



Trigger-Based Data Replication Using SAP LT (Landscape Transformation) Replication Server for SAP HANA

SAP HANA Appliance Software SPS 04

Document Version 1.3 – June 2012



SAP AG
Neurottstraße 16
69190 Walldorf
Germany
T +49/18 05/34 34 24
F +49/18 05/34 34 20
www.sap.com

© Copyright 2012 SAP AG. All rights reserved.

No part of this publication may be reproduced or transmitted in any form or for any purpose without the express permission of SAP AG. The information contained herein may be changed without prior notice.

Some software products marketed by SAP AG and its distributors contain proprietary software components of other software vendors.

Microsoft, Windows, Outlook, and PowerPoint are registered trademarks of Microsoft Corporation.

IBM, DB2, DB2 Universal Database, OS/2, Parallel Sysplex, MVS/ESA, AIX, S/390, AS/400, OS/390, OS/400, iSeries, pSeries, xSeries, zSeries, z/OS, AFP, Intelligent Miner, WebSphere, Netfinity, Tivoli, and Informix are trademarks or registered trademarks of IBM Corporation in the United States and/or other countries.

Oracle is a registered trademark of Oracle Corporation.

UNIX, X/Open, OSF/1, and Motif are registered trademarks of the Open Group.

Citrix, ICA, Program Neighborhood, MetaFrame, WinFrame, VideoFrame, and MultiWin are trademarks or registered trademarks of Citrix Systems, Inc.

HTML, XML, XHTML and W3C are trademarks or registered trademarks of W3C®, World Wide Web Consortium, Massachusetts Institute of Technology.

Java is a registered trademark of Sun Microsystems, Inc.

JavaScript is a registered trademark of Sun Microsystems, Inc., used under license for technology invented and implemented by Netscape.

MaxDB is a trademark of MySQL AB, Sweden.

SAP, R/3, mySAP, mySAP.com, xApps, xApp, SAP NetWeaver, and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP AG in Germany and in several other countries all over the world. All other product and service names mentioned are the trademarks of their respective companies. Data contained in this document serves informational purposes only. National product specifications may vary.

These materials are subject to change without notice. These materials are provided by SAP AG and its affiliated companies ("SAP Group") for informational purposes only, without representation or warranty of any kind, and SAP Group shall not be liable for errors or omissions with respect to the materials. The only warranties for SAP Group products and services are those that are set forth in the express warranty statements accompanying such products and services, if any. Nothing herein should be construed as constituting an additional warranty.

Disclaimer

Some components of this product are based on Java™. Any code change in these components may cause unpredictable and severe malfunctions and is therefore expressly prohibited, as is any decompilation of these components.

Any Java™ Source Code delivered with this product is only to be used by SAP's Support Services and may not be modified or altered in any way.






Documentation in the SAP Service Marketplace

You can find this documentation at the following Internet address:
service.sap.com/instguides

Typographic Conventions

Type Style	Represents
Example Text	Words or characters that appear on the screen. These include field names, screen titles, pushbuttons as well as menu names, paths and options. Cross-references to other documentation
Example text	Emphasized words or phrases in body text, titles of graphics and tables
EXAMPLE TEXT	Names of elements in the system. These include report names, program names, transaction codes, table names, and individual key words of a programming language, when surrounded by body text, for example, SELECT and INCLUDE.
Example text	Screen output. This includes file and directory names and their paths, messages, names of variables and parameters, source code as well as names of installation, upgrade and database tools.
Example text	Exact user entry. These are words or characters that you enter in the system exactly as they appear in the documentation.
<Example text>	Variable user entry. Pointed brackets indicate that you replace these words and characters with appropriate entries.
EXAMPLE TEXT	Keys on the keyboard, for example, function keys (such as F2) or the ENTER key.

Icons

Icon	Meaning
	Caution
	Example
	Note
	Recommendation
	Syntax

Contents

1	Getting Started.....	6
1.1	Important SAP Notes	6
1.2	History of Changes	6
1.3	Key Terms.....	7
2	Basic Concepts and Landscape Options.....	9
2.1	Basic Concepts of Trigger-based data Replication using SAP LT Replication Server for SAP HANA	9
2.2	Landscape and Installation Options	10
3	Details on Configuration Aspects and Replication Concept 12	
3.1	Technical Prerequisites and Authorization Aspects	12
3.1.1	Software Installation	12
3.1.2	System Connections and Authorizations.....	12
3.2	Managing the Replication Process using the SAP HANA Studio	13
3.3	Important Transactions and Control Tables	14
3.3.1	Mass Transfer ID and Schema GUID	15
3.3.2	Important Replication-Relevant Tables	15
3.3.3	Table Structure in SAP HANA Modeler.....	15
4	Operations and Management of SAP LT Replication Server 16	
4.1	Sizing and Basic Job Handling.....	16
4.1.1	Sizing of SAP LT Replication Server - Basic rules and Influencing Factors	16
4.1.2	Important SAP LT Replication Server Jobs	16
4.1.3	Stopping jobs	18
4.1.4	Restarting jobs	18
4.2	Changing Load and Replication Procedures	18
4.2.1	Changing the number of Jobs.....	18
4.2.2	Performance Improvements for Initial Load of Tables.....	19
4.3	Monitoring of Load and Replication Process.....	20
4.3.1	Status of Jobs and Connections.....	20
4.3.2	Status of Triggers.....	22
4.3.3	Statistics	22
4.3.4	Monitoring using SAP Solution Manager	23
4.4	Backup and Recovery Aspects.....	23
5	Special Considerations for Source Systems.....	24

5.1	Impact of Software Maintenance activities in SAP Source Systems	24
5.2	Archiving Data in Source Systems.....	25
5.3	Performance Implications in Source System using Trigger-based Data Replication	25
5.4	Data Volume Management	26
6	Further Tips and Tricks, Frequently Asked Questions, and Troubleshooting Recommendations	27
7	Appendix	30
7.1	Related Guides	30
7.2	Related SAP Note	30

1 Getting Started



This guide does not replace the daily operations handbook that we recommend customers to create for their specific production operations.

About this Guide

Designing, implementing, and running your SAP applications at peak performance 24 hours a day has never been more vital for your business success than now.

This guide provides a starting point for managing major operations aspects of your SAP LT Replication Server.

Target Groups

- Technical Consultants
- System Administrators
- Support Specialist

1.1 Important SAP Notes



Check regularly for updates available for the following SAP Notes.

SAP Note Number	Title	Comment
1605140	Central Note - SAP LT Replication Server	Collective Note for all the relevant Notes for LT Replication Server for HANA
1709225	SAP LT Replication Server for SAP HANA SPS04 - Release Information Note	Collective Note including compatibility information and references to required corrections

1.2 History of Changes



Make sure you use the **current** version of the Technical Operations Guide.

The current version of the Technical Operations Guide is located on the *SAP Help Portal* at <http://help.sap.com/hana> -> SAP HANA Appliance -> System Administration and Maintenance Information.

The following table provides an overview of the most important changes in prior versions.

