SAP HANA implementation on SLT with a Non – SAP source

Poornima Ramachandra
AGENDA

- Introduction
- Planning
- Implementation
- Lessons Learnt
Introduction
Disparate data due to various sources and platforms
Due to the various data sources ensuing actions can be misdirected and/or incorrectly prioritized

Our Goal: Design a solution for a “Single Source of Truth”
Create a comprehensive corporate reporting tool, while design a solution to achieve all the below parameters:

- Achieve Real time replication and batch load processing

- Load and/or replicate tables from the existing Non SAP (Oracle DB) and SAP system in future

- Simplification of landscape, one tool for data transformation of SAP and Non-SAP Systems
- SAP HANA System as a backend for the reporting tool
- SAP Business Objects for Analytics and Reporting
- SAP LT Replication Server for SAP HANA Data Provision (AKA SLT) and Data Transformation
Data Replication involves sharing information between different data resources to ensure data consistency, flexible transformations, improve reliability, and maintain data consistency where the data can be easily accessible by the end user.

- **SAP LT Replication Server (SLT)**
  
  For real time *(trigger based)* and scheduled batch load Data Replication and from Source to Target for SAP and non-SAP data sources (SAP supported data bases only)

  → This is an ideal solution if you want to have both the scenarios in one landscape

- **SAP Business Objects Data Services (DS)**

  For batch load-based data replication from non-SAP sources and SAP sources (with complex ETL requirements)

  → Mainly required if you extensively use scheduled load scenario

  → No real-time replication mode
Other Data Provisioning Options:
SAP HANA Direct Extractor Connection (DXC) utilizes existing BW Datasources
→ Does not provide a real time replication option and complex transformation

Sybase Event Stream Processor (ESP)*: will be available for replicating real time event streams from Sybase ESP into SAP HANA

Sybase Log Replication: Works for non-SAP based applications on Sybase ASE, MS SQL. Currently not widely available
SO WHY SLT???
KEY BENEFITS OF SLT

- Allows real-time (and scheduled) data replication
- Ability to migrate data into HANA format while replicating data in real-time
- “Unlimited” release coverage (from SAP R/3 4.6C onwards) sourcing data from ABAP based SAP applications
- Handling of cluster and pool tables
- Automatically non-Unicode to Unicode conversion during load/replication
- Table Settings and transformation capabilities (e.g. only replicate certain records, enrich table structure)
- Fully integrated with SAP HANA Studio

SAP LT Replication Server is the ideal solution for all HANA customers who need real-time or scheduled data replication sourcing from SAP and NON-SAP sources.
Planning
Steps before Implementation

- SLT Overview
- Architecture Design
- Sizing
SLT for SAP HANA offers both scheduled and real-time data replication for SAP and Non-SAP sources.

The main function of SLT is to replicate data from source system to SAP HANA systems.

Certain data format adjustments from source system to SAP HANA systems happen automatically, e.g., conversion to UNICODE format.

More (complex) transformations such as change of the date type, filtering, scrubbing, etc. can be defined via the Advanced Replication Settings UI.

Advanced data transformation can be performed by adding custom ABAP code.
Architecture Design

- SAP Business Suite
- non-SAP Data sources
- Read Engine
- Mapping & Transformation Engine
- Write Engine
- SAP LT Replication Server
- SAP HANA Appliance
  - BI Client
  - SAP HANA DB
  - In-Memory
- SAP HANA Studio
A database trigger is procedural code that is automatically executed in response to certain events on a particular table or view in a database. The trigger is mostly used for maintaining the integrity of the information on the database. For example, when a new record (representing a new worker) is added to the employees table, new records should also be created in the tables of the taxes, vacations, and salaries.

The need and the usage

- Triggers are commonly used to:
  - audit changes (e.g. keep a log of the users and roles involved in changes)
  - enhance changes (e.g. ensure that every change to a record is time-stamped by the server's clock)
  - enforce business rules (e.g. require that every invoice have at least one line item)
  - execute business rules (e.g. notify a manager every time an employee's bank account number changes)
  - replicate data (e.g. store a record of every change, to be shipped to another database later)
  - enhance performance (e.g. update the account balance after every detail transaction, for faster queries)

The examples above are called Data Manipulation Language (DML) triggers because the triggers are defined as part of the Data Manipulation Language and are executed at the time the data is manipulated. Some systems also support non-data triggers, which fire in response to Data Definition Language (DDL) events such as creating tables, or runtime or and events such as logon, commit and rollback. Such DDL triggers can be used for database auditing purposes.
SAP LT Replication Server does not have to be a separate SAP system and can run on any SAP system with SAP NetWeaver 7.02 ABAP stack or higher.

Connection(s) between source system and SAP HANA system are defined as “Configuration” on the SAP LT Replication Server.

