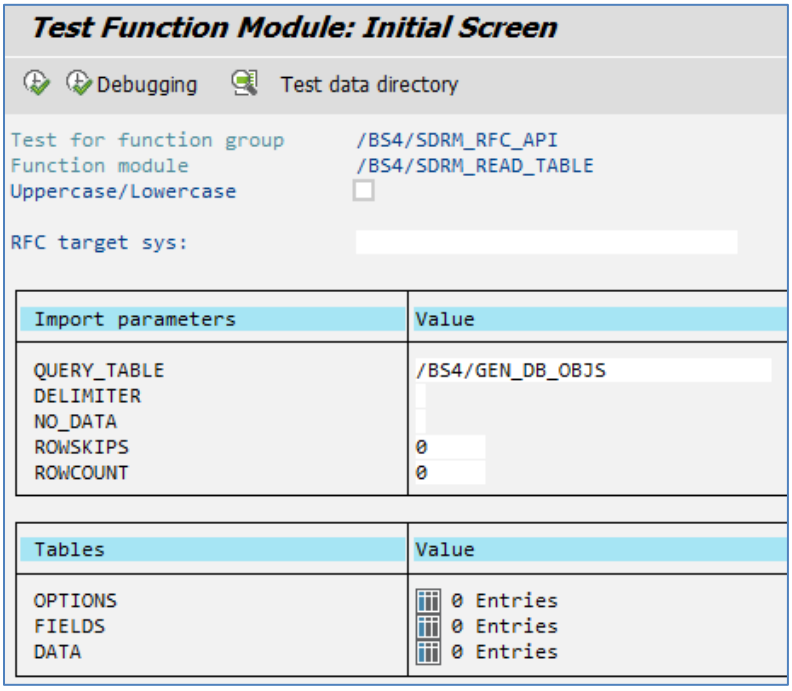


Figure 25 - Read API - Generated Database Objects

Once the API is executed, tables FIELDS and DATA are populated.

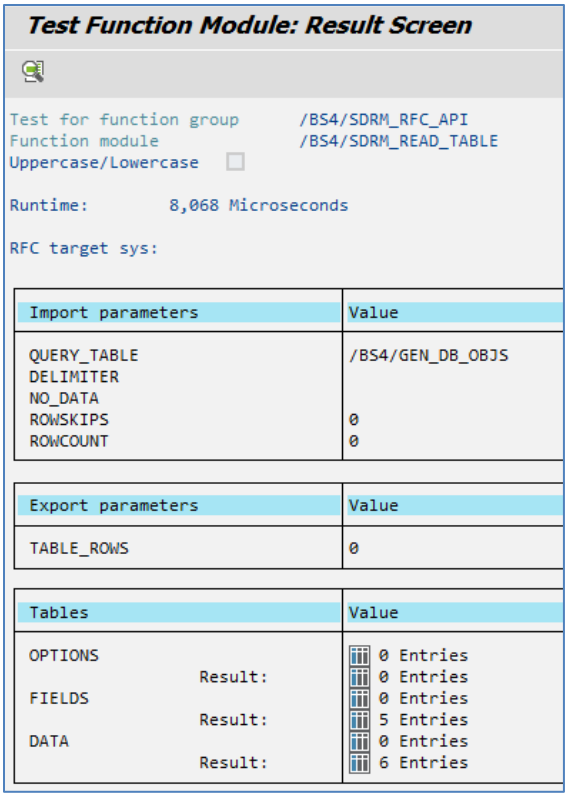


Figure 26 - Read API - Generated Database Objects - Output

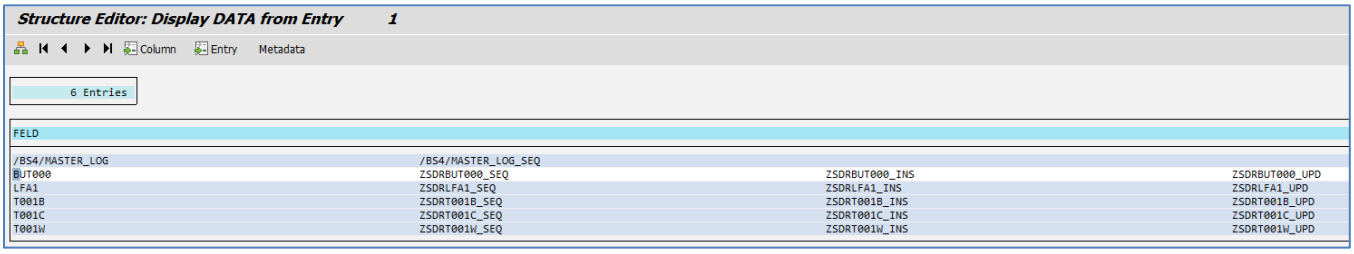


Figure 27 - Read API - Generated Database Objects - Data Table

Reading Error Table

In order to read the Error Log Table, input field **QUERY_TABLE** must be populated with value '/BS4/ERROR_LOG'. The other input fields are optional.

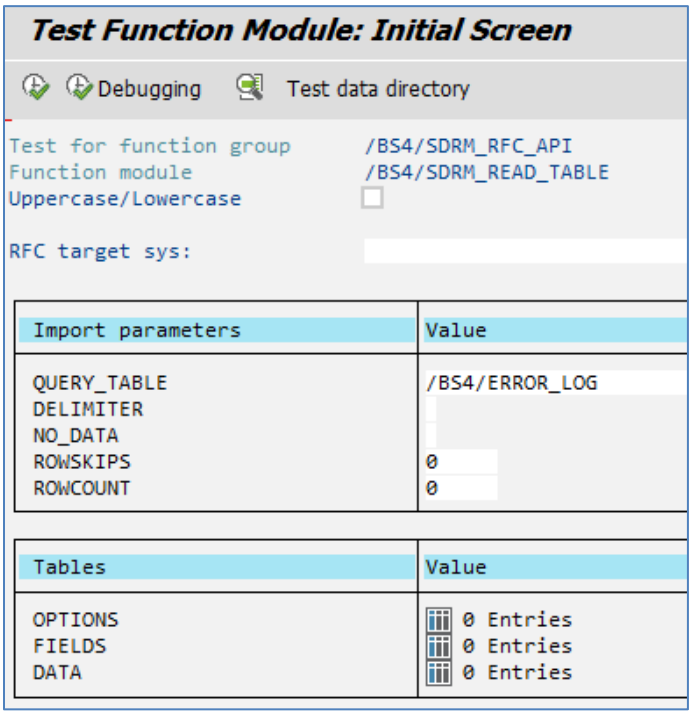


Figure 28 - Read API - Error Log

Once the API is executed, tables FIELDS and DATA are populated.

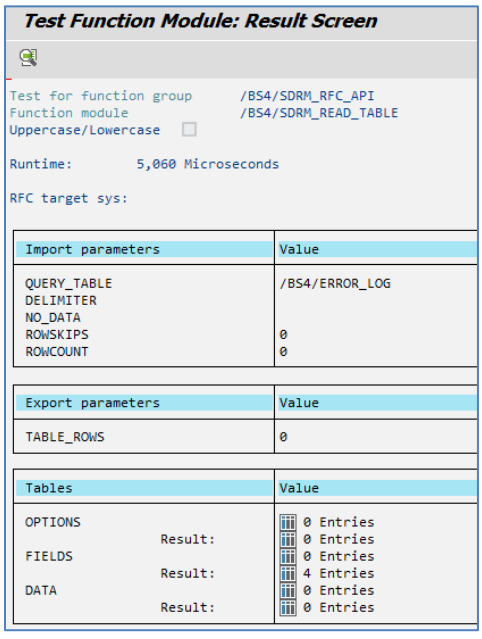


Figure 29 - Read API - Error Log - Output

Update Master Log Table API

The Update Master Table API (/BS4/SDRM_UPDATE_MASTER_TABLE) can be used to update the FLAG field of the Master Log Table /BS4/MASTER_LOG, provided that the user executing it has the required authorizations.

The input parameters for the Update Master Log Table API are the following:

- **OLD_FLAG**: Current value of field FLAG – Used to select entries in /BS4/MASTER_LOG;
- **NEW_FLAG**: Value to be used to update field FLAG;
- **SCHEMA_NAME**: Selection parameter for querying /BS4/MASTER_LOG;
- **TABLE_NAME**: Selection parameter for querying /BS4/MASTER_LOG;
- **TOP**: Maximum number of rows to be updated;
- **TID**: Selection parameter for querying /BS4/MASTER_LOG – multiple values can be defined;
    - **SIGN**:
        - I – Include;
        - E – Exclude;
    - **OPTION**:
        - EQ – Equal;
        - NE – Not Equal;
        - GT – Greater Than;
        - LT – Lower Than;
        - GE – Greater or Equal;
        - LE – Lower or Equal;
        - BT – Between;
        - CP – Contains Pattern;
    - **LOW**: Value for single value options and from value for double value options;
    - **HIGH**: To value for double value options.

The output parameters for Update Master Log API are the following:

- **MESSAGES**: Table of messages raised during the execution of the API.

Updating Master Log Table

In order to update the Master Log Table, input fields **OLD_FLAG** and **NEW_FLAG** must be populated. The other input fields are optional. It is recommended to populate either **SCHEMA_NAME** and **TABLE_NAME** or **TID** table

to limit the records being updated. The following example updates **FLAG** field from **/BS4/MASTER_LOG** from 0 to 1 for TIDs 1 to 10.

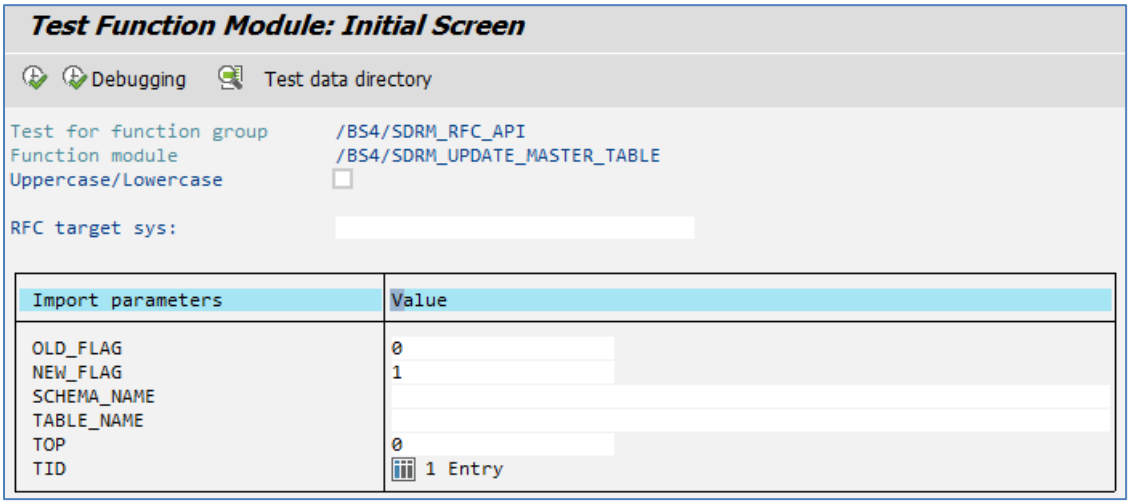


Figure 30 - Update Master Log Table API

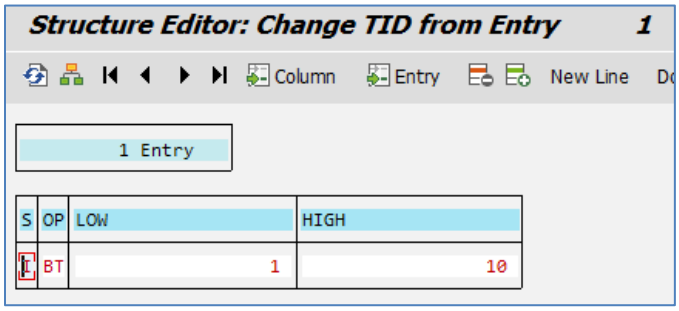


Figure 31 - Update Master Log Table API - TID Table

Once the API is executed, table MESSAGES is populated.