Version	Important Changes
V0.8	Initial completion of guide
V1.0	First published version, including revisions from information development

V1.2	Final Draft version for SAP HANA SPS04
V1.3	Revised draft version for SAP HANA SPS04
V1.5	Revised published version for SAP HANA SPS04

1.3 Key Terms

The following table contains key terms related to the SAP LT Replication Server for SAP HANA:

Term	Definition
Advanced Replication Settings	A transaction that runs on the SAP LT Replication Server that you can use to specify advanced replication settings. For example, you can: <ul style="list-style-type: none">• Modify target table structures• Specify performance optimization settings• Define transformation rules
Configuration	The definition of the parameters that the SAP LT Replication Server uses to replicate data from one or more source systems to one or more target systems. The configuration specifies the source system, the target system, and the relevant connections.
Configuration and Monitoring Dashboard	An application that runs on the SAP LT Replication Server that you use to specify configuration information (such as the source and target systems, and relevant connections) so that data can be replicated. You can also use it to monitor the replication status.
Database trigger	A piece of code that updates a database automatically in response to a certain event.
Data transfer Job	A job that is used for the data transfer process in the SAP LT Replication Server.
Initial load	A step within the trigger-based replication process that loads data from the source system to target system.
Initial load Job	A job that is used for the initial load process in the SAP LT Replication Server.
Latency	The length of time to replicate data (a table entry) from the source system to the target system.
Logging table	A table in the source system that records any changes to a table that is being replicated. This ensures that the SAP LT Replication Server can replicate these changes to the target system.
Master job	A job that exists for each configuration that calls the initial load jobs and the data transfer jobs in

	the SAP LT Replication Server.
Maximum latency	The maximum time taken to replicate data (a table entry) from the source to target system.
Median latency	The median time taken to replicate data (a table entry) from the source to target system.
Minimum latency	The minimum time taken to replicate data (a table entry) from the source to target system.
Reading type	A technique for reading data from tables in the target system during the initial load process.
Replication phase	A phase in the trigger-based replication process whereby only changes to the source database (recorded by databases triggers) are replicated to the target database, thereby facilitating real-time data replication.
SAP LT Replication Server	An SAP system that facilitates the replication of data from one or more source systems to one or more target systems. The source systems can be SAP or non-SAP systems.
Tables for replication settings	The set of tables in the SAP LT Replication Server that contain the replication settings for a specific configuration.
Trigger-based replication	A technique for replicating data where an initial load is first performed that loads data from the source to the target system, and a replication phase begins whereby only changes to the source database (recorded by databases triggers) are replicated to the target database, thereby facilitating data replication in real-time.
Transformation rules	<p>A rule that you can specify in the Advanced Replication Settings transaction for source tables such that data is transformed during the replication process. The transformed data will then be present in the target table. For example, you can specify a rule to:</p> <ul style="list-style-type: none"> • Convert fields • Fill empty fields • Skip records

2 Basic Concepts and Landscape Options

2.1 Basic Concepts of Trigger-based data Replication using SAP LT Replication Server for SAP HANA

The SAP Landscape Transformation (LT) Replication Server is the SAP technology that allows you to load and replicate data in real-time from SAP source systems and non-SAP source systems to an SAP HANA environment.

The SAP LT Replication Server uses a trigger-based replication approach to pass data from the source system to the target system.

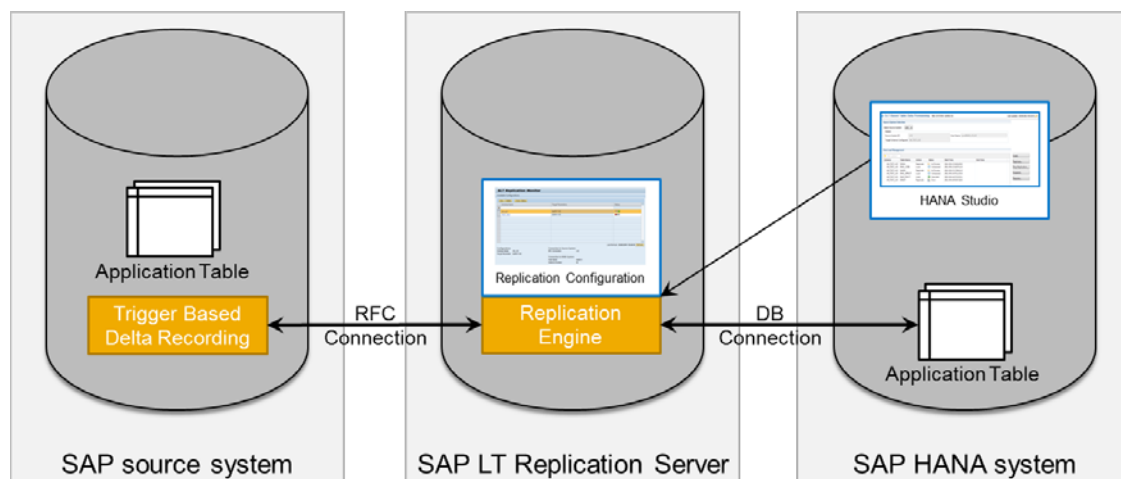
The SAP LT Replication Server can either be installed as a separate SAP system, or if the technical prerequisites permit, on an SAP source system.

In order to replicate data, you must first define the parameters that the SAP LT Replication Server will use to replicate data from one or more source systems to one or more target systems. You specify this information in a *Configuration*. A configuration contains information about the source system, the target system, and the relevant connections. You define configurations in the SAP LT Replication Server.

You use a configuration to load and replicate data from one source system to one target database schema of a HANA system (1:1), or from multiple source systems to one target database schema of an SAP HANA system (N:1). Furthermore, it is possible to load and replicate data from one source system to multiple (up to 4) target database schemas of one or more HANA systems (1:N). You can also specify the type of data load and replication - either in real-time, or scheduled by time or by interval.

The trigger-based data replication approach is a table-based concept that retrieves data from application tables of the source system(s). A user uses the SAP HANA Studio to select the tables for the replication. If not all data records of a table should be transferred, you can create transformation rules to selectively filter the data (selective data replication) or to enable other transformations during the data replication process.

The following graphic outlines the basic concept and the typical landscape (for an SAP source system) using the trigger-based data replication approach of the SAP LT Replication Server.



2.2 Landscape and Installation Options

The SAP LT Replication Server can be used for data replication from SAP sources and non-SAP sources to the HANA system. In the *Configuration & Monitoring Dashboard* (transaction *LTR*) of the SAP LT Replication Server, you can define a new configuration that contains the relevant information required to create the connection between the source system(s) and the target SAP HANA system(s).

The technical landscape consists of following components:

SAP source system(s)

The source system tracks database changes by using database triggers. It records information about changes in the logging tables. Read modules (located on the SAP source system) transfer the data from the source system to the SAP LT Replication Server. The relevant data is read from the application tables.

Non-SAP source system(s)

The non-SAP source system tracks database changes by using database triggers. It records information about changes in the logging tables. Read modules (located at the SAP LT Replication Server) transfer the data from the non-SAP source system to the SAP LT Replication Server. The relevant data is read from the application tables.

SAP LT Replication Server

An SAP system that facilitates the replication of data from one or more source systems to one or more target systems. The source systems can be SAP or non-SAP systems.

SAP HANA system

The SAP HANA system contains the SAP HANA database. It is used to store the replicated data. The SAP LT Replication Server and the SAP HANA system communicate by means of a database connection.

