SAP HANA Data Warehousing Foundation 1.0 SPS 05
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SAP HANA Data Warehousing Foundation
Installation Guide
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1 Introduction

This installation guide describes how to install SAP HANA Data Warehousing Foundation tools, such as Data Distribution Optimizer or Data Lifecycle Manager.

SAP HANA Data Warehousing Foundation is provided with delivery units. The delivery units are contained in software component archive files that can be installed with SAP HANA application lifecycle management.

Related Information

Section SAP HANA Content in the SAP HANA Master Guide on http://help.sap.com/hana_platform

1.1 About SAP HANA Data Warehousing Foundation

The SAP HANA Data Warehousing Foundation option is a series of packaged tools for large-scale SAP HANA installations which support data management and distribution within a SAP HANA landscape.

With SAP HANA Data Warehousing Foundation, you can achieve smart data distribution across complex landscapes, optimize the memory footprint of data in SAP HANA and streamline administration and development. This helps to reduce TCO and support SAP HANA administrators and data warehouse designers.

SAP HANA Data Warehousing comprises specialized SAP HANA XS-based applications:

- **Data Distribution Optimizer** to plan, adjust and analyze landscape reorganizations for SAP HANA scale-out systems.
  The main purpose of the Data Distribution Optimizer is to help the SAP HANA administrator to manage the distribution of tables and to optimize the allocation of SAP HANA memory in a SAP HANA scale-out landscape (multiple-host system). The redistribution algorithm has to reflect the relationship between single tables as well as constraints imposed by the landscape itself, such as allocation limits and server roles (master or slave for example).

- **Data Lifecycle Manager** to deliver the means of displacing data from SAP HANA persistency. With Data Lifecycle Manager, you can leverage storages such as SAP HANA Dynamic Tiering, Hadoop (Spark SQL) or SAP IQ in SAP HANA native use cases to define aging rules on SAP HANA tables. This tool-based approach is used in order to optimize the memory footprint of data in SAP HANA.
1.1.1 Overview of Data Distribution Optimizer Architecture

Data Distribution Optimizer is composed of the components shown in the graphic below.

The Data Distribution Optimizer user interfaces are based on SAPUI5 technology and run in a Web browser.

The SAP HANA Data Warehousing Foundation Reuse Core component (delivery unit HCO_HDM) provides base services, such as scheduling or locking, that can be used by any of the SAP HANA Data Warehousing Foundation tools.

The SAP HANA Data Warehousing Foundation Data Distribution Optimizer Core component (delivery unit HCO_HDM_DDO) contains Data Distribution Optimizer specific logic, such as the logic for generating redistribution plans.

The SAP HANA Core Distribution Services contain modules that SAP HANA Data Warehousing Foundation calls in the SAP HANA core, such as database procedures REORG_GENERATE and REORG_EXECUTE.
1.1.2 Overview of Data Lifecycle Manager Architecture

Data Lifecycle Manager is composed of the components shown in the graphic below.

The Data Lifecycle Manager user interfaces are based on SAPUI5 technology and run in a Web browser.

The SAP HANA Data Warehousing Foundation Reuse Core component (delivery unit HCO_HDM) contains a suite of reuse functionalities, such as scheduling or locking, that can be used by any of the SAP HANA Data Warehousing Foundation tools.

The SAP HANA Data Warehousing Foundation Data Lifecycle Manager Core component (delivery unit HCO_HDM_DLM) contains Data Lifecycle Manager-specific functionality and services:

- **Data Lifecycle Manager engine**
  The Data Lifecycle Manager engine contains services for creating lifecycle profiles, creating storage destination instances and executing relocation jobs, for example.

- **Relocation agents**
  Relocation agents provide the interface to the corresponding storage destinations, for example the relocation agent for SAP HANA Dynamic Tiering, Hadoop (Spark SQL) or SAP IQ.

- **Persistence object services**
  Persistence services provide a common set of DDL/DML functionalities specific to a particular persistence object. Relocation agents are the main consumers of the persistence services. Relocation Agents pass among other context, also the connection object to the Persistence Services. Persistence Services are specific to Storage Destinations (table service for Dynamic Tiering, for example).
The storage destinations specify instances of the storage stack to which the data can be moved to. These instances must be created before they can be assigned for relocation purposes.

1.2 Supported Browsers

For an overview of the supported browsers, see the Product Availability Matrix for SAP HANA Data Warehousing Foundation 1.0.

Related Information

SAP HANA Data Warehousing Foundation 1.0 Planning Product Availability Matrix (Planning PAM)

1.3 Software Download

In the SAP Software Download Center, you have access to the installation media for SAP HANA Data Warehousing Foundation.

You can find the installation media under [SAP Software Download Center] [Support Packages and Patches] [Software Downloads] [SUPPORT PACKAGES & PATCHES] [By Alphabetical Index (A-Z)] [H] [SAP HANA DW FOUNDATION] [SAP HANA DW FOUNDATION 1.0] [COMPRISES SOFTWARE COMPONENT VERSIONS]

- DATA LIFECYCLE MANAGER 1
- DATADISTRIBUTIONOPTIMIZER 1
- HANA DATA MANAGEMENT 1
- HANA DWF DOCU 1

Note

We strongly recommend keeping the various SAP HANA Data Warehousing Foundation software components and delivery units on the same Support Package Stack (SPS) and patch level.

Note that the SAP HANA Data Warehousing Foundation software is complete. You can install the most recent and appropriate SAP HANA Data Warehousing Foundation SPS and patches. There is no need to install earlier patches or to perform an additional upgrade.

Related Information

SAP Software Download Center
2 Planning and Preparation

You need to perform a number of planning and preparation steps.