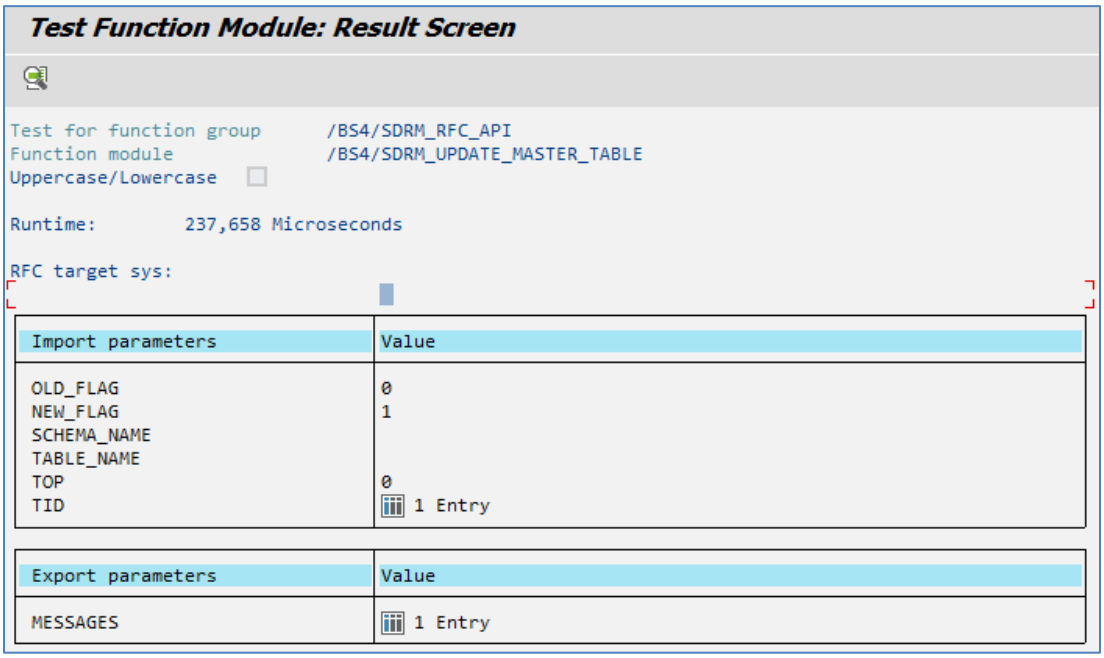


Figure 32 - Update Master Log Table API - Output

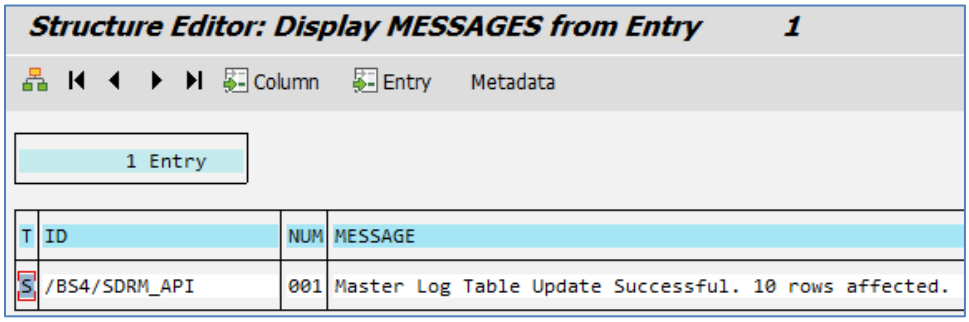


Figure 33 - Update Master Log Table API - Messages

Update Log Tables API

The Update Log Table API (/BS4/SDRM_UPDATE_LOG_TABLE) can be used to update the FLAG field of the Log Tables, provided that the user executing it has the required authorizations.

The input parameters for the Update Log Table API are the following:

- **LOG_TABLE_NAME:** Name of the Log Table to be updated;
- **OLD_FLAG**: Current value of field FLAG – Used to select entries from LOG_TABLE_NAME;
- **NEW_FLAG**: Value to be used to update field FLAG;
- **TOP**: Maximum number of rows to be updated;
- **TID**: Selection parameter for querying LOG_TABLE_NAME – multiple values can be defined;

- **SIGN**:
  - I – Include;
  - E – Exclude;
- **OPTION**:
  - EQ – Equal;
  - NE – Not Equal;
  - GT – Greater Than;
  - LT – Lower Than;
  - GE – Greater or Equal;
  - LE – Lower or Equal;
  - BT – Between;
  - CP – Contains Pattern;
- **LOW**: Value for single value options and from value for double value options;
- **HIGH**: To value for double value options.

The output parameters for Update Log API are the following:

- **MESSAGES**: Table of messages raised during the execution of the API.

Updating Log Table

In order to update the Log Table, input fields **LOG_TABLE_NAME**, **OLD_FLAG** and **NEW_FLAG** must be populated. The following example updates **FLAG** field from **ZSDRBUT000** from 0 to 1 for TIDs 1 to 10.

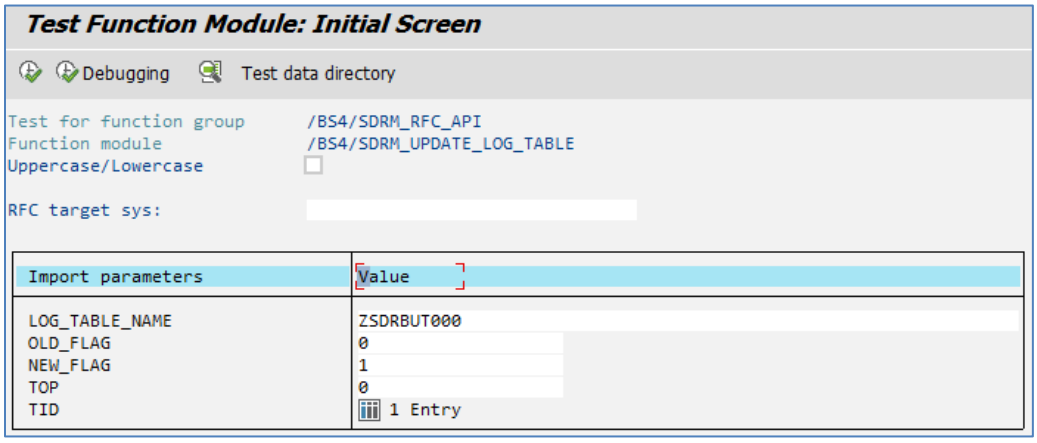


Figure 34 - Update Log Table API

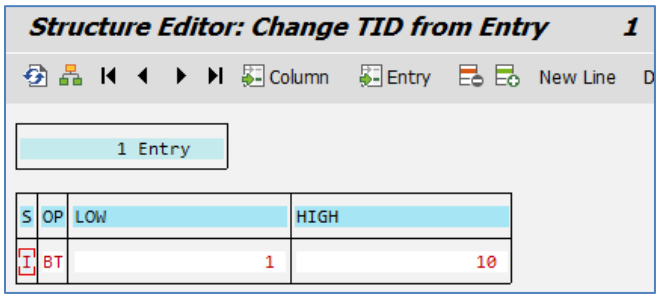


Figure 35 - Update Log Table API - TID Table

Once the API is executed, table MESSAGES is populated.

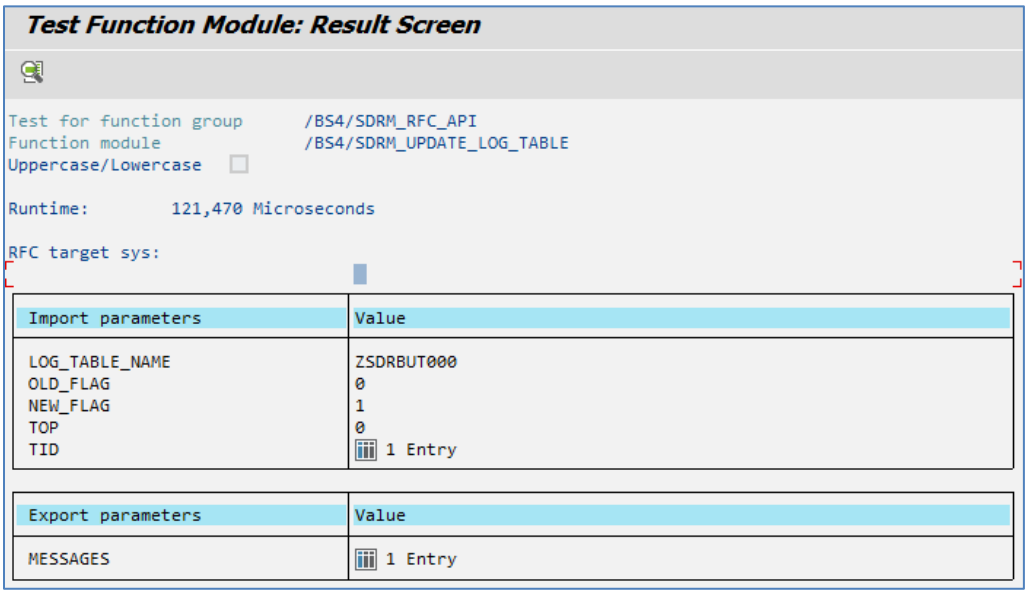


Figure 36 - Update Log Table API - Output

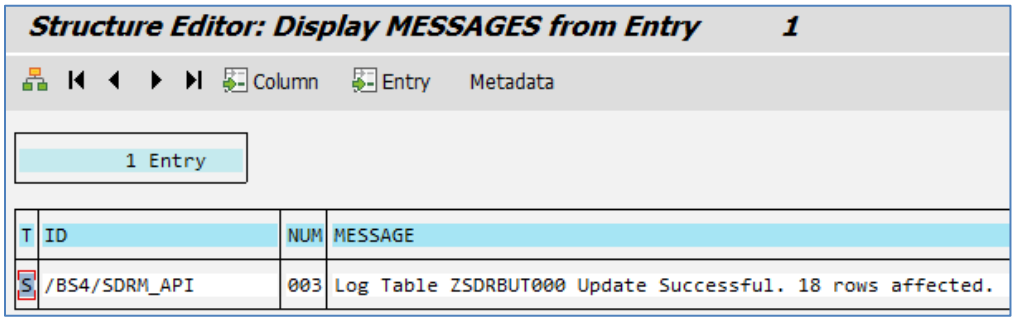


Figure 37 - Update Log Table API - Messages

Delete Master Log Table API

The Delete Master Table API (/BS4/SDRM_DELETE_MASTER_TABLE) can be used to delete entries of the Master Log Table /BS4/MASTER_LOG, provided that the user executing it has the required authorizations.