Prior to the installation, it is important to understand the various system landscape options available:

- For an SAP source system, the SAP LT Replication Server can either be installed as part of the source system (depending on the customers system landscape strategy, and only if certain technical prerequisites are fulfilled) or as a separate SAP system (recommended for productive use). However from a technical perspective, the SAP LT Replication Server does not have to be a separate SAP system if the source system complies with the technical prerequisites.
- For non-SAP source systems, the SAP LT Replication Server has to be installed as a separate SAP system

The following table outlines in more detail the advantages and disadvantages of the different installation options:

	Source System (if SAP system)	SAP Solution Manager	Dedicated System
Advantages	<ul style="list-style-type: none"> • Simplified landscape and administration 	<ul style="list-style-type: none"> • Re-use of existing NW instance 	<ul style="list-style-type: none"> • No software maintenance dependencies

			<ul style="list-style-type: none"> Flexibility
Disadvantages	<ul style="list-style-type: none"> Performance impact Potential software maintenance dependencies 	<ul style="list-style-type: none"> Performance impact Potential software maintenance dependencies 	<ul style="list-style-type: none"> Investment and maintenance effort for separate server / NW instance

Experiences show that HANA customers using the SAP LT Replication Server tend to use a dedicated SAP LT Replication Server for productive use. An SLT sandbox or quality assurance system is installed sometimes on top of an appropriate SAP source system or on top of an SAP Solution Manager system.

All details about the preparation, the installation, and the configuration procedure of SAP LT Replication Server for SAP HANA are described in the Installation Guide, *SAP HANA Installation Guide - Trigger-based Replication (SLT)*, and the Security Guide, *SAP HANA Security Guide – Trigger-based Replication (SLT)*. You can find the latest version of these guides on the *SAP Help Portal* at <http://help.sap.com/hana> -> *SAP HANA Appliance Software*.

For more information about sizing-related information, see chapter 4.1.

3 Details on Configuration Aspects and Replication Concept

This section provides an overview of the transactions and tools you use to define a configuration and related table settings. It also includes basics about the SLT-based replication concept which is key to understanding important SLT-related operational aspects.

3.1 Technical Prerequisites and Authorization Aspects

Before you can create a configuration and start the data replication, you have to install the required software and establish related system connections with appropriate user authorizations.

For more information, see the relevant installation and security guides on the *SAP Help Portal* at <http://help.sap.com/hana> -> *SAP HANA Appliance Software*, as well as in the specific SAP Notes listed below.

3.1.1 Software Installation

SAP LT Replication Server is shipped in a specific add-on (DMIS_2010*). Depending on the installation option, you have to ensure that the respective DMIS add-on is installed in the SAP source system(s) and in the SAP LT Replication Server. The installation of the DMIS add-on is not required (or possible) on non-SAP source systems.

Note:

- Ensure that the correct SAP kernel version is in use in the SAP LT Replication Server with the appropriate patch level - otherwise the connection to the HANA system will fail. For more information, see SAP Note [1597627](#)
- In the SAP source system(s) and the SAP LT Replication Server, check if the minimum support package level for the DMIS add-on is applied to ensure compliance with the respective SAP HANA Studio version. For more information, see SAP Note [1709225](#)
- Ensure that the appropriate front-end requirements are met (SAP GUI version).
- Verify that the SLT-specific web services are activated before you launch the *Configuration & Monitoring Dashboard* (transaction LTR). For more information, see SAP Note [517484](#)

3.1.2 System Connections and Authorizations

Before you create a configuration in the SAP LT Replication Server, you need to define the related users with relevant authorizations in the source system(s), and establish the appropriate system connections.

For SAP source systems, a predefined user role (SAP_IUUC_REPL_REMOTE) is available, and an RFC connection between the SAP source system and the SAP LT Replication Server has to be established.

For non-SAP sources, you need to create database user(s) with appropriate authorizations in advance and establish the database connection by using transaction *DBC*O in the SAP LT Replication Server.

The connection to the SAP HANA system is established when you create a configuration in the SAP LT Replication Server. You need to use an SAP HANA Studio user with appropriate authorizations (such as user SYSTEM) to establish a database connection and to successfully create a database schema (for the data replication) in the SAP HANA system.

Note:

- For SAP source systems:
 - Ensure that the user for the RFC connection has the role IUUC_REPL_REMOTE assigned and that the user role is generated correctly.
 - Do not use a DDIC user for RFC connection.
- For non-SAP source systems:
 - Grant a database user sufficient authorizations for data replication. For more information, see the Security Guide.
 - Ensure the database-specific library components for the SAP 7.20EXT kernel are installed in the SAP LT Replication Server.
 - Review other database specific requirements and potential limitations by searching for SAP Notes that contain the key word “non-SAP”, under application area BC-HAN-LTR.
- For the SAP HANA system:
 - While creating a configuration, a replication user (with name equal to the schema name) is generated automatically.
 - You explicitly need to grant this replication user authorization for the created database schema using the schema-specific roles (<SCHEMA>_DATA_PROV; <SCHEMA>_POWER_USER; <SCHEMA>_USER_ADMIN, <SCHEMA>_DATASELECT) that are available after successfully creating the related configuration.

You can find more information about the roles and authorization concept of the SAP LT Replication Server in the Security Guide.

3.2 Managing the Replication Process using the SAP HANA Studio

Once a configuration is created in the SAP LT Replication Server, you use the SAP HANA Studio to initiate and control the table-based replication process of the SAP LT Replication Server.

Procedure

- In the SAP HANA Studio, access the information modeler and select *Data Provisioning*.

SLT Based Table Data Provisioning N62 (SYSTEM) bsl5011 62 Last update: 20.09.2011 05:32:53

Source System Selection

Select Source System: LOI

Details:

Source System ID: LOI Host Name: pwwdf6628_LOI_28

Target Schema Configured: JM_TEST_LOI

Data Load Management

Filter pattern

Schema	Table Name	Action	Status	Start Time	End Time
JM_TEST_LOI	DD02L	Replicate	In Process	2011-09-13 16:54:29.0	
JM_TEST_LOI	DMC_COBJ	Load	Scheduled	2011-09-13 16:57:12.0	
JM_TEST_LOI	MARA	Replicate	In Process	2011-09-13 17:06:11.0	
JM_TEST_LOI	DMC_SPROCT	Load	Scheduled	2011-09-14 07:12:33.0	
JM_TEST_LOI	DMC_PRJCT	Load	Executed	2011-09-14 07:23:25.1	
JM_TEST_LOI	DD02T	Replicate	Error	2011-09-19 05:47:28.0	

Buttons: Load..., Replicate..., Stop Replication..., Suspend..., Resume...

- Select the relevant source system and related target schema.

3. You can use the *Load*, *Replicate*, *Stop Replication*, *Suspend*, and *Resume* pushbuttons to control the replication of tables for the selected source system.

Note: Before you can select application tables related to the selected source system and target schema, the initial load of the tables DD02L, DD02T and DD08L must be completed as they include important meta data information. For more information, see chapter 3.3.2.

Load: Starts an initial load of replication data from the source system. The procedure is a one-time event. After it is completed, further changes to the source system database will not be replicated.