1. Before installing or updating SAP HANA Data Warehousing Foundation, see SAP Note 2092669 - Release Note SAP HANA Data Warehousing Foundation.

2. Before installing SAP HANA Data Warehousing Foundation SPS 05, install or upgrade SAP HANA to SAP HANA revision 120 (SPS 12) or a higher SPS 12 revision.

   Note
   ○ The SAP HANA Data Warehouse Foundation delivery units have dependencies to the SAP HANA SPS versions as described in the Product Availability Matrix for SAP HANA Data Warehousing Foundation 1.0. These are as follows:

<table>
<thead>
<tr>
<th>SAP HANA Data Warehousing Foundation (SAP HANA DWF) Version</th>
<th>SAP HANA Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP HANA DWF 1.0 SPS 00</td>
<td>SAP HANA SPS08</td>
</tr>
<tr>
<td>SAP HANA DWF 1.0 SPS 01</td>
<td>SAP HANA SPS09</td>
</tr>
<tr>
<td>SAP HANA DWF 1.0 SPS 02</td>
<td>SAP HANA SPS10</td>
</tr>
<tr>
<td>SAP HANA DWF 1.0 SPS 03</td>
<td>SAP HANA SPS11</td>
</tr>
<tr>
<td>SAP HANA DWF 1.0 SPS 05</td>
<td>SAP HANA SPS12</td>
</tr>
</tbody>
</table>

   For more information about supporting SAP HANA versions, see SAP Note 2092669 - Release Note SAP HANA Data Warehousing Foundation.

   ○ In a multiple-container system, you cannot use Data Distribution Optimizer in the system database, although you can use it in any of the tenant database containers.

3. When you want to use SAP HANA Dynamic Tiering as storage destination in Data Lifecycle Manager, install or upgrade SAP HANA Dynamic Tiering to SAP HANA revision 120 (SPS 12) or a higher SPS 12 revision.

4. Provide a user for the installation and configuration tasks, and grant this user the relevant roles and privileges. We recommend using the SYSTEM database user for this purpose. For more information, see section SYSTEM User in the SAP HANA Administration Guide.

5. SAP HANA Data Warehousing Foundation depends on SAP HANA automated content. You should therefore make sure that SAP HANA automated content is installed properly. For more information on automated content, see section SAP HANA Content in the SAP HANA Administration Guide.

6. Note that we strongly recommend keeping all SAP HANA Data Warehousing Foundation software components and delivery units on the same Support Package Stack (SPS) and Patch level, 1.0 SPS 05 Patch 0 for all delivery units for example. For more information, see SAP Note 2092669 - Release Note SAP HANA Data Warehousing Foundation.

7. For Data Distribution Optimizer, the statistics service has to be active. For more information, see section The Statistics Service in the SAP HANA Administration Guide.
Related Information

- Section *Installing SAP HANA* in the *SAP HANA Master Guide* at http://help.sap.com/hana_platform
- https://support.sap.com/content/dam/library/ssp/infopages/pam-essentials/TIP/HDW10PAM.pdf
- 2092669 - Release Note SAP HANA Data Warehousing Foundation
- Sections System User and SAP HANA Content in the *SAP HANA Administration Guide* at http://help.sap.com/hana_platform
- Section *The Statistics Service* in the *SAP HANA Administration Guide* on http://help.sap.com/hana_platform
3 Installing or Updating SAP HANA Data Warehousing Foundation

SAP HANA Data Warehousing Foundation content is delivered in software components. Each software component contains a functional delivery unit (independent delivery units) and a language delivery unit. Functional delivery units provide core services, SAP HANA Data Warehousing Foundation applications, and documentation for the applications. Language delivery units provide translated and quality-assured texts for SAP HANA Data Warehousing Foundation.

The following table provides an overview of the SAP HANA Data Warehousing Foundation software components and the delivery units they contain:

<table>
<thead>
<tr>
<th>Software Component Archive File</th>
<th>Delivery Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCOHDM&lt;Support Package Stack_&lt;Patch&gt;-&lt;material number of software component&gt;.ZIP</td>
<td>Functional: HCO_HDM</td>
<td>Core delivery unit containing reuse services, such as a scheduler or lock manager</td>
</tr>
<tr>
<td></td>
<td>Language: LANG_HCO_HDM</td>
<td>Delivery unit containing revised texts for HCO_HDM</td>
</tr>
<tr>
<td>HCOHDMDDO&lt;Support Package Stack_&lt;Patch&gt;-&lt;material number of software component&gt;.ZIP</td>
<td>Functional: HCO_HDM_DDO</td>
<td>Delivery unit containing the Data Distribution Optimizer application</td>
</tr>
<tr>
<td></td>
<td>Language: LANG_HCO_HDM_DDO</td>
<td>Delivery unit containing revised texts for HCO_HDM_DDO</td>
</tr>
<tr>
<td>HCOHDM_DLM&lt;Support Package Stack_&lt;Patch&gt;-&lt;material number of software component&gt;.ZIP</td>
<td>Functional: HCO_HDM_DLM</td>
<td>Delivery unit containing the Data Lifecycle Manager application</td>
</tr>
<tr>
<td></td>
<td>Language: LANG_HCO_HDM_DLM</td>
<td>Delivery unit containing revised texts for HCO_HDM_DLM</td>
</tr>
<tr>
<td>HDCHDM&lt;Support Package Stack_&lt;Patch&gt;-&lt;material number of software component&gt;.ZIP</td>
<td>Functional: HDC_HDM</td>
<td>Documentation delivery unit containing help that can be accessed directly from the application (embedded help)</td>
</tr>
</tbody>
</table>

**Note**

SAP HANA Data Warehousing Foundation is delivered in English only.