The input parameters for the Delete Master Log Table API are the following:

- **SCHEMA_NAME**: Selection parameter for querying /BS4/MASTER_LOG;
- **TABLE_NAME**: Selection parameter for querying /BS4/MASTER_LOG;
- **TOP**: Maximum number of rows to be updated;
- **TID**: Selection parameter for querying /BS4/MASTER_LOG – multiple values can be defined;
    - **SIGN**:
        - I – Include;
        - E – Exclude;
    - **OPTION**:
        - EQ – Equal;
        - NE – Not Equal;
        - GT – Greater Than;
        - LT – Lower Than;
        - GE – Greater or Equal;
        - LE – Lower or Equal;
        - BT – Between;
        - CP – Contains Pattern;
    - **LOW**: Value for single value options and from value for double value options;
    - **HIGH**: To value for double value options.

The output parameters for Update Master Log API are the following:

- **MESSAGES**: Table of messages raised during the execution of the API.

Deleting Master Log Table

In order to delete the Master Log Table the input fields are optional. It is recommended to populate either **SCHEMA_NAME** and **TABLE_NAME** or **TID** table to limit the records being updated. The following example deletes records **/BS4/MASTER_LOG** for TIDs 1 to 10.

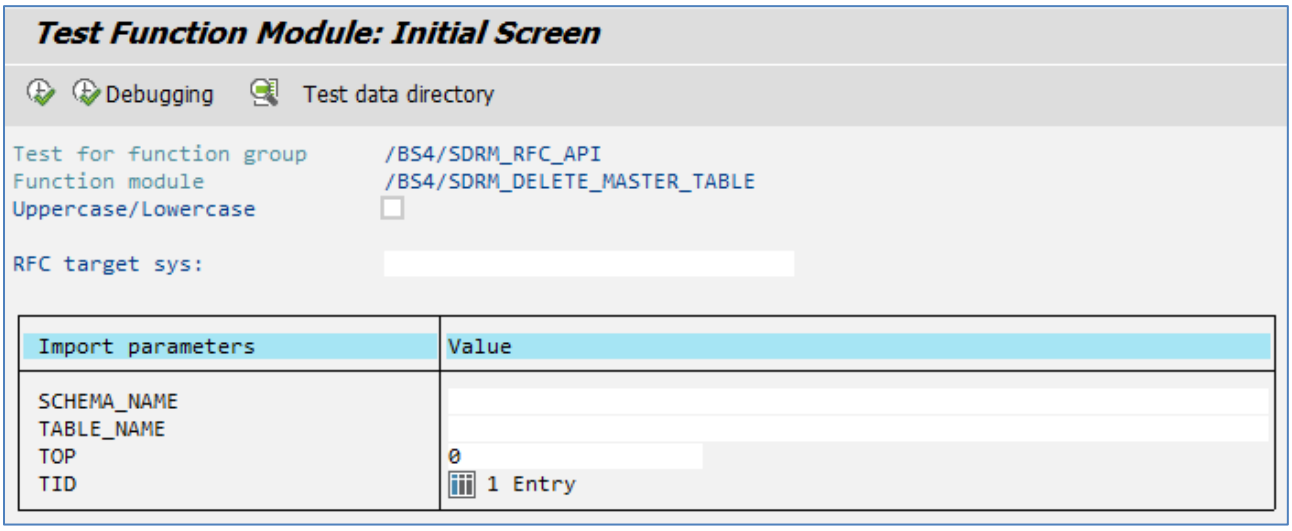


Figure 38 - Delete Master Log Table API

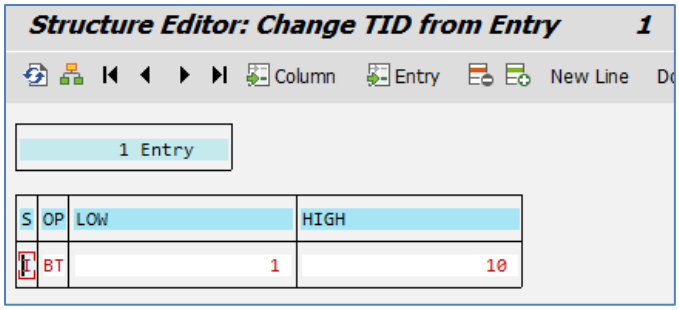


Figure 39 - Delete Master Log Table API - TID Table

Once the API is executed, table MESSAGES is populated.

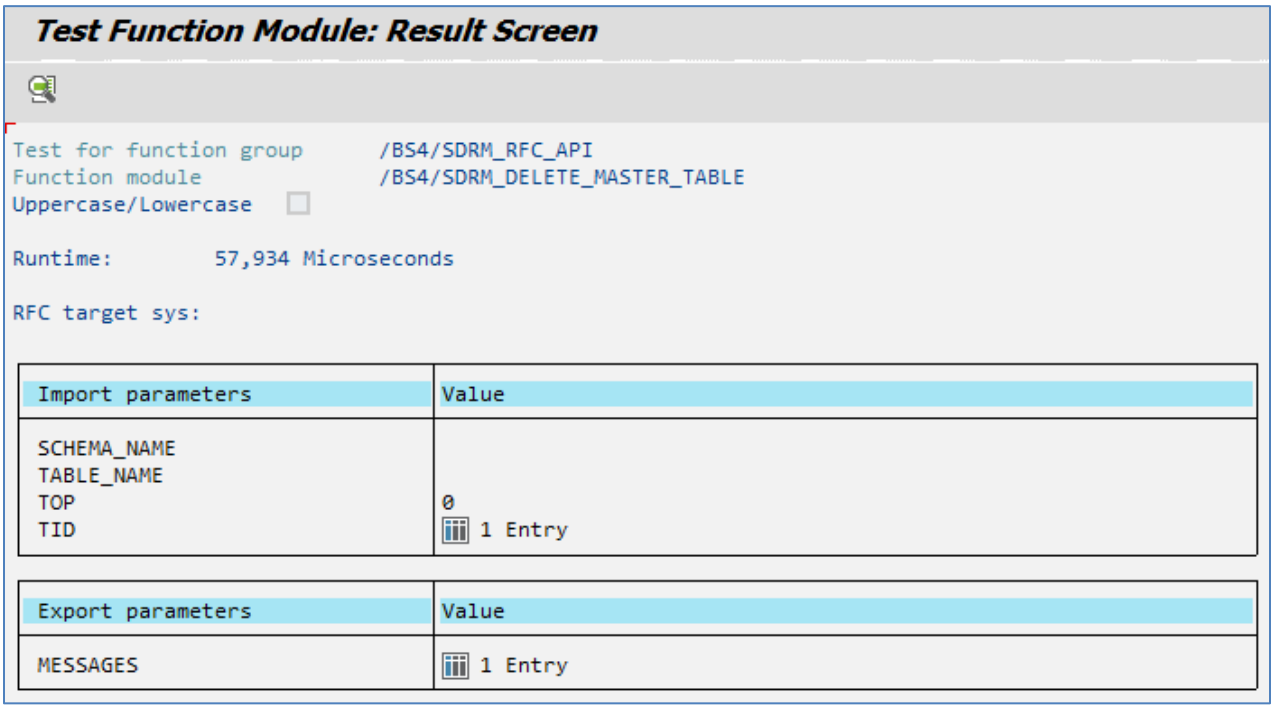


Figure 40 - Delete Master Log Table API - Output

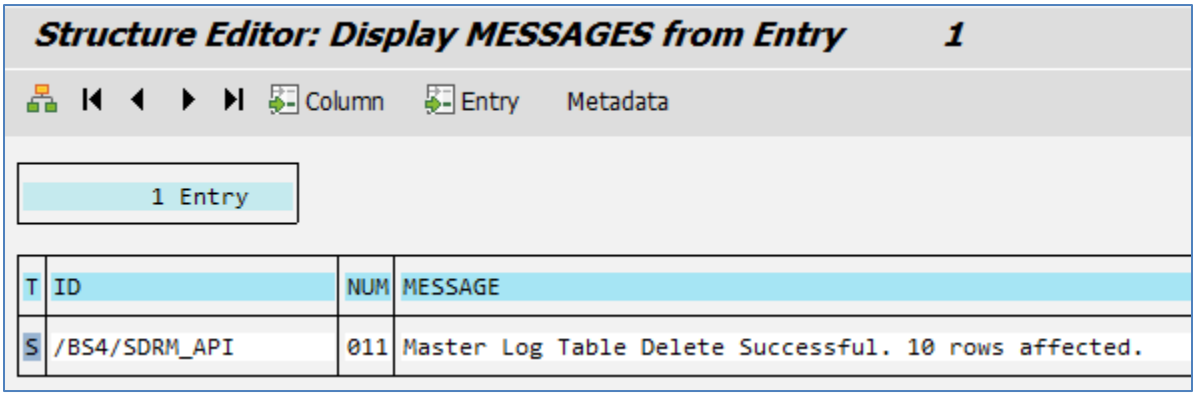


Figure 41 - Update Master Log Table API - Messages

Delete Log Tables API

The Delete Log Table API (/BS4/SDRM_DELETE_LOG_TABLE) can be used to delete entries from Log Tables, provided that the user executing it has the required authorizations.

The input parameters for the Delete Log Table API are the following:

- **LOG_TABLE_NAME**: Name of the Log Table to be updated;
- **TOP**: Maximum number of rows to be updated;
- **TID**: Selection parameter for querying LOG_TABLE_NAME – multiple values can be defined;
    - **SIGN**:
        - I – Include;
        - E – Exclude;
    - **OPTION**:
        - EQ – Equal;
        - NE – Not Equal;
        - GT – Greater Than;
        - LT – Lower Than;
        - GE – Greater or Equal;
        - LE – Lower or Equal;
        - BT – Between;
        - CP – Contains Pattern;
    - **LOW**: Value for single value options and from value for double value options;
    - **HIGH**: To value for double value options.