Data load and replication are triggered via SAP HANA Studio.
In a first step, SAP LT Replication Server transfers all metadata table definitions from the non-SAP source system to the HANA system. From the HANA Studio perspective, non-SAP source replication works as for SAP sources. When a table replication is started, SAP LT Replication Server creates logging tables within the source system. As a difference, the read modules are created in the SAP LT Replication Server. The connection the non-SAP source system is established as a database connection.
Multi-System Support

1:n and/or m:1 Replication

Source systems are connected to separate HANA schema on the same HANA System

Source systems are connected to separate HANA systems. Schema name can be equal or different

Source systems are connected to same HANA system and also the same schema

SAP source system is connected to separate HANA systems or to the same system with different schema name.
Monitor Job: Constantly checks whether there are new tasks and triggers master control Jobs

Master Control Job: Started by Monitoring Job, responsible for creating database triggers and logging tables, creating tables and synonyms in SAP HANA system

Data Load Job: Responsible for loading / replicating the data
ARCHITECTURE CONCEPT

Connections for the source system and SAP HANA systems are part of Initial Configuration/Setup in the SLT system. This is covered in the later slides.

Scheduled Load and Replication processes are triggered from HANA Studio (Data Provisioning)
Chosen Multi-Schema Support Replication

- Multi Schemas within the same source system can be connected to the respective target schemas.
- The relevant target schema can be selected in the data provisioning UI.

NON- SAP source system is connected to HANA systems or to the same system with different schema names.
SIZING

- Numbers of configurations Numbers of tables per configuration

- Details about each table:
  - Table type [transparent/cluster]
  - Number of records [rowcount]
  - Size of single record (<>1500 bytes/record)
  - Numbers of columns (S: < 150, M: 151...250, L: > 250)
  - Expected change rate [changes per hour]
  - Complex data transformations required [y/n?]
- Data reading Type choice
- Max. tolerable initial load time [hours]
- Max tolerable replication latency [sec]

Input all the above mentioned parameters to derive the system requirements from the sizing guide.

The current sizing guide only provides sizing guidelines for SAP systems. Minor modifications are required when sizing for NON-SAP systems.
### Template based Quick Sizing

<table>
<thead>
<tr>
<th>Use Case</th>
<th>SMALL</th>
<th>MEDIUM</th>
<th>LARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A small scenario with</strong></td>
<td>• typically one LTR configuration</td>
<td>• Approx ~ 3 different Source Systems (equivalent to 3 LTR Configurations),</td>
<td>• Up to 10 different Source Systems (equivalent to 10 LTR Configurations),</td>
</tr>
<tr>
<td></td>
<td>• with approx. up to 50 tables</td>
<td>• and/or up to 200 tables in total;</td>
<td>• and/or up to 500 tables (in total);</td>
</tr>
<tr>
<td></td>
<td>• weighted table size category S-M</td>
<td>• weighted table size category M-L</td>
<td>• weighted table size category M-XL</td>
</tr>
<tr>
<td></td>
<td>• an overall expected throughput of less than 1,000,000 records/hour</td>
<td>• an overall expected throughput of less than 10,000,000 records/hour</td>
<td>• an overall expected throughput of up to 50,000,000 records/hour</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SLT Server</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 LTR configuration with 2 Data Transfer Jobs</strong></td>
<td><strong>10 Data Transfer Jobs in total (sum of all configurations)</strong></td>
<td><strong>25 Data Transfer Jobs in total (sum of all configurations)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Hardware:</strong> 2-4 CPU Cores, 8-10 GB Main Memory</td>
<td><strong>Hardware:</strong> 4-6 CPU Cores, 10-16 GB Main Memory</td>
<td><strong>Hardware:</strong> 8-10 CPU Cores, 16-32 GB Main Memory</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source System(s)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1:1 relation to data transfer jobs per source</strong></td>
<td><strong>1:1 relation to data transfer jobs per source</strong></td>
<td><strong>1:1 relation to data transfer jobs per source</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Reserve 2 BTC work processes for ACL (Access plan calculation), ensure 2 free Dialog work processes for data load/replication</strong></td>
<td><strong>Reserve 2-4 BTC work processes for ACL (Access plan calculation), ensure 10 free Dialog work processes for data load/replication</strong></td>
<td><strong>Reserve 4-8 BTC work processes for ACL (Access plan calculation), ensure in sum 25 free Dialog work processes for data load/replication</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Additional Hardware required:</strong> ~ 1 CPU Core (0.5 CPU per data transfer job, APPL &amp; DB)</td>
<td><strong>Additional Hardware required:</strong> ~ 5 CPU Core in total (0.5 CPU per data transfer job, APPL &amp; DB)</td>
<td><strong>Additional Hardware required:</strong> ~ 12 CPU Core in total (0.5 CPU per data transfer job, APPL &amp; DB)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SAP HANA System</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>~ 1 additional CPU core</td>
<td>~ 3-4 additional CPU cores</td>
<td>~ 8 additional CPU cores</td>
<td></td>
</tr>
</tbody>
</table>