Note:

- For the initial load procedure, neither database triggers nor logging tables are created in the source system
- Default settings use reading type 3 (DB_SETGET) with up to three background jobs in parallel to load tables in parallel or subsequently into the HANA system. For very large tables, you may consider in advance to accelerate the initial load procedure as outlined in chapter 4.

Replicate: Combines an initial load procedure and the subsequent replication procedure (real-time or scheduled).

Note: Before the initial load procedure will start, database trigger and related logging table are created for each table in the source system (as well as additional replication-related objects in the SAP LT Replication Server).

Stop Replication: Stops any current load or replication process of a table.

Note: The stop function will remove the database trigger and related logging tables (and additional replication-related objects) completely. Only use this function if you do not want to continue a selected table otherwise you must initially load the table again to ensure data consistency.

Suspend: Pauses a table from a running replication. The database trigger will not be deleted from the source system. The recording of changes will continue and related information are stored in the related logging tables in the source system.

Note: If you suspend tables for a long time, watch carefully the size of the logging table(s) and adjust the table space if required

Resume: Restarts the replication for a suspended table. The previous suspended replication will be resumed (no new initial load required).

3.3 Important Transactions and Control Tables

In the SAP LT Replication Server, there are two transactions for managing configuration-specific settings and table-specific settings:

- The *Configuration & Monitoring Dashboard* (transaction *LTR*) provides capabilities to initially create, manage, and monitor configuration and related settings. After the creation of a configuration, you can:
 - Use functions such as stop/restart the configuration master job.
 - Change configuration settings such as the number of total jobs (and number of total jobs for initial load).
 - Monitor the trigger and replication status, including detailed throughput information for the data replication.

- The *Advanced Settings* (transaction IUUC_REPL_CONT) allows you to define and change various table settings for a configuration such as:
 - Partitioning and structure changes for target tables in HANA
 - Table-specific transformation and filter rules
 - Adjusting the number of jobs (and reading type) to accelerate the load/replication process

The following sections provide you with a summary of the most important control tables that are relevant for understanding in more detail the SLT-based replication process.

3.3.1 Mass Transfer ID and Schema GUID

When creating a new configuration in the SAP LT Replication Server, a schema GUID and a mass transfer ID (MT_ID) is automatically created and assigned to the configuration.

A schema GUID ensures that configurations with the same schema name can be created.

The mass transfer ID is used in the naming of SLT jobs. With the mass transfer ID, the system can uniquely identify a schema.

The mapping (and further details) of mass transfer IDs and related schema are stored in the SLT control table DMC_MT_HEADER in the SAP LT Replication Server.

3.3.2 Important Replication-Relevant Tables

Application tables in the source system can be selected for initial load or for replication.

In SAP systems, table definitions of the SAP dictionary are stored in table DD02L, related texts in DD02T. These dictionary tables as well as table DD08L (containing foreign key relationships of SAP application tables) are automatically replicated from the source system into the SAP HANA system when creating a schema. Once the replication is successfully completed, SAP HANA Studio users can select tables for initial load and/or for replication.

To ensure that new tables or structure changes of existing tables in the source system(s) are automatically reflected in SAP HANA, the dictionary tables DD02L, DD02T and DD08L always remain in the status *Replicate*, or *In process*.

3.3.3 Table Structure in SAP HANA Modeler

While saving a configuration in the SAP LT Replication Server the system automatically generates related control tables in the HANA database for each schema.

The general definition and registration of all schemas are stored in the replication configuration table RS_REPLICATION_COMPONENTS which is included in schema SYS_REPL.

Overview of important control tables:

Schema Name	Contains Tables	Owner
SYS_REPL	RS_REPLICATION_COMPONENTS	SYSTEM
<SCHEMA>	RS_ORDER: includes basic information about table selected for initial load/replication RS_STATUS: includes information about replication status of each table RS_LOG_FILES <loaded_and_replicated_tables>: provides details and log information of replicated tables	<SCHEMA>

These control tables provide the flexibility to explicitly grant schema-specific authorizations to dedicated SAP HANA studio users. For more information, see the Security Guide, *SAP HANA Security Guide – Trigger-based Replication (SLT)* on the *SAP Help Portal* at <http://help.sap.com/hana> -> *SAP HANA Appliance Software*.

4 Operations and Management of SAP LT Replication Server

4.1 Sizing and Basic Job Handling

4.1.1 Sizing of SAP LT Replication Server - Basic rules and Influencing Factors

As a minimum requirement, an SAP LT Replication Server should provide the following hardware configuration:

- File system: 100 GB
- RAM: 16-32 GB
- CPU: 2-4 cores
- Minimum number of background jobs: 10
- Network: 1GB/sec

However, for productive use and especially if you are dealing with large volume tables – the sizing may need to be adjusted. See also chapter 4.2, Changing Load and Replication Procedures.

In general, the load and replication procedure uses reading type 3 (DB_SETGET) with a maximum of three BGD jobs for each table for the load/replication procedure. Depending on the number of jobs available, the load/replication of tables is performed in parallel or sequentially.

The following criteria influence the requirement to change or increase the number of jobs:

- The number of configurations managed by the SAP LT Replication Server.
- The number of tables to be loaded/replicated for each configuration.
- The expected speed of the initial load (load time).
- The expected replication latency time (which mainly depends on the number and volume of changes of the tables in replication). As a rule of thumb, one BDG job should be used for each 10 tables in replication to achieve acceptable latency times ("real-time" data replication).

4.1.2 Important SAP LT Replication Server Jobs

To understand the concept of the load and replication procedures in more detail, the following section explains in more detail the purpose the major jobs involved in the replication process.

1. Master Job (Monitoring Job)

Naming Convention: IUUC_MONITOR_<MT_ID>

Every 5 seconds, the monitoring job checks in the SAP HANA system whether there are new tasks and, if so, triggers the master control jobs. It also deletes the processed entries (tasks) from table RS_ORDER and writes statistics entries into table RS_STATUS (in the relevant_schema in the SAP HANA system).

Note: Every day at midnight, the monitoring job and related data load jobs - but not the migration object definition or access plan calculation jobs – are automatically stopped and restarted immediately. This action has no negative impact on the ongoing data load and replication, it will simply resume immediately.

However, this procedure allows several activities on specific SAP LT Replication Server control tables that avoids potential long-term performance issues with the SAP LT Replication Server and simplifies a lot of log and job-related troubleshooting activities, for example by providing the option to filter by date in transaction SM37.

2. Master Controller Job

Naming Convention: IUUC_REPLIC_CNTR_<MT_ID>

This job is scheduled on demand and is responsible for:

- Creating database triggers and logging table in the source system
- Creating synonyms
- Writing new entries in admin tables in SLT server when a new table is loaded/replicated

3. Data Load Job

Naming Convention: DTL_MT_DATA_LOAD_<MT_ID>_<2digits>

This job should always be active. If the job does not complete successfully, the master controller job restarts it.

This job is responsible for:

- Loading data (load)
- Replicating data (replication)
- Changing status flag for entries in control tables in the SAP LT Replication Server

4. Migration Object Definition Job

Naming Convention: IUUC_DEF_MIG_OBJ_<2digits>

This job defines the migration object of a specific table (that you choose to load/replicate), which is the fundamental object for LT replication. The migration object definition should normally be quite fast for all tables.