The output parameters for Update Log API are the following:

- **MESSAGES**: Table of messages raised during the execution of the API.

Deleting Log Table

In order to delete the Log Table entries, input field **LOG_TABLE_NAME** must be populated. The following example deletes entries from **ZSDRBUT000** for TIDs 1 to 10.

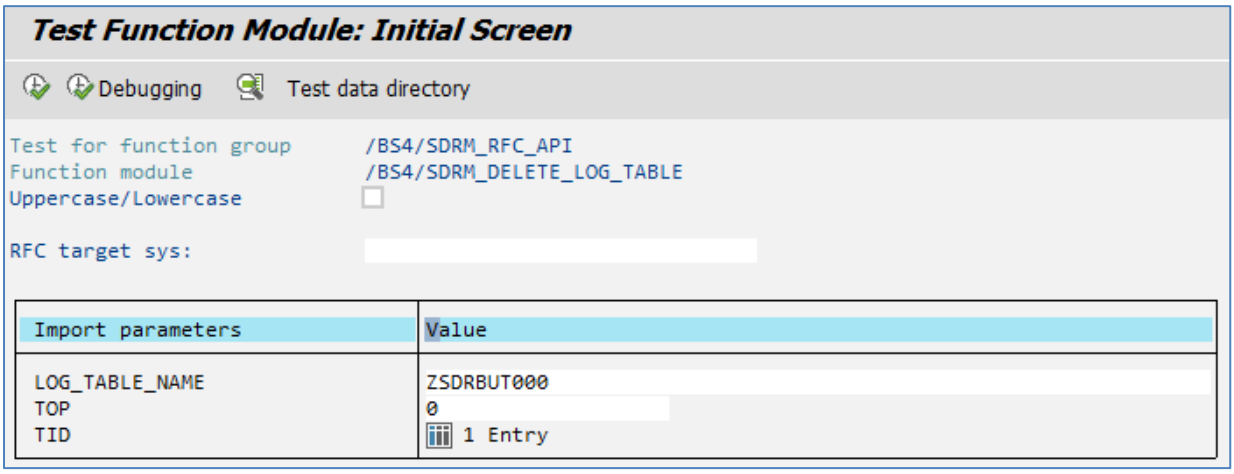


Figure 42 - Delete Log Table API

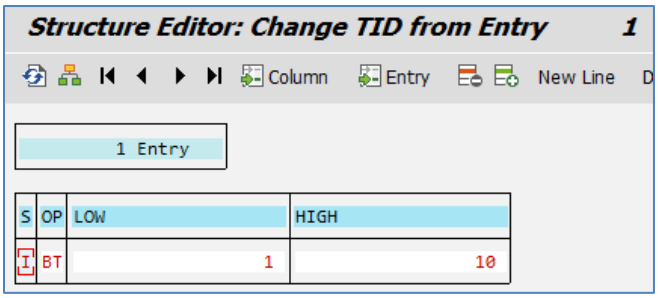


Figure 43 - Delete Log Table API - TID Table

Once the API is executed, table MESSAGES is populated.

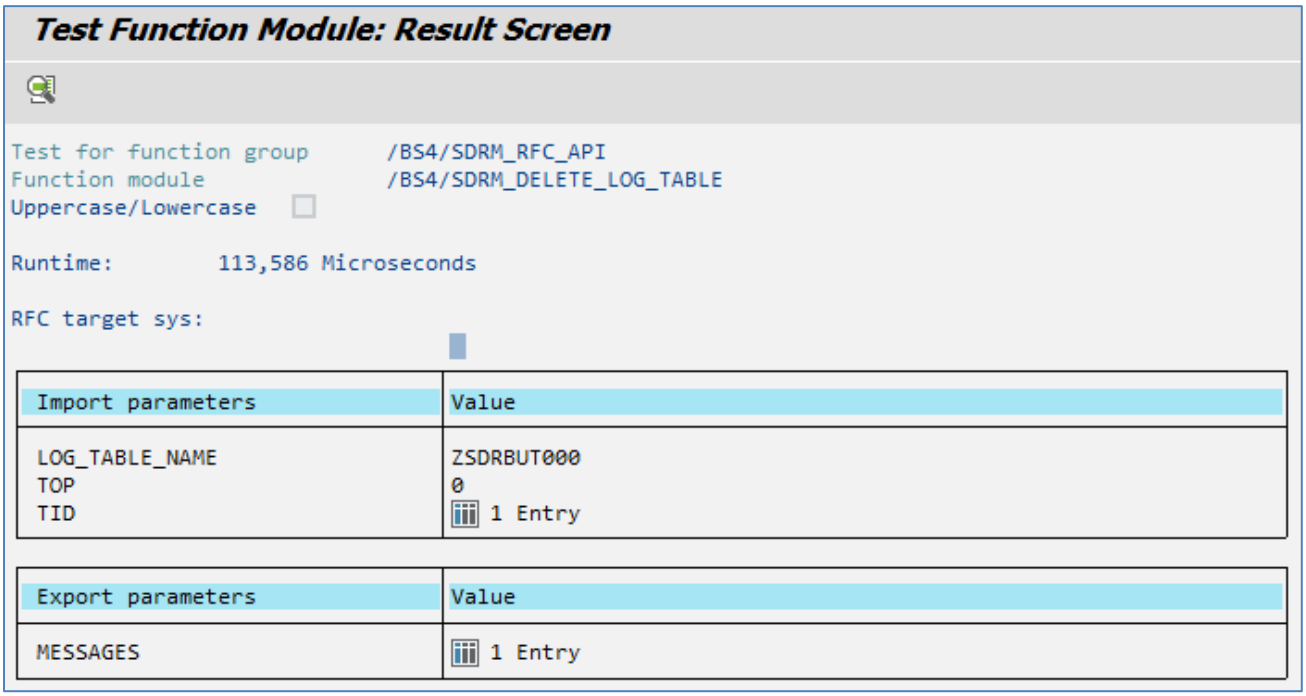


Figure 44 - Delete Log Table API - Output

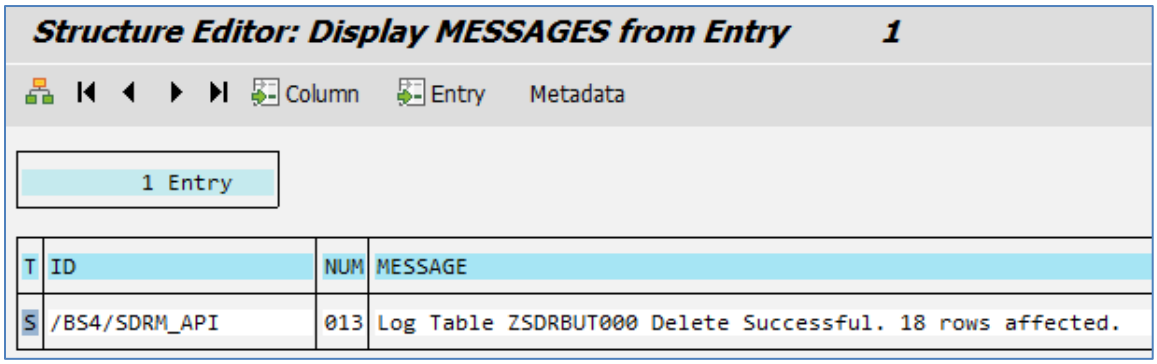


Figure 45 - Delete Log Table API - Messages

Steps for Replicating Tables

Extracting data from SAP ECC and S/4 HANA Systems using Syniti Replicate requires software to be installed on the application server running Syniti Replicate.

Syniti Replication Windows Application Server

To use the Syniti Replicate SAP NetWeaver Extract database type, the SAP NetWeaver RFC SDK must be installed on the application server running Syniti Replicate. The following libraries from the RFC SDK must be available at run time:

- sapnwrfc.dll
- icudt30.dll
- icuin30.dll
- icuuc30.dll
- libicudecnumber.dll
- libsapucum.dll

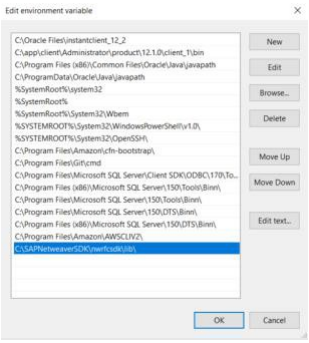
NOTE: Details explaining how to download the SAP NetWeaver RFC SDK can be found at the following location: https://support.sap.com/en/product/connectors/nwrfcsdk.html

NOTE: The Syniti Replicate Application Server MUST have .Net Framework 3.5 and Windows Visual Studio 2013 C++ installed.

NOTE: After installing the SAP NetWeaver RFC SDK, the installation location must be added to the PATH System Environment Variables.

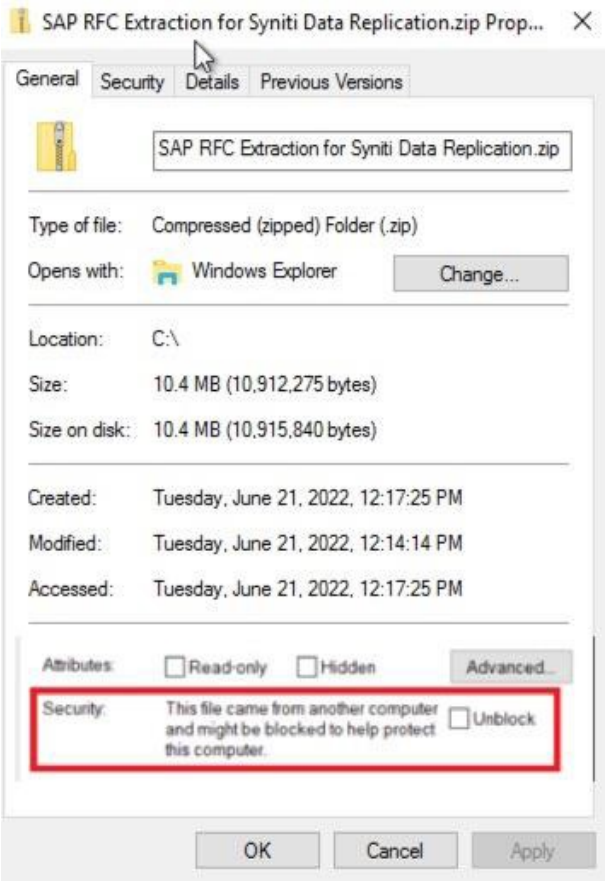
NOTE: It is important that the above installations are all aligned to the correct 64-bit processing capability as Syniti Replicate is a 64-bit application and will rely on the .Net Framework, Windows Visual Studio 2013 C++ and SAP NetWeaver RFC SDK being aligned to 64-bit. If not, then errors will occur when testing the connectivity either directly via 64-bit ODBC connections or via Syniti Replicate.