**Related Information**

3.1 Install or Update SAP HANA Data Warehousing Foundation

You install or update SAP HANA Data Warehousing Foundation with SAP HANA application lifecycle management.

Context

Note

We strongly recommend keeping all SAP HANA Data Warehousing Foundation software components and delivery units on the same Support Package Stack (SPS) and Patch level, 1.0 SPS 05 Patch 0 for all delivery units for example.

See SAP Note 2092669 - Release Note SAP HANA Data Warehousing Foundation before installing or updating SAP HANA Data Warehousing Foundation.

Procedure

1. Download the software component archive files (.zip) from the SAP Support Portal to a file directory on your local machine. Do not extract the archive files.
2. Proceed as described in section Installing and Updating SAP HANA Software Components in the SAP HANA Administration Guide.

Caution

To make sure that installation is performed correctly, the files have to be installed in the following order of delivery units:

1. HCO_HDM
2. HCO_HDM_DDO / HCO_HDM_DLM
3. HDC_HDM

Related Information

Section Installing and Updating SAP HANA Software Components in the SAP HANA Administration Guide on http://help.sap.com/hana_platform
4 Configuring SAP HANA Data Warehousing Foundation

Once you have completed the installation, you need to perform configuration tasks to set up the system for using SAP HANA Data Warehousing Foundation.

4.1 Check the Configuration of the HTTP or HTTPS Port

In the instance profile of your SAP Web Dispatcher, you can check whether the HTTP or HTTPS port has been configured for the SAP HANA XS web server.

**Procedure**

1. Open the instance profile of your SAP Web Dispatcher.
   The SAP Web Dispatcher profile can be found at the following location in the SAP HANA studio:
   
   - [SAP HANA Administration Console] > [Configuration] > [webdispatcher.ini] > [profile]
2. Check the HTTP/S port settings in the SAP Web Dispatcher profile.

Alternatively, access both SAP HANA XS Administration Tool URL options:

- http://<WebServerHost>:80/<SAPHANAinstance>/sap/hana/xs/admin/
- https://<WebServerHost>:80/<SAPHANAinstance>/sap/hana/xs/admin/

4.2 Configure SAP HANA System Properties

You change specific system properties in the configuration file of the SAP HANA XS engine in order to configure SAP HANA Data Warehousing Foundation.

**Prerequisites**

You have the system privilege INIFILE ADMIN.
Procedure

1. In the Administrator editor of the SAP HANA Administration Console, choose the Configuration tab. A list of all configuration files appears.
2. Expand the xsengine.ini file and set the following parameters:

<table>
<thead>
<tr>
<th>Relevant for...</th>
<th>Section</th>
<th>Parameter Key</th>
<th>Parameter Value</th>
<th>Reset the Value (when uninstalling the software)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Distribution Optimizer</td>
<td>jsvm</td>
<td>max_runtime_bytes</td>
<td>at least 268435456</td>
<td>If jsvm.max_runtime_bytes was changed for SAP HANA Data Warehousing Foundation only, you can reset it to the previous value from the context menu.</td>
</tr>
</tbody>
</table>

**Note**
This is the minimum volume that is needed to run the Data Distribution Optimizer application.

○ Data Distribution Optimizer
○ Data Lifecycle Manager | scheduler       | enabled       | true          | If scheduler.enabled was enabled for SAP HANA Data Warehousing Foundation only, you can delete the parameter value from the context menu. |

○ Data Distribution Optimizer
○ Data Lifecycle Manager | Trace           | xsa:sap_hdm   | error         | To reset trace.xs:sap.hdm, you can delete the parameter value from the context menu. |

If a section and/or parameter is not available, you can add it to the xsengine.ini file. Sections can be added from the context menu of the xsengine.ini file. Parameters can be added from the context menu of the section.

Related Information

Sections Configuring SAP HANA System Properties (INI Files), and SAP HANA XS Configuration Parameters in the SAP HANA Administration Guide on http://help.sap.com/hana_platform

4.3 Activate SQL Connection Configurations

In SAP HANA Extended Application Services (SAP HANA XS), you use the SQL connection configuration to enable the execution of SQL statements from your server-side JavaScript application, using credentials that are different to the credentials of the requesting user. Data Distribution Optimizer and Data Lifecycle Manager use this mechanism, for example when generating and executing redistribution plans in Data Distribution Optimizer.
Prerequisites

You have been granted the SAP HANA user role sap.hana.xs.admin.roles::SQLCCAdministrator.

Procedure

1. **Start the SAP HANA XS Administration Tool.**
   - Depending on whether the HTTP or HTTPS port has been configured, the SAP HANA XS Administration Tool is available on the SAP HANA XS Web server at one of the following URLs:
     - http://<WebServerHost>:80<SAPHANAinstance>/sap/hana/xs/admin
     - https://<WebServerHost>:43<SAPHANAinstance>/sap/hana/xs/admin
2. **Start the SAP HANA XS Artifact Administration tool.**
3. **In the Application Objects list, locate the following packages:**
   - For Data Distribution Optimizer and Data Lifecycle Manager: sap.hdm.core.sudo
   - For Data Distribution Optimizer: sap.hdm.ddo.sudo
4. **For the relevant packages, select the SQL connection configuration object sudo.xssqlcc.**
5. **Click Activate to set the run-time status of the XS SQL connection configuration to Active.**

Results

Data Distribution Optimizer redistribution plans will be generated or executed in the context of the user who is currently logged on. In order to generate or execute a plan, the user will be prompted to confirm with his/her password.