5. Access Plan Calculation Job

Naming Convention: ACC_PLAN_CALC_<MT_ID>_<2digits>

This job calculates the access plan of a specific table (that you choose to load/replicate), and the access plan is used for data load or replication. The access plan is also a fundamental object for the replication. For a normal sized table, access plan calculation should finish quite quickly (less than 1 minute) while large tables might take up to several hours to finish.

What is the relationship between the number of data transfer jobs in the configuration settings and the available BGD work processes?

Each job occupies 1 BGD work process in the SAP LT Replication Server. For each configuration, the parameter *Data Transfer Jobs* restricts the maximum number of data load job for each mass transfer ID (MT_ID).

In total, a mass transfer ID (MT_ID) requires at least 4 background jobs to be available:

- One monitoring job (master job)
- One master controller job
- At least one data load job
- One additional job either for the migration objects definition, access plan calculation or to change configuration settings in the *Configuration & Monitoring Dashboard*.

Example: if you set the parameter “data transfer jobs” to 04 in a configuration “SCHEMA1”, a mass transfer ID 001 is assigned. As a result, the following jobs should be in the system:

- 1 Monitoring job: IUUC_MONITOR_SCHEMA1
- 1 Master controller job: IUUC_REPLIC_CNTR_001_0001

- At most 4 parallel jobs for MT_ID 001: DTL_MT_DATA_LOAD_001_01/~02/~03/~04

4.1.3 Stopping jobs

In the *Configuration & Monitoring Dashboard* (tab page *Job and Connections*), you can suspend the load and / or replication for all tables of a configuration using the pushbutton *Stop* for the master job. The master job stops as well all related jobs of a configuration – initial load and / or replication will immediately discontinue – however, a database trigger in the source system(s) will continuously record changes in the log tables.

Note:

- As an alternative to automatically temporarily stopping and restarting the replication after a certain point in time, you can switch the replication mode in the tab page *Settings* from “Real time” to “Schedule by time”.

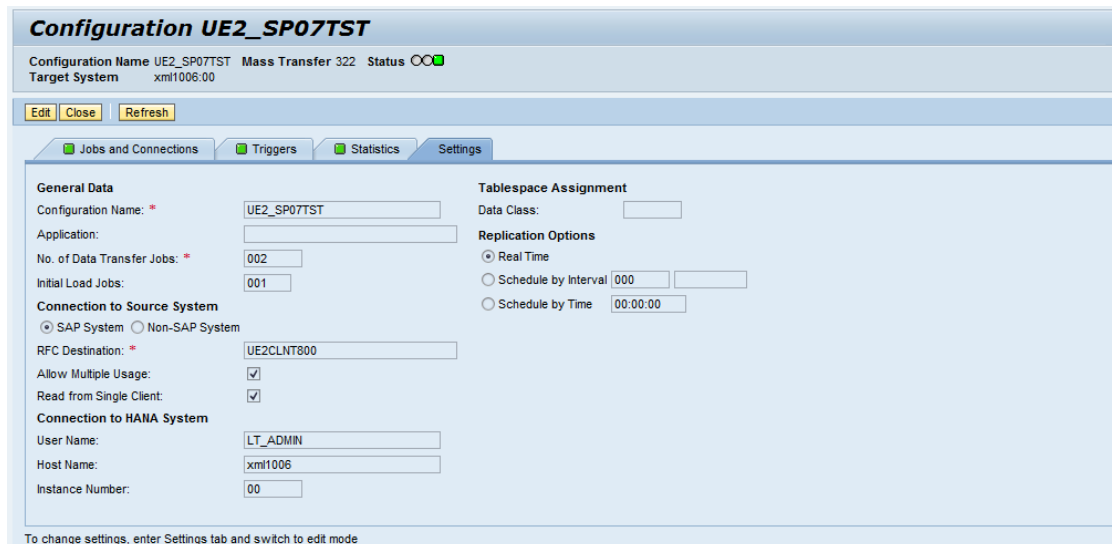
4.1.4 Restarting jobs

If you stopped the master job of a configuration, or if it was aborted, you can restart the master job from the *Configuration & Monitoring Dashboard* (tab page *Jobs and Connections*). The master job resumes as well as all related jobs.

4.2 Changing Load and Replication Procedures

4.2.1 Changing the number of Jobs

Once a configuration is created, you can adjust the number of jobs in the *Settings* tab page.



The screenshot shows the 'Settings' tab for configuration 'UE2_SP07TST'. The configuration name is 'UE2_SP07TST', Mass Transfer is 322, and the status is 'OK'. The target system is 'xml1006.00'. The 'Jobs and Connections' tab is active, showing 'No. of Data Transfer Jobs' as 002 and 'Initial Load Jobs' as 001. The 'Connection to Source System' is set to 'SAP System' with RFC Destination 'UE2CLNT800'. The 'Connection to HANA System' is set to 'User Name: LT_ADMIN', 'Host Name: xml1006', and 'Instance Number: 00'. The 'Replication Options' are set to 'Real Time'. The 'Tablespace Assignment' is set to 'Data Class:'. The 'Allow Multiple Usage' checkbox is checked, and the 'Read from Single Client' checkbox is also checked. A note at the bottom states: 'To change settings, enter Settings tab and switch to edit mode'.

You may want to change the number of the jobs for the following reasons:

- If you are not satisfied with the speed of the initial load and / or the replication latency time
- If the SAP LT Replication Server has more resources than initially available, you can increase the number of data transfer and / or initial load jobs
- After completion of the initial load, you may want to reduce the number of initial load jobs

Note: there must be at least one free background job to be able to change any configuration settings in the *Configuration & Monitoring Dashboard*.

4.2.2 Performance Improvements for Initial Load of Tables

The SAP LT Replication Server uses reading type 3 (DB_SETGET) as the default technique to retrieve fixed portions of data records from the source system(s). This procedure is optimized especially for cluster-tables and uses up to three background jobs in parallel for each table.

Note: If a lot of tables are selected for load / replication at the same time, it may happen that there are not enough background jobs available to start the load procedure for all tables immediately. In this case, you may increase the number of initial load loads in the tab page *Settings* – assuming sufficient system resources are available. Otherwise the initial load of tables will be handled sequentially.

For tables with a large volume of data (especially if they are cluster tables - where the read performance is about 70% compared to transparent tables), you can use the transaction *Advanced Replication Settings* (transaction IUUC_REPL_CONT) to further optimize the load and replication procedure for dedicated tables.

The screenshot shows the 'IUUC REPL TABSTG' tab in the 'Advanced Replication Settings' transaction. The 'Specific Performance Options' table is visible, with columns: Table Name, No of Parallel Jobs, Field Name for Parallelization, Seq. No., and Reading Type. The first row shows table 'ZTESTSLT01' with 2 parallel jobs and field 'BUKRS'. The 'Reading Type' dropdown is open, showing a list of options: 1 acc. plan. calculation, 2 pool table, 3 cluster table (DB_SETGET) (highlighted), 4 INDX CLUSTER (IMPORT FROM DB), 5 INDX CLUSTER with FULL TABLE SCAN, 6 INDX CLUSTER filled from external, and 7 INDX CLUSTER child table FTS.