Example:



Download zip file SAP RFC Extraction for Syniti Replicate Application Server

Download and unzip file Syniti Replicate.zip onto the Windows Server where Syniti Replicate is installed. Before unzipping the file, check the properties of the zip file to ensure it's not blocked. If it is, check the Unblock flag and click apply.



Install cData Driver for SAP ERP

To install the cData Driver for SAP ERP:

1. Copy the folder cData from file 'SAP RFC Extraction for Syniti Replicate.zip.
2. Paste the folder into location where Syniti Replicate was installed. By default, Syniti Replicate is installed in the following location:

C:/Program Files/Syniti/Syniti Replicate

Register cData Driver for SAP ERP

To register the cData Driver for SAP ERP:

The Syniti_Register_cData_Driver_for_SAP_ERP.reg file expects that the driver files have be copied to the default Syniti Replicate installation location. If Syniti Replicate has been installed in a different location, then the highlighted file paths below will need to be modified.

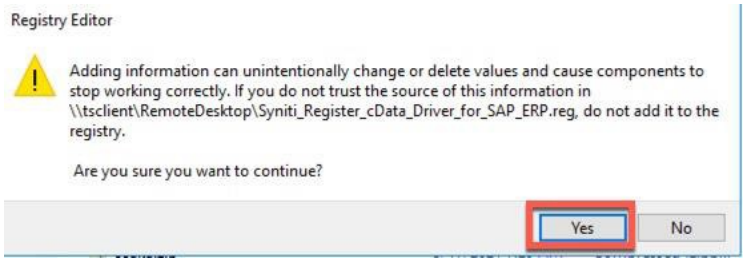
Syniti_Register_cData_Driver_for_SAP_ERP.reg

```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SOFTWARE\ODBC\ODBCINST.INI\Syniti-CData Driver for SAP ERP]
"Driver"="C:\\Program Files\\Syniti\\Syniti Replicate\\CData\\CData ODBC Driver for SAP ERP\\lib64\\CData.ODBC.SAPERP.dll"
"Setup"="C:\\Program Files\\Syniti\\Syniti Replicate\\CData\\CData ODBC Driver for SAP ERP\\lib64\\CData.ODBC.SAPERP.dll"
"OEM"="TRUE"
"DisplayProperties"="ALL"
"Help"="C:\\Program Files\\Syniti\\Syniti Replicate\\CData\\CData ODBC Driver for SAP ERP\\help\\help.htm"

[HKEY_LOCAL_MACHINE\SOFTWARE\ODBC\ODBCINST.INI\ODBC Drivers]
"Syniti-CData Driver for SAP ERP"="Installed"
```

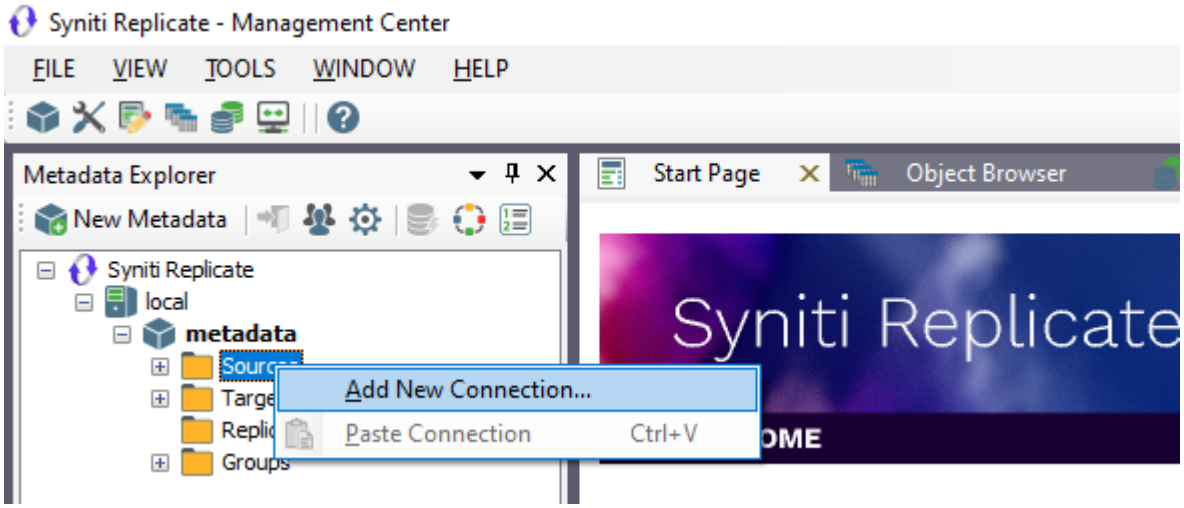
When prompted, confirm that you want to update the registry.



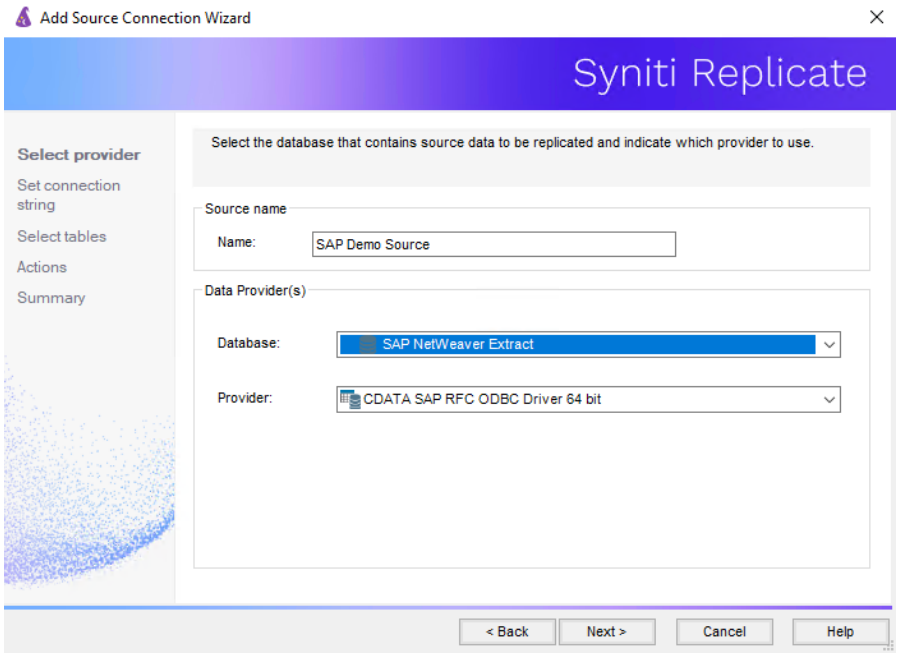
Set Up a Source Connection to SAP

To set up the connection:

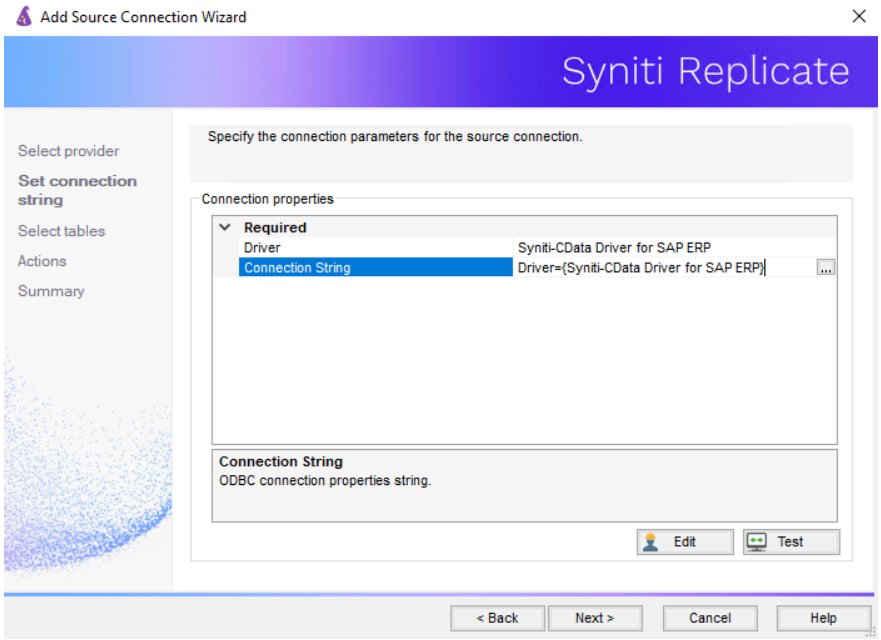
1. In the Metadata Explorer, expand the metadata node to view the **Sources** and **Targets** nodes.
2. Select the **Sources** node.
3. From the right mouse button menu, choose **Add New Connection**.



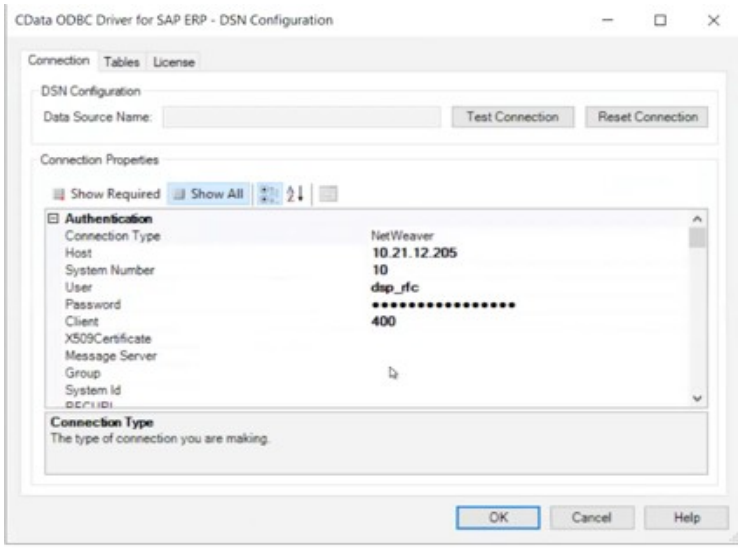
4. In the Source Connection Wizard, follow steps to add a connection string and test the connection to the database.
5. Enter a Name for the Source Connection.



6. Select SAP NetWeaver Extract from the Database list box.
7. Select cData SAP RFC ODBC Driver 64-bit from the Provider list box.



8. Click the connection properties and configure the connection.
   The cData ODBC Driver for SAP ERP DSN configurator opens.



The table below defines the available cData ODBC SAP ERP driver connection properties along with recommended values to be used for particular properties.

YELLOW = Syniti recommended changes to default values

GREEN = SAP connection information that may or may not need to be populated based upon requirements.