Related Information

Section *Edit an SQL Connection Configuration* in the SAP HANA Administration Guide at http://help.sap.com/hana_platform

4.4 User Authorization

Every user who is required to work with SAP HANA Data Warehousing Foundation tools must have a database user. To perform tasks in the tools, the database user must have the required privileges.

SAP HANA Data Warehousing Foundation tools are delivered with a set of roles containing the required privileges for specific tasks. Appropriate roles have to be granted to the database users working with Data Warehousing
Foundation. In addition, database users working with SAP HANA Data Warehousing Foundation require further custom object privileges on entity level (on schema level, for example).

**Related Information**


### 4.4.1 Privileges for Working with Data Distribution Optimizer

#### 4.4.1.1 Roles for Data Distribution Optimizer

The following table describes the roles that provide predelivered application privileges for working with Data Distribution Optimizer:

<table>
<thead>
<tr>
<th>Role</th>
<th>Type</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>sap.hdm.ddo.roles::Viewer</td>
<td>application</td>
<td>This role provides read-only access to view redistribution plans. It also allows you to view configurations.</td>
</tr>
<tr>
<td>sap.hdm.ddo.roles::Administrator</td>
<td>application</td>
<td>This role has to be granted to the database user who creates Data Distribution Optimizer configurations, generates redistribution plans, executes the plans, exports plans or uploads them.</td>
</tr>
</tbody>
</table>

**Note**

- This role uses the RESOURCE ADMIN system privilege, which allows the user to manage data volumes for example, and restart the SAP HANA system. Caution should be exercised when granting this role. For more information, see the *SAP HANA Security Guide*.
- This role also uses the INIFILE ADMIN system privilege, which authorizes changing of system settings. This is necessary in order to access the M_VOL-UMES system view.

In addition to the privileges provided with this role, this user needs to have ALTER, EXECUTE and UPDATE privileges for all schemas contained in a redistribution plan. For more information, see [Custom Privileges at Entity Level for Data Distribution Optimizer](#) [page 15].
### 4.4.1.2 Custom Privileges at Entity Level for Data Distribution Optimizer

A number of custom privileges at entity level have to be granted to Database Distribution Optimizer users.

Grant the following object privileges to the user with the sap.hdm.ddo.roles::Administrator role on all database schemas that redistribution plans should be generated for. If you only want to generate redistribution plans for SAP BW on SAP HANA for example, grant the following privileges on <BW DB Schema Name>:

<table>
<thead>
<tr>
<th>object privilege</th>
<th>SQL-ALTER-Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALTER</td>
<td>GRANT ALTER ON SCHEMA &lt;DB-SCHEMA NAME&gt; TO &lt;user with the role sap.hdm.ddo.roles::Administrator&gt;;</td>
</tr>
<tr>
<td>UPDATE</td>
<td>GRANT UPDATE ON SCHEMA &lt;DB-SCHEMA NAME &gt; TO &lt;user with the role sap.hdm.ddo.roles::Administrator&gt;;</td>
</tr>
<tr>
<td>EXECUTE</td>
<td>GRANT EXECUTE ON SCHEMA &lt;DB-SCHEMA NAME &gt; TO &lt;user with the role sap.hdm.ddo.roles::Administrator&gt;;</td>
</tr>
</tbody>
</table>

### 4.4.2 Privileges for Working with Data Lifecycle Manager
4.4.2.1 Roles for Data Lifecycle Manager

Data Lifecycle Manager is delivered with a set of roles containing privileges required for specific tasks. Additionally, there is a set of roles that have to be generated during Data Lifecycle Manager configuration. The generated roles contain the respective predelivered roles plus additional privileges needed to work with the tool.

The following table describes the roles that provide application privileges for working with Data Lifecycle Manager:

<table>
<thead>
<tr>
<th>Predelivered Role</th>
<th>Generated Role</th>
<th>Type</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>sap.hdm.dlm.role::Administrator</td>
<td>sap.hdm.dlm.role.GNR.Administrator</td>
<td>application</td>
<td>The generated role has to be granted to the database user who maintains storage destinations, modeled persistence objects and lifecycle profiles, and who executes relocation runs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In addition to the privileges provided with this role, this user needs to have custom privileges. For more information, see Custom Privileges at Entity Level for Data Lifecycle Manager [page 16].</td>
</tr>
<tr>
<td>sap.hdm.dlm.role::Display</td>
<td>sap.hdm.dlm.role.GNR.Display</td>
<td>application</td>
<td>This role provides read-only access to view relocation activities.</td>
</tr>
<tr>
<td>sap.hdm.dlm.role::Support</td>
<td>sap.hdm.dlm.role.GNR.Support</td>
<td>SAP internal</td>
<td>This role is used for support purposes.</td>
</tr>
</tbody>
</table>

Related Information

- Custom Privileges at Entity Level for Data Lifecycle Manager [page 16]

4.4.2.2 Custom Privileges at Entity Level for Data Lifecycle Manager

A number of custom privileges at entity level have to be granted to Data Lifecycle Manager users.

Source Specific Privileges

Grant the following object privileges to the Data Lifecycle Manager logon user (database user) for all tables that lifecycle profiles should be generated for:
### Target Specific Privileges

#### Storage Destination "Spark SQL (Destination)"

Grant the following object privileges to the Data Lifecycle Manager logon user (database user) to enable the use of Spark SQL (Destination) as the storage destination:

<table>
<thead>
<tr>
<th>Object Privilege</th>
<th>For example with SQL-ALTER-Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE VIRTUAL TABLE</td>
<td>GRANT CREATE VIRTUAL TABLE ON REMOTE SOURCE &quot;&lt;Remote Source name&gt;&quot; TO &lt;user with the role sap.hdm.dlm.role::Administrator&gt;;</td>
</tr>
<tr>
<td>DROP</td>
<td>GRANT DROP ON REMOTE SOURCE &quot;&lt;Remote Source name&gt;&quot; TO &lt;user with the role sap.hdm.dlm.role::Administrator&gt;;</td>
</tr>
</tbody>
</table>

You can find the Remote Sources in the SAP HANA Studio in the Systems view under **Provisioning ➤ Remote Sources**. For more information about Remote Sources, see SAP HANA Smart Data Access in the SAP HANA Administration Guide.