In this screen, you can assign more (or less) jobs to run in parallel for a table or define a sequence that should be considered if load and replication of tables should run subsequently.

Furthermore, it is possible to switch the default reading type 3 to another more appropriate reading procedure. The following table compares the advantages and disadvantages of the three most important reading types:

Reading type	Advantages	Disadvantages
1 – Access Plan Calculation	<ul style="list-style-type: none"> - Fast data load if index exists - Parallel data load possible 	<ul style="list-style-type: none"> - Additional index may be required - Requires a key field which is selective enough to significantly speed-up the data access - Calculation time required before load
3 – DB_SETGET (Default)	<ul style="list-style-type: none"> - No separate index required - Parallel data load (multi-threading) with starting with DMIS_2010 SP07 	<ul style="list-style-type: none"> - Additional consumption of database buffer
4 & 5 – Index Cluster	<ul style="list-style-type: none"> - Very fast data load after data is extracted to table 	<ul style="list-style-type: none"> - Additional table space temporarily required in the source system

	DMC_INDCL - Minimal usage of DB buffer	
--	---	--

Note:

- Other reading types such as “1 access plan calculation” may require the creating of a secondary index beforehand otherwise there will be no positive impact on the switching the reading type.
- Switching to a specific reading type requires additional preparation steps and expert knowledge – therefore we recommend that you engage the services of an SAP performance specialist in this matter.

4.3 Monitoring of Load and Replication Process

The *Configuration & Monitoring Dashboard* includes several information you can use to monitor and identify potential replication issues.

You can access the *Configuration & Monitoring Dashboard* by using transaction LTR.

Configuration and Monitoring Dashboard for HANA

Available Configurations

New Delete Check Status

Configuration Name	Target System	Status
MH_LSS	xmi1006:00	Red
MH_LSS2	xmi1006:00	Green
NONSAP_DEMO_ADA	xmi1006:00	Green
STS_DAY_DEMO	xmi1006:00	Green
UE2_SP07TST	xmi1006:00	Green
UE2_SP07TST	xmi1006:00	Yellow
UE2_SP07TST_1_TO_N	xmi1006:00	Yellow
UE5_RV	xmi1006:00	Green
UE6_TESTALL	xmi1006:00	Red
UE7_TK_1	xmi1006:00	Green

Last Refresh: 10.04.2012 11:55:57 Refresh

Details

Configuration Name: BG_ARCHIVE_TEST2

Connection to Source System

RFC Connection: BG7archive

Connection to HANA System

Host Name: xmi1006

Instance Number: 00

From the overview screen, you can identify whether the overall status of the configuration.

Details on status information:

- Status *Yellow*: May occur if trigger status is set to yellow, for example because the triggers are not yet successfully created.
- Status *Red*: May occur if master job aborted, for example because it was stopped manually in transaction SM37.

4.3.1 Status of Jobs and Connections

On the tab page *Jobs and Connections*, you can identify potential issues of the configuration-related jobs and / or the connection(s) to the source system and target (SAP HANA) system.

Configuration UE2_SP07TST

Configuration Name UE2_SP07TST Mass Transfer 322 Status OO ■
 Target System xml1006:00

Edit Close Refresh

Jobs and Connections Triggers Statistics Settings

Jobs

Master Job

Status: Running ■ Actions

Data Transfer Jobs

Status: ■

Available: 018

Defined: 002

Running: 002

Connections

Source System

Status: ■

RFC Connection: UE2CLNT800

Target System

Status: ■

User Name: LT_ADMIN

Host Name: xml1006

Instance Number: 00

To change settings, enter Settings tab and switch to edit mode

If the job status is not ok, you can check your settings compared to actual system performance.

Details on status information:

- Master job - Can have status *Red* for example, for the following reasons:
 - The SAP LT Replication Server was restarted
 - The job was manually stopped in the Configuration and Monitoring Dashboard or by using transaction SM37
 - A support package or SAP Note was applied that changed program code and therefore the ABAP compiler aborted the job
- Data Transfer Jobs – Can have status *Red* if the number of defined jobs is greater than the number of available jobs.
- Connections:
 - The SAP source system RFC connection can have the status *Red* if the source system or network is down (if ping to the SAP source system exceeds time limit defined in the RFC settings of the SAP LT Replication Server) or authorization of RFC user has changed.
 - Connection to non-SAP source system and HANA system: Can have the status *Red* if the open connection fails.

4.3.2 Status of Triggers

Configuration UE2_SP07TST

Configuration Name UE2_SP07TST Mass Transfer 322 Status ●●

Target System xml1006:00

Edit Close Refresh

Jobs and Connections Triggers Statistics Settings

Status	Table Name	Description
●	DD02L	Trigger is active in Source System
●	DD02T	Trigger is active in Source System
●	DD08L	Trigger is active in Source System
●	GLPCA	Trigger is active in Source System
●	MARA	Trigger is active in Source System
●	ZTESTSLT01	Trigger is active in Source System
●	ZTESTSLT02	Trigger is active in Source System

To change settings, enter Settings tab and switch to edit mode

Once a table is selected for replication in the SAP HANA Studio, related database triggers are automatically created in the source system to record changes.

In the *Triggers* tab page, you can view the trigger status of each table in replication. The column *Description* provides with useful details about the trigger status – this is especially important if status indicator is not green.

Details about status information:

The trigger status may turn to *yellow* if the creation of the trigger fails for example for one of the following reasons:

- Missing authorization for source system to create trigger
- Related logging table are for whatever reason corrupted
- If MaxDB or Sybase ASE is used, if other database triggers already exist

Note: if you delete trigger manually in source system, the trigger status will stay green.

4.3.3 Statistics

Similar to the *SLT Based Table Data Provisioning* screen in the SAP HANA Studio, the *Statistics* tab page provides key information about tables. It includes details about the current action and status, and replication latency time of each table (calculated with the median, the minimum, and the maximum). In addition, you can view *Replication Details* including through put information of inserted, updated and deleted data records.

Configuration UE2_SP07TST

Configuration Name UE2_SP07TST Mass Transfer 322 Status CC
 Target System xml1006:00

Edit Close Refresh

Jobs and Connections Triggers Statistics Settings

Latency Information

Status	Table Name	Current Action	Current Status	Latency Med (All)	Latency Med (24h)	Latency Min (24h)	Latency Max (24h)	Last Replication
■	DD02L	Replication	In Process	0.57 sec	No latency data available	No latency data available	No latency data available	1 sec
■	DD02T	Replication	In Process	0.63 sec	No latency data available	No latency data available	No latency data available	1 sec
■	DD08L	Replication	Scheduled	No latency data available	No latency data available	No latency data available	No latency data available	No record replicated yet
■	GLPCA	Replication	Scheduled	No latency data available	No latency data available	No latency data available	No latency data available	No record replicated yet
■	MARA	Replication	Scheduled	No latency data available	No latency data available	No latency data available	No latency data available	No record replicated yet
■	ZTESTSLT01	Replication	Scheduled	No latency data available	No latency data available	No latency data available	No latency data available	No record replicated yet
■	ZTESTSLT02	Replication	Scheduled	No latency data available	No latency data available	No latency data available	No latency data available	No record replicated yet

Show Replication Details

To change settings, enter Settings tab and switch to edit mode

If the through put or replication latency time does not meet your expectations, you can change the number of jobs as outlined in chapter 4.2.