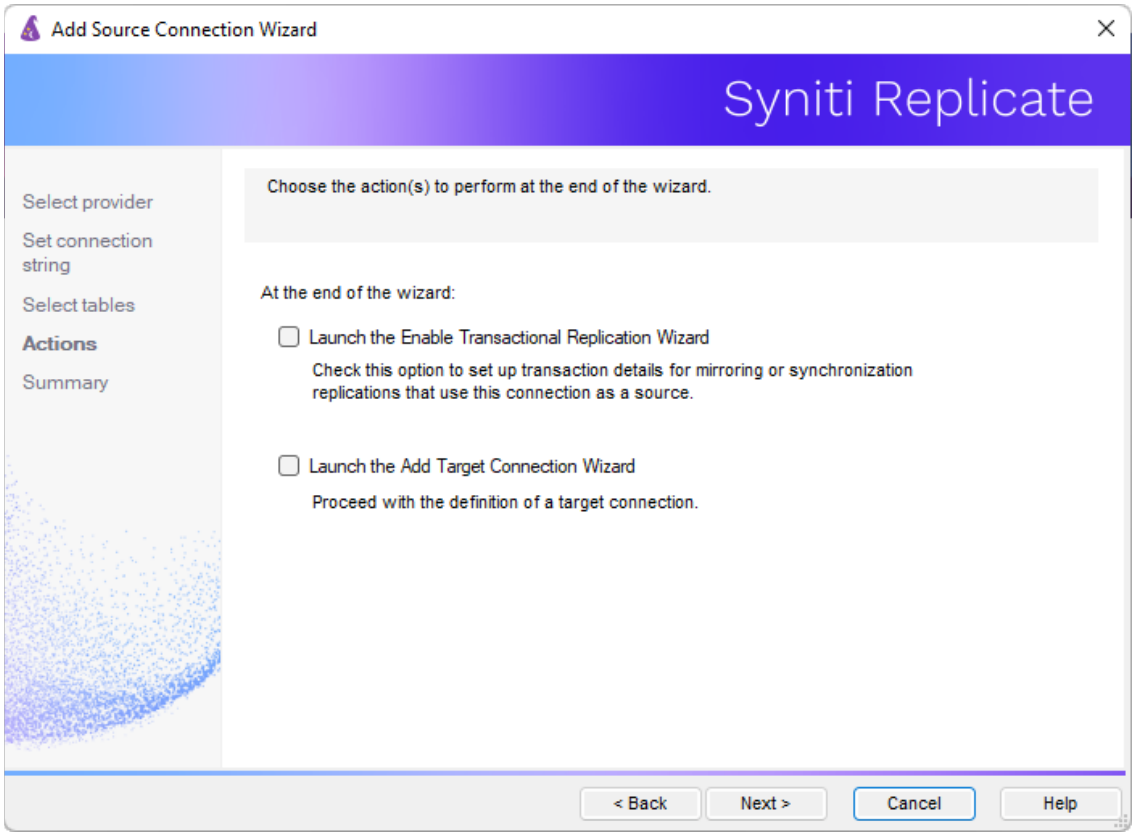
Group	Property	Recommended Value
Authentication	ConnectionType	Netweaver
Authentication	Host	{Enter SAP Host or Message Server}
Authentication	SystemNumber	{Enter SAP System Number}
Authentication	User	{Enter SAP RFC Username}
Authentication	Password	{Enter SAP RFC User Password}
Authentication	Client	{Enter SAP Client}
Authentication	X509Certificate	
Authentication	MessageServer	{Enter SAP Host or Message Server}
Authentication	Group	{Enter Group if using Message Server}
Authentication	SystemId	{Enter SAP System ID}
Authentication	RFCURL	
Authentication	MessageServerService	
Caching	AutoCache	FALSE
Caching	CacheProvider	
Caching	CacheConnection	
Caching	CacheLocation	%APPDATA%\CData\SAPERP Data Provider

Group	Property	Recommended Value
Caching	CacheTolerance	600
Caching	Offline	FALSE
Caching	CacheMetadata	FALSE
Firewall	FirewallType	NONE
Firewall	FirewallServer	
Firewall	FirewallPort	0
Firewall	FirewallUser	
Firewall	FirewallPassword	
Logging	Logfile	
Logging	Verbosity	1
Logging	LogModules	
Logging	MaxLogFileSize	100MB
Logging	MaxLogFileCount	-1
Misc	Charset	
Misc	Destination	
Misc	EndianType	Auto
Misc	GatewayHost	{Populate if SAP Gateway is used}
Misc	GatewayService	{Populate if SAP Gateway is used}
Misc	GenerateSchemaFiles	Never
Misc	InitialValueMode	InitialValue
Misc	Language	EN
Misc	Location	
Misc	MaxRows	-1
Misc	Other	
Misc	Pagesize	25000
Misc	PseudoColumns	*=*
Misc	QueryMode	Global
Misc	ReadTableFunction	/BOA/SDR_READ_TABLE (SAP ECC Systems) /BS4/SDR_READ_TABLE (SAP S/4 HANA Systems)

Group	Property	Recommended Value
Misc	RTK	
Misc	StoredProcedureFilter	BAPI*
Misc	SupportEnhancedSQL	TRUE
Misc	TableMode	(NOT TABNAME LIKE '%/%' AND (TABCLASS = 'TRANSP' OR TABCLASS = 'POOL' OR TABCLASS = 'CLUSTER') AND CONTFLAG <> 'L')
Misc	Timeout	60
Misc	UseLabels	FALSE
Misc	UseUnicodeRFC	TRUE
Misc	UseSimpleNames	FALSE
Misc	DefaultDomain	
Misc	EnableForeignKeyDetection	FALSE
Misc	IncludeDualTable	FALSE
Misc	LimitKeySize	255
Misc	MapBigintToVarchar	FALSE
Misc	MapToInt	FALSE
Misc	MapToLongVarchar	-1
Misc	MapToWVarchar	TRUE
Misc	MaximumColumnSize	16000
Misc	UpperCaseIdentifiers	FALSE
Proxy	ProxyAutoDetect	TRUE
Proxy	ProxyServer	
Proxy	ProxyPort	80
Proxy	ProxyAuthScheme	BASIC
Proxy	ProxyUser	
Proxy	ProxyPassword	
Proxy	ProxySSLType	Auto
Proxy	ProxyExceptions	
Schema	BrowsableSchemas	

Group	Property	Recommended Value
Schema	Tables	
Schema	Views	
Security	SNCMode	{Set to TRUE if SNC Used}
Security	SNCName	{Populate if SNC is used}
Security	SNCOop	{Populate if SNC is used}
Security	SNCPartnerName	{Populate if SNC is used}
Security	SNCLibPath	{Populate if SNC is used}
SSL	SSLServerCert	

9. If using Mirroring mode to replicate data from SAP, in the **Actions** screen, check the option **Launch the Enable Transactional Replication Wizard**.



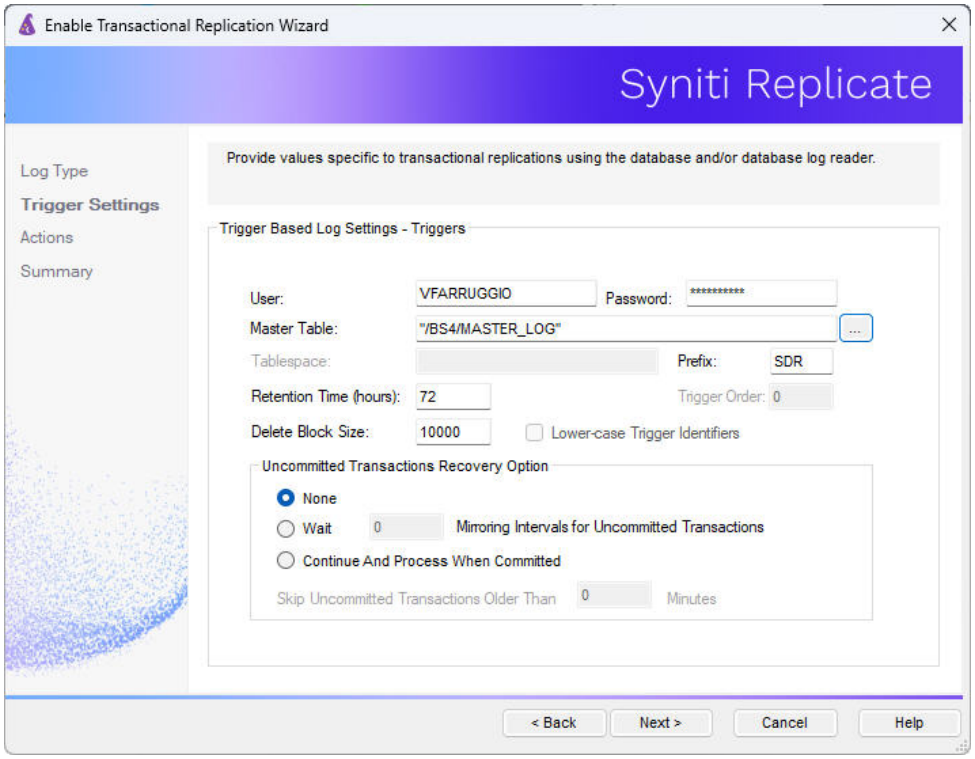
2. Configure the Enable Transactional Replication Wizard

Skip this section if you are setting up a Refresh replication. Continue here if you are setting up a Mirroring replication.

This section assumes you have checked the Source Connection wizard option to launch the Enable Transactional Replication wizard. To open the wizard from the Management Center, choose the connection in the Metadata Explorer, then right-click to choose **Transactional Setup > Enable...**

In the **Enable Transactional Replication** wizard:

1. Select the Triggers option.
2. Complete the Triggers Based Log Setting



Trigger Settings Screen

User and Password

Add credentials for the user in SAP

Master Table

Either specify an existing qualified table name, or click **Change** to create a new table to hold general information about replication transactions including user name, timestamp, table name for each transaction.

There are two tables associated with each replication: a Master table, common to all replications using that connection, and a Log table for each replication source table. The Master table keeps track of all the transactions affecting the source tables and it records general transactional information.

Master and Log tables are created in the schema specified when you set the Master table name. You can choose a Master table name, or use the default _DBM__MASTERLOG. Log tables are automatically generated by Syniti Replicate and the names are _DBM__LOG_#, where # is a number. The selected schema for the Master and Log tables must not contain other non-Syniti Replicate tables with names _DBM__LOG_#. You should create a new schema to use specifically for the Syniti Replicate Master and Log tables.

Tablespace

SAP HANA does not use tablespaces.

Retention Time

The amount of time in hours that a transaction is kept in the log tables. The default value is 72 hours. When the amount of time a transaction resides in the log exceeds the retention time, the transaction is permanently removed from the log tables. Tuning the retention time provides control over the size of the log tables. It is also possible to instruct Syniti Replicate to remove all the processed transactions at the end of each mirroring interval. Tuning the retention time provides control over the size of the log tables.