#### Storage Destination "SAP IQ over SDA"

Grant the following object privileges to the Data Lifecycle Manager logon user (database user) to enable the use of SAP IQ as the storage destination:

<table>
<thead>
<tr>
<th>Object Privilege</th>
<th>For example with SQL-ALTER-Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE VIRTUAL TABLE</td>
<td>GRANT CREATE VIRTUAL TABLE ON REMOTE SOURCE &quot;&lt;Remote Source name&gt;&quot; TO &lt;user with the role sap.hdm.dlm.role::Administrator&gt;;</td>
</tr>
<tr>
<td>DROP</td>
<td>GRANT DROP ON REMOTE SOURCE &quot;&lt;Remote Source name&gt;&quot; TO &lt;user with the role sap.hdm.dlm.role::Administrator&gt;;</td>
</tr>
</tbody>
</table>

You can find the Remote Sources in the SAP HANA Studio in the Systems view under **Provisioning ➤ Remote Sources**. For more information about Remote Sources, see SAP HANA Smart Data Access in the SAP HANA Administration Guide.

Also check for the following:

---

**Code Syntax**

```sql
select * from "PUBLIC"."EFFECTIVE_PRIVILEGES" where USER_NAME = '<user with the role sap.hdm.dlm.role::Administrator>' and OBJECT_NAME = '"<Remote Source name>"';
```
Generation Specific Privileges

For storage destination types *SAP HANA Dynamic Tiering*, *SAP IQ over SDA*, and *Deletion Bin Destination* Data Lifecycle Manager provides default schema SAP_HDM_DLM_GNR as a target database schema for the generated objects. When creating a storage destination, you can overwrite the default schema. Data Lifecycle Manager then uses the schema specified in the Parameters section of the storage destination that is assigned to the lifecycle profile. For storage destination type *Spark SQL (DESTINATION)*, Data Lifecycle Manager uses the schema of the source persistence object target database schema for the generated objects.

You therefore need to grant the following object privileges to the user with the Data Lifecycle Manger administrator role on all target database schemas (of lifecycle profiles):

<table>
<thead>
<tr>
<th>Object Privilege</th>
<th>For example with SQL-ALTER-Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXECUTE</td>
<td>GRANT EXECUTE ON SCHEMA &lt;DB-SCHEMA NAME&gt; TO &lt;user with the role sap.hdm.dlm.role::Administrator&gt;;</td>
</tr>
<tr>
<td>CREATE ANY</td>
<td>GRANT CREATE ANY ON SCHEMA &lt;DB-SCHEMA NAME&gt; TO &lt;user with the role sap.hdm.dlm.role::Administrator&gt;;</td>
</tr>
<tr>
<td>INSERT</td>
<td>GRANT INSERT ON SCHEMA &lt;DB-SCHEMA NAME&gt; TO &lt;user with the role sap.hdm.dlm.role::Administrator&gt;;</td>
</tr>
<tr>
<td>SELECT</td>
<td>GRANT SELECT ON SCHEMA &lt;DB-SCHEMA NAME&gt; TO &lt;user with the role sap.hdm.dlm.role::Administrator&gt;;</td>
</tr>
<tr>
<td>DELETE</td>
<td>GRANT DELETE ON SCHEMA &lt;DB-SCHEMA NAME&gt; TO &lt;user with the role sap.hdm.dlm.role::Administrator&gt;;</td>
</tr>
</tbody>
</table>

Related Information

- Roles for Data Lifecycle Manager [page 16]

4.4.3 Create and Authorize Users

Every user required to work with SAP HANA Data Warehousing Foundation tools must have a database user. To perform the tasks in the tools, specific roles must be granted to the database user(s) by a user administrator.

Prerequisites

- You have the system privilege USER ADMIN.
- You have the privileges required to grant specific privileges and roles to the new user. For more information, see Prerequisites for Granting and Revoking Privileges and Roles in the *SAP HANA Administration Guide*.
- If you are integrating SAP HANA database users into a single-sign-on (SSO) environment using one or more of the supported mechanisms, the required infrastructure must be in place and configured.
For Data Lifecycle Manager: You have generated the roles needed for working with the tool. For more information, see *Generate Default Schema for Generated Objects and Roles Needed for Data Lifecycle Manager* [page 26].

**Context**

The following section describes the procedure for creating and authorizing SAP HANA database users, focusing on SAP HANA Data Warehousing specific information. For a detailed description of the general procedure, see *Create and Authorize a User* in the *SAP HANA Administration Guide*.

**Procedure**

1. If the database user that you want to authorize does not exist yet, create the user:
   a. In the *Systems* view, choose *Security > Users*.
   b. From the context menu, choose *New User*.
2. Specify the user name and properties.
3. Authorize the user by granting the required roles and privileges.
   a. Grant the required roles for working with SAP HANA Data Warehousing Foundation tools.
   b. Grant the appropriate custom privileges at entity level.
4. Save the user by pressing *(Deploy)*. The user is created and appears in the *Users* folder. A new schema is also created for the user in the catalog. This schema has the same name as the user.