Details on status information:

The statistic status for a table may change to *yellow* if the replication latency - median (24h) exceeds 5 seconds

Note: since calculation of replication latency also considered initial load time, the statistic status most likely will be remain on status yellow at least in the first 24h after the successful completion of the initial load.

The statistic status for a table may change to *red* if the column *Current Status* shows “Error” for example because of the following reasons:

- Connection issues with the HANA system or source system
- Master job was not stopped before applying software maintenance activities in the SAP source system
- Inconsistent mapping of data formats, such as NC -> INT; DATS -> DATE

Note: As long as the connection to the HANA system exists, the column status *Current Status* reflects the same table status as control table *RS_Status* of the related schema in the HANA system.

4.3.4 Monitoring using SAP Solution Manager

Starting with SAP Solution Manager 7.1 SP05 (and using at least DMIS_2010 SP07 on the SAP LT Replication Server), you can also use the system monitoring capabilities of SAP Solution Manager to monitor the status of a configuration and related schema.

From the SAP Solution Manager system, you can connect to the SAP LT Replication Server during the set-up steps using the SAP template “SAP SLT ABAP Add on” that is automatically proposed to be assigned, if the DMIS Add-on is detected.

After the completion of the set-up steps, you are able to monitor – aggregated for a schema - basic information on job, trigger and table status.

Note: The system monitoring capabilities of SAP Solution Manager does not allow viewing details for each table and related trigger – it contains only aggregated information for a schema.

4.4 Backup and Recovery Aspects

You need to backup your system landscape regularly to ensure that you can restore and recover it in case of system outages or other failures.

The backup and restore strategy for SAP LT Replication Server consists of two parts:

1. Backup and restore coverage for each component (see table below)
2. Cross-system data dependencies and handling

The backup and recovery strategy for your system landscape should not only consider SAP systems but should also be embedded in overall business requirements and incorporate your company's entire process flow.

In addition, the backup and recovery strategy must cover disaster recovery processes, such as the loss of a data center through fire.

Situation	Consequences	Actions
Source system goes down	<ul style="list-style-type: none"> - Replication is stopped - SLT waits for source system to be available again 	<ul style="list-style-type: none"> - Restart the source system - SLT will continue from where it stopped
SAPLT Replication Server goes down (or source system and SLT, if in the same stack)	<ul style="list-style-type: none"> - Replication is stopped 	<ul style="list-style-type: none"> - Restart SLT jobs
SAP HANA system goes down	<ul style="list-style-type: none"> - Replication is stopped - SLT waits for HANA DB to be available again 	<ul style="list-style-type: none"> - Restart the HANA system - SLT will continue from where it stopped

If the source system or the SAP HANA system cannot be fully recovered to the same point in time, tables have to be dropped and reloaded into the SAP HANA system again to ensure data consistency between both systems. Therefore, the replication needs to be stopped and restarted for all tables of a schema from the *SLT Based Table Data Provisioning* screen in the SAP HANA Studio.

5 Special Considerations for Source Systems

5.1 Impact of Software Maintenance activities in SAP Source Systems

Software maintenance activities (applying support packages or using the SAP transport management system TMS) in the source system may affect tables that have the status *In Replication* using active database triggers.

In SAP source systems on SAP NW release 7.00 onwards (like SAP ERP 6.0), the software maintenance tools such as the SAP transportation management system (TMS) together with restrictive checks on the ABAP dictionary layer will – by default – prevent the activation of any table structure changes while triggers are active and abort with error.

You can change this default behavior by applying SAP Note [1655725](#) in the relevant SAP source system. After implementing the SAP Note and using DMIS_2010 SP07 in the SAP LT Replication Server, simple table structure changes (adding new fields) is possible and automatically included by the SLT-based replication.

Example: You can apply a change in source table (A) by adding an additional field (aa), the table structure change will be activated even the triggers are still active. Furthermore, relevant adjustments in the replication procedure for table A (the replication object is regenerated, table in HANA database is altered, and so on) happen automatically.

However, for other table structure changes such as a data format change for an existing field or any changes to key fields, the activation of ABAP dictionary will fail, also the automated adjustments of the replication procedure will not work.

In these cases, we recommend the following general procedure:

1. Request that the transport owner identifies any critical dictionary changes to replicated tables in advance.
2. Stop the tables that have the status *In Replication* prior to the software maintenance event or prior to the import of transports.
3. Take a full or incremental backup of the SAP source system prior the software maintenance event or importing transports.
4. Apply software maintenance or import transports in the test system first to identify the impact on replicated tables.
5. Take any necessary actions - for example removing the trigger - depending on the dictionary changes for the replicated tables.
6. Restart the replication after the software maintenance event or after the import of transports.

Note: If you cannot restart the replication, including a full initial load, contact an SLT expert or create a message using component BC-HAN-LTR.

5.2 Archiving Data in Source Systems

The trigger-based replication also considers the deletion in source tables by archive activities (since it is not possible to distinguish on the database level between delete actions cause by archiving versus regular deletion of data records). As a consequence, SAP LT Replication Server will also replicate archiving activities as delete actions in the SAP HANA database.

If archived data of SAP source systems should be also available in the SAP HANA database, you can use report `IUUC_CREATE_ARCHIVE_OBJECT`.

The report creates a replication object, allows the selection of relevant tables of an archive object and the loading of the archived data (by the date of the archiving session) into the respective the schema.

As a technical prerequisite, related SAP ILM (Information Lifecycle Management) APIs need to be available in the SAP source system. For more information, see SAP Note 1652039.

Note: Similar to the initial load procedure, for the archive load procedure, no trigger and no logging tables are created.

5.3 Performance Implications in Source System using Trigger-based Data Replication

Considering the relationship of jobs as outlined before, the main system load of the trigger-based replication approach resides on the SAP LT Replication Server.

Detailed experience with the trigger-based technology has proven that the performance impact of establishing triggers (only for the limited number of tables that have the status *In Replication*) on the database of the source system is not significant and in many cases not measurable compared to the transactional load of the SAP application.

However, as a rule of thumb, SAP assumes a maximum of 2-3% performance impact on the source system. If the number of background jobs is significantly increased to speed up the initial load of tables or replication, the impact might be higher since a related number of dialog processes are consumed in the source system by the replication process.

In specific cases, it might be reasonable to leverage a more powerful application server especially during dedicated initial load activities.

5.4 Data Volume Management

Data replication using SAP LT Replication Server transfers data from the source system(s) to the target (SAP HANA) system. The following considerations apply:

1. Source system(s):
 - SLT related logging tables: The size of logging tables may increase in size, if the replication is suspended for a long period of time and/or there is a system outage of the system of the SAP LT Replication Server or the SAP HANA system. You should carefully monitor the table space size (assuming logging tables have been assigned to a separate table space) and take appropriate action early enough.
 - RFC logging: Since data replication from SAP source systems is managed by RFC connection, the size of related log files should be reviewed. Especially, if performance improvements are implemented that will increase the number of jobs for initial load / replication, check if RFC related logging is critical.
2. SAP LT Replication Server: Since the data transfer – managed in dedicated portions of data records - during the replication process is handled by the memory of the SAP LT Replication Server, there are no specific data volume issues to be considered. In case of system (source and/or SAP HANA system) or network outages, the replication process will generate logging information for related failures. To avoid unnecessary logging information from being stored, you can pause the replication by stopping the schema-related jobs as outlined in chapter 4.2.3.
3. SAP HANA system: Depending on the number of tables that have the status *In Replication* (or initially loaded only) and the growth rate of tables in the source system, the size of the SAP HANA database will increase accordingly.