Delete Block Size

Based on the retention time, Syniti Replicate deletes items from the log. This field specifies the maximum number of records to delete from the Syniti log tables with a single SQL statement. The default value is 10,000 records. You do not typically need to edit this value.

Lower-case Trigger Identifiers

Check this option if your database installation uses lower-case trigger identifiers.

Trigger Order

Always inactive for SAP HANA sources.

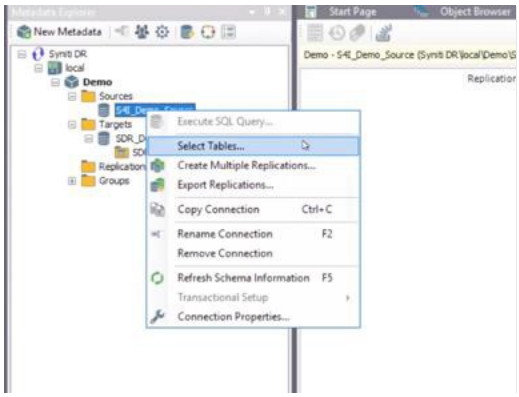
Uncommitted Transactions Recovery Option

This section can be used to indicate how uncommitted transactions should be handled during replication.

None	No gap conditions handled. Uncommitted transactions may cause data to be skipped in replication.
Wait	Set a number of mirroring intervals to hold all replications on the connection to wait when a gap is found due to an uncommitted transaction. All replications in the connection will hold and wait for the number of cycles specified to see if the gap is filled. If after the number of cycles, a transaction is still not committed, it will be skipped.
Continue and Process when Committed	Instead of pausing all replications in case of a gap, replication proceeds with all currently committed transactions. During the next mirroring cycle, the trigger log table is checked for earlier transactions that now have been committed, and any identified transactions are processed.
Skip Uncommitted Transactions Older Than	If wait or continue are selected, this property sets a limit on the amount of time to wait for uncommitted transactions. For instance, a value of 15 minutes means that, no matter which option you choose, transactions opened and not committed for more than 15 minutes will be skipped.

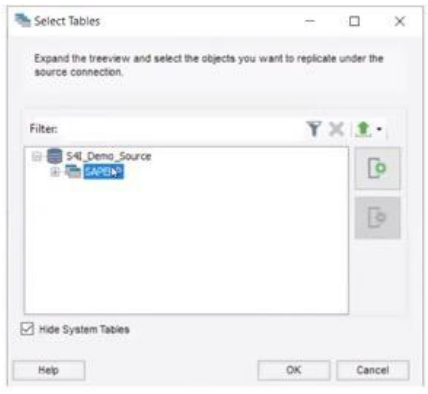
Select source Tables

Right-click the Source Connection that represents the SAP System where data is being extracted and choose Select Tables.



1. In the Select Tables dialog box, expand the Source navigation tree (S4I_Demo_Source) and then click the schema called SAPERP.

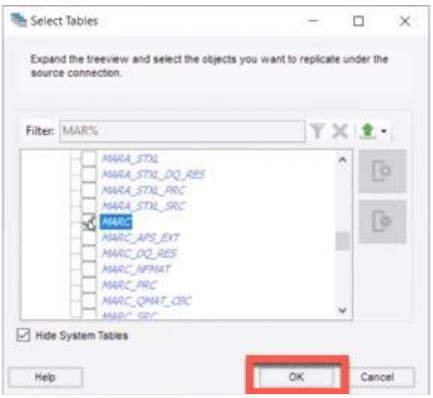
Tip: Avoid expanding the navigation tree below the SAPERP schema. If you expand it, the system attempts to load all the tables defined by the 'TableMode' connection property and could take a few minutes to complete.



Select the specific table that needs to be extracted by entering the name in the Filter field and then clicking the Apply Filter icon.

Tip: Append % to the first characters of a table to retrieve a list of tables that begin with specific characters.

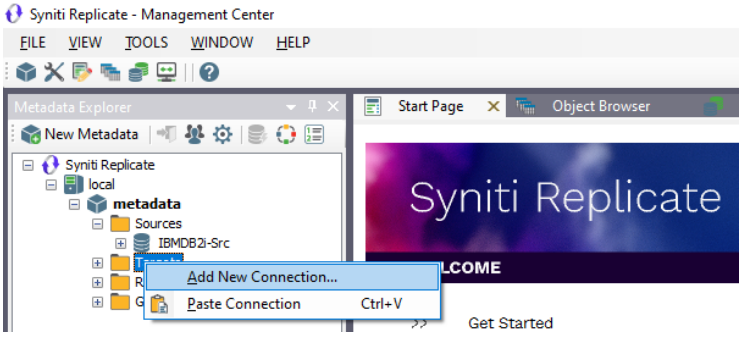
Select the table(s) that need to be imported into the Source Connection table metadata store and click OK.



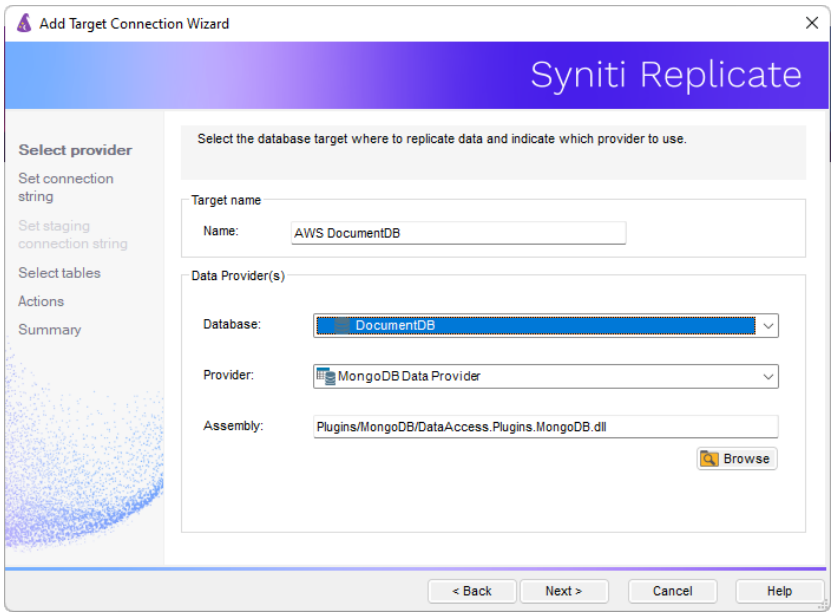
NOTE: This action may take 10 – 15 seconds to complete.

Set up a Target Connection

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



3. In the Add Target Connection Wizard **Database** field.
   The **Provider** and **Assembly** fields are automatically filled out for you.

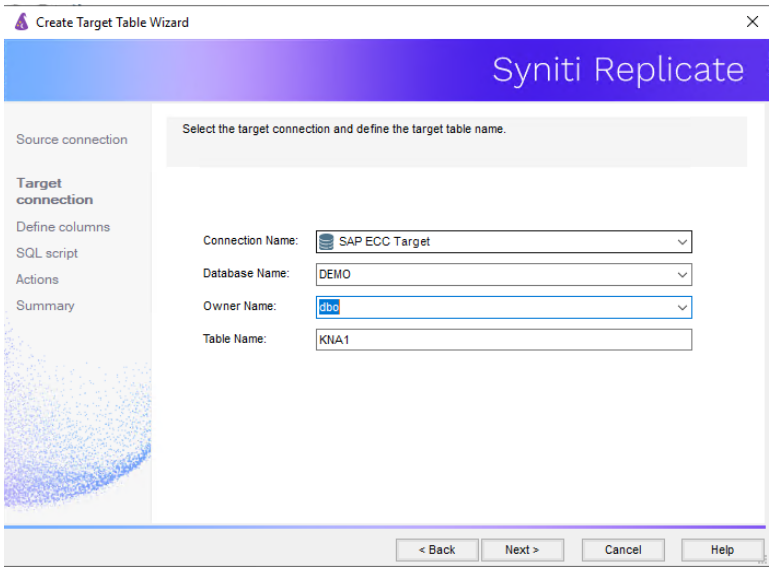


   In the **Set Connection String** page, set properties as described in the table below. The table displays only properties specific for use with Syniti Replicate.

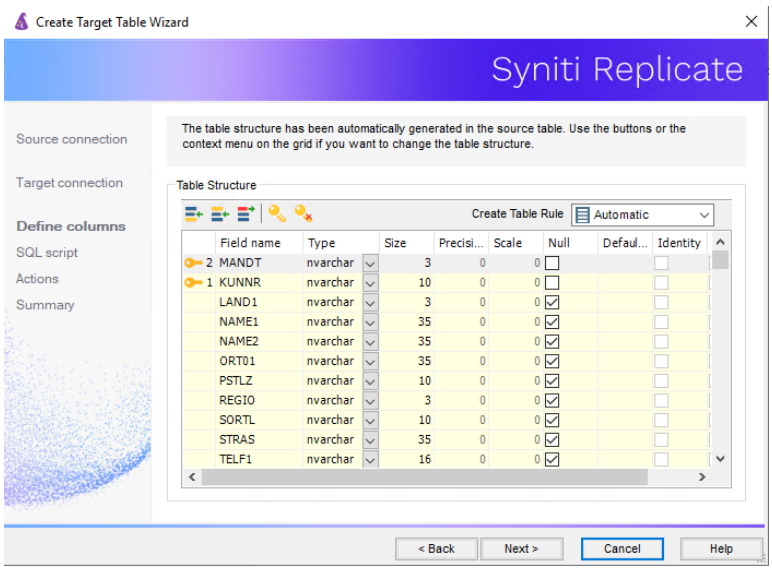
4. Click **Next** to display the **Select tables** page.
   At this point, there is no text output structure available to display. You can add the information after completing the Target Connection wizard.
5. Click **Next** to display the **Summary** page.
6. Click **Finish** to complete the wizard.