**Related Information**

- Section *Generate Default Schema for Generated Objects and Roles Needed for Data Lifecycle Manager* in the *SAP HANA Data Warehousing Foundation Installation Guide* on [http://help.sap.com/hana_options_dwf](http://help.sap.com/hana_options_dwf)
4.5 Configuring Data Distribution Optimizer

For Data Distribution Optimizer, a number of additional configuration steps have to be performed.

4.5.1 Configure Database Traces

You can change the trace level of specific trace components in order to configure Data Distribution Optimizer.

Prerequisites

- In the Administrator editor of the SAP HANA Administration Console on the Configuration tab, the parameter with key `xsapsap.hdm` and value `info` must have been added to the Trace section of the xsengine.ini file.
- You have been assigned the system privilege TRACE ADMIN.

Procedure

1. In the Administrator editor of the SAP HANA Administration Console, choose the Trace Configuration tab.
2. Choose the Edit Configuration button for the database trace. The Trace Configuration dialog box appears.
3. Select Show all Components.
4. In the INDEXSERVER service, for the trace component `landscapereorg`, select `INFO` from the dropdown menu of the System Trace Level column.
5. In the XSENGINE service, for the trace component `xsapsap.hdm`, select `ERROR` from the dropdown menu of the System Trace Level column.

Related Information

Sections Database Trace, and Configure Traces in the SAP HANA Administration Guide on http://help.sap.com/hana_platform
4.5.2 Check for Data Distribution Optimizer Readiness

Before you start working with the Data Distribution Optimizer, you can check whether the system has been configured properly.

Procedure

1. Log on to the Data Distribution Optimizer with a Data Distribution Optimizer user that has an appropriate role assigned.
   
   Depending on whether the HTTP or HTTPS port has been configured, the Data Distribution Optimizer is available on the SAP HANA XS Web server at one of the following URLs:
   
   ○ http://<WebServerHost>:80/<SAPHANAinstance>/sap/hdm/ddo/index.html or

2. In the header area of the screen, a button indicates whether the system has been configured correctly. Click the button to view the configuration details.
   
   The following dialog box lists the configuration parameters with their statuses in the RESULT column. If the configuration is incorrect, the RESULT column displays the entry false.

4.6 Configuring Data Lifecycle Manager

For Data Lifecycle Manager, additional configuration steps have to be performed.
4.6.1 Preparing Storage Destinations

The storage destinations specify instances of the storage stack which Data Lifecycle Manager can move data to. The destinations have to be created before they can be assigned in a lifecycle profile for relocation purposes.

4.6.1.1 Supported Storage Destination Types

The table below provides an overview of the supported storage destination types.

<table>
<thead>
<tr>
<th>Storage Destination Type</th>
<th>Restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP HANA Dynamic Tiering Local</td>
<td>The following factors prevent the lifecycle profile from being activated:</td>
</tr>
<tr>
<td></td>
<td>● Source tables with keys of type VARCHAR/CHAR/VARBINARY/BINARY and length</td>
</tr>
<tr>
<td></td>
<td>greater than 255</td>
</tr>
<tr>
<td></td>
<td>● Source tables with keys of type NVARCHAR/NCHAR and length greater than 85</td>
</tr>
<tr>
<td></td>
<td>● Source tables of type row</td>
</tr>
<tr>
<td></td>
<td>● Source tables with columns with data type BLOB</td>
</tr>
<tr>
<td></td>
<td>● Source tables without a primary key</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>Defining a nominal key in the lifecycle profile allows you to overcome this</td>
</tr>
<tr>
<td></td>
<td>restriction.</td>
</tr>
<tr>
<td></td>
<td>You can find further information on data type support for SAP HANA Dynamic</td>
</tr>
<tr>
<td></td>
<td>Tiering in SAP Note <a href="#">2183717</a>.</td>
</tr>
<tr>
<td></td>
<td>Tables, table groups or table hierarchies with tables containing double</td>
</tr>
<tr>
<td></td>
<td>quotation marks and other special characters are not supported for data</td>
</tr>
<tr>
<td></td>
<td>relocation to SAP HANA Dynamic Tiering (extended tables). For more</td>
</tr>
<tr>
<td></td>
<td>information, see SAP Note <a href="#">2309420</a>.</td>
</tr>
<tr>
<td>SAP IQ over SDA</td>
<td>The following factors prevent the lifecycle profile from being activated:</td>
</tr>
<tr>
<td></td>
<td>● Source tables with keys of type VARCHAR/CHAR/VARBINARY/BINARY and length</td>
</tr>
<tr>
<td></td>
<td>greater than 255</td>
</tr>
<tr>
<td></td>
<td>● Source tables with keys of type NVARCHAR/NCHAR and length greater than 85</td>
</tr>
<tr>
<td></td>
<td>● Source tables of type row</td>
</tr>
<tr>
<td></td>
<td>● Source tables with columns with data type BLOB</td>
</tr>
<tr>
<td></td>
<td>● Source tables without a primary key</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>Defining a nominal key in the lifecycle profile allows you to overcome this</td>
</tr>
<tr>
<td></td>
<td>restriction.</td>
</tr>
<tr>
<td>Spark SQL (DESTINATION)</td>
<td>For an overview of restrictions, see SAP Note <a href="#">2290922</a>.</td>
</tr>
</tbody>
</table>
### Storage Destination Type

<table>
<thead>
<tr>
<th>Deletion Bin Destination</th>
<th>Restrictions</th>
</tr>
</thead>
</table>
|                          | The following factors prevent the lifecycle profile from being activated:  
|                          |● Source tables without a primary key |