Note:

- Consider that the SAP HANA database supports compression rates – therefore the table size in the SAP HANA database may be different to that of the source system.
- If the table size (in the SAP HANA database) exceeds 2 billion records, you must split the table by using the available partitioning features. For more information, see the administration guide *SAP HANA Database - Partitioning and Distribution of Large Tables* on the SAP Help Portal at <http://help.sap.com/hana> -> *SAP HANA Appliance Software*.

6 Further Tips and Tricks, Frequently Asked Questions, and Troubleshooting Recommendations

If SAP LT Replication Server for SAP HANA is already in use, what are the considerations when applying DMIS_2010 SP07?

If you use DMIS_2010 with SP05 (and SAP HANA SP03) or higher in the SAP LT Replication Server, you are flexible to choose if and when to upgrade the SAP LT Replication Server, the source system and the HANA system – see SAP Note [1709225](#) for details

If you use DMIS_2010 with a support package level lower than SP05 in the SAP LT Replication Server, it is necessary to use at least the SAP HANA SPS03 - see SAP Note [1649910](#) for details.

Does SAP LT Replication Server for SAP HANA only support 1:1 data replication or is it possible to do filtering (selective data replication) and / or transform data during the replication?

The SAP LT Replication Server includes various transformation capabilities. However, by default the replication process is a 1:1 table replication. Several adjustments of data from source systems to the SAP HANA database format such as conversion to UNICODE format happen automatically during the replication process.

You can use *Advanced Replication Settings* (transaction IUUC_REPL_CONT, tab page IUUC ASS RULE MAP) to define transformation rules for filtering of data or for more advanced transformation requirements such as the scrambling of data. Transformation rules have to be implemented for respective tables on the SAP LT Replication Server before you start with the data replication.

Note: Since applying transformation rules may lead to unexpected data inconsistencies between source and target (SAP HANA) system or may have a negative impact on the performance of the data replication process, we highly recommend involving an SAP LT Replication Server expert in this matter.

Are there any special considerations if the source system is a non-SAP system?

The fundamental concept of the trigger-based replication is designed as for SAP source systems. The main differences are that the connection is a database connection (no RFC connection) and the read modules reside on the SAP LT Replication Server.

Furthermore, consider the following:

- Due to the database trigger concept, tables in non-SAP source systems must have a primary key to be considered for replication.
- Tables DD002L, DD002T (for SAP source systems used to replicate the SAP dictionary information) include the metadata of the tables in the non-SAP system – however these tables are just initially loaded and not automatically updated (replicated).
- Tables that have database-specific formats may need to apply dedicated mappings (transformation rules) before they can be properly replicated.
- Only SAP supported databases (with respective DBSL for SAP NetWeaver 7.02) are supported as non-SAP source systems.

Is it possible to use a configuration for multiple source and target SAP HANA systems?

Yes, the SAP LT Replication Server supports both (N:1 replication and 1:N replication – limited to 1:4)

For N:1 replication: consider specific preparation steps especially if you want to replicate data from the same tables.

For 1:N replication: consider that you flag the related configuration during the initial creation already accordingly (transaction: LTR)

In any case, we recommend involving an SLT expert for the initial set-up of those scenarios.

What are the potential issues if the creation of a configuration and a related schema fails?

- Missing add-on DMIS_2010 in your source system: Check and make sure that in your source system you have installed the required add-on DMIS_2010. See SAP Note 1468391 for further information.
- Missing the proper roles for the RFC user: In the system log (SM21) and ABAP dump (ST22), both indicated that RFC_NO_AUTHORIZATION error occurred. Logon to the source system and check if role SAP_IUUC_REPL_REMOTE is assigned to the RFC user.
- Roles are not generated properly: If the roles are assigned correctly to the RFC user, but still get the error you might not have generated the roles properly. The role should have a green traffic light on the tab pages *Authorization* and *User*. If there is a yellow light on these tabs, generate the roles and execute the user comparison (as outlined in chapter 3).
- DDIC user is used for RFC communication: You cannot use user DDIC for RFC connections between the source system and SLT, as it is in conflict with coding in the SAP core function.
- HANA DBSL is not installed or database client software path not specified in the OS environment: check the work process log and refer to SAP Note 1597627.
- DB client software is outdated. Check the work process log and update the database client software. See SAP Note 1603671 for further information.
- Logon credentials for SAP HANA system are not correct: Check the logon information when you create a new schema.

How can I ensure that data is consistent in the source system and SAP HANA system?

Since any change in the source system is tracked in dedicated logging tables, the replication status for each changed data record is transparent. A entry of a logging table is deleted after a successful “commit” statement from the SAP HANA database, this procedure guarantees data consistency between source and target (SAP HANA) system – even in the case of system outages or network failures. Advanced monitoring and further expert functions allow you to track the replication progress of each data portion in detail – however, dedicated reconciliation lists that allow reviewing the replication status from a business perspective are currently not available.

What happens in case of network failures?

As long as there was no successful “commit” statement from the SAP HANA database, respective information in the logging tables stay in place – therefore the replication of related changes will be repeated until the replication is successfully completed.

Is the partitioning of SAP HANA tables supported by SAP LT Replication Server?

There may be several reasons why partitioning of tables replicated into SAP HANA is needed - for example if there are more than 2 billion records in a source table, it needs to be partitioned into multiple SAP HANA tables.

You can use *Advanced Replication Settings* (transaction IUUC_REPL_CONT, tab page IUUC_REPL_TABSTG) to flexibly define related partitioning commands. You have to enter the SQL statements using the same syntax as in the SQL editor of the SAP HANA Studio (see also in the Guide “[SAP HANA Database – Partitioning and Distribution of large tables](#)”).

Note: You have to complete the partitioning definition before you set the related table(s) into status *Load* or *Replication* from the SAP HANA Studio.

Does SAP LT Replication Server for SAP HANA support data compression like the SAP HANA database?

Yes, this is automatically covered by the RFC connection used for the data replication from the SAP source systems.

7 Appendix

7.1 Related Guides

The following table contains useful links to related guides:

Content	Guide
Installation Guide - Trigger-based Data Replication Using SAP LT Replication Server	SAP HANA Installation Guide - Trigger-based Replication (SLT)
Security Guide – Trigger-based Data Replication Using SAP LT Replication Server	SAP HANA Security Guide - Trigger-based Replication (SLT)
Technical Operations Guide – SAP HANA Appliance Software	Technical Operations Guide – SAP HANA Appliance Software

7.2 Related SAP Note

The following table contains links to information related SAP Notes:

SAP Note Number	Title	Comment
1605140	Central Note - SAP LT Replication Server	Collective Note for all the relevant Notes for LT Replication Server for HANA
1709225	SAP LT Replication Server for SAP HANA SPS04 - Release Information Note	Collective Note including compatibility information and references to required corrections