Create Target Tables

1. Drag the source table to the target to open the Create Target Wizard.



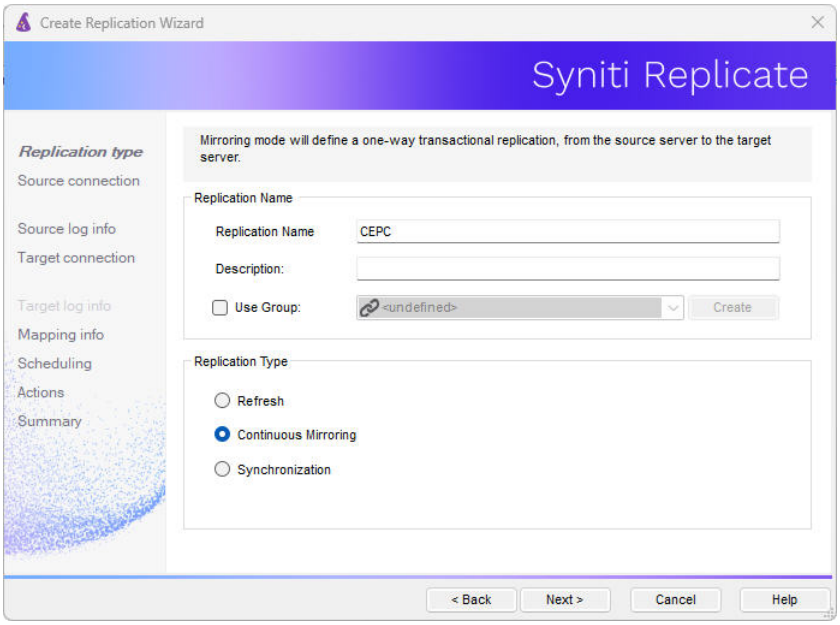
2. Click Next twice to reach the Target Connection Details form, and populate the Database Name, Owner Name and Table Name and click Next.
3. In the Table Structure form, scroll to the bottom to assign the **datetime2** Type to the **ReplicateDateTime** field and click Next:



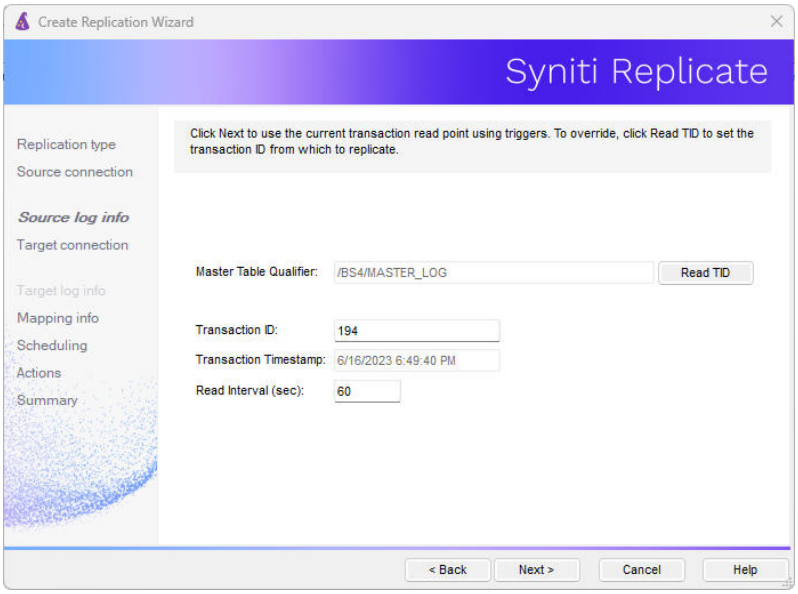
4. Click Next twice and then click **Finish**.

4. Define Replications

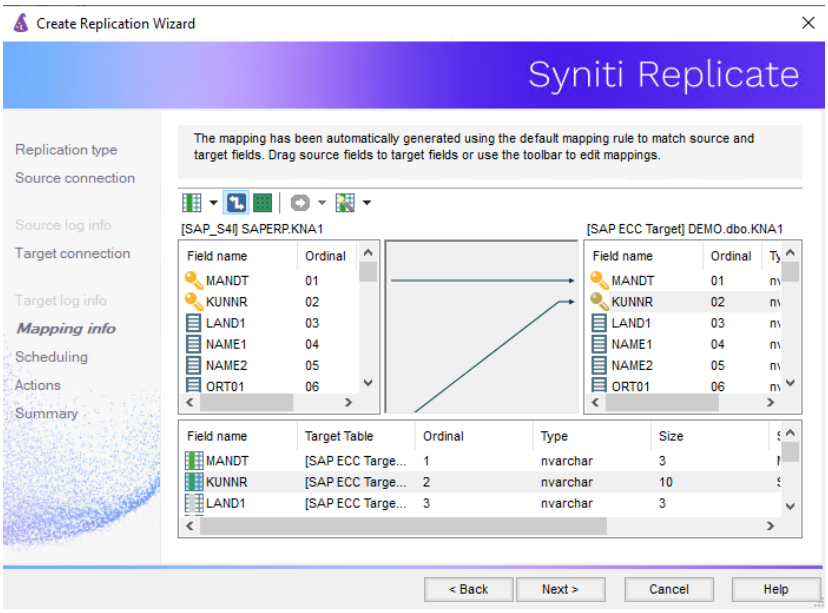
1. Expand the Metadata Explorer tree to display the table that contains the data you want to replicate.
2. Select the table.
3. From the right mouse button menu, choose **Replication** then **Create New Replication**....
4. In the Define Replication Type screen, type a name to identify the replication.
5. Optionally provide a description of the replication.
6. In the **Replication Mode** area, choose **Refresh** or **Continuous Mirroring**.



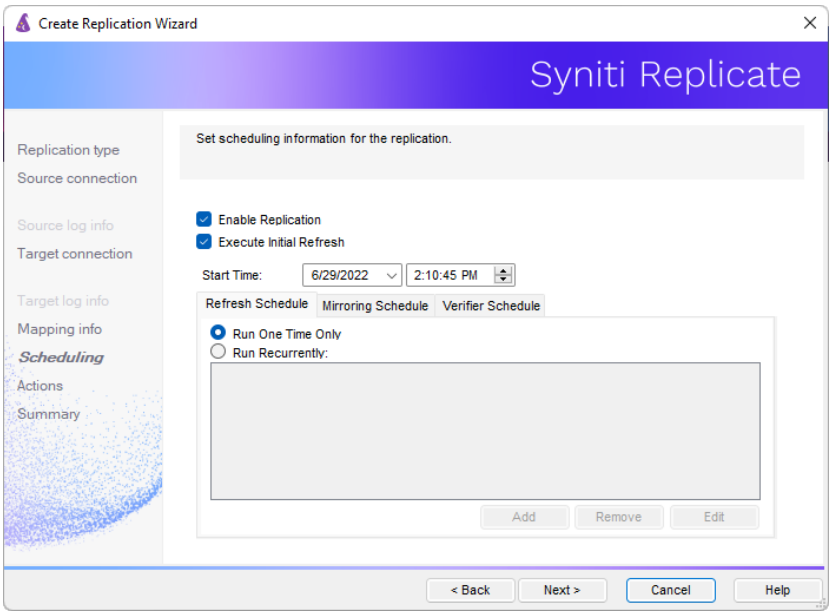
7. Click **Next** to go to the **Select Source Connection** screen.
8. Choose the source connection name from the drop-down list that includes all the source connections you have created in Syniti Replicate.
9. Choose the table that you want to replicate from the drop-down list.
10. If you want more information about the table before proceeding, click **Open Table...**.
11. Click **Next** to go to the **Source Log Info** screen.
    Complete the fields in this screen only if you are setting up a mirroring replication. The fields displayed depend on the source database log type.



12. Click **Next** to go to the **Select Target Connection** screen.
13. Choose the target connection for text output from the drop-down list that includes all the target connections you have created in Syniti Replicate.
14. Choose the data set you want to replicate from the drop-down list.
    If the drop-down list is empty, exit the wizard and add or create a target data set.
15. Click **Next** to go to the **Set Mapping Info** screen.
    Source columns and target data with the same name are automatically mapped.



16. Click **Next** to go to the **Scheduling** screen.



17. Make sure the **Enable Replication** option is checked. This is required for the replication to run.
18. Set a start time for the replication. The **Start Time** field indicates the time at which the Replication Agent will begin considering the replication for execution.
19. Check the option to **Execute Initial Refresh**.
    A full replication will be performed from the source table to the data file.
20. Click **Next** to go to the **Summary** screen.
21. Click **Finish** to complete the wizard.

Start Replications

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

- 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 set up the Replication Agent as a service:

- From the Service Monitor program in the Windows Notification Area, choose **Launch Service Installer**.
- Manage the service from Service Monitor program (located in the Windows Notification Area).
- 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.

Stop Replications

Stop the Replication Agent from the Service Monitor in the Windows Notification Area.

Appendix 1 – Important Connection Property Details

TableMode

The value entered here represents the filter criteria that is applied to SAP data dictionary table DD02L to extract the scope of tables available for extraction.

This statement can be altered to add some additional tables e.g., cluster / pooled or views e.g., (NOT TABNAME LIKE '%/%' AND TABCLASS = 'TRANSP' AND (CONTFLAG = 'A' OR CONTFLAG = 'C' OR CONTFLAG = 'G' OR CONTFLAG = 'E' OR CONTFLAG = 'S' OR CONTFLAG = 'W')) OR TABNAME = 'PAPPINSVH'

Using criteria that select more tables than recommended may cause performance issues when performing operations that browse the SAP metadata.

PageSize

This property defines the number of records that will be extracted per RFC call. The recommended default value is 25000, however, this can be adjusted. Using a higher value may reduce extraction times, however, if the value is too large, then extracting tables with lots of columns may fail due to lack of temporary memory on the SAP application side.

QueryMode

The SAP Query to extract long text BOAQ_READ_TEXT is a global query, hence by default it's recommended to use value Global.

However, if Local queries are created, then this value can be set to ALL.

NOTE: If there are queries with names that overlap with standard SAP tables or queries with the same name but in different User Groups then this may be problematic and hence should be avoided if possible.

InitialValue

This property controls how Blank versus NULL values are handled. By default, it's recommended that value InitialValue is used. This writes a <Blank> value to a table field with no data. This value can be changed to NULL if the value written should be NULL.

NOTE: If there are columns that are primary keys that have <Blank> values then using value NULL will cause the extract to fail.

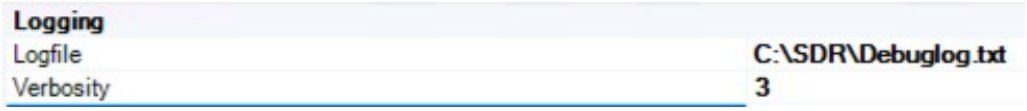
Views

This property allows a subset of the tables returned by the TableMode criteria to be restricted in the metadata extract.

Appendix 2 – Troubleshooting

If there are data extraction errors that can't be resolved through the usual Syniti Replicate logs, it's possible to activate detailed logging in the cData Driver for SAP ERP. This can be done by setting the following connection properties:

- Logfile -> Enter the location and filename of the log file e.g. C:\SDR\Debuglog.txt
- Verbosity –> Enter value 3



Known Issue 1: Maximum ODBC Connection String Exceeded

When creating a connection using the properties in Syniti Replicate, there is a limit to maximum connection string length. This limit is 1032 characters. Therefore, deviating from the recommended property values may cause the character limit to be exceeded and hence cause problems.

To get around this issue it's possible to create a DSN record and then reference this DSN directly in the Syniti Replicate connection.

Known Issue 2: SAP connection using SNC

When connecting to SAP systems using SNC with the latest versions of the SAP RFC SDK dll's there is a connection failure due to a missing parameter that was previously automatically set by the dll. The workaround for this issue is to request the SAP RFC SDK (Patch 7) dll from Syniti support.