Follow @ASUG365 and #ASUG2013 on Twitter
Implementation
Technical Requirements & System Set Up

Basic Configuration:
Create a DB user for Secondary DB Connection

System Requirements:
The OS/DB restrictions of NetWeaver 7.02 apply (see at http://service.sap.com/pam)

Installation
- Netweaver 7.02 EHP2 ABAP stack and higher with Kernel 7.20EXT
- Replication Add On DMIS 2010(***) / DMIS 2011 (***)

Basic Configuration
- DB Connection to the source system
- DB Connection to HANA system
- Define no of jobs to be used for data replication

System Requirements
- Based on the sizing performed

Installation
HANA SPS04/05: This includes the LT replication functionality fully integrated into the UI of the HANA modeler
Create a DB connection to the source system

<table>
<thead>
<tr>
<th>DB Connection</th>
<th>DBMS</th>
<th>User Name</th>
<th>DB password</th>
<th>Conn. info</th>
<th>Permanent</th>
<th>Connection Limit</th>
<th>Optimum Conns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The next step is to create the HANA schema. Using the SAPGui, logon as admin user and invoke transaction LTR. This brings up a Webdynpro. Click on New and the following screen appears:

- **HANA schema**
- **Source sys. schema**
- **Hana hostname**
Master Jobs can be restarted or stopped based on the required configuration in transaction LTR
Table Settings in IUUC_REPL_CONTENT

Select the Schema

Choose the table for which the changes have to be made.

Table settings can be defined in this location. This includes:

1. Setting for optimal performance for load and replication
2. Transformation Rules assignment
- Batch load processes in the source system affect the Latency metrics
- Latency information is only relevant to table in “Replication status”
Open the hana studio and select the hana system in the navigator pane.

Then select Help->Quick Launch from the menu bar.
1. Select the Source system and Target Schema
2. Choose the Load/Replicate button to choose the setup the tables and choose the table
3. Choose the Stop Replication to stop the replication completely. This actions deletes all the triggers and logging tables in the source system
4. Choose the Suspend option to pause the replication and Resume to continue the replication
Executive decisions are taken based on this Sales Budget report

Real Time data available with a touch of a button

Mobile ready reports on smart phones and Tablets

Goal achieved, a “Single source of Truth”
Lessons Learnt
- Source database must be sized and configured to support SLT operation

- Source data needs to conform to certain requirements for HANA & SLT:
  - All tables to be replicated via SLT must have a unique primary key configured in the DB
  - Key fields to be used in joins must be defined as fixed-size NUMBER data type.
SLT implements fields in HANA using the equivalent SAP data types, which is not what may be expected as the closest native HANA data type.

- All text fields are converted to NVARCHAR (unicode) in HANA.
- Oracle DATE fields are converted to NVARCHAR (SAP standard for dates) by default, custom transformation is required to implement as DATE.
- Oracle NUMBER data type without specified size are converted to DOUBLE.

Tables that are truncated and reloaded every night in the source system require a different approach and needs a script to initiate the job.
Tables above 2 millions records needs to be portioned in SAP HANA system

Apply all the notes in the SLT Central Note 1709225/1759156 based on the DMIS version and the Installation Guide
SLT facilitates the real time replication and batch load process.

Options to change table settings and custom transformation rules.

Sizing of the system is required before the implementation as per the sizing guide.

SLT system can be hosted as a standalone system or a already existing SAP system.
Thank you

Poornima Ramachandra
Important Links

**Web Pages:**
- Maidenform: [www.maidenform.com](http://www.maidenform.com)
- SLT @ SAP Service Marketplace: [http://service.sap.com/hana](http://service.sap.com/hana)
- SLT @ SAP Service Marketplace: [http://service.sap.com/pam](http://service.sap.com/pam)
- SLT @ SCN: [http://scn.sap.com/community/replication-server](http://scn.sap.com/community/replication-server) (new!)
- Some assets linked @ HANA Experience Page

**SAP LT – Support Component**
BC-HAN-LTR

**SAP LT – Key Documents and Links**
- New [SLT - Introduction Video](#)
- [Installation and Configuration Guide](#)
- [Security Guide](#)
- [Operations Guide](#)
- [How-To Guide „Advanced Replication Settings“](#) (see SAP Note [1733714](#))
- [Sizing Guide](#)
- Important SLT Notes: see in SLT General Note [1605140](#)
Robert Russo  Sr VP & CIO, Maidenform
Laz Rodriguez  Director Technical Operations, Maidenform

Roland Hamm  SLT Product Manager, SAP
roland.hamm@sap.com

Tobias Koebler  SLT Product Manager, SAP
tobias.koebler@sap.com

Michael Goedecke  Platinum Support Consultant, SAP
michael.goedecke@sap.com

Special Thanks!!
THANK YOU FOR PARTICIPATING

Please provide feedback on this session by completing a short survey via the event mobile application.

SESSION CODE: 0603

For ongoing education on this area of focus, visit www.ASUG.com