**Note**
Defining a nominal key in the lifecycle profile allows you to overcome this restriction.

---

### 4.6.1.2 Prerequisites for Using Hadoop Cluster as Storage Destination

1. For leveraging a Hadoop Cluster as storage Destination for Data Lifecycle Manager, you have chosen the right combination of end to end product versions according to the information given in SAP Note [2290350](http://help.sap.com/hana_platform).
2. The SAP HANA Spark Controller has been installed and configured properly. For more information, see the SAP Note for the appropriate SAP HANA Spark Controller version referenced from SAP Note [2290350](http://help.sap.com/hana_platform).
3. The Data Lifecycle Manager use case has been enabled by maintaining the following parameter in the `hanaes-site.xml` Spark Controller configuration file located in `/usr/sap/spark/controller/conf`:

   ```xml
   <property>
   <name>sap.hana.es.warehouse.dir</name>
   <value>/sap/hana/hanaes/warehouse</value>
   <final>true</final>
   </property>
   ``

   The parameter indicates the location in the Hadoop Distributed File System (HDFS) where all SAP HANA data files will be stored.

   **Note**
   You can change the location to any valid HDFS directory.

4. The SAP HANA Spark Controller has been added as Remote Source to SAP HANA:
   1. In the *Systems* view in the SAP HANA Studio, choose **Provisioning** ➔ **Remote Sources**
   2. Right-click **Remote Sources** and select **New Remote Source**.
   3. Enter a **Source Name**, select **SPARK SQL (DESTINATION)** as **Adapter Name** and **indexserver** as **Source Location**.
   4. Enter the following information:
      - Under **Connection Properties**, enter the server and port
      - Under **Credentials**, enter the name and password for a technical user: This is the operating system user of the Hadoop environment who is allowed to use the SAP HANA Spark Controller being used. For more information, see the SAP Note for the appropriate SAP HANA Spark Controller version referenced from SAP Note [2290350](http://help.sap.com/hana_platform).
5. Click the **Save this editor** icon in the upper right-hand corner of the screen.

5. The SAP HANA system has been configured for Spark connectivity:

1. In the SAP HANA Administration Console, right-click the SAP HANA system and choose **Configuration and Monitoring** \open {Open Administration} to open the Administration editor. Now choose the **Configuration** tab.

   A list of all configuration files appears.

2. Expand the following configuration files and sections and change the system properties as described in the following table:

<table>
<thead>
<tr>
<th>Configuration File</th>
<th>Section</th>
<th>Parameter Key</th>
<th>Parameter Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>indexserver.ini</td>
<td>data_aging</td>
<td>spark_remote_source</td>
<td>&lt;name of the Remote Source you created for the SAP HANA Spark Controller&gt;</td>
</tr>
<tr>
<td>xsengine.ini</td>
<td>data_aging</td>
<td>spark_remote_source</td>
<td>&lt;name of the Remote Source you created for the SAP HANA Spark Controller&gt;</td>
</tr>
</tbody>
</table>

   If a section and/or parameter is not available, you can add it to the configuration file. Sections can be added from the context menu of the configuration file. Parameters can be added from the context menu of the section.

   **Note**

   Alternatively, you can use the following statement to configure the SAP HANA system:

   ```sql
   ALTER SYSTEM ALTER CONFIGURATION ('indexserver.ini', 'SYSTEM') SET ('data_aging', 'spark_remote_source') = '<remote_source_name>' WITH RECONFIGURE;
   ALTER SYSTEM ALTER CONFIGURATION ('xsengine.ini', 'SYSTEM') SET ('data_aging', 'spark_remote_source') = '<remote_source_name>' WITH RECONFIGURE;
   ```

4.6.1.3 **Prerequisites for Using SAP HANA Dynamic Tiering as Storage Destination**

- The SAP HANA Dynamic Tiering option has to be installed and configured.

  For more information, see the following guides at [http://help.sap.com/hana_options_dt](http://help.sap.com/hana_options_dt):
  - SAP HANA Dynamic Tiering: Master Guide
  - SAP HANA Dynamic Tiering: Installation Guide
  - SAP HANA Dynamic Tiering Administration Guide

- We recommend using array insert as the most optimal mechanism to load data into an extended table.
SAP HANA dynamic tiering converts an array-insert into a LOAD statement on the SAP HANA dynamic tiering node. Bulk load is controlled by the bulk_inserts_as_load and bulk_load_as_binary parameters. Both parameters are ‘true’ by default. If you need to re-enable the defaults, proceed as follows:

1. Re-enable the bulk load mechanism for optimizing array inserts:
   
   ```
   ALTER SYSTEM ALTER CONFIGURATION ('esserver.ini', 'SYSTEM') SET ('row_engine', 'bulk_inserts_as_load') = 'true' WITH RECONFIGURE;
   ```

2. Re-enable binary load (instead of the ASCII load):
   
   ```
   ALTER SYSTEM ALTER CONFIGURATION ('esserver.ini', 'SYSTEM') SET ('row_engine', 'bulk_load_as_binary') = 'true' WITH RECONFIGURE;
   ```

- To increase security and improve performance, configure communication between the SAP HANA database and the SAP HANA dynamic tiering service over an internal network. For more information, see one of the following sections in the SAP HANA Dynamic Tiering: Administration Guide:
  - Configure Private Internal Communication Using the Command-Line Interface
  - Configure Private Internal Communication Using the Graphical User Interface

4.6.1.4 Prerequisites for Using SAP IQ via SAP HANA Smart Data Access as Storage Destination

- A SAP IQ version that is supported by SAP HANA Smart Data Access has to be installed and configured. For more information, see the installation and configuration guide for the relevant SAP IQ version at http://help.sap.com/iq.
- SAP HANA Smart Data Access has to be installed and configured for accessing SAP IQ. For more information, see the following guides at http://help.sap.com/hana_platform:
  - SAP HANA Server Installation and Update Guide
  - SAP HANA Administration Guide
- SAP IQ has to be added as a remote source. For more information, see the SAP HANA Administration Guide at http://help.sap.com/hana_platform.

4.6.1.5 Sizing Data Lifecycle Manager

Data Lifecycle Manager is a Java script based application, which is not resource demanding, and thus it does not require additional sizing.

However, SAP HANA needs sizing as well as the storage destinations used for relocating data.

<table>
<thead>
<tr>
<th>Component/Storage</th>
<th>Sizing Information</th>
</tr>
</thead>
</table>
### 4.6.2 Check for Data Lifecycle Manager Readiness

Before you start working with the Data Lifecycle Manager, you can check whether the system has been configured properly.

#### Procedure

1. Log on to the **Data Lifecycle Manager** with a user that has an appropriate role assigned.

   Depending on whether the HTTP or HTTPS port has been configured, the **Data Lifecycle Manager** is available on the SAP HANA XS Web server at one of the following URLs:
   - \http://<WebServerHost>:80<SAPHANAinstance>/sap/hdm/dlm/index.html
   - \https://<WebServerHost>:43<SAPHANAinstance>/sap/hdm/dlm/index.html

2. In the header area of the screen, a button indicates whether the system has been configured correctly. Click the button to view the configuration details.
   The following dialog box lists the configuration parameters with their statuses in the **RESULT** column. If the configuration is incorrect, the **RESULT** column displays the entry `false`.

### 4.6.3 Generate Default Schema for Generated Objects and Roles Needed for Data Lifecycle Manager

The default schema SAP_HDM_DLM_GNR for generated objects as well as the roles required for working with the schema and schema artifacts have to be created after Data Lifecycle Manager installation.

#### Context

During installation of Data Lifecycle Manager an `.hdbprocedure` file is created, which you use to generate the default schema for generated objects and roles for working with Data Lifecycle Manager.
Prerequisites

You have been granted the following privileges and roles:

- System privileges DATA ADMIN and ROLE ADMIN
- Object privilege EXECUTE on "_SYS_REPO"."GRANT_ACTIVATED_ROLE"
- Role sap.hdm.dlm.role::Administrator

Procedure

1. Check for Data Lifecycle Manager Readiness. For more information, see Check for Data Lifecycle Manager Readiness [page 26]. If the configuration parameters with the keys `is_prepared_before_using/generated` and `is_prepared_before_using/granted` are displayed with result false, proceed as described in the next steps.

2. In the SQL Console of the SAP HANA studio use the call "SAP_HDM_DLM"."sap.hdm.dlm.core.db::PREPARE_BEFORE_USING"(); statement to invoke the procedure that generates the following schema and roles:
   - Schema: SAP_HDM_DLM_GNR (default schema for objects that are generated with lifecycle profile activation)
   - Roles:
     - sap.hdm.dlm.role.GNR.Administrator
     - sap.hdm.dlm.role.GNR.Display
     - sap.hdm.dlm.role.GNR.Support

   Note that the user who executes the statement owns the SAP_HDM_DLM_GNR schema and its objects.

Next Steps

Now the GNR roles can be granted to users intended to work with Data Lifecycle Manager.
5 Uninstalling SAP HANA Data Warehousing Foundation

If required, you can uninstall SAP HANA Data Warehousing Foundation using the SAP HANA application lifecycle management tool.

Prerequisites

- Make sure that there are no scheduled activities for Data Distribution Optimizer or Data Lifecycle Manager. If there are any scheduled activities, check and deactivate the XS jobs.
- Previously, Data Distribution Optimizer required the the xsengine.ini file parameter `httpserver.embedded` to be set to `true`. With SAP HANA Data Warehousing Foundation 1.0 SPS 02 and higher, this is not needed anymore. If `httpserver.embedded` has been enabled for SAP HANA Data Warehousing Foundation only, and is not needed for other applications, you can delete the parameter value. In the Administrator editor in the SAP HANA Administration Console, choose the `Configuration` tab and expand the xsengine.ini file. Change the parameter from the context menu for the `httpserver` section.

Procedure

2. On the `Home` screen, select the `Delivery Units` tile.
3. Select the delivery unit that you want to delete.

Caution

The following delivery units have to be uninstalled in order to completely uninstall SAP HANA Data Warehousing Foundation. The delivery units have to be deleted in the following order (inverse order to their installation):

1. HDC_HDM (for uninstalling the SAP Data Warehousing Foundation documentation)
2. HCO_HDM_DDO /HCO_HDM_DLM (for uninstalling Data Distribution Optimizer / Data Lifecycle Manager)
3. HCO_HDM (for uninstalling the SAP Data Warehousing Foundation core component)

4. Choose `Delete` with the option `include objects and packages`.

Note

Together with the functional delivery units selected, the system also deletes the relevant language delivery units.
5. Drop the following roles:
   ○ sap.hdm.dlm.role.GNR.Administrator
   ○ sap.hdm.dlm.role.GNR.Display
   ○ sap.hdm.dlm.role.GNR.Support

6. Drop the Data Distribution Optimizer and Data Lifecycle Manager schemas with the SQL statement `DROP SCHEMA <schema_name> CASCADE;`
   ○ SAP_HDM
   ○ SAP_HDM_DDO
   ○ SAP_HDM_DDO_REMOTEMODE
   ○ SAP_HDM_DLM
   ○ SAP_HDM_DLM_GNR

7. Check whether you need to reset the configuration of SAP HANA system properties. For information about the system properties and how to reset them, see Configure SAP HANA System Properties [page 11